

Grand Challenge General Questions

What is the ultimate goal of the Grand Challenge Series? How will you know you are successful?

The stated goal of the Grand Challenge is to host a series of UAM ecosystem-wide scenarios to promote public confidence in UAM safety and facilitate community-wide learning while capturing the public's imagination. The Grand Challenges and each scenario within the challenges will be measured on their ability to provide benefit to the community. It is NASA's desire for the Grand Challenge Series to "raise the water level" for the entire UAM community. NASA plans to do this by developing a series that focusses on system level issues, but is robust enough to also guide the design and development of a UAM ecosystem. An example yardstick for the success of the Grand Challenge will center around the ability of the scenarios to develop quality data that is valuable to the FAA, certification bodies, standards groups, and for general requirements development.

What are the timelines for GC?

NASA would like to define a robust set of participants and partners and finalize activities for the first Grand Challenge effort by the summer of 2019. NASA is currently engaged in staffing efforts to support the Grand Challenge 1, which is projected to execute in 2020. It is expected that the primary agreement will be space act agreements laid out in a template format for all participants. This template will become available in the March 2019 timeframe. Participants will begin technology development, testing, and then go through appropriate NASA approvals (i.e. airworthiness, etc.) in the June 2020 timeframe, whereupon they begin participation in the Grand Challenge.

As the cycle for Grand Challenge 1 progresses, it will better inform NASA preparation and timelines for Grand Challenge 2, which is currently projected to occur in 2021. Based on complexities, a two-year cadence between subsequent Grand Challenges may be established.

Why should I participate in the Grand Challenge? There is no prize mentioned, so what are the incentives?

NASA believes it can play a role in the advancement of UAM, based on past experiences where NASA has served as a systems integrator for a diverse community. NASA's close collaboration and partnership with the FAA, along with its engagement with industry and other stakeholders provides a framework for industry to vet its capabilities, communities to align their capabilities, as well as for the FAA to prepare for potential applicants. By providing a forum for all stakeholders in the community to work together in an inclusive, collaborative manner, public acceptance will also be enhanced. Further, the GC series will likely be an important mechanism for flight evaluating and demonstrating airspace and air traffic management system concepts that will provide the foundation for an advanced UTM inspired airspace system providing capabilities and capacities beyond current VFR/IFR operations.

Will there be winners in the Grand Challenge?

No. Each participant individually measure themselves against their ability to efficiently accomplish elements of the scenarios.

Is it possible to participate in the Grand Challenge even though as of today we cannot meet the NASA airworthiness process, due to the developmental stage of our vehicle?

NASA recognizes that several interested parties will not have vehicles built in time for GC-1. NASA is interested in vehicle technology development timelines, in order to accommodate the industry as a whole, and encourages RFI responses on this matter. NASA is considering signing agreements with participants that are ready to complete the GC-1 scenarios (~2020) prior to GC-2 (~2021). Airworthiness reviews may start before vehicles are actually built and flown, but it is NASA's intent to perform the airworthiness processes with participants that demonstrate robust and mature vehicle designs capable of performing critical aspects of the GC series.

If a company does not participate in Grand Challenge-1 (GC-1), can it still participate in Grand Challenge-2 (GC-2)?

Yes. The timeline in the program includes a second airworthiness process as a part of GC-2 for new participants or participants whose systems have advanced enough to require a new airworthiness certificate. NASA requests that you identify your desire to participate, and when your technology would be ready to be included.

Why is NASA doing a Grand Challenge versus performing other more traditional research activities?

NASA believes that it can play a leadership role in the UAM industry. The UTM and UAS-NAS projects developed a strong base in related emerging UAS markets, and the NASA Aeronautics relationship with the FAA is stronger than ever. Hosting the UAM Grand Challenge Series will raise the water level for the UAM community by baselining safety and standardizing best practices. Additionally, NASA has continued to perform high quality research that helps maintain United States aviation leadership.

