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U.S. Department of Transportation
1200 New Jersey Ave, SE
West Building Room W12-140
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RE: Docket No.: DOT-OST-2023-0079: RFI Response: Advanced Air Mobility

On behalf of the National Business Aviation Association's (NBAA's) 11,000-member companies, our Advanced Air Mobility Roundtable, and our Emerging Technology Committee, we commend the Interagency Working Group (IWG) for providing the opportunity to collaborate on the future of Advanced Air Mobility (AAM).

NBAA's members rely on general aviation aircraft to meet some portion of their transportation needs. These aircraft provide connectivity to communities in every state and to some areas that do not receive commercial airline service. While airlines serve only around 500 airports across the US, business aviation utilizes over 5,000 public-use airports, some located in remote areas that greatly rely on connectivity by general aviation. Advanced Air Mobility will utilize existing facilities, and as operations scale, will add to the infrastructure. General aviation is getting people where they need to be when they need to be there, supporting 1.2 million American jobs and $247 billion in economic output.

As the IWG knows, the U.S. has been at the forefront of aviation leadership and innovation for decades. Modern aviation was born on America's shores with the first powered flight in Kitty Hawk, North Carolina. We led the transition from piston engines to the jet age. We pioneered air traffic control technology and airspace policies that created the safest, most efficient and most diverse air traffic system in the world. Our robust aviation infrastructure is unparalleled and our workforce, while greatly affected by the COVID pandemic, remains the most agile, innovative and sought-after in the world.

We have the potential to continue to lead the next phase in the evolution of aviation with AAM, but competition with other nations is fierce and rapidly advancing. Among other considerations, this means the Federal Aviation Administration (FAA) will need to keep pace with its promised regulatory schedule, so that the first AAM commercial operations can occur as soon as 2025. This is a critical milestone if we are to fully scale this promising new technology and utilizing existing infrastructure will be key to ensuring we reach this goal.

In short, we stand at a critical juncture–the investments, regulatory and policy decisions we make today will determine whether we harness the full economic, environmental and national security potential of AAM and maintain our position as a global leader in aerospace.

AAM IWG RFI

1. Most Likely Use Cases: Descriptions of the most likely use cases for AAM in the short, medium, and long term, along with high-level estimations of when these use cases may come to market. Also, what government actions could enhance or inhibit those market timelines? Are there use cases that are a national priority? Please include descriptions of the operating areas, other transportation options available in the operating area, the supporting infrastructure for the conceptual ecosystem, and the roles and expected involvement that private industry, as well as the federal, state, local, tribal, and territorial governments, would have in AAM integration.

The most likely use cases for Advanced Air Mobility span various timelines and present exciting opportunities for innovation. The AAM industry is considering a crawl, walk, run approach.

In the short term, the operational landscape of AAM is poised to experience a confluence of efficiency and regulatory milestones. Leveraging existing infrastructure, such as heliports, regional airports, flyways, and corridors, emerges as a strategic imperative, enabling a swift and seamless entry into service for AAM vehicles. This approach capitalizes on established facilities, streamlining operational logistics and expediting integration into the existing aviation network. Concurrently, the FAA meeting its Special Federal Aviation Regulation (SFAR) certification deadlines offers a pivotal regulatory backdrop. As these deadlines are attained, the industry is poised to benefit from a progressively refined regulatory framework that aligns with the dynamic landscape of AAM operations. This convergence of utilizing existing infrastructure and timely regulatory adaptations sets the stage for a promising short-term trajectory, priming AAM to contribute meaningfully to modern transportation paradigms. Uses for AAM include cargo delivery, medical transport and emergency response, air taxis, tourism, short-range commuter routes, and search and rescue, to name a few.

In the medium term, AAM is anticipated to witness further maturation and expansion across a range of diverse applications driven by evolving technologies, refined regulations, and increasing public acceptance. Establishing permanent guidelines by the FAA for AAM certification will mark a crucial milestone in the evolution of this innovative transportation mode. As the AAM industry gains momentum and technologies mature, the need for a regulatory framework becomes paramount to ensure consistent safety and operational standards. Permanent guidelines provide the industry with a clear and stable path toward certification, instilling confidence among manufacturers, operators, investors, and the public.

By crafting enduring certification guidelines, the FAA contributes to the predictability and sustainability of the AAM ecosystem. This proactive approach fosters an environment where manufacturers can invest in research, development, and production, with the assurance that their efforts align with long-term regulatory expectations.

Looking towards the long term, AAM may revolutionize regional travel by connecting cities and towns, reducing travel times, and unlocking economic opportunities. It has the potential to transform the way we commute, making long-distance travel faster, more accessible, and environmentally friendly.

Government actions play a crucial role in enhancing or inhibiting market timelines for AAM. Supportive regulatory frameworks, investment in infrastructure development, and collaboration with private industry can accelerate the integration of AAM into our transportation systems. On the other hand, regulatory hurdles, airspace restrictions, and lack of funding can impede progress.

Certain use cases in AAM may be considered national priorities, such as emergency medical services and disaster response. These applications can save lives and improve the resilience of communities in times of crisis. However, ensuring equitable access and considering the social and environmental impacts of AAM deployment are essential.

To achieve successful AAM integration, collaboration is key. Private industry, federal, state, local, tribal, and territorial governments should work together to establish safety standards, develop infrastructure, manage airspace, and foster public acceptance. AAM integration requires a multi-stakeholder approach, with each entity playing a specific role in creating an efficient and sustainable AAM ecosystem.

2. Safety Enhancements: Understanding that safety must be the key component of any future AAM operations, provide information on how new concepts in aviation, such as third-party service providers, automation, and new forms of navigation-enabling infrastructure, provide for, or even enhance, the level of safety of operations.

Establishing the suitable safety parameters for integrating Advanced Air Mobility vehicles necessitates a regulatory approach that aligns with the safety standards applicable to analogous aircraft, such as conventional airplanes and helicopters, as well as existing services like Part 135 operations. It is critical to avoid imposing new prerequisites that could be barriers to entry, as this could potentially hinder the progress of safety enhancements within the system. A judicious calibration of safety measures, reflective of established norms, is pivotal to fostering a safe and dynamic environment for the introduction of AAM innovations.

While enlisting the assistance of third-party service providers can offer valuable support in tasks such as route and flow planning, clearance delivery, communications, and dispatch-related responsibilities, it's important to note that manufacturers and operators possess the capacity to independently oversee and implement their Safety Management Systems (SMS) and other safety-related facets. These entities are actively engaged in the installation and management of

SMS systems, aligning with the existing regulatory oversight structure to ensure comprehensive safety compliance within the realm of their operations.

Automation is another key element that enhances safety in AAM. Improved crew interfaces and "simplified vehicle operations" (SVO) flight control systems are already incorporated into most AAM vehicle concepts.

Over the longer term, autonomous flight systems, coupled with advanced sensors and artificial intelligence, can mitigate the risks associated with human error. Automation enables precise navigation, obstacle detection and avoidance, and real-time flight path adjustments, all of which contribute to safer operations. By reducing reliance on human intervention, automation helps minimize potential errors and enhances overall operational safety.

