Urban Air Mobility
VISION
Keeping Utah Moving
“everything from improving our roads and traffic lights to providing alternate means of getting from A to B”

MISSION
Innovating transportation solutions that strengthen Utah’s economy and enhance quality of life.

Division of Aeronautics
- Vision
- Elevate Life
- Utah's motto is "Life Elevated;" at the Division of Aeronautics, we "Elevate Life" through a safe and effective aviation system.
Commercial Drones are Taking Off
Projected worldwide market growth for commercial drones

- Revenue (in billion U.S. dollars)
  - 0.6
  - 0.8
  - 1.1
  - 1.6
  - 2.4

- Drones sold (in thousands)
  - 3.6
  - 5.3
  - 7.6
  - 10.1
  - 12.6

2016: 110
2017: 159
2018: 246
2019: 392
2020: 634
2021: 996
2022: 1,414
2023: 1,909
2024: 2,329
2025: 2,679

Source: Tractica
Number of passenger drones in operation worldwide (forecast)

Passenger drones in UAM operations [’000#]

- Intercity flights
- Air taxis
- Airport shuttles

2020: 3
2025: 12
2030: 28
2035: 53
2040: 75
2045: 98
2050: 100

Note: Estimated that ~100 cities will have UAM operation in 2050.
When will UAM become a commercial reality?
Respondents expect UAM routes to become profitable by 2025, and become viable for daily commuting by 2040.

When will the first commercial eVTOL air taxi route open to the public at a profitable scale (with or without subsidy) somewhere in the world?
- Min: 2020
- Max: 2040

When will this happen in London?
- Min: 2021
- Max: 2030

When will commercial eVTOL air taxis become a cheaper option than ground transportation?
- Min: 2022
- Max: 2100+†

When will they become a viable option for the daily commute?
- Min: 2024
- Max: 2100+†

1) 10 respondents believed this would never occur; 2) Two respondents believed this would never occur.
- Public Perception
  • Will the Public Accept It?
  • What Will The First Headline Be?

- University of Maryland Drone Delivers Kidney For Successful Transplant
Three Questions UDOT needed to answer:

1. Privacy
2. Noise
3. Safety
Highways in the Sky

Urban Air Mobility
Airspace Typical Section

Urban Air Taxi Airspace
Package Delivery Airspace

800' AGL
600' AGL
400' AGL
- Planned Flight Corridors
- Assigned Altitudes by Direction of Flight
- Speed Limits on “Lanes”
- Commercial Vehicles must be “Street Legal”
- **Airspace Design Demo**
Start With the End In Mind

- End Result
- Work Backwards
- First Considerations
Hardware and Software
Hardware

ADS-B
Link with manned aircraft

GPS-RTK
Precision Vertical Operations

RADAR
Detection and Avoidance

5G / DSRC
Seamless Connectivity
Current Statewide GPS Network Coverage
The Utah Reference Network (Turn GPS)
Unmanned Traffic Management (UTM) Integration Software and A-TOC

Software must integrate:
1. ADS-B / Radar
2. GPS-RTK
3. Wireless / DSRC
4. RWIS Weather
5. FAA Flight Approval
Aerial Traffic Simulations

- FOX 13 NEWS
If You Build It... They Will Come?

- Who is “They?”
- **Public Perception**
  - Will the Public Accept It?
  - What Will The First Headline Be?

- University of Utah Students helping UDOT predict future drone traffic
1.25 sq miles
UUHC Proposed Use Cases

UUHC PACKAGE DELIVERY USE CASES
The University of Utah Health Care system has brought forth 4 initial use cases for medical package delivery via drone.
The first stage will begin with a partnership with the University of Utah Health care team and key industry partners. This will allow us to research utilizing unmanned aerial systems for aerial package delivery. This will allow us to safely test an Urban Air Mobility system on a smaller scale while significantly improving the quality of healthcare delivery to Utah patients.

1. UUH to HCH: a distance of 1,000 feet carrying less than ten pounds of IV fluids.
2. Radiology to UUH: a distance of 1.1 miles carrying less than ten pounds of cancer treatment drugs.
3. IDS to CCTS: a distance of 1.3 miles carrying less than ten pounds of specialized surgical toolkits.
4. CTRM to UUH/HCI/OC/PC/SJHC: a varying distance between 0.6 and 2.2 miles carrying less than five pounds of lab specimens.
Recent News

- **University of Maryland Drone Delivers First Kidney for Transplant**
  • 28 April 2019 – CNN, NBC, BBC

- **University of Utah Team Working on How to Stay in Command of Coming Drone Horde**

- **Google’s ‘Wing’ Drone Delivery Business First to Get FAA Approval**
  • 23 April 2019 – Bloomberg, CNBC

- **Watch Airbus Vahana’s 50th Test Flight**
  • 28 February 2019

- **City Airbus eVTOL Prototype Makes First Flight in Germany**
  • 6 May 2019
North Carolina is the leading state in UAS and UAM implementation and is part of the FAA’s IPP program. They are currently testing medical deliveries using Utah manufactured radar and batteries. (Fortem Tech in Pleasant Grove, and EPS in Logan) They are successfully utilizing Matternet vehicles and AirMap software.

- Through NCDOT Aeronautics, the state has committed $2,500,000 per year to the development of UAS testing and infrastructure.

Ohio was not selected for the IPP program but is a close second to North Carolina. Through their ‘DriveOhio’ and ‘FlyOhio’ programs they have established a 33 mile corridor with the necessary infrastructure for both Connected Autonomous surface Vehicles as well as Urban Air Mobility vehicles.

- Through ‘FlyOhio’ the state has committed $4,900,000 per year to implement working autonomous infrastructure.

New York was also not selected for the IPP program but the state’s NUAIR alliance based in Syracuse is working towards their own UAS ‘ecosystem’ combining UAS infrastructure with economic development and business acceleration, local airports, unmanned traffic management, and flight testing.

- Through NUAIR, the state made an initial investment of $30,000,000 to develop a 50-mile flight traffic management system between Syracuse and Griffiss International Airport, in Rome, New York.

Nevada is part of the FAA’s IPP and NASA’s UPP. The states’ Nevada Institute for Autonomous Systems (NIAS) is currently delivering consumer goods packages via drone and is partnered with over 100 companies working to implement both surface and aerial autonomous vehicles infrastructure and operations.

- Through NIAS, the state has invested over $3,000,000 currently with plans for an additional $4,000,000 per year over the next 5 years.

Maryland successfully delivered a liver for an organ transplant from one hospital to another.

Kansas, North Dakota, and Virginia each have growing Urban Air Mobility programs within their state DOT Aeronautics divisions.
Path Forward

- Continued Safety Research
  • Traffic Simulations

- Establish Infrastructure Toehold
  • Small Area of Operational Infrastructure

- Management Delegation
  • Cooperative relationship between FAA and DOT’s

- Further engagement with UAM and UTM industry
  • Allow Space for Vehicle and Infrastructure Development
Questions:

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