Why does NASA expect industry to spend their resources attending grand challenges if NASA isn't contributing technologies?

NASA believes that in order for this industry to prosper, especially on the timelines being discussed, they must begin developing baseline safety requirements and methods of compliance immediately. Unified national efforts and partnerships must be formed in order for industry to overcome technology and regulatory hurdles. NASA believes the GC proving ground provides an excellent means to unite the ecosystem of partners around UAM. NASA's research portfolio has UAM specific research for both vehicles and airspaces, and additional research activities will evolve naturally the series of grand challenges through identification of industry needs.

It's becoming clearer as to what NASA expects from industry as part of the Grand Challenge series. What should participating industry partners expect from NASA?

For Grand Challenge 1 (GC-1), NASA believes the critical components are: airworthy vehicles; interfaces between vehicles and a basic UAM Traffic Management system; a set of common safety and integration scenarios; a common set of data collection capabilities; and a set of common range requirements to support participation by non-NASA test range providers. For participants that elect to negotiate and sign an agreement with NASA, NASA is proposing to provide expert personnel to assess vehicle developer's vehicle airworthiness through NASA's airworthiness process. NASA is proposing to provide a system to interface between the vehicle and a basic UAM Traffic Management system. The proposed details of this system were described at Industry Day and further refined using RFI inputs. NASA, along with intensive collaboration from the FAA, is proposing to develop scenarios that support understanding barriers, development of standards, potential means to identify safety compliance and path(s) to certification.

What is NASA's planned investment in UAM? If there is no monetary award for the Grand Challenge scenarios, what resources are there for current and future NASA projects?

The Aeronautics Research Mission Directorate (ARMD) currently has a robust investment in areas critical to enabling UAM markets. This investment is contained in our Revolutionary Vertical Lift Technologies (RVLT), Air Traffic Management-eXploration (ATM-X), UAS Traffic Management (UTM), UAS Integration in the NAS (UAS in NAS), Flight Demonstrations and Capabilities (FDC), System Wide Safety (SWS)), and Transformative Tools and Technologies (TTT) projects. More information related to the research in these projects can be found on the Fact Sheets in the Industry Day registration package and on NASA's Techport website <https://techport.nasa.gov/home>. Resources for current and future NASA ARMD projects will come from the ARMD budget.

What are examples of what potential partners need to contribute to "pay their way"?

Partners may contribute airworthiness support, from organizations with superior airworthiness experience, aircraft for GC dry-runs, service provider Air Traffic Management (ATM) services and infrastructure for UAM operations, LVC-DE infrastructure contributions, Ranges (rural and urban).

Does grand challenge participation and/or a Space Act Agreement come with funding for industry providers?

We do not anticipate providing direct funding to support participants in the Grand Challenge. NASA will provide a test facility to execute flight test scenarios specified in the grand challenge. NASA will also provide personnel to evaluate the potential airworthiness of the participant's system, pursuant to NASA Airworthiness processes.

How are you going to handle international partnerships considering NASA doesn't traditionally sign SAA's with International primarily due to NASA's charter?

NASA is open to international participation in GC-1. NASA will leverage the RFI to understand the overall set of public interests, and continue to work internal processes. However, there

may be some limitations on international participants that will be coordinated as part of the formal process to develop agreements.

Will GC selectees receive any additional support or priority in the FAA's approval process?

While no additional FAA support or priority can be assured simply through GC participation, it is likely that GC participation will help facilitate more effective interactions between participants and the various FAA organizations involved in certifying vehicles, operations, and other services. NASA and the FAA are jointly committed to leveraging the Grand Challenge series in a way that accelerates the UAM Market.

How much of each participants' technologies do you plan to share publicly?

NASA does not plan to share specific technologies developed by industry, but we do expect to share performance data to support standardization. NASA will create general guidance and work with partners directly to determine appropriate IP.