Also, looking to the future, new forms of navigation-enabling infrastructure, such as advanced air traffic management systems and vehicle-to-infrastructure communication also enhance safety. These technologies enable efficient airspace management, real-time monitoring of flight paths, and effective coordination between AAM vehicles. By integrating AAM operations into existing air traffic management frameworks, potential conflicts can be minimized, and safety can be maximized.

Furthermore, emerging technologies like sense-and-avoid systems, geofencing, and micro-weather monitoring can provide additional layers of safety in AAM operations. These advancements help AAM vehicles navigate complex environments, avoid collisions with other aircraft and obstacles, and respond to changing weather conditions, ensuring a safer and more reliable transportation system. The FAA should acknowledge these enhancements and encourage their use to help AAM scale, which would in turn promote further investments in safety technology.

While safety is a key focus both today and moving forward, it is important to recognize that continuous collaboration among stakeholders, including regulators, industry leaders, and technology developers, is crucial for setting and adhering to rigorous safety standards while not standing in the way of the rapid pace of innovation that is required for AAM to take flight. By combining our existing tried and true operational framework and aviation infrastructure with new concepts in aviation, third-party oversight, automation, and navigation-enabling infrastructure, we can create a robust long-term safety framework that underpins the future of AAM operations and ensures safe and efficient transportation for all.

3. Expected Customer Experience: Information about AAM regarding scheduling and ticketing a flight, arrival at a vertiport, passenger and baggage screening, flight boarding, and flight and postflight experience. This information should include procedures passengers should expect to encounter prior to boarding; assistance available for passengers (either onboard the aircraft or on the ground); how passengers communicate problems in the cabin; expected levels of comfort in terms of vibration, transition phases (in/ out of hover), cabin noise, heat ventilation and air conditioning air quality; how stowage of cargo is achieved including essential items such as wheelchairs; and divisions of responsibility between vertiport and operations personnel. Any comments specific to cargo or other types of AAM operations are also welcome.

The current framework for part 135 regulations serves as a foundation of safety, security, and operational integrity. Market dynamics will also drive toward a positive customer experience. By leveraging the robust framework provided by current regulations, a foundation of safety, security, and operational integrity is firmly established.

This approach ensures that passengers are met with consistent standards underpinned by the well-established norms of the aviation industry. At the same time, allowing the market to influence the customer experience fosters a competitive environment that encourages innovation, differentiation, and optimization of services tailored to passengers' evolving needs.

The detailed parameters encompassing passenger interactions, assistance, communication channels, comfort levels, and cargo handling further align with the principle of allowing market forces to shape the industry. This approach inherently enables operators to cater to diverse preferences, refine operational protocols, and enhance customer satisfaction in a manner that resonates with the evolving demands of the passengers. By clarifying responsibilities between vertiport and operations personnel, this strategy ensures seamless coordination while allowing industry players to innovate and optimize their respective roles.

4. Research, Development, and Testing Environment: Information about the current status, accessibility, and adequacy of policies and institutions to promote research and development that enable a world-class AAM industry in the United States. Please comment on the adequacy and suitability of existing, congressionally directed test sites. The AAM IWG is also interested in the processes for enabling testing of these technologies and systems, and suggested expansions or improvements of testing locations, platforms, or other suggestions to better enable testing of emerging aviation technologies and highly automated systems. As part of the comprehensive testing options, the AAM IWG is interested in understanding simulation, demonstrations, and validation capabilities that must be available to conduct demonstration and validation activities to accelerate maturity.

The United States has made significant strides in promoting research, development, and testing for the AAM industry. The country's robust research and development environment enables innovation and supports the growth of new technologies.

The existing congressionally directed test sites have played a vital role in advancing AAM testing capabilities. These sites provide controlled environments for testing emerging aviation technologies and highly automated systems. However, it is essential to continually evaluate their adequacy and suitability to meet the evolving needs of the AAM industry. Suggestions for expansions or improvements in testing locations and platforms can help enhance the effectiveness of these test sites.

In addition to physical testing sites, simulation, and demonstration capabilities are crucial for accelerating the maturity of AAM technologies. Simulation allows for cost-effective testing of various scenarios and enables system performance assessment in different conditions.
To promote a world-class AAM industry, it is essential to have collaborative processes in place that enable testing of AAM technologies and systems. This includes establishing partnerships between industry stakeholders, research institutions, and regulatory bodies. Such collaborations foster knowledge sharing, facilitate testing initiatives, and support the development of standards and best practices.

To accelerate the maturity of AAM technologies, it may be beneficial to explore further expansions and improvements in testing locations. This could involve identifying additional sites that offer diverse environmental conditions, airspace characteristics, and operational complexities with a specific focus on the communication, navigation and surveillance (CNS) components of AAM. Furthermore, exploring the integration of AAM testing with existing aerospace and aviation testing facilities can leverage shared resources and expertise.

Overall, ensuring a comprehensive testing ecosystem, encompassing physical testing sites, simulation capabilities, and demonstration activities, is crucial for the advancement of AAM. By continually evaluating and improving the existing research, development, and testing environment, the United States can maintain its position as a leader in the global AAM industry and accelerate the realization of safe and efficient aerial mobility.

5. Statutory and Regulatory Scheme: Information about specific statutes, federal regulations, or other legal authorities that could be created or updated to support AAM in the United States and maintain the regulatory agility necessary to safely enable this new form of transportation.

To support the development and safe integration of Advanced Air Mobility in the United States, specific statutes, federal regulations, and legal authorities can be created or updated. These measures are crucial for establishing a robust regulatory framework that addresses the unique challenges and requirements of AAM operations. Additionally, the FAA should continue to assert its preemptive authority as the regulator of operations, certification, and airspace. Here are some key considerations:

1. AAM-Specific Regulations: Continued development of comprehensive regulations specifically tailored to AAM is essential. These regulations cover areas such as certification standards for AAM vehicles, operational requirements, pilot qualifications, maintenance and safety protocols, and airspace management. Clear guidelines will help ensure AAM's safe and efficient deployment while addressing public concerns and maintaining public trust.

2. Airspace Integration: Updating existing regulations to address airspace integration challenges posed by AAM is crucial - specifically for scaled operations. This includes developing procedures for efficient air traffic flow management, airspace access for AAM operations, and communication protocols between AAM vehicles and air traffic control. For entry into service, the existing airspace structure will be able to accommodate operations. Still, the evolution to scaled operations will require a more thought-out approach that requires updating policies, regulations, and airspace infrastructure/routes. Flexibility in airspace management and the ability to adapt to changing technological advancements will be vital to maintaining regulatory agility.

3. Privacy and Data Protection: Creating or updating statutes and regulations to address privacy concerns and data protection is important. AAM operations will inherently involve the acquisition and analysis of personal data, necessitating the implementation or revision of frameworks that strike a delicate balance between preserving individuals' privacy rights and facilitating the essential exchange and evaluation of data for the sake of operational safety.

To this end, developing robust frameworks encapsulating stringent privacy measures is pivotal. Such frameworks should encompass a range of considerations, including explicit consent mechanisms for data collection, transparent communication about the types of data gathered and their intended purposes, stringent data encryption protocols, and delineated guidelines for data retention and sharing. By fostering a clear and structured approach to handling personal data, passengers' privacy rights can be upheld, assuring them that their sensitive information is treated with the highest standards of security and confidentiality.

