Lone Star Urban Air Mobility Proving Ground
(Pre-Decisional)

North Central Texas Council of Governments (NCTCOG)
December 2018
The Urban Air Mobility Vision
<table>
<thead>
<tr>
<th>Industry Day Participants</th>
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<tbody>
<tr>
<td><strong>47</strong> Aircraft Developers</td>
</tr>
<tr>
<td><strong>23</strong> Comm/Nav/Surveillance Providers</td>
</tr>
<tr>
<td><strong>22</strong> Integrated Automation &amp; Operations Developers</td>
</tr>
<tr>
<td><strong>18</strong> ATM Developers (both traditional and UAM)</td>
</tr>
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<td><strong>12</strong> Universities</td>
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<tr>
<td><strong>10</strong> Fleet Operations Providers</td>
</tr>
<tr>
<td><strong>10</strong> Test Site Representatives</td>
</tr>
<tr>
<td><strong>8</strong> Manufacturers</td>
</tr>
<tr>
<td><strong>6</strong> Propulsion System Developers</td>
</tr>
<tr>
<td><strong>5</strong> Media</td>
</tr>
<tr>
<td><strong>5</strong> Federal Agencies</td>
</tr>
<tr>
<td><strong>5</strong> Local Governments</td>
</tr>
<tr>
<td><strong>5</strong> Airspace Designers</td>
</tr>
<tr>
<td><strong>3</strong> Vertiport Designers</td>
</tr>
<tr>
<td><strong>2</strong> Trade Associations</td>
</tr>
</tbody>
</table>
Bringing UAS to America's Skies

- **MARKET: LARGE UAS & HALE**
- **MARKET: THIN / SHORT HAUL**
- **MARKET: URBAN AIR MOBILITY**
- **MARKET: SMALL / MEDIUM UAS**

- **HALE UAS**
- **LARGE UAS**
- **URBAN VERTIPORT**
- **SMALL AIRPORT**

- **AIRPORT**
- **DRONEPORT**
- **DISTRIBUTION CENTER**

**UPPER CLASS E AIRSPACE**
**CLASS A AIRSPACE**
UAM Market Studies

- ARMD has funded two Urban Air Mobility market studies that included several air taxi/metro models, air ambulance, and last-mile package delivery.

- Studies include:
  - A range of urban areas and business models, technology requirements, legal and regulatory barriers, social acceptance issues.
  - Assumptions for issues such as autonomy, batteries, weather, infrastructure, operating costs, passenger adoption rates, etc.

- Generally speaking, UAM markets were found to have viable and profitable use cases.
  - By ~2028 “air metro” could be profitable and by ~2030 result in ~750M annual passenger trips in 15 metro areas.
  - Air ambulance model may not be profitable, but have high impact on public good.
  - By ~2030 “last mile package delivery” could be profitable and result in ~500M deliveries annually.
  - Large variability across studies based on differences in assumptions, e.g., infrastructure.
Grand Challenge (GC) Series Overview

**Vehicles**
functional UAM vehicles with threshold level of demonstrated airworthiness

**Airspace Management**
airspace and air traffic management technologies and services built and simulated to a threshold level of UAM ATM requirements

**Safety and Integration Scenarios**
airworthiness processes and realistic UML-4 scenarios designed in concert with the FAA, with range(s) and Testbeds as a UAM proving ground

**Stakeholder Integration**
societal integration and acceptance of UAM Operations including public acceptance, supporting infrastructure, operational integration, standards organizations, the local regulatory environment, etc.

- Industry Provided
- NASA Provided
- Ecosystem Wide Support
UAM Vision and Framework

Design, development, and implementation of infrastructure to enable safe and efficient multi-vehicle UAM operations

Societal integration and acceptance of UAM operations

Operations and management of multiple vehicles within a UAM system that enable safe and efficient sharing of airspace and other system resources

Airspace System Design & Implementation

Community Integration

Air Traffic & Fleet Operations Management

Individual Vehicle Management & Operations

Vehicle Development & Production

Design, manufacture, and system readiness of UAM vehicles

Operations and maintenance of a single UAM vehicle, independent of the sharing of airspace or other system resources

Urban Air Mobility (UAM) Vision
Revolutionize mobility around metropolitan areas by enabling a safe, efficient, convenient, affordable, and accessible air transportation system for passengers and cargo
Stakeholder Integration

