URBAN AIR TAXIS
EXPLORING THE PIONEERING OPPORTUNITIES OF TOMORROW

What will revenue streams will be generated?
How big is the market?
Who will dominate in the value chain?
How can this market be monetized?
Which are the most attractive cities for air taxi adoption?
Who is ready to invest in cities and supporting technologies?
## Air Taxi Ecosystem:
### Value Chain, Key Stakeholders, Main Roles and Responsibilities

### Stakeholders
- **Urban Integration**
  - Regulatory agencies
  - Judicial authorities
  - Ground airport/helipads
  - Air infrastructures: traffic controls
  - Public transport authorities
  - Energy providers
  - Insurance providers
  - Licensing authorities

- **Fleet Management**
  - OEMs
  - Fleet operators
  - Maintenance and training providers
  - Public transport authorities
  - Lessors and banks
  - IT Solutions and software providers
  - Licensing authorities

- **Fleet Operations**
  - OEMs
  - Tax & car-fleet operators
  - Public transport authorities
  - Airlines & helicopter operators
  - Security solutions providers
  - Network providers
  - IT Solutions and software providers

- **MaaS Aggregators**
  - OEMs
  - Operators
  - IT software/apps
  - Network providers
  - eCommerce
  - Marketing & advertising firms

### Roles & Responsibilities
- **Air Taxi Technology**
  - OEM: Aviation
  - OEM: Automotive
  - OEM: Disruptors
  - System Suppliers
  - IT solutions and software providers
  - Certification authorities
  - Test centers

- **Urban Integration**
  - Concept & development
  - Research & test
  - Certifications
  - Production

- **Fleet Management**
  - Licensing
  - Acquisition
  - Maintenance
  - Human resources
  - Training

- **Fleet Operations**
  - Transport services
  - Managed Services
  - Booking and passenger management
  - Weather/events
  - Securing infrastructure

- **MaaS Aggregators**
  - Taxi rides
  - Co-Sharing
  - VIP services/concierge
  - Personalisation services
DEMAND <> SUPPLY: PERCEPTIONS, PROBABILITY & POTENTIAL

100+ smart cities analyzed across 60 attractiveness parameters assessing transport habits and aviation capabilities

Top 10 cities - most attractive destinations to host urban aero mobility (UAM) capability

Regionally balanced list of 12 cities extracted from top 5 cities in 5 regions

- PERCEPTION
- WILLINGNESS
- ADDRESSABLE JOURNEYS
- PRICE POINT
- OPERATIONS PERSPECTIVES

4,669 customer/citizen surveys

- PERCEPTION
- TECHNICAL CRITERIA
- COST PER FLIGHT HOUR
- OPERATIONAL VIABILITY

60+ value chain stakeholders

Image source: Freepik, gettyimages
Number of cities that will host commercial UAM operations

<table>
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<th>Year</th>
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<tr>
<td>2030</td>
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<tr>
<td>2040</td>
<td>33</td>
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<td>2051</td>
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</table>

Based on demand perceptions, passenger volumes and per journey operating margins, the Air Taxi business is considered to be operationally and financially viable.

Indicated service price per journey across all the surveyed cities is higher than the cost per flight hour (CPFH) perceived by value chain stakeholders.

Across the 12 cities surveyed, potential customers would be willing to pay between $17 and $50 for shared Air Taxi trips (like a carpool) and $50 and $110 for personal Air Taxi trips (like an Uber).
Nearly half of all consumer/customer survey respondents declared that they would definitely or probably use **AIR TAXIS** as a transportation option in the future.

In addition, the age group over 50 is the least likely to use Air Taxis meaning that the overall percentage of potential customers willing to fly in them will steadily increase over time.

Travel time is the main determining factor for consumers when selecting a transport mode for daily work commutes.

Respondents indicated that trip cost/price was a more of a concern than safety.

Stakeholders identify battery energy density limitations as the most impactful technology affecting progress in the development and implementation of Air Taxi platforms.

**PROBABILITY: HIGH & ATTRACTIVE**
The Serviceable Addressable Market (SAM) across intercity and intracity journey types is estimated to generate **$2.7 trillion** in OEM and operations services revenues by 2040.

By 2040, cumulative consumer demand will translate into the need for more than **2.5 million** Air Taxi platform units across the various vehicle capacity types.