How will you protect IP during the Grand Challenge? Are you planning to release NASA reports? You mention that a NASA goal is to disseminate knowledge.

IP protection specifics will be documented as part of the process negotiating and signing an agreement to participate in the GC. Any NASA reports that are released will adhere to the conditions of the negotiated agreements. Questions are in the RFI to understand Industry's specific concerns relative to IP so that the agreement template will be better aligned with participants' desires and ideally result in fewer issues requiring negotiation and a longer approval process. The stated goal of the GC is to facilitate community-wide learning. It is anticipated that much like the DARPA grand challenges, generalized results will be able to be released without violating IP agreements.

How do you envision the participation in the Grand Challenge for the suppliers to the vehicle Original Equipment Manufacturers (OEMs)?

Our vision is that sub-system suppliers will participate in the Grand Challenge by partnering with a participating vehicle developers or airspace service suppliers. The large number and diversity of potential sub-system suppliers makes direct participation of this segment of the UAM community impractical

RFI Questions

When are RFI responses due?

November 16, 2018.

Will there be any other opportunities to participate and provide input after the Nov 16 due date of the RFI?

RFI responses received by the November 16th deadline are needed to better scope the GC to the number and interests of respondents. While we are always open to inputs from the community, this deadline for formal responses is important to organizing the event, particularly

GC-1. RFI respondents will have priority relative to pursuing Space Act Agreements which will be required to participate in the GC.

After the RFI is submitted, when will we hear back regarding NASA's interest in working with us?

We expect to host an open webinar in the January timeframe to summarize the breadth of RFI responses and any updates to the GC. In this same timeframe, we expect to individually follow up with RFI respondents, as necessary, expressing an interest in participating in the GC. In March we expect to issue a public notice regarding formulation of agreements with individual GC participation candidates.

Can industry partners collaborate on RFI responses, or should they submit independently?

Potential industry partners can collaborate on RFI responses and/or respond individually as they deem most effective for communicating their interests and intentions.

For the RFI, would it be beneficial to identify specific industry partners and stakeholders (e.g., municipalities)?

NASA welcomes the identification of specific partners, and the roles they will play in your effort moving forward, in your response to the RFI.

Is matchmaking anticipated post RFI? This is asked in the context of participants who are subsystems manufacturers.

We do not anticipate providing directed matching based on respondents to the RFI. However, NASA has posted the list of participants from the Industry Day forum, and encourages companies to actively engage in collaborative relationships, both prior and subsequent to, the RFI submission deadline.

You say RFI responses will be treated as proprietary and confidential. Pursuant to what agreement? Does submitting RFI make us party to a confidentiality agreement?

The Government is required to safeguard from unauthorized disclosure all information received in response to the RFI, see Federal Acquisition Regulations (FAR) 15.207. Proprietary information should always be marked by the owner with an appropriate notice indicating that the information is proprietary before it is accepted by NASA. See NASA Interim Directive (NID) 1600.55, Sensitive But Unclassified (SBU) Information.

Are all types of companies (e.g., subsystems manufacturers, non-electric vehicle manufacturers etc.) allowed to respond to the RFI? Does this include international companies?

For GC-1 and GC-2, NASA welcomes submissions from all vehicle types (STOL, hybrid electric etc.) and configurations (e.g., all-electric, hybrid electric, gas, etc.) in order to better scope the grand challenge effort. International participants are also welcome to submit responses to the RFI, though the mechanisms of engagement and partnership may be more nuanced. Future challenges in the series may down select participants based off of technical considerations that are more or less likely to help achieve successful UAM markets.

Vehicles and Airspace Oriented Questions

What is the strategy across airspace and vehicles?

Vehicles and airspace companies will be building systems that efficiently meet the needs of the community, Grand Challenge Series will stress those systems and compile safety data to develop necessary requirements and standards. NASA believes co-development of both vehicles and airspace technologies will be required for UAM to be successful.