Societal integration and acceptance of UAM Operations including public acceptance, supporting infrastructure, operational integration, standards organizations, and the local regulatory environment

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Grand Challenge Relationship</th>
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</thead>
<tbody>
<tr>
<td>Supporting infrastructure</td>
<td>Infrastructure elements such as vertiports and charging stations could be provided by stakeholders</td>
</tr>
<tr>
<td>Local communities</td>
<td>Opportunities to perform in local communities via ranges and Test Sites. Considering surveying and other public acceptance campaign initiatives</td>
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<tr>
<td>Operational integration</td>
<td>Connectivity and infrastructure requirements for smart city initiatives, multi-modal, etc.</td>
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<tr>
<td>Standards organizations</td>
<td>Strategic partnership with standards organizations to support development of a complete requirement and standards set to enable UAM vehicles, airspace, vertiports, infrastructure, etc</td>
</tr>
<tr>
<td>Local government</td>
<td>Local regulators will have the opportunity to assess complete lists of current local regulations and consider ways to approach legislation and long-term planning consideration for the future</td>
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</tbody>
</table>
### UAM Maturity Levels (UML)

**Grand Challenge**

<table>
<thead>
<tr>
<th>Vehicles</th>
<th>Airspace</th>
<th>Community</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UML-1</strong></td>
<td><strong>Early Operational Exploration and Demonstrations in Limited Environments</strong></td>
<td></td>
</tr>
<tr>
<td>*Vehicle certification testing and operational evaluations; traditional</td>
<td>*Aircraft certification testing and operational evaluations; traditional airspace and</td>
<td></td>
</tr>
<tr>
<td>airspace and procedures; exploratory community demos and data</td>
<td>procedures; exploratory community demos and data</td>
<td></td>
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<tr>
<td><strong>UML-2</strong></td>
<td><strong>Low Density and Complexity Commercial Operations with Assistive Automation</strong></td>
<td></td>
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<tr>
<td>*Type certified aircraft; initial Part 135 operation approvals; limited</td>
<td>*Type certified aircraft; initial Part 135 operation approvals; limited markets with</td>
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<tr>
<td>markets with favorable weather and regulation; small UAM network serving</td>
<td>favorable weather and regulation; small UAM network serving urban periphery; UAM</td>
<td></td>
</tr>
<tr>
<td>urban periphery; UAM corridors through controlled airspace</td>
<td>corridors through controlled airspace</td>
<td></td>
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<tr>
<td><strong>UML-3</strong></td>
<td><strong>Low Density, Medium Complexity Operations with Comprehensive Safety Assurance Automation</strong></td>
<td></td>
</tr>
<tr>
<td>*Operations into urban core; operational validation of airspace, UTM</td>
<td>*Operations into urban core; operational validation of airspace, UTM inspired ATM, CNS,</td>
<td></td>
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<tr>
<td>inspired ATM, CNS, C^2, and automation for scalable, weather-tolerant</td>
<td>C^2, and automation for scalable, weather-tolerant operations; closely space UAM pads,</td>
<td></td>
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<tr>
<td>operations; closely space UAM pads, ports; noise compatible with urban</td>
<td>ports; noise compatible with urban soundscape; model-local regulations</td>
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<tr>
<td>soundscape; model-local regulations</td>
<td></td>
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<tr>
<td><strong>UML-4</strong></td>
<td>**Medium Density and Complexity Operations with Collaborative and Responsible Automated</td>
<td></td>
</tr>
<tr>
<td>*100s of simultaneous operations; expanded networks including high-capacity</td>
<td>*100s of simultaneous operations; expanded networks including high-capacity UAM ports;</td>
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<tr>
<td>UAM ports; many UTM inspired ATM services available, simplified</td>
<td>many UTM inspired ATM services available, simplified</td>
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<td>vehicle operations for credit; low-visibility operations</td>
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<tr>
<td><strong>UML-5</strong></td>
<td><strong>High Density and Complexity Operations with Highly-Integrated Automated Networks</strong></td>
<td></td>
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<tr>
<td>*1,000s of simultaneous operations; large-scale, highly-distributed</td>
<td>*1,000s of simultaneous operations; large-scale, highly-distributed networks; high-density</td>
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<tr>
<td>networks; high-density UTM inspired ATM; autonomous aircraft and remote,</td>
<td>UTM inspired ATM; autonomous aircraft and remote, M:N fleet management; high-weather</td>
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<tr>
<td>M:N fleet management; high-weather tolerance including icing;</td>
<td>tolerance including icing; high-volume manufacturing</td>
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<td>high-volume manufacturing</td>
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<tr>
<td><strong>UML-6</strong></td>
<td><strong>Ubiquitous UAM Operations with System-Wide Automated Optimization</strong></td>
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<tr>
<td><em>Ubiquitous UAM Operations with System-Wide Automated Optimization</em></td>
<td><em>Ubiquitous UAM Operations with System-Wide Automated Optimization</em></td>
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<tr>
<td>*10,000s of simultaneous operations (limited by physical infrastructure,</td>
<td>*10,000s of simultaneous operations (limited by physical infrastructure, scaled ATM);</td>
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<tr>
<td>scaled ATM); essential ownership models enabled, ad hoc landing sites;</td>
<td>essential ownership models enabled, ad hoc landing sites; noise compatible with</td>
<td></td>
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<tr>
<td>noise compatible with suburban/rural operations; societal expectation</td>
<td>suburban/rural operations; societal expectation</td>
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Grand Challenge Series progresses through scenarios that increase in number, complexity, technology readiness, operational readiness, and standards and regulatory emphasis.
NASA UAM Grand Challenge Timeline