4. Infrastructure Development: Statutes and regulations can facilitate infrastructure development necessary for AAM operations. This may involve guidelines for vertiport construction, maintenance, and safety standards, as well as regulations concerning charging infrastructure for electric AAM vehicles. Addressing infrastructure-related challenges through legal authorities will be critical for successfully integrating AAM into existing transportation systems. Additionally, it should go without saying that we should utilize existing infrastructure from day one. Our existing network of airports and heliports is ready to support AAM operations. It would be critical to ensure that existing and new infrastructure and facilities can be used by both helicopters and new AAM aircraft. Updating guidance in the current Engineering Brief 105 on Vertiport Design and the subsequent advisory circular will be critical in providing the standards and framework to ensure that current and future infrastructure to support vertical lift includes all types of aircraft.

5. Continued collaboration and Interagency Cooperation: Encouraging continued collaboration and interagency cooperation through legal frameworks is important. AAM involves multiple stakeholders, including federal agencies, state and local governments, industry players, and regulatory bodies. Establishing information sharing, coordination,

and joint decision-making mechanisms will facilitate effective governance and regulatory agility.

6. Testing: Transparent, rules-based (instead of exception-based) path to testing autonomous AAM in class G airspace in remote areas to support the airworthiness process.

7. Risk-based agility and predictability: In addition to creating and updating specific statutes and regulations, maintaining regulatory agility is crucial. The regulatory framework should be designed to accommodate rapid technological advancements and evolving industry standards based on the risks they pose. Regular reviews, stakeholder engagement, and flexibility in rulemaking processes ensure that regulations remain effective and responsive to the ever-changing landscape of AAM.

At the same time, the AAM industry needs to have a predictable regulatory framework. The agency changed the certification pathway in the middle of the design process and now proposes deviations from the expected operating and airman certification standards. Such drastic changes create a lack of predictability, making it difficult for U.S. companies to flourish.

On the other hand, Parts 135 and 380 are positive examples of flexible and agile regulations that establish the operating rules under which innovation flourishes while facilitating differing business models that provide flexibility to adapt to continuing changes in the aviation industry, with robust safety and security compliance. For example, the evolution of commercial air transportation—particularly with respect to vertical take-off and landing aircraft, hybrid and all-electric flight, and advanced air mobility operations—depends on Part 380 for commercial success. Swift regulatory change without research, data, or stakeholder input could negatively impact promising new technologies.

By establishing a comprehensive and agile statutory and regulatory scheme, the United States can foster an environment that supports innovation, safety, and the successful integration of AAM into the broader transportation ecosystem.

6. Role of State, Local, Tribal, and Territorial Governments: Information about the role that state, local, tribal, and territorial governments should play in enabling AAM in the United States.

State, local, tribal, and territorial governments have a crucial role to play in enabling the successful integration of AAM in the United States, including:

1. Regulation and Policy: State and local governments should actively develop and implement regulations and policies that align with federal guidelines for AAM operations. They can address specific regional considerations, such as noise regulations, land use planning for vertiports, and environmental impact assessments. Collaboration

with federal authorities and other stakeholders is important to establish consistent and harmonized regulations across jurisdictions.

2. Infrastructure Development: Governments at all levels can contribute to the development of AAM infrastructure. This includes identifying suitable locations for vertiports, providing permits and land use authorizations, and ensuring necessary utility connections for charging and operations. State and local governments can work with industry stakeholders to plan and develop the physical infrastructure required for AAM operations, taking into account local needs and community impacts.

3. Economic Development and Workforce Training: State, local, tribal, and territorial governments can support economic development efforts related to AAM. This includes attracting AAM companies and investment, fostering innovation clusters, and providing financial incentives for research and development activities. They can also collaborate with educational institutions to develop training programs and create a skilled workforce to meet the needs of the growing AAM industry.

4. Public Engagement and Education: Governments and industry play a vital role in facilitating public engagement and education initiatives related to AAM. Local government can organize public hearings, community meetings, and stakeholder consultations to gather input and address concerns. Public education campaigns help increase awareness about the benefits, safety measures, and potential impacts of AAM, ensuring that communities are informed and engaged in the decision-making process.

5. Collaboration and Coordination: State, local, tribal, and territorial governments should collaborate with each other, as well as with federal agencies and industry stakeholders, to ensure effective governance and coordination. Sharing best practices, lessons learned, and information on successful initiatives can foster collaboration and accelerate AAM integration. Additionally, coordination with neighboring jurisdictions can help establish consistent regulations and facilitate cross-border operations.

By actively participating in developing regulations, promoting infrastructure development, supporting economic growth, engaging the public, and fostering collaboration, state, local, tribal, and territorial governments can create an enabling environment for AAM in the United States. Their contributions are crucial to ensure safe, efficient, and sustainable AAM operations that benefit communities and support the growth of this transformative transportation technology.

7. Anticipated Power Requirements: Information about the anticipated demand on power grids by AAM, the ability of municipal power grids to accommodate this anticipated demand, and improvements or investments in power infrastructure needed to enable such operations. This also includes information on how AAM could generally assist in achieving long-term energy sustainability and efficiency goals, such as using alternative forms of energy for propulsion (e.g., hydrogen), and the infrastructure requirements that would accompany these alternative power structures.

Anticipating the power requirements of AAM is crucial for assessing the ability of municipal power grids to accommodate this demand and identifying necessary improvements or investments in power infrastructure. Here are some key considerations:

1. Power Demand: AAM operations will introduce new power demands, particularly for electric vertical takeoff and landing (eVTOL) vehicles. The power requirements will vary based on the size and capacity of the vehicles, flight durations, and charging needs. Comprehensive studies and projections are necessary to estimate the anticipated power demand at various scales of AAM deployment.

2. Grid Accommodation: Municipal power grids may require upgrades or enhancements to accommodate the increased power demand from AAM operations. This could involve infrastructure improvements such as substation upgrades, grid expansion, or smart grid technologies. Assessing the current grid capacity and evaluating its ability to handle the additional load from AAM vehicles is essential to ensure a reliable and uninterrupted power supply.

3. Energy Sustainability and Efficiency: AAM presents an opportunity to contribute to long-term energy sustainability and efficiency goals. One avenue is using alternative forms of energy for propulsion, such as hydrogen fuel cells or electric batteries charged with renewable energy sources. Transitioning to alternative power structures can reduce greenhouse gas emissions and dependence on fossil fuels, promoting environmental sustainability. However, it would require investment in alternative energy infrastructure and charging stations compatible with these technologies.

4. Infrastructure Requirements: The infrastructure requirements for alternative power structures, such as hydrogen fuel cells, differ from traditional power systems. Establishing hydrogen production facilities, storage and transportation infrastructure, and hydrogen refueling stations would be necessary to support the widespread use of hydrogen-powered AAM vehicles. Similarly, expanding the network of charging stations, both for electric vehicles and AAM, would be crucial to ensure accessibility and range for these vehicles.

Addressing the power requirements of AAM should be approached comprehensively, involving collaboration among energy providers, municipalities, regulatory bodies, and industry stakeholders. By investing in power infrastructure improvements, integrating renewable energy sources, and exploring alternative power structures, AAM can contribute to achieving long-term energy sustainability and efficiency goals.

It is important to conduct detailed assessments and feasibility studies to identify specific power infrastructure needs, evaluate grid capacity, and plan investments accordingly. Such initiatives should align with broader energy transition strategies and consider the local energy landscape to ensure seamless integration of AAM into the power grid while supporting a sustainable and efficient energy future.