Will VTOL UAVs with UAM use cases outside of passenger transport (e.g. heavy lift cargo) be permitted entry into the UAMGC?

NASA is focused on vehicle types that provide the most potential to identifying paths forward for the largest number of UAM markets. The scope of vehicle use cases described across the RFI responses will be used to adjust the parameters of the GC to accommodate as many vehicle types and missions as practical, particularly considering the need for diverse vehicle classes to interoperate within a future air space system. RFI submissions from vehicle developers will aid NASA in informing the final scope of the Grand Challenge Series, and will promote a better understanding the broader community's interest in UAM and related applications.

Are you going to specify performance requirements, range, speed, altitude, payload, or are you leaving that up to the respondents' own business assessment?

Performance requirements for certification and airworthiness may vary depending on the type of operation performed. Respondents to the RFI are encouraged to supply their own specific concept of operations that they are considering. This information will be potentially be used to inform the Grand Challenge scenarios going forward, and help to scope requirements beyond those specified in the MTEs.

How closely coupled are the UAM RFI MTE's to the FAA certification requirements?

In most of the Mission Task Elements (MTEs) it is expected that participants who exceed Desired Performance may be approaching levels of performance that would be required to gain FAA-certification for Urban on-demand air mobility operations. However, the FAA has not yet decided on Applicable regulations, nor minimum design standards for this emerging class of aircraft. The goal of the GC MTEs is to shed some light on operational challenges that will drive future acceptable certification standards. GC MTEs act to identify the relationship between aircraft performance and flight characteristics, as well as investigate means of demonstrating compliance to performance requirements.

UAM infrastructure could have significant costs in advance of commercial operations. Is there a role for NASA research and investment to minimize the impact and facilitate more cost-effective implementations?

One of the goals of the GC is to explore and demonstrate alternative ATM concepts and infrastructure for UAM operations. In particular, UTM-inspired airspace service concepts are expected to be featured in the Grand Challenge. The results of this work are expected to inform FAA decisions regarding operational deployment of UTM-inspired ATM capabilities and systems.

What is the standard and certification process for potential UAM ATM systems?

Currently the FAA self-certifies the current (conventional) ATM system through the judicious procurement of products and services under a variety of standards (e.g., DO-278A, DO-264, DO-200B etc.). It is unclear what, if any, specific standards and certification process may be applied to UAM ATM systems and services. However, it is reasonable to expect that these requirements will be guided by a system-safety perspective. Systems and services with high criticality will likely need correspondingly rigorous certification processes.

One of the goals of UAM ATM research will be developing and evaluating airspace system concepts with a high-degree of architectural resilience with the goal of minimizing the criticality, and corresponding certification requirements, of individual elements. Additionally, research and deliberation, facilitated through airspace workgroups (e.g., NASA, FAA, industry etc.) can be used to identify and develop appropriate standards, as well as their domains of application.

Community and Standards Oriented Questions

How do you plan to include the entire community (e.g. Local government, Standards bodies, infrastructure, the general public, etc.)?

NASA is exploring Grand Challenge as a means to foster robust partnerships across the ecosystem of UAM stakeholders. Local governments, standards bodies, real estate and construction, and many others have an interest in UAM and could learn from the Grand Challenge Series. Standards bodies may need data. Local governments may want to understand noise, or interface requirements for Smart City infrastructure or multi-modal transit. NASA is requesting input from all stakeholders in the RFI.

The general public can be engaged through surveys, as well as target public acceptance campaigns on challenging issues such as noise, security, and privacy.

What are the mechanisms to investigate and synergize UAM with other systems in our current cities?