Industry Day
- Nov 1-2 2018
- Discuss GC-1 plans, objectives, & execution strategy. Outline participation requirements, objectives, expectations, execution strategy, & schedules.

RFI Responses Due
- Nov 16
- Webinar/Set Up Working Groups

Jan 2019
- This activity includes drafting Space Act Agreement (SAA) templates, participants identifying the desire to sign an SAA, the negotiation and signing of specific SAAs.

Jan 2020
- GC-1 is anticipated to challenge industry and other community participants to address foundational UAM vehicle design readiness and robustness for UAM operations.

Jan 2021
- GC-2
- Future challenges in this series are anticipated to address key safety and integration barriers across the UAM ecosystem while also emphasizing critical operational challenges.

This would be for participants new to the Grand Challenge desiring to participate in GC-2 or, if needed, to update SAAs with GC-1 participants continuing on to GC-2.

GC-1 SAAs

GC-1

GC-2 SAAs
Lone Star Urban Air Mobility Proving Ground (Snapshot)

- **Goal:** Provide the UAM Community of Practice, OEMs, ECOSYSTEM Vendors and Providers (DAA, C2, UTM-Like Tools, Urban Communities, User-Stake Holders) with an opportunity to begin exploring the art of the possible.

- **UAM GC 1 2020 Edwards Air Force Base**
  - LS UAMPG Offers OEMs and Ecosystem Providers opportunity to conduct systems and flight testing “prior” to NASA GC1
  - LS UAMPG offers NCTCOG Team opportunity to attract NASA to Texas for GC 2 and beyond
Our Mission Control Center

Remote C2 for UAS Night Operations

Bringing UAS to America’s Skies
All Information is LSUASC Proprietary

Texas Test Ranges and Infrastructure
National Class G

Lone Star Urban Air Mobility Proving Ground

Legend
- Controlled Airspace
- Texas UAM Corridor
- Texas Triangle
- LSUASC Test Range

Expanded UAM Proving Ground
(Surface – 400+ ft AGL)

Riverside & Disaster City

Chase Field
(Surface – 6,000 ft AGL)

Southern Range Complex
(Surface – 5,000 ft AGL)

Texas Triangle
(Surface – 400+ ft AGL)