8. Supply Chain: Information about existing or planned supply chain requirements for current AAM manufacture, including traceability of components and potential vulnerabilities in the event of possible international supply chain disruptions, such as what occurred during the COVID pandemic. To ensure that the AAM industry at large will be supported in the entire life cycle without causing undue security risks and ensuring U.S. competitiveness, the original equipment manufacturers (OEMs), as well as suppliers, are encouraged to provide inputs related to the challenges and gaps they may experience in future AAM supply chains. This includes supply chain challenges related to the entire life cycle, from mining, materials, processing, manufacturing capabilities, and limited/few suppliers. In particular, dependencies on foreign entities that could cause security risks must be clearly understood.

The supply chain for AAM manufacturing is a critical aspect that requires careful consideration to ensure resilience, traceability, and security. Here's an overview of key points that should be considered regarding supply chain requirements and potential challenges:

1. Traceability and Vulnerabilities: Ensuring the traceability of components within the AAM supply chain is vital for quality control, regulatory compliance, and addressing vulnerabilities. Manufacturers should establish robust tracking systems to monitor the origin and movement of components throughout the production process. Identifying potential vulnerabilities, such as dependencies on specific suppliers or countries, helps mitigate risks associated with supply chain disruptions.

2. Lessons from the COVID-19 Pandemic: The COVID-19 pandemic highlighted the importance of evaluating and addressing vulnerabilities in global supply chains. The AAM industry can learn from this experience to enhance supply chain resilience. Manufacturers and suppliers should assess potential risks, diversify sourcing strategies, and establish contingency plans to mitigate the impact of future disruptions.

3. Input from OEMs and Suppliers: OEMs and suppliers in the AAM industry play a vital role in identifying challenges and gaps in the supply chain. Their insights regarding supply chain limitations, manufacturing capabilities, potential vulnerabilities, and dependencies on foreign entities are essential for developing strategies to address security risks and ensure long-term competitiveness. Collaboration between industry stakeholders and policymakers is crucial to gathering these inputs and developing appropriate solutions.

4. Lifecycle Considerations: Supply chain challenges extend beyond manufacturing to encompass the entire lifecycle of AAM vehicles. From mining and materials sourcing to processing and manufacturing capabilities, every stage of the supply chain should be evaluated for potential vulnerabilities and security risks. This evaluation helps identify areas where domestic capabilities can be enhanced and dependencies on foreign entities can be reduced.

5. Security Risk Mitigation: To ensure U.S. competitiveness and minimize security risks, it is important to prioritize domestic manufacturing capabilities and reduce dependencies on foreign entities, especially in critical components and technologies. Encouraging

domestic production, fostering innovation, and supporting research and development efforts can help strengthen the entire AAM supply chain while addressing security concerns.

By understanding supply chain requirements, evaluating vulnerabilities, and fostering collaboration among OEMs, suppliers, and policymakers, the AAM industry can proactively address challenges and gaps in the supply chain. This will contribute to a resilient, secure, and competitive AAM manufacturing ecosystem, supporting the growth and long-term success of the industry.

9. Privacy: Information about the technologies, data systems, software, or other products that can be used in conjunction with emerging technologies that potentially impact the privacy of the public.

Emerging technologies in the Advanced Air Mobility field have the potential to impact privacy, and it is essential to consider the tools, systems, and products that can be used to address privacy concerns. Here are some key aspects to consider:

1. Privacy-by-Design: Privacy should be a fundamental consideration when developing and implementing technologies in the AAM industry. Privacy-by-design principles can be employed to ensure that privacy safeguards are incorporated into the design and development of AAM systems from the outset. This approach involves implementing privacy-enhancing features, data protection mechanisms, and user-centric privacy controls.

2. Data Protection Measures: Robust data protection measures can be implemented to safeguard the public's privacy. This includes ensuring secure data storage, encryption, and access controls to protect personal and sensitive information collected during AAM operations. Anonymization and de-identification techniques can be employed to minimize the risks of personal data exposure.

3. Transparency and Informed Consent: Transparency is crucial in maintaining public trust and privacy. AAM operators and service providers should provide clear and easily understandable privacy policies, detailing the types of data collected, how it is used, and the measures taken to protect it. Obtaining informed consent from individuals for data collection and usage is essential, ensuring that individuals are fully aware of the privacy implications and have control over their data.

4. Privacy Impact Assessments: Conducting privacy impact assessments can help identify potential privacy risks and develop mitigation strategies. These assessments involve evaluating the data collection, storage, sharing, and retention practices of AAM technologies to ensure compliance with privacy laws and regulations. Assessments should be conducted regularly to account for changes in technology, data usage, and legal requirements.

5. Legal and Regulatory Compliance: Compliance with applicable privacy laws and regulations is essential. AAM industry stakeholders should stay abreast of relevant legislation and ensure their operations adhere to privacy requirements. Compliance frameworks, such as the General Data Protection Regulation (GDPR) or specific privacy laws, guide the responsible collection, processing, and storage of personal data. Additionally, it is imperative that powered-lift vehicles are able to take advantage of existing privacy protections, such as the Limiting Aircraft Data Display program and the Privacy ICAO Address program.

6. Privacy Training and Education: Training programs and awareness initiatives can be implemented to educate AAM operators, service providers, and employees about privacy best practices. Promoting a privacy-conscious culture and providing training on privacy policies, data handling procedures, and security protocols will help ensure privacy is prioritized throughout the AAM ecosystem.

By incorporating privacy-by-design principles, implementing robust data protection measures, ensuring transparency and informed consent, conducting privacy impact assessments, complying with legal requirements, and promoting privacy training and education, the AAM industry can address privacy concerns and foster public confidence in the responsible use of emerging technologies. Customers should know their privacy is not checked.

10. Workforce Development: Information about the knowledge, skills, and abilities needed in the working population to accelerate AAM in the United States, including federal labor policies that could assist or expand the populations available to support the AAM industry. What can federal agencies do, working together, to build a skilled labor force in the United States to support the growth of this industry? This inquiry also includes information about educational pathways and training programs necessary to produce a workforce competent to operate, manage, fix, improve, and regulate emerging aviation technologies, associated infrastructure, and underlying policies.

To accelerate the growth of the AAM industry in the United States, it is crucial to build a skilled workforce equipped with the necessary knowledge, skills, and abilities. Here are some key considerations:

1. Required Knowledge and Skills: The AAM industry requires a diverse range of expertise, including aerospace engineering, aviation operations, software development, data analytics, cybersecurity, regulatory compliance, and policy development. Additionally, skills in project management, problem-solving, communication, and collaboration are essential. The workforce should have a deep understanding of emerging aviation technologies, associated infrastructure, and underlying policies.

2. Federal Labor Policies: Federal labor policies can play a crucial role in expanding the populations available to support the AAM industry. Policies that promote workforce development, such as grants and incentives for training programs, apprenticeships, and internships, can encourage individuals to pursue careers in AAM. Collaborative efforts

between federal agencies, educational institutions, industry associations, and workforce development boards can facilitate the alignment of labor policies with industry needs.

