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*Airspace Link*

*In partnership with*

*Beaumont Health Spectrum Health ◉ MissionGO*

## Drones Replace a Traditional Courier at Beaumont

*Speaker: Alice Griffith*

*Director of Business Development, Airspace Link*

## Disclosures / Potential Conflicts of Interest

- Alice Griffith has a vested interest in or an affiliation with Airspace Link products and services.

Note: This program may contain the mention of suppliers, brands, products, services or drugs presented in a case study or comparative format using evidence-based research. Such examples are intended for educational and informational purposes and should not be perceived as an endorsement of any particular supplier, brand, product, service or drug.

## | Learning Objectives

*At the end of this session, participants should be able to:*

1. Describe new drone technologies for transportation of samples, goods or people in a health system.
2. Review the advantages of drones & how these technologies can assist with reducing cost and lead to an overall improvement with patient care.
3. Identify government financing and strategies for assistance with these new technologies.

## | Problem Statement

Every hospital has a significant spend on transportation. This currently involves using internal combustion vehicles that add to pollution and require expensive maintenance and rely on non-renewable sources of energy



# Presentation Agenda

- Drones 101
  - Medical Aircraft Platforms
  - State of the Industry
- Case Study Specifics
  - Project Team
  - Project Scope
  - Workplan
  - Benefits & Success Metrics
- Operations Overview
  - Risk Assessment
  - 10 days; 40 Flights, 2 Healthcare Locations
  - Video & Final Report
- Value Proposition
  - Benefits for Patient Care
  - Use Cases & Medical Applications
- Closing & Summary



# Drones 101

- Medical Aircraft Platforms
- State of the Industry

ARE YOU READY FOR  
THE NEXT DIMENSION  
OF MOBILITY?

MISSION

MISSION GO  
UNMANNED SYSTEMS

H020042

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# Drones 101 – Medical Aircraft Platforms (UAS/Drone – Small Package Delivery)

## Medical Drone Matrix

All Aircraft listed are required by the FAA to weigh 55 lbs & under, inclusive of payload. Focus is for Autonomous Small Package Delivery



Drone Company:  
Home Country:  
Aircraft Model:  
Payload:  
Speed:  
Range:  
Max Flight Time:

**Matternet**  
**Germany**  
Quadcopter  
2 kg (4.4 lbs)  
25 mph  
10 km (6.25 mi)  
20 min

**Zipline**  
**Africa**  
Fixed Wing  
3 lbs  
90 mph  
93 miles  
45 min

**Flirtey (SkyDrop)**  
**Australia**  
Quadcopter  
2 kg (4.4 lbs)  
40 mph  
20 miles  
120 min

**Spright**  
**USA**  
Multicopter/ Hybrid  
5 kg (11 lbs)  
89 mph  
75 km (46 mi)  
90 min

**MissionGO**  
**USA**  
Rotorcraft  
22 lbs  
80 mph  
25 mi  
90 min

**DHL Parcelcopter**  
**Germany**  
Tilt-Wing Rotorcraft  
13 lbs  
93 mph  
28 mi  
65 km

**Swoop Aero**  
**Australia**  
Multicopter/ Hybrid  
3 kg (6.6 lbs)  
124 mph  
175 km (108 mi)  
60 min

**Drone Delivery Canada**  
**Ontario, Canada**  
Rotorcraft/Multirotor  
8.8 lbs  
50 mph  
20 km (12.4 mi)  
75 min

Unique Facts:

UPS Partnership  
Kiosk Custody Locker



**\*Standard Part 135 Approved**

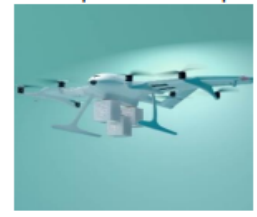
Parachute Drop  
Launch Pad Required:



Single Winch Drop

USA Wingcopter Partnership

Triple Winch Drop



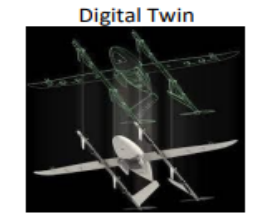
2 Payload Sizes:



Africa Wingcopter Partnership  
**\*No testing yet in USA**

North Sea Island, Juist  
**Africa Operations:**  
Tanzania  
Mwanza  
Reit im Winkel to  
Winklmoosalm

Skyports Partnership  
UK & Kenya Operations



**\*Canadian Transport License Approved**  
Certified Parachute

Healthcare Partners:

CVS,  
The Villages, FL

Cardinal Health,  
Intermountain Healthcare

Vault Health,  
REMSA Health

Air Methods,  
Interpath

United Network of Organ  
Sharing (UNOS), Various  
OPO's,  
Beaumont Health

Direct to Patient Care

UK's National Health  
Service (NHS), BD Rowa  
(Pharma Logistics)

Halton Healthcare

Source: Data generated by Airspace Link for Market Industry Study on medical UAS Platforms.