LSUASC Test Range

300 mi
Texas UAM Corridor

KPIL – Port Isabel Cameron County Airport, Port Isabel, Texas
T05 - Charles R Johnson Airport, Port Mansfield, Texas
KRBO - Nueces County Airport, Robstown, Texas
83TX - Texas A & M Flight Test Station Airport, Bryan, Texas
KLXY - Mexia-Limestone County Airport, Mexia, Texas
KGDJ - Granbury Regional Airport, Granbury, Texas
KLUD - Decatur Municipal Airport, Decatur, Texas
KGLE - Gainesville Municipal Airport, Gainesville, Texas
KSLR - Sulphur Springs Municipal Airport, Sulphur Springs, Texas
K07F - Gladewater Municipal Airport, Gladewater, Texas
KE70 - Huber Airpark Civic Club LLC Airport, Seguin, Texas
K1T8 - Bulverde Airpark, San Antonio, Texas
KEYQ - Weiser Air Park, Houston, Texas
KLZZ - Lampasas Airport, Lampasas, Texas
KLWY - Mid-Way Regional Airport, Midlothian/Waxahachie, Texas
4F2 - Panola County Airport-Sharpe Field, Carthage, Texas
KASL - Harrison County Airport, Marshall, Texas
MWL - Mineral Wells Airport, Mineral Wells, Texas
KCPT - Cleburne Regional Airport, Cleburne, Texas
K41 - Ennis Municipal Airport, Ennis, Texas
KTRL - Terrell Municipal Airport, Terrell, Texas
RTC Legislative Program

RTC position on UAS (Draft – Approval expected Dec. 13):
Support the collaboration between local governments, the military, the State and FAA to advance regulations for the safe operations of unmanned aircraft vehicles
86th Texas Legislature

Bill pre-filing began Nov. 12

SB 59 (Zaffirini-D): Relating to certain images captured by an unmanned aircraft

Amends Texas Government Code 423.002(a): It is lawful to capture an image using an unmanned aircraft in this state:

(22) if the image is:

(A) captured for the purpose of delivering consumer goods that were ordered through an Internet website or mobile application and the operator of the unmanned aircraft is authorized by the Federal Aviation Administration to conduct operations within the airspace from which the image is captured; and

(B) directly related to the purpose described by Paragraph (A), including images captured for purposes of navigation or ensuring public safety.
Questions

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UAS Safety and Integration Task Force

CONTRIBUTING COMMITTEES AND WORKING GROUPS
Working Groups

<table>
<thead>
<tr>
<th>Working Group</th>
<th>Tasks</th>
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</thead>
<tbody>
<tr>
<td>Education and Public Awareness</td>
<td>Each Working Group will be tasked with the following:</td>
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<tr>
<td></td>
<td>1. Identifying Issues</td>
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<td>2. Provide Recommendations</td>
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<td>3. Who on the Task Force can act on solution?</td>
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<td>4. Is the Solution Scalable?</td>
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<td>5. How could the solution be funded?</td>
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<td>6. Determine Working Group Leaders</td>
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<td></td>
<td>7. Report all findings to Task Force</td>
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<tr>
<td>Legislation</td>
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<tr>
<td>Training</td>
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<tr>
<td>Integration</td>
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</table>
Education and Public Awareness

Working Group Members

- Bryan Archer
- Candy Slocum
- Chad Sparks
- Charles Gbadebo
- Jordon Carmona
- Karen VanWinkle
- Mark Hays
- Peter Morgan
- Romeo Durscher
- Ron Poynter
- Ruedi Schubarth
- Wayne Sanderson
- Wes Jurey
- Kenneth Bergstrom
- Galaxy UAV/AUVSI
  - North Central Texas InterLink, Inc.
  - Bell
  - Skystream Aerial, LLC
  - City of McKinney
  - Arlington Municipal Airport
  - Dallas County Community College District
  - US Navy-FAA Liaison Officer
  - DJI
  - OnPoynt Aerial Solutions
  - LeTourneau University
  - Mineral Wells Airport
  - UAS Werx
  - NCTCOG - Transportation

**Issues**
- Reckless recreational users
- Lack of Airmanship
- Public Awareness

**Possible Solutions**
- Know Before You Fly Workshops
- Informational Brochures
Legislation

Working Group Members

- Aaron Barth  
  City of Fort Worth
- Candy Slocum  
  North Central Texas InterLink, Inc.
- Chad Sparks  
  Bell
- Chuck Allen  
  American Airlines
- Jamie Moore  
  Johnson County
- Paul N. Wageman  
  Winstead PC
- Peter Morgan  
  US Navy-FAA Liaison Officer
- Romeo Durscher  
  DJI
- Amanda Wilson  
  NCTCOG - Public Involvement

• Issues
  - Lack of Police Enforcement Power
  - Lack of Local Jurisdiction

• Possible Solutions
  - Model Ordinance
  - State Law Mirror Federal Law (New Reauthorization Language)
Training