3. Collaborative Federal Agency Efforts: Federal agencies can work together to build a skilled labor force for the AAM industry. This can be achieved through initiatives that promote collaboration, information sharing, and coordination among agencies. Federal agencies can pool resources to establish training programs, fund research and development, and support educational pathways that prepare individuals for careers in AAM. Encouraging cross-disciplinary collaboration, such as the AAM Interagency Working Group, and leveraging existing programs, such as those within the Federal Aviation Administration, National Aeronautics and Space Administration (NASA), and Department of Transportation (DOT), can foster the development of a comprehensive workforce development strategy.

4. Educational Pathways and Training Programs: Educational institutions should offer relevant programs that provide students with the knowledge and skills required for the AAM industry. This includes undergraduate and graduate degree programs in aerospace engineering, aviation management, computer science, data analytics, and other relevant disciplines. Additionally, targeted training programs, certifications, and professional development opportunities can enhance the skills of existing professionals seeking to transition into the AAM sector.

5. Public-Private Partnerships: Collaborative efforts between government, industry, and academia are crucial to building a skilled labor force. Public-private partnerships can facilitate industry input in curriculum development, provide real-world learning experiences through internships and cooperative programs, and create pathways for industry professionals to share their expertise in educational settings. These partnerships ensure educational programs align with industry needs and provide students with hands-on experience and practical knowledge.

By implementing federal labor policies that support workforce development, fostering collaborative efforts among federal agencies, establishing educational pathways, and creating training programs, the United States can build a skilled labor force capable of operating, managing, fixing, improving, and regulating emerging aviation technologies in the AAM industry. These efforts will ensure a competent workforce that drives innovation, safety, and growth while positioning the United States as a global leader in the AAM field.

11. Global Leadership and International Practices: Information about the steps that the United States needs to take to become a durable global leader in AAM and safe automated technologies, from establishing regulatory standards and practices that will enable the industry to safely develop the engagements necessary that support international AAM services in North America and beyond. In addition, the AAM IWG seeks information about the impact of foreign government approaches to regulate emerging airspace technologies, including recommended practices the U.S. government should consider adopting as well as practices the U.S. government should avoid.

To establish durable global leadership in Advanced Air Mobility and safe automated technologies, the United States can take several steps to shape regulatory standards, foster international engagements, and learn from foreign government approaches. Here are key considerations:

1. Establishing Regulatory Standards: The United States should proactively establish comprehensive and forward-thinking regulatory standards for AAM. By collaborating with industry stakeholders, regulatory bodies, and international partners, the U.S. government can develop robust safety and operational guidelines that align with global best practices laid out by ICAO. These standards should prioritize safety, innovation, and environmental sustainability while promoting interoperability and harmonization across international borders.

2. International Engagements and Partnerships: Engaging with international counterparts is crucial for promoting the adoption of AAM services beyond North America. The United States should actively participate in international forums, working groups, and organizations dedicated to shaping global aviation regulations. Through these engagements, the U.S. government can collaborate on developing common frameworks, sharing best practices, and harmonizing standards to support the safe and efficient integration of AAM services globally.

3. Impact of Foreign Government Approaches: The U.S. government should closely monitor and assess foreign government approaches to regulating emerging airspace technologies, including their strategic collaboration with other foreign governments. If the U.S. does not follow the global framework outlined by ICAO, Including ICAO Document 10103, Guidance on the Implementation of ICAO Standards and Recommended Practices for Tilt-rotors and Annex 1, 2.1.1.4 for pilot licensing, other countries will lead the way for AAM manufacturing, approval, and operations. By evaluating the impact of different approaches, the U.S. can identify recommended practices to adopt and build upon, leveraging international experiences to inform domestic regulatory frameworks. It is important to consider factors such as safety, privacy, security, environmental impact, and public acceptance.

4. Recommended Practices to Adopt: The U.S. government should consider adopting recommended practices that demonstrate proven effectiveness in regulating emerging airspace technologies. These practices may include robust certification processes for AAM vehicles, well-defined operational requirements, airspace management systems that accommodate AAM operations, and comprehensive safety management frameworks. Leveraging successful practices from other countries can help expedite the development of a sound regulatory ecosystem.

5. Practices to Avoid: While learning from international experiences, the U.S. government should also identify practices to avoid. This may include approaches that overly stifle innovation, hinder competition, or create unnecessary barriers to entry. Striking the right balance between safety and enabling the growth of the AAM industry is crucial to ensuring sustainable global leadership.

By establishing regulatory standards, fostering international engagements, learning from foreign government approaches, adopting recommended practices, and avoiding counterproductive practices, the United States can become a durable global leader in AAM and safe automated technologies. This leadership will facilitate the secure integration of AAM services within North America and beyond, promoting harmonization, innovation, and a safe and sustainable global airspace ecosystem.

12. National Security and Aviation Security Implications: Information about the national security implications of accelerating AAM in the United States, specifically how the physical security of passengers and cargo should be addressed and who should bear responsibility for security assurances, security and system resilience, and what threats exist in considering the growth of counter-drone capabilities that will operate in similar low-altitude airspace. Information on these and other security issues should include the dual-use nature of any emerging airspace technologies and any opportunities or vulnerabilities created by emerging technologies and associated risk mitigation recommendations.

The rapid acceleration of AAM in the United States brings with it important national security implications, particularly regarding the physical security of passengers and cargo. Here are key points to consider:

1. Responsibility for Security Assurances: Ensuring the physical security of passengers and cargo in the AAM ecosystem is a shared responsibility. AAM operators, vertiport operators, and relevant government agencies should collaborate to establish and enforce robust security assurance protocols. This includes implementing effective security measures for passengers and cargo, establishing secure access controls at vertiports, and conducting comprehensive background checks for personnel involved in AAM operations.

2. Security and System Resilience: AAM systems should be designed with security and system resilience in mind. This involves implementing safeguards to prevent unauthorized access, ensuring secure communication and data transmission, and employing encryption and authentication mechanisms. AAM operators and manufacturers should work closely with cybersecurity experts to address potential vulnerabilities and proactively mitigate cyber threats.

3. Threats and Counter-Drone Capabilities: As AAM operations occur in low-altitude airspace, it is crucial to consider the threats posed by unauthorized or malicious drones. The growth of counter-drone capabilities is essential to protect AAM operations in similar airspace. These countermeasures should encompass systems for detection, tracking, and mitigation of rogue drones, ensuring the integrity and safety of AAM operations.

4. Dual-Use Nature of Emerging Technologies: Emerging airspace technologies often have dual-use applications, presenting both opportunities and vulnerabilities. While these technologies offer benefits for AAM, they can also be exploited for malicious purposes.

Risk mitigation strategies should be implemented to address these vulnerabilities. This includes establishing robust regulatory frameworks, conducting security assessments, and developing countermeasures to mitigate potential misuse.

5. Collaboration and Industry Involvement: Addressing national security implications in AAM requires collaboration among government agencies, AAM operators, manufacturers, and security experts. Effective information sharing, coordination, and collaboration can enhance security measures, identify emerging threats, and develop risk mitigation recommendations. Public-private partnerships can facilitate the exchange of expertise and ensure that security concerns are addressed comprehensively.

6. Regulatory Oversight: Government agencies, such as the Federal Aviation Administration (FAA) and the Transportation Security Administration (TSA), play a critical role in ensuring the security of AAM operations. These agencies should adapt existing regulatory frameworks to address the unique security challenges posed by AAM. Regular audits, compliance checks, and security assessments should be conducted to maintain and improve security standards.