**London** tops the ranking of cities assessed to be the most attractive to host Advanced Air Mobility / Urban Air Mobility (AAM/UAM) operations.

However, **Dubai** is set to become the first city, globally, to host commercial AAM/UAM operations in **2025**.

*Image source: Freepik, gettyimages*
Air Taxi services providers should plan for a mixed fleet, offering both 2 and 4 passenger options as this will fulfill most demand requirements.

Meeting the demands of intercity, AAM travel should be considered a knowledge-building step toward developing/implementing intracity solutions.

Infrastructure planning should account for a network of small vertiports dispersed across a city.

While there will be significant future demand for Air Taxi services, large AAM aircraft will likely be used initially for cargo transport. This is due to the lower regulatory barriers and comparatively easier waiver process for unmanned aircraft flying along defined air routes.
Stakeholders should determine the demand and potential for cargo transport as well as related platform design strategies. Air Taxi developers should design modular platforms that support applications across cargo, passenger, and mixed fleets.

Stakeholders need to recognize the critical importance of communication across the value chain. Air Taxis and other airborne vehicles will need to be compatible with a unified digital infrastructure, manage communications, and ensure seamless data transfer across all autonomous platforms, and between platforms and data centers.

**Collaboration & Coordination**

Stakeholders should engage with local governments and urban planners of cities that exhibit the most readiness for Air Taxi integration. Significant coordination will be required to ensure consensus on the development and implementation of operating/technology standards.

**Supply Chain Restructuring**

The aviation industry will need to dramatically rethink and overhaul its supply chain to ensure that it effectively serves large-scale demand. Synergizing learnings in certification and product development areas through sustained partnership between automotive and aviation industries will be instrumental in meeting spiraling demand.

*Image source: Freepik, gettyimages*
WRAP UP

REPORT AVAILABLE FOR LICENSING

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QUESTIONS?
Weather Impacts All Our Decisions…

…Aviation Autonomy Is An Unprecedented Micro-Weather Challenge …

…UAS Industry Must Care About This…

…It will Take an ecosystem of Weather Sensors
How Do We Know This?

TruWeather is a micro weather data and analytics company that provides weather insights to Autonomous Systems.
TruFlite V360° is an All-In-One SaaS platform empowering Unmanned Aerial System operators, dispatchers and airspace managers to safely optimize flight time and increase business margins 40% when weather is a factor.
**One Stop Shop Capabilities**

Our SaaS analytics platform integrates a hugely fragmented market of the best data suppliers and sensors to acquire the most relevant weather intelligence for ubiquitous flight.

**Targeted Mission Planning and Execution**

TruFlite V360° provides the user with the right data, for the right time, the right location and the right application.

**Weather Cost Recovery**

TruFlite’s tailored and actionable insight increases vehicle utilization rates, optimizes resources and customer scheduling by targeting the best flight windows—more flying means more revenue.
WE ACCELERATE THE COMMERCIALIZATION OF PROVEN NEXT GENERATION SCIENCE AND TECHNOLOGY INTO OUR ROBUST PLUG AND PLAY MICRO-WEATHER ANALYTICS PLATFORM

• 35 Years In Aviation/Logistics Operations and Weather Systems
• Can Integrate Proprietary Customer Weather Sensors
• Proven US Air Force Framework to Increase Operations Effectiveness
• Recognized Globally For Emerging Smart City Weather Solutions
Our Weather Infrastructure has a “Weather Data Dead Zone” in the lowest 5,000 Feet of the Atmosphere.
An Ecosystem of New Generation Weather Sensors Required to Close the “Weather Data Dead Zone” Gap and Improve Weather Knowledge and Predictions
The Reality

• Governments Cannot Solve This Alone
  • Lack Resources ($3T US Deficit)
  • Inter-Agency Bureaucracy

• Public – Private Partnerships
  • “CASA-model”
  • Incentive Sensor constituencies
  • Can address UAS weather gaps

• Requires Agility and Rapid S&T Transition
New Aviation Weather Paradigm

• Follow NASA/FAA UTM federated approach
• Weather Supplemental Data Service Providers (SDSP)
• Certify “weather data” rather than “instruments”
• Data performance and risk-based standards
• Business model to incentivize infrastructure investment
  • States and local municipalities; private investors
Urban Canyon Adds Complexity to Weather Measurement Gap...