Working Group Members

- Aaron Barth (City of Fort Worth)
- Candy Slocum (North Central Texas InterLink, Inc.)
- Chad Sparks (Bell)
- Chuck Allen (American Airlines)
- Jamie Moore (Johnson County)
- Paul N. Wageman (Winstead PC)
- Peter Morgan (US Navy-FAA Liaison Officer)
- Romeo Durscher (DJI)
- Ernest Huffman (NCTCOG - Transportation)
- Jessica Mason (NCTCOG - Emergency Preparedness)
- David Dean (NCTCOG - 911)
- Kasey Cox (NCTCOG - 911)

• Issues
  • Lack of Trainers
  • No Standardization
  • Limited Labor Pool

• Possible Solutions
  • Create Standardized Training
  • Promote drone programs at all education levels

• Existing Groups
  • PSURT Committee and Team
  • UAS Werx
Integration

Working Group Members

Karen VanWinkle  Arlington Municipal Airport
Michael Smith  Bell
Chad Sparks  Bell
Paul Sichko  DFW Airport
Robbie Terrell  DFW Airport
Romeo Durscher  DJI
Mark Hays  Dallas County Community College District
Aaron Barth  City of Fort Worth
Jordon Carmona  City of McKinney
Wayne Sanderson  Mineral Wells Airport
Peter Morgan  US Navy-FAA Liaison Officer
Paul N. Wageman  Winstead PC
Charles Gbadebo  Skystream Aerial, LLC
Ernest Huffman  NCTCOG - Transportation
Kathrine Powers  NCTCOG - Environment and Development

• Issues
  - Remote ID
  - Flying over people
  - BVLOS
  - Automation
  - Air Taxi Integration

• Possible Solutions
  - Flight Testing
  - Planning Studies
  - Unmanned Traffic Management

• Existing Groups
  - Lone Star UAS Center of Excellence & Innovation
  - Uber Elevate/Bell
Meeting Schedule
Option 1

Working Group Kickoff Day- January 8th

Education and Public Awareness
- 1st Session 8-10am

Legislation
- 2nd Session 10-12pm

Training
- 3rd Session 1-3pm

Integration
- 4th Session 3-5 pm
Meeting Schedule

Option 2

Working Group Kickoff Week January 7th -10th

Education and Public Awareness
- January 7th 10am – 12pm

Legislation
- January 8th 10am-12pm

Training
- January 9th 10am-12pm

Integration
- January 10th 10am-12pm
Next Steps

- Working Group Participants
- Determine Working Group Leaders
- Working Group Meeting Schedule
Questions?
UAS Safety and Integration Initiative

Know Before You Fly Workshops
What are the Workshops?

- Six workshops for general public interested in recreational and commercial UAS operations
- Locations throughout the Dallas-Fort Worth region
- Promote FAA Know Before You Plan Resources
- Promote various regional UAS initiatives and resources
- Each workshop will last approximately 4 hours
Workshop Content

• UAS legislative and regulatory environment
• Difference between recreational and commercial pilots
• Education on Part 107 and how it applies to the recreational user
• UAS Safety and Airspace knowledge
• Introduction to FAA’s Know before you fly resources
• Introduction to FAA LAANC process
• Training resources
• Best Locations to fly
Workshop Content

• Part 107 and how it applies to the Commercial User
• Insurance resources
• Professional UAS pilot training resources
• Market opportunities in area
• Career options in area
Workshop Trainer Requirements

1. Ability to teach a minimum of six workshops
2. Ability to collaborate with other training companies, industry and local government
3. Create course content outline
4. Outline should include concept for different themes for each workshop based on location
5. Explain the training process
6. Provide number of instructors
7. Provide qualifications for personnel/instructors
Workshop Booklet

• Agenda
• Key information
• Pilot resources
• Sponsorship page
• Training options (sponsored pages)
• Airport contact information page
Sponsorship Opportunities

Two separate sponsorship options

**Overarching Sponsorship**
Your company name and logo used in workshop communications
Featured as an Know Before You Fly Workshop Sponsor on the NCTCOG Website (logo - with link to sponsors website)
An exhibitor table to display your organization’s materials each workshop
Full page in the program

**Lower Tier Sponsorship**
Highlighted in Booklet