NASA considers the cities to be the critical source of potential mechanisms to investigate and synergize UAM. NASA is interested in understanding the cities' perspectives, and identifying where they think they have knowledge gaps in relation to potential UAM operations. NASA is also investigating potential impacts of UAM operations in urban areas. These studies are at a high-level (non-city specific) and are looking at areas such as electric infrastructure needs and impacts, along with command and control operational concepts. As mentioned during Industry Day, NASA is considering the potential of public-private partnerships (PPPs) as an avenue to address critical barriers. NASA is committed to not duplicating efforts already underway to advance the community and it is important to understand what initiatives have already begun, as well as ensure that new initiatives are complementary, needed and provide benefit.

Under community investment, how would a city be engaged in this community?

NASA believes that the first step for cities engaging with the UAM community involves understanding the capabilities concerned with, and required for, hosting UAM operations. Cities that are capable of understanding the constraints posed by UAM operations will be capable of working closely with their communities to understand how these capabilities would integrate into their current concerns and infrastructure. The Grand Challenge will be designed to collect data that will help inform communities regarding some potential realities of UAM operations.

Is there potential to work with local airports for vehicle testing if companies work with the FAA and municipalities for approval?

We are open to such arrangements if they meet the safety and technical requirements of the GC. We look forward understanding the scope of such proposals through the RFI responses.

Is there a potential to work with multiple airports or municipalities for approval?

NASA will consider test data generated at other ranges, or facilities, in terms of establishing an airworthiness case, however, the pedigree of the data will determine the efficacy of illustrating that airworthiness claims are met via that data. As the Grand Challenge series progresses, partnerships with multiple alternate ranges will provide participants with the ability to test continually, in a manner that could not be supported by the sole use of the NASA test range.

You're talking about using the data from the Grand Challenge to develop standards. What about the standards work that's already being done by RTCA 228 and ASTM? Do you plan to integrate with those at all?

The Grand Challenge will integrate with and help inform the expansion of existing standards to accommodate UAM, and validate whether existing standards are appropriate. The Grand Challenge is not meant to compete or conflict with existing standards.

Certification and Safety Oriented Questions

Why would someone go through the NASA Grand Challenge instead of just working through the FAA process for airworthiness and type design?

NASA's Grand Challenge provides a unique opportunity for a developer to experience a 3rd party evaluation of the safety and performance concerns of a system early in its lifecycle. The airworthiness and type certification process for the FAA is primarily geared for mature vehicles which have a preponderance of test and evaluation evidence, and whose configurations will remain fixed.

Certification

Is there a channel in the grand challenge vision, to bridge the gap between the difference required to build safe, complex systems, and effectively and efficiently getting these systems in front of the regulator?

NASA understands that the lack of standards and clarity of requirements creates a gap between building a system that is safe, and demonstrating that safety to a regulator. Collaborative efforts to produce industry standards that are accepted by regulators may help to address this gap. However, NASA recognizes that striking the right balance between providing sufficient evidence to demonstrate that a system is safe, without inundating the regulator with documentation that will slow down the review process, is difficult. By participating in the NASA Grand Challenge series, NASA expects participants will be able to better calibrate their thresholds for evidence generation, as well as skillfully construct a safety case as to why the evidence is sufficient.

Safety

How much data will be needed to prove safe operations?

Safe operations are assured through the generation of evidentiary artifacts (such as testing or simulation data), meeting the required quality standards, that are sufficient to demonstrate that the risk posed by the operation has been mitigated to the required, acceptable level. The data, presented in context to NASA and FAA, will then be used to gain safety assurance, or confidence the proposed operation can be done safely. The details of what (and how much) data is required varies with type of aircraft, its intended use, and the need to show compliance with the applicable safety, performance, and operational safety requirements.

Does the FAA see a shift from the framework outlined in SAE ARP 4754A? Although there is talk of regulation shifts, will DO-254 and DO-178 still be the framework to follow for the development of electrical hardware/software for aircraft systems?

Through NASA's close collaboration with the FAA, we have received indications that the FAA is open to new certification approaches. The FAA encourages new entrants to read current standards, such as SAE ARP 4761, 4754A and others, and to apply the relevant best practices and concepts in the design and implementation of aircraft systems. ARP 4754A in particular is an industry standard that is well proven and is an aerospace recommended best practice for complex systems.