Credit: NASA AMES Research Center, Dr. John Melton
TRUWEATHER’S R&D TO BUILD AND COMMERCIALIZE THE FIRST URBAN WIND PREDICTIONS CONFIGURABLE TO ANY CITY FOR DRONES AND AIR TAXIS WORLDWIDE
Future Smart City Weather Data Collection Ecosystem

Integral to Smart City Infrastructure Planning

Array of Sensors
Performance-Based
Public-Privately Funded
Government Oversight
Weather SDSP Ecosystem Managed
Contact Info

Thank you

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- TruWeather Solutions
- Reston, VA/Syracuse NY/Albany NY/Grand Forks ND
- Don.berchoff@truweatherolutions.com
- http://www.truweatherolutions.com
Remote ID, Ops Over People & At Night

Dawn M.K. Zoldi, CEO & Founder - January 26, 2021
Overview

• Intro
• Remote ID
• OOP
• Night Ops
• Resources & Questions
Intro

• *Disclaimer

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• www.facebook.com/p3techconsulting
Remote ID

• History & Purpose
• Applicability - and Not
• How it Works
  • Standard RID
  • Broadcast Module
  • FRIA
• Message Elements
Remote ID (Con’t)

Breaking Down the US Rollout of Remote ID
A Look at New FAA Remote Identification Regulations

Rules Go Into Effect, But No Impact on Drone Pilots for 30 Months

While the rules may go into effect as early as March 2021, the FAA has allowed for a 30 month period before any operational rules go into effect, although industry stakeholders will need to take action sooner.

After this 30 month period, the rules require all unmanned aircraft that need to register with the FAA to remotely identify. Notably, this excludes drones weighing 0.55 lbs or less, unless operated under Part 107 or another criteria that would require registration.

Three Ways to Remotely Identify:

1. **Standard Remote ID**
   - A pilot purchases a drone that broadcasts telemetry and other information to its surroundings (likely via Bluetooth or Wi-Fi).

2. **Install a Remote ID Broadcast Module**
   - A pilot purchases a separate broadcast module, installs it and registers the module’s serial # for the aircraft.

3. **Fly in a FAA-Recognized Identification Area (FRIA)**
   - Working with other organizations, the FAA will establish geographic areas where drones not equipped with Remote ID can fly.

Actions Required of Manufacturers and Applications Open for FRIA

1. **New Aircraft Must Meet Standard Remote ID Requirements**
   - Manufacturers must install RID capabilities on all new drones to meet Standard Remote ID requirements (#1 above).

2. **FRIA Application Window Opens**
   - Recognized community-based organizations, educational institutions and more can apply to establish a FRIA. FRIA authorizations are valid for 48 months.

Remote ID Rules Published

The FAA is expected to publish the final rules by early February. The Federal Register will be updated with the notice in the Federal Register any day now. The Federal Register will be updated with the notice in the Federal Register any day now.

New ID Rules Published

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January 2021
- Remote ID rules become law

March 2021
- New ID rules become law

August 2022
- Manufacturer compliance required

August 2023
- All registered UAWs must use RID

V1.0 / Find more insights at droneanalyst.com
OOP

- History
- Applicability & Not
- What it Allows
  - Moving Vehicles
  - At Night
  - *Open Air Assemblies
## OOP (Con’t)

<table>
<thead>
<tr>
<th>Category</th>
<th>Additional Requirements</th>
<th>Ops Permitted</th>
</tr>
</thead>
</table>
| **1:** < 0.55 pounds at take-off + no exposed rotating parts to lacerate human skin | None | • OOP  
• briefly transit over moving vehicles  
• dwell over moving vehicles only if UA remains w/in/over closed or restricted-access site + humans inside vehicle w/in site on notice  
• op in sustained flight over open-air assemblies only if meets Standard RID/RID broadcast module requirements |
| **2:** > 0.55 pounds/no airworthiness cert; not create >11 ft lbs damage, no exposed rotating parts, no safety defects | • **Pilot**: display label on UA that can conduct Cat 2 ops; have OIs incl. lims + OOPs cats for DOC  
• **Manufacturer**: MOC + (DOC) + product support and notification process | • OOP  
• briefly transit over moving vehicles  
• dwell over moving vehicles only if UA remains w/in/over closed or restricted-access site + humans inside vehicle w/in site on notice  
• op in sustained flight over open-air assemblies only if meets Standard RID/RID broadcast module requirements |
### OOP (Con’t)