7. Interagency Coordination for National Security: Advocating for stringent interagency collaboration, especially with the Department of Justice (DOJ), is paramount in addressing national security concerns in advanced air mobility (AAM). Given that Counter Unmanned Aircraft Systems (UAS) efforts predominantly fall under the purview of the DOJ, a cohesive approach ensures a unified response to potential threats. Furthermore, the pivotal "action" facet of mitigation squarely rests with local and regional Law Enforcement Officers (LEOs), accentuating the significance of close coordination for a comprehensive and effective national security strategy.

By proactively addressing security concerns, implementing robust security protocols and countermeasures, fostering collaboration among stakeholders, and adapting regulatory frameworks, the United States can enhance the physical security of passengers and cargo in the context of AAM operations. These measures will help mitigate threats, ensure system resilience, and safeguard national security interests while promoting the growth and safety of the AAM industry.

13. Vertiport Development and Operations: Information about the expected role of governments and private industries at all levels as to the development, funding, and operation of vertiports. The term "vertiport" in this capacity is meant to describe a range of specialty landing, boarding, and takeoff areas designed for AAM operations, including single-operation vertiports, vertiports integrated into existing airports and heliports today, as well as sprawling, multi-operation, multi-purpose, and multi-transportation option vertiports that act as commercial and transportation hubs. The AAM IWG seeks information on whether system planning similar to the National Plan of Integrated Airport Systems 6 should exist for vertiports, and what level of coordination is required for effective vertiport planning and use.

The development, funding, and operation of vertiports, which serve as landing, boarding, and takeoff areas for Advanced Air Mobility operations, involve various levels of collaboration between governments and private industries. Here are important considerations:

1. Government and Private Industry Roles: Governments and private industries have distinct roles in vertiport development and operations. Governments provide regulatory oversight, establish guidelines and standards, facilitate land use planning, and ensure safety and security measures. Private industries contribute to the design, construction, funding, and day-to-day operations of vertiports. Collaboration between these entities is crucial to ensure effective and efficient vertiport infrastructure.

2. Types of Vertiports or Vertistops:: Vertiports and Vertistops can vary in scale and purpose, ranging from single-operation to integrated within existing airports and heliports. There are also multi-operation, multi-purpose, and multi-transportation option vertiports that serve as commercial and transportation hubs. Each type may require different considerations regarding planning, infrastructure, capacity, and integration with existing transportation networks.

3. System Planning: Establishing system planning for vertiports would be valuable to ensure we take a high-level view of where the needs and gaps are as we build out vertical infrastructure. Vertiports should be included in the National Plan of Integrated Airport Systems (NPIAS) rather than creating a separate national planning document. Vertiports and vertical infrastructure can have an additional category, similar to how airports are classified. Having our public-use infrastructure in the same plan can provide a strategic framework for their development and integration. Such planning would involve identifying priority locations, assessing capacity needs, coordinating land use planning, and ensuring interoperability between vertiports and other transportation modes. System planning can support vertiport infrastructure's efficient growth and connectivity across regions.

4. Coordination and Collaboration: Effective vertiport planning and use require coordination among various stakeholders, including federal, state, and local governments, transportation authorities, industry representatives, and community members. Coordination is essential to ensure compatibility with existing infrastructure, airspace management, regulatory compliance, environmental considerations, and community engagement. Stakeholders should collaborate to identify optimal vertiport locations, address zoning and land use issues, and integrate vertiport operations seamlessly into the broader transportation network.

5. Funding Considerations: Funding sources for vertiport development can come from a combination of public and private investments. Governments can provide grants, incentives, and funding programs to support the establishment and expansion of vertiport infrastructure. Private industries can contribute capital investment and participate in public-private partnerships to drive vertiport development and operations.

By fostering collaboration between governments and private industries, establishing system planning, ensuring coordination among stakeholders, utilizing existing infrastructure, and considering appropriate funding mechanisms, the United States can effectively plan and develop vertiports to support the growth of AAM. This approach will facilitate the safe and efficient integration of AAM operations, enhance transportation options, and contribute to developing sustainable mobility solutions.

14. Electromagnetic Spectrum: Information on the electromagnetic spectrum and telecommunications infrastructure needs of piloted and autonomous AAM applications in the near, medium, and long term, including what spectrum-using applications (e.g. communications, navigation, radar, command and control, payload, telemetry, or others) should be considered necessary components of an AAM ecosystem and what the state of development of such applications is in the near, medium, and long term; what spectrum bands are being considered or tested to support such applications; any specific spectral characteristics needed to support various AAM applications (e.g. bandwidth, propagation characteristics, and reliability); network infrastructure deployment scenarios under development for functions such as command and control; network architecture needed for local/regional/ nationwide flights; additional systems or capacities needed; forecasting of expected demand in the near, medium, and long-term for frequencies; risks associated with integrating AAM into existing navigation, communication, and other systems; and any statutory, legal or policy changes related to electromagnetic spectrum use that would facilitate AAM.

The electromagnetic spectrum and telecommunications infrastructure are crucial in supporting piloted and autonomous Advanced Air Mobility applications. In light of the prevailing circumstances, it is imperative to underscore the necessity for comprehensive spectrum analysis and research within the designated domain. Collaborative efforts, notably involving NASA and the Interagency Working Group, hold the potential to yield invaluable insights in this regard. In particular, there is a need to acquire a dedicated aviation spectrum immune to the influences of adjacent band interference, a concern notably relevant with the advent of burgeoning technologies such as 5G. As industries progressively transition towards autonomous operational paradigms, it becomes incumbent upon us to institute robust risk mitigation strategies.

Considering the development of spectrum-using applications, evaluating suitable spectrum bands, planning network infrastructure and architecture, forecasting demand, addressing integration risks, and enacting supportive statutory and policy changes are key to ensuring the electromagnetic spectrum and telecommunications infrastructure effectively support the growth of AAM and enable safe and efficient operations.

15. System Resilience: Information about how the AAM industry plans to secure critical systems by integrating cybersecurity and identifying critical systems in the design of overall architecture of the sector as it evolves. Furthermore, include what tools are available or must be developed to identify critical AAM systems and ensure that those systems have the necessary measures in place to identify, detect, and mitigate potential software intrusions. The government also seeks information about how overall transportation system resilience will be affected by AAM.

Securing critical systems and ensuring system resilience is a priority for the Advanced Air Mobility industry. Currently, the industry plans to address cybersecurity and identify critical systems in several ways, including:

1. Integrating Cybersecurity: The AAM industry recognizes the importance of integrating cybersecurity measures into the design and operation of critical systems. This involves implementing robust cybersecurity protocols, ensuring secure communication channels, adopting encryption and authentication mechanisms, and conducting regular vulnerability assessments. Collaboration with cybersecurity experts and adherence to established best practices are crucial for safeguarding AAM systems from potential software intrusions.

2. Identifying Critical AAM Systems: AAM stakeholders are working to identify critical systems within the AAM architecture. These critical systems may include flight control systems, communication networks, navigation systems, and data management platforms. By identifying and categorizing these systems, specific security measures and resilience strategies can be applied to protect them from cyber threats.