Is there more than one way to present something to the FAA, especially when there are no existing certification standards, such as for software and hardware codesign processes (e.g., FPGAs)?

Ultimately, the FAA is looking for safety assurance and establishing confidence that the products built will perform as specified. Safety arguments, annotated by sufficient evidence will aid in the ability to convey that a safety claim has been met, on the behalf of a system. The FAA is open to multiple methods of compliance for software and hardware certification.

Autonomy-Oriented Questions

Is there a Grand Challenge on Assured Autonomy Algorithms? How can we certify high-level decision-making algorithms?

Migration of tasks typically done during any phase of flight by the controller and pilot through automation, along with the shifting locus of control between humans and automation, will be a key focus for the core technology maturation process under the grand challenge. It is important to assess whether the automation strategies deployed can be proven to adequately address safety and operational reliability requirements. All entrants would benefit from using design best practices, and investigating architecture requirements for assured, resilient automation, and from lessons learned by others. This will enable entrants to develop their own safety cases for high-level decision-making algorithms, in preparation for opening a dialogue with the FAA.

Data is the key, especially when we are talking about autonomy (e.g., Machine Learning Models, Analytics, etc.); for how would we create models without data? How would we improve systems without data? Is it possible for us to create an open source UAM Data sharing initiative/framework?

Documenting the datasets used to train (safety-critical) autonomous algorithms is fundamental to ensuring the integrity and reproducibility of system behavior. Additionally, the quality of the data used to train the algorithm (or develop a model) directly influences the correctness and usability of the algorithm and its results. However, due to concerns regarding participant intellectual property and privacy rights, an Open Source repository maintained by NASA may not be the correct vehicle by which these datasets are shared. NASA encourages the formation of participant consortia to facilitate dataset sharing, in order to level set industry requirements for data quality and integrity.

How is the notion of human-autonomy teaming being handled, as automation is one of the things that we have to work? How does this work into the current challenge scenario progression that you have on the board?

The NASA UAM Grand Challenge is developed in such a way to initially be agnostic to the level of automation and autonomy employed in system solutions. A goal of the Grand Challenge is to assess the state of the art and/or practice currently employed in industry, with respect to automation and autonomy, as well as the scalability of these approaches. The role of the operator (be it for a vehicle or a traffic management system) is not prescribed by the Grand Challenge scenarios. Additionally, aspects related to public acceptance related to the roles of humans and automation in these new paradigms need to be evaluated before sustained operations can commence. As the series progresses it is highly likely that human-autonomy teaming, and the general need for more automation, will become more important.

Where is the natural fit for role allocation between pilots, controllers and onboard automation?

Viable decompositions of roles between pilots, controllers and automation is an open area of study. The issue of role allocation, specifically for different phases of flight will be investigated through several Grand Challenge Scenarios. Certification, Flight Standards and Air Traffic Operations Approvals may become intersectional in these circumstances, as roles shift from traditional paradigms.

Range and Infrastructure Oriented Questions

Where will the GC be hosted? How do you plan to include Test Ranges?

GC will likely occur across multiple locations. NASA AFRC is planning to ensure a range is available at EAFB in restricted airspace, and will collect a baseline set of data specific to the site such as noise. This will ensure a set of standard data and airspace availability, as flight testing would occur in restricted airspace under the auspices of a NASA AFSRB. Other participants and test ranges are encouraged to work together to perform the same scenarios at ranges across the nation. NASA is interested in hearing from test ranges regarding their ability to develop UAM capabilities and identify the requirements necessary to provide robust national UAM testing capabilities that could support testing for a broad range of potential UAM missions. All ranges will be required to meet the intent of NASA's NASA Airworthiness and Flight Safety Review Board (AFSRB) process.