<table>
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<th>Category</th>
<th>Additional Requirements</th>
<th>Ops Permitted</th>
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</thead>
<tbody>
<tr>
<td>3: &gt; 0.55 pounds/no airworthiness cert; not create &gt;25 ft lbs damage, no exposed rotating parts, no safety defects</td>
<td>• Same as Cat 2</td>
<td>• OOP &amp; vehicles only when op w/in/over closed or restricted-access site + all humans on notice or SUA is flying over humans directly participating in op or located under a covered structure or inside a stationary vehicle providing reasonable protection from it if it falls. • NO ops over open-air assemblies</td>
</tr>
<tr>
<td>4: Part 21 airworthiness cert + op’d IAW oplims in approved Flight Manual or as otherwise specified by the Administrator</td>
<td>• must have mx, preventive mx, alterations or inspections performed by qualified persons IAW rule requirements</td>
<td>• IAW approved Flight Manual • sustained flight over open-air assemblies when the op standard RID or RID broadcast modules requirements met</td>
</tr>
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- **Plus:** inspection, testing & compliance demonstration provisions; expands the list of who can make the “ask” for various documents beyond FAA.
Night Ops

- New Training
  - Available March 1, 2021
  - Applicable March 16, 2021
  - Initial will also now include night ops.
- SUA must have operational anti-collision lights w/ sufficient flash rate + vis for 3 statute miles.
## Timelines

**Clock starts:** January 15, 2021

<table>
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<th></th>
<th>RID</th>
<th>OOP</th>
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<td><strong>Effective</strong></td>
<td>Start + 60 days</td>
<td>Start + 60 days</td>
<td>Start + 60 days</td>
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</table>
| **Operators**     | + 30 months       | • Cat 1: Effective date  
                    |                   | • Cat 2 - 4: MOC/DOC*  
                    |                   | *some ops RID on board  
                    |                   | Effective date w/ right training |
| **Manufacturers** | + 18 months       | • MOC/DOC (9 - 12 mo?) | N/A                       |
Resources & Questions


• IUS RID Article: https://insideunmannedsystems.com/3-2-1-done-remote-id-rule-is-final. + Stay Tuned for Feb/Mar IUS!

• Final OOP Rule: https://www.federalregister.gov/documents/2021/01/15/2020-28947/operation-of-small-unmanned-aircraft-systems-over-people

• IUS OOP Article: https://insideunmannedsystems.com/oops-there-it-is/

• Contact Me: dawn@p3techconsulting.com
Thank You!
North Texas UAS Safety and Integration Task Force

Working Group Rosters
## Education and Public Awareness

<table>
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<th>Name</th>
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<tr>
<td>Maggie Schuster</td>
<td>Your Aerial View (Leader)</td>
</tr>
<tr>
<td>Evan Merelli</td>
<td>ELM Aerial Services (Second)</td>
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<tr>
<td>Arjuna Fields</td>
<td>FAA</td>
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<tr>
<td>Candy Slocum</td>
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<tr>
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<td>Chris Jenseth</td>
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<tr>
<td>Christa Slejko</td>
<td>Dallas County Community Colleges - North Lake</td>
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<tr>
<td>David Setzer</td>
<td>NCTCOG Workforce Development</td>
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<td>Black Girls Drone</td>
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<td>Kenneth Bergstrom</td>
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<tr>
<td>Linda Brady</td>
<td>Dallas County Community Colleges - Brookhaven</td>
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<tr>
<td>Louise Jupp</td>
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<tr>
<td>Mario Herrera</td>
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<td>Ron Poynter</td>
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<td>Scott Dodson</td>
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## Legislation and Policy

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<tr>
<td>Michael Hill</td>
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# Training and Workforce

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<tr>
<td>Wes Jurey</td>
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<td>ASCM Assn of Supply Chain Management</td>
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# Integration

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<tbody>
<tr>
<td>Russell Julian</td>
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<tr>
<td>Apoorva Bajaj</td>
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<td>Natalie Bettger</td>
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<tr>
<td>Robbie Terrell</td>
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<tr>
<td>Adrian Doko</td>
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<tr>
<td>Scott Shtofman</td>
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</tbody>
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Schedule

Next week 2.2.20

Education and Public Awareness – 9:00 am to 10:00 am
Legislation – 10:30 am to 11:30 am
Training – 1:00 pm to 2:00 pm
Integration – 2:30 pm to 3:30 pm
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