3. Tools for System Identification: Tools and methodologies are being developed to identify critical AAM systems effectively. This includes conducting system risk assessments, threat modeling, and vulnerability analyses to identify potential points of weakness. These tools enable stakeholders to prioritize the implementation of cybersecurity measures and allocate resources accordingly.

4. Intrusion Detection and Mitigation: A key aspect of securing critical AAM systems is the implementation of intrusion detection and mitigation measures. This involves utilizing advanced monitoring systems, intrusion detection systems (IDS), and security incident and event management (SIEM) tools. Through continuous monitoring and real-time threat detection, potential software intrusions can be identified, analyzed, and mitigated promptly.

5. Transportation System Resilience: The integration of AAM will have implications for the overall resilience of the transportation system. AAM can offer alternative transportation options, enhance mobility, and contribute to disaster response and recovery efforts. However, it is crucial to ensure that AAM operations are conducted in a manner that does not compromise the resilience of existing transportation systems. Coordination, proper planning, and collaboration with stakeholders across the transportation sector are essential to maintain overall system resilience.

By integrating cybersecurity into critical systems, identifying and prioritizing their protection, developing tools for system identification, implementing intrusion detection and mitigation measures, providing robust contingency operations and infosec compromise recovery capabilities, and ensuring overall transportation system resilience, the AAM industry aims to enhance the security and resilience of critical systems. These efforts contribute to building a secure and robust AAM ecosystem that can safely and reliably operate within the broader transportation infrastructure.

16. Environmental Impacts and Public Involvement. Information regarding the reasonably foreseeable environmental benefits and costs of integrating AAM operations into the U.S. airspace and broader transportation system, including the application of any standard methodologies to identify, investigate, and evaluate (either qualitatively or quantitatively) potential environmental impacts and available mitigation measures. Information regarding opportunities to synchronize, sequence, or coordinate applicable permitting/licensing and public involvement/consultation requirements or processes across Federal, State, local, or Tribal government to minimize duplication and improve efficiency and effectiveness.

Integrating Advanced Air Mobility operations into the U.S. airspace and transportation system entails considering the environmental impacts and involving the public in decision-making.

1. Environmental Benefits and Costs: The integration of AAM operations has the potential to bring both environmental benefits and costs. Benefits include reduced greenhouse gas emissions, congestion relief, and enhanced energy efficiency. However, standard methodologies are being developed and applied to identify, investigate, and evaluate any potential environmental impacts in a comprehensive manner.

2. Mitigation Measures: The AAM industry is actively exploring mitigation measures to minimize potential environmental impacts. These measures include using electric or hybrid-electric propulsion systems to reduce emissions, noise reduction technologies, and careful planning to minimize visual and habitat disturbances. Additionally, efforts are being made to optimize flight routes and airspace management to minimize community disruption and environmental impacts.

3. Permitting and Public Involvement: To streamline the integration of AAM operations, opportunities exist to synchronize, sequence, or coordinate permitting and licensing processes across federal, state, local, and tribal governments. Harmonizing these processes can minimize duplication, improve efficiency, and ensure consistent environmental assessments and mitigation strategies. Public involvement and consultation are also critical to provide transparency, gather community input, and address public concerns. Engaging the public early in the decision-making process enables better-informed decisions and promotes public acceptance - all in alignment with the National Environmental Protection Act (NEPA).

4. Efficiency and Effectiveness: Coordinating and streamlining permitting, licensing, and public involvement requirements across government levels can improve efficiency and effectiveness. By aligning environmental impact assessments, mitigation strategies, and public consultation processes, duplication can be minimized, resources can be utilized more effectively, and decision-making timelines can be streamlined. Collaboration among federal, state, local, and tribal authorities is essential to achieve these outcomes.

5. Stakeholder Engagement: Effective stakeholder engagement is crucial to ensuring that the public has opportunities to provide input, express concerns, and be involved in the

decision-making process. Establishing clear channels of communication, conducting public meetings, and soliciting feedback through various mechanisms fosters transparency, builds trust, and enhances the overall decision-making process.

By considering the environmental benefits and costs, applying standard methodologies for impact assessment, identifying mitigation measures, synchronizing permitting processes, and involving the public, the integration of AAM operations can be conducted in a manner that minimizes environmental impacts, maximizes benefits, and ensures the public's voice is heard. These efforts contribute to AAM's sustainable and socially acceptable integration into the broader transportation system.

17. Alternative Means of Navigation Beyond GPS: Given that these vehicles are expected to operate in urban, suburban, and remote places, reliable and persistent GPS may not be always available. Additionally, AAM are expected to operate in areas where today's radar arrays do not or cannot provide service. What are the most efficient, reliable, and readily available means to provide communication, navigation, and surveillance for AAM in a way that will not disrupt other modes of transportation? Please provide thorough information on alternative options to ensure continuity of navigation using alternative position, navigation, and timing capabilities.

Ensuring reliable communication, navigation, and surveillance for Advanced Air Mobility operations in various locations is crucial, especially when GPS signals may be unreliable or unavailable. Here are alternative options that can provide continuity of navigation using alternative position, navigation, and timing capabilities:

1. Multisensor Fusion: A key approach to navigation in GPS-denied environments is the integration of multiple sensors. This includes combining data from inertial measurement units (IMUs), magnetometers, barometers, vision-based sensors, LiDAR, and advanced algorithms. By fusing data from these sensors, AAM vehicles can accurately estimate their position, velocity, and altitude even when GPS signals are degraded or unavailable.

2. Inertial Navigation Systems (INS): INS relies on accelerometers and gyroscopes to measure changes in velocity and attitude. By integrating these measurements over time, an INS can estimate an AAM vehicle's position. While INS is subject to drift over time, it can be aided by occasional GPS fixes or other external references to correct its estimates and maintain accuracy.

3. Radio-Based Positioning Systems: Radio-based positioning systems, such as the Long-Range Navigation (LORAN) system or the Differential Global Navigation Satellite System (DGNSS), can provide alternative position information. These systems use ground-based transmitters to broadcast signals that can be used to determine a vehicle's position. LORAN and DGNSS can provide accurate positioning in areas where GPS signals are weak or unavailable.

4. Visual Navigation and Simultaneous Localization and Mapping (SLAM): AAM vehicles can utilize visual navigation techniques and SLAM algorithms to estimate their

position by recognizing and mapping features in the environment. This involves using cameras and computer vision algorithms to identify landmarks and track the vehicle's position relative to them. Visual navigation and SLAM can be effective in urban or remote areas where visual cues are available.

5. Communication and Collaboration Among AAM Vehicles: A collaborative approach can enhance navigation capabilities by allowing AAM vehicles to communicate with each other and share position and navigation information. AAM vehicles can improve their navigation accuracy and redundancy by leveraging cooperative techniques, such as vehicle-to-vehicle communication and collaborative mapping.

6. Research and Development Efforts: Ongoing research and development are focused on further improving alternative means of navigation. This includes advancements in sensor technologies, machine learning algorithms, and the integration of data from various sources. Efforts are also underway to explore emerging technologies, such as quantum-based positioning systems, which could provide highly accurate and robust navigation capabilities. In addition to private industry, the government also bears the responsibility of funding research and development endeavors.

A combination of these alternative options, such as multisensor fusion, INS, radio-based positioning, visual navigation, collaborative techniques, and ongoing research and development, should be considered to ensure continuity of navigation in AAM operations. By integrating and refining these technologies, AAM vehicles can navigate reliably, efficiently, and without disrupting other modes of transportation in urban, suburban, and remote environments.