NASA plans to leverage a simulation environment, as required, early in testing to ensure a safe test environment. As the GC series progresses the operational environment should become more realistic.

Prior to Grand Challenge 1, would it be helpful for a UAM Platform OEM to provide a safety case along with flight test results flown at one of the FAA UAS Test Sites?

We expect Grand Challenge 1 participants to have solid practical knowledge and experience of safety and airworthiness considerations. In addition, aircraft are expected to have flight demonstrated several basic test scenarios before arriving to demonstrate more complex Grand Challenge 1 scenarios at the central test range. If such knowledge and experience is obtainable whether through a partnership with a UAS test site or another means, it may help facilitate participation in Grand Challenge 1.

Will the existing ground control voice communications out at Armstrong be available to the GC-1 participants?

Communications will be commensurate with the goals of the Grand Challenge series and range safety requirements. Minimum Range requirements for all planned test ranges and will be included as part of the formal agreement processes (e.g., template Space Act Agreements). It is likely that range requirements will include considerations for voice communications and potentially industry provided command and control infrastructure.

How are issues of communication systems and spectrum access being handled?

Spectrum access is important, and one of the things that will have to be considered in both the vehicle and air traffic management design is the spectrum requirements. Communication requirements related to the quality of all data links, specifically those connecting vehicles to ground control stations are of specific importance. In subsequent Grand Challenges, reallocation of communication functions and spectrum requirements to potential vehicle to vehicle communications, as well as vehicle to UAM traffic management/UAS service providers, will have to be considered, in collaboration with organizations such as the FAA and FCC. These aspects will influence airworthiness and certification considerations.

Is it possible to fly Commercial Off the Shelf (COTS) platforms/components on NASA Ranges?

NASA requires all parties performing flight test at NASA owned or administered facilities to conform to all NASA IT Security Directives. Pursuant to the NASA Policy Memo issued on March 1st, 2018 by the Office of the Chief Information Officer (NASA HQ), the use of certain COTS platforms and components were restricted at NASA ranges. Waivers regarding the current policy against the flight of COTS are a potential avenue by which participants may be able to go forward. NASA is sensitive to the fact that specific COTS platforms and/or components may have some difficulty obtaining the ability to fly on the NASA range, and is addressing this issue.

Are you planning on offering any supporting funding to support infrastructure? Or is everyone expected to be self-funded?

We do not anticipate providing direct funding for supporting infrastructure specific to the Grand Challenge outside of NASA, FAA or other federal facilities. We encourage suppliers of non-federal infrastructure to consider new commercial opportunities that may be enabled through GC participation. For example, such infrastructure may provide extended commercial testing opportunities beyond what a federal test site could support.

Miscellaneous Questions

Do you have any definition guardrails around what is UAM? What are the mission profiles that are included in UAM, (e.g., short regional), or must all mission operation be in urban areas?

Currently, the mission definition regarding UAM is still somewhat open. There is a focus on urban-oriented missions (or flights originating/terminating in urban areas). However, NASA solicits RFI inputs across the diverse range of concepts of operations that the community embraces in and around urban areas.

Will the upcoming SBIR/STTR solicitation have focus areas on Urban Air Mobility?

ARMD is currently developing topics for the 2019 SBIR/STTR solicitation. 2019 topics will be released for solicitation Jan 7 with proposals due Mar 8 2019. While not specifically called out in the 2018 SBIR/STTR solicitation, most elements of UAM are included. Topic A1.06 Vertical Lift Technology and Urban Air Mobility, A3.02 Increasing Autonomy in the National Airspace Systems (NAS), and A3.03 Future Aviation Systems Safety capture critical barriers that need to be addressed to enable UAM markets.

How will you foster an environment for startups to link with strategic investors?

We are looking to industry participants to lead the formation of technical and financial partnerships. We will foster this process through events such as the GC industry day, which helps to bring the community together and facilitate rapid networking opportunities.