18. Overall Functional Architecture: Given that AAM is an ecosystem consisting of aircraft, airspace, enabling communication, navigation, and surveillance technologies, as well as infrastructure, it is important to ensure consistency of assumptions about functions and requirements from each of these components. Please provide information regarding your assumptions about functional capabilities needed for infrastructure, communication, navigation, and surveillance technologies. This will enable the development of a functional architecture consisting of comprehensive functional requirements and their performance, information exchanges, and various assumptions about roles and responsibilities.

The establishment of a resilient ecosystem and architecture for AAM requires a collaborative effort that encompasses the realms of both industry innovation and governmental guidance. As we delve into the intricate domain of Communication, Navigation, and Surveillance (CNS), it becomes evident that a comprehensive approach to research and development, particularly through partnerships with entities like NASA and other government agencies, is imperative. A well-coordinated effort can provide the foundation for a robust CNS infrastructure that underpins AAM's safe and efficient operations.

The intrinsic understanding that a combination of ground and air surveillance technologies is indispensable underscores the complexity of the AAM landscape. The industry's dedication to formulating layered approaches to minimize risk models is commendable. However, the pivotal role of federal partners in spearheading CNS cannot be understated. The convergence of technical expertise and regulatory insight will foster an ecosystem where innovation harmoniously coexists with safety, leading to a seamless and secure airspace environment.

The stipulation that all AAM operations adhere to 91.113, whether through onboard pilots, electronic conspicuity, or ground radar, underscores the adherence to established aviation protocols. This confluence of traditional practices and emerging technologies necessitates a layered approach to ensure the robustness of collision avoidance systems. The acknowledgment that a singular "Detect and Avoid" solution remains elusive in the current landscape is pragmatic, urging the industry to focus on developing multi-faceted strategies.

In this complex journey, the call for CNS research in collaboration with respected institutions like NASA and other government agencies is a clarion imperative. Such concerted endeavors serve as the cornerstone for establishing a resilient CNS infrastructure that aligns with evolving technological paradigms and reflects a profound commitment to ensuring the utmost safety and efficacy in the growing realm of advanced air mobility.

19. Automation Standards: Information on needed consensus areas, standards, and design guidelines related to automation; critical integration challenges with the national airspace system; and data needed or available to inform standards, safety tools, and artificial intelligence/machine learning-enabled systems.

To ensure the safe and efficient integration of automation in Advanced Air Mobility operations, there is a need for consensus areas, standards, and design guidelines. Here are some items to consider:

1. Consensus Areas: Consensus areas are crucial to establish common understanding and agreement among stakeholders. Key consensus areas related to automation in AAM include operational procedures, system design principles, human-machine interfaces, safety protocols, data sharing, and cybersecurity. Consensus must be reached in these areas to ensure interoperability, safety, and seamless integration within the national airspace system.

2. Standards and Design Guidelines: Standards play a vital role in ensuring uniformity, compatibility, and safety across AAM operations. Standards and design guidelines are needed in various areas, including flight CJ operations, vehicle design, communication protocols, navigation systems, maintenance procedures, and data management. Developing and adopting these standards promote interoperability, mitigates risks, and supports the efficient development and deployment of AAM systems.

3. Integration Challenges: Integration challenges arise when incorporating automated AAM operations into the existing national airspace system. These challenges include airspace management, traffic coordination, communication protocols, collision avoidance, and the integration of air traffic control systems. Addressing these challenges requires close collaboration between AAM industry stakeholders, regulators, and air traffic management authorities to establish harmonized procedures and systems.

4. Data for Standards and Safety Tools: Data plays a crucial role in informing standards, safety tools, and the development of artificial intelligence (AI) and machine learning-enabled (ML) systems. Data sources such as flight data, operational performance, system reliability, and incident reporting are valuable for analyzing trends, identifying safety risks, and refining automation standards. Data sharing and collaboration among industry stakeholders, regulators, and researchers are essential to collect, analyze, and disseminate the necessary data for informed decision-making and developing effective standards and safety tools.

5. Safety and Certification: Automation standards should consider safety and certification requirements to ensure the reliability and performance of automated AAM systems. Guidelines for testing, verification, and validation of automation technologies are necessary to establish the safety cases and certification processes. Collaborative efforts between industry and regulatory bodies are critical to define these standards and ensure the safe deployment of automated AAM operations.

The AAM industry can promote safe and efficient automation in its operations by establishing consensus areas, developing standards and design guidelines, addressing integration challenges, leveraging data for informed decision-making, and incorporating safety and certification requirements. Collaboration among stakeholders, including industry experts, regulators, standardization organizations, and research institutions, is crucial to advance automation standards and enable the widespread adoption of AI/ML-enabled systems in the AAM ecosystem.

20. Other Areas of Interest: Respondents are encouraged to identify areas that are not directly identified or not adequately expressed for which inter-governmental coordination is critical to the success of the AAM ecosystem.

Identifying areas where inter-governmental coordination is critical to the success of the Advanced Air Mobility ecosystem beyond the ones already identified is important for comprehensive planning and implementation. Here are some additional areas of interest that highlight the need for inter-governmental coordination:

1. Land Use and Zoning: Land use and zoning regulations have a significant impact on the development of AAM infrastructure, such as vertiports and charging stations. Coordinating land use policies and zoning regulations among federal, state, and local authorities is essential to identify suitable locations for AAM infrastructure, ensure

compliance with safety and environmental requirements, and enable efficient planning for AAM integration.

2. Research and Development in CNS: Ensuring adequate funding for the research and development of CNS is essential to drive innovation, improve air traffic management, enhance aviation safety, and ensure the seamless integration of emerging technologies into the global aviation infrastructure.

By recognizing these additional areas of interest and promoting inter-governmental coordination, stakeholders can address critical aspects beyond the scope of direct identification. Collaborative efforts between government entities at various levels, regulatory bodies, industry stakeholders, and the public are essential to ensure a safe, robust and efficient AAM industry.

Conclusion

The pursuit of advanced air mobility represents a transformative leap in the evolution of transportation systems, promising unprecedented benefits in speed, efficiency, and sustainability, and we, again, thank the IWG for requesting our input on this significant, new mode of aviation transportation.

We emphasize that safety is the cornerstone upon which the foundation of AAM must be built, and a comprehensive risk management strategy is the best path. Additionally, two critical junctures lie ahead on the road to AAM integration: in the near-term, entry into service enabled by federal regulations; and longer-term government-stakeholder collaboration to facilitate scaled operations.

Equally crucial is nurturing community acceptance and addressing any apprehensions that may arise from this paradigm shift in transportation. Engaging in transparent communication, soliciting public input, and managing concerns head-on will foster trust and collaboration between industry, regulators, stakeholders, and the general public.

The path to realizing the goals of advanced air mobility is a complex and multifaceted endeavor. However, by upholding a steadfast commitment to security, adhering to regulatory timelines, harnessing existing infrastructure, and fostering community acceptance, we can pave the way for a future where the skies are not just a symbol of boundless potential but a tangible and integrated component of our modern transportation landscape. Working together to make this vision a reality will ensure that all Americans can benefit from this new technology, but the United States remains the global leader in aviation.