# Drone 101 – State of the UAS Industry

UAS – Uncrewed Aerial System

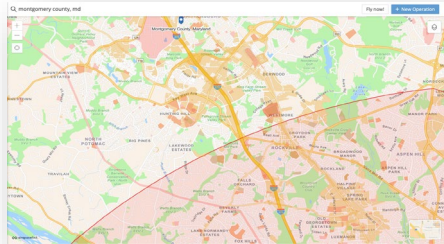
**Shared USE infrastructure is needed**



**2015 – 2019**

## Flying a drone Line of Sight, safely & legally

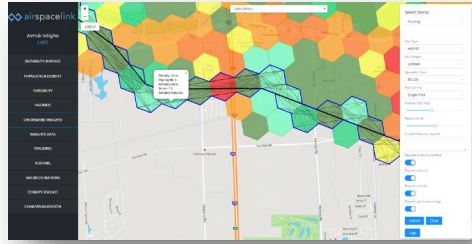
Commercial Vehicles emerge; FAA issues Part 107 (LOS) & enables digital authorizations (LAANC) for flying in controlled airspace



**2019 – 2021**

## Flying a drone Beyond Visual Line of Sight

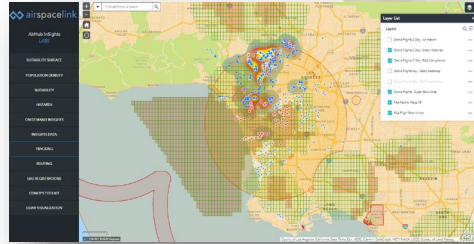
Proof of Concept demos expand, FAA requires operator safety cases & waivers for advanced approvals to fly BVLOS.



**2021 – 2024**

## Flying Advanced drone operations at scale

Partnerships form; State Governments implement UAS Traffic Management and Surveillance functions; local cities start infrastructure



# Is Drone Delivery Real?

## Walmart expands its drone-delivery service to reach 4 million households

PUBLISHED TUE, MAY 24 2022-6:00 AM EDT | UPDATED TUE, MAY 24 2022-6:00 AM EDT



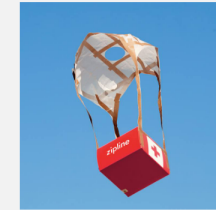
### WakeMed launches drone program with test in Raleigh

Swiss company Matternet began testing its delivery drones in Raleigh, a program operated by the North Carolina Department of Transportation by the Federal Aviation Administration.

### Intermountain Healthcare and Zipline Partner to Bring Care Closer to Patient Homes with Automated, On-Demand Delivery

Nov 11

Zipline, the global instant logistics leader, today announced a first-of-its-kind partnership with Intermountain Healthcare. Together, Zipline and Intermountain Healthcare will deliver prescriptions and medical supplies to patients in the Salt Lake City metro area. The operation is expected to grow over a multi-year period to ultimately complete hundreds of deliveries each day and be capable of delivering to approximately 90 percent of patient homes in the region.



## America's largest retirement community can soon receive their prescriptions from CVS via a UPS drone delivery service



### Cities standing up drone delivery services today:

- **Hospitals:** Winston-Salem, NC (Wake Med); Salt Lake City, UT (Intermountain)
  - **Pharmaceuticals:** The Villages, FL (CVS); Christiansburg, VA, & Frisco & Little Elm, TX (Walgreens)
  - **Walmart:** Fayetteville, NC; Bentonville, AR + 37 more sites (Reach 4M households)
  - **Amazon Prime Air:** College Station, TX & Lockeford, CA (Amazon package delivery to homes)
  - **Food Delivery Brands:** Kroeger, Papa Johns, Jersey Mike's, El Pollo Loco, Ben & Jerry's + locals

Source: **Wake Med:** <https://www.modernhealthcare.com/care-delivery/wakemed-health-hospitals-joins-forces-ups-faa-drone-pilot#> **Intermountain:** <https://www.upr.org/utah-news/2021-11-23/intermountain-healthcare-to-use-drones-to-deliver-medications>; **Walmart:** <https://www.cnn.com/2022/05/24/walmart-expands-drone-delivery-service-to-reach-4-million-households.html>

## Case Study Specifics

- Project Team
- Project Scope
- Workplan
- Benefits & Success Metrics

# Case Study – Project Team

## Participants

### Public Sector



FAA Approved Operations

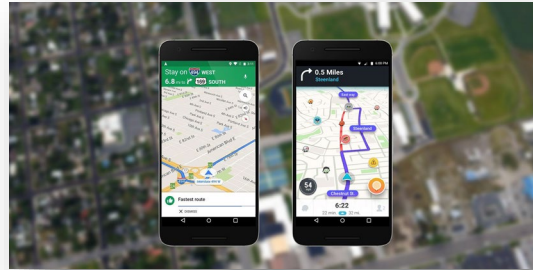


MICHIGAN ECONOMIC DEVELOPMENT CORPORATION

MICHIGAN OFFICE OF FUTURE MOBILITY & ELECTRIFICATION

Mobility Funding Platform  
Provides Project Funds

Think Waze or Google Maps for Drones



airspace link™

Provides the digital infrastructure, project management and professional services

### Private Sector



MISSION GO  
UNMANNED SYSTEMS

Delivers flight testing, in a real-world environment, using proprietary aircraft to execute drone operations



Beaumont Spectrum Health

Provides facility access, payload (cargo) contents, clinical feedback if desired, & POC feedback.

# | Case Study – Scope of Work, Deliverables & Timeline

## Phase 1 – Planning & Assessments (90 days)



- Software Setup
- Site Selections
- ConOps Generation
- Risk Assessments (60-90 days)

## Phase 2 – Real-World Operations (60 days)



- Site Inspections
- Flight Testing
- Operational Showcases
- Data Collection (30-60 days)

## Phase 3 – Feasibility Analysis/ Final Report (45 days)



- Data Analysis & Modelling
- Site Suitability Analysis
- Cost/Benefit Analysis
- Economic Impact Analysis (30 days)

## Future Phases & Infrastructure



- Infrastructure Proposals
- Funding Support
- Crawl/Walk/Run Phased Integrations
- Workshops/ Training (Location Specific)

# Case Study – Strategy, Funding & Success Metrics

Available Federal & State Grants: SMART, BBBA, CMAQ, IJJA, JES, RAISE, NSF

- Total Funding: \$125K + \$63,650 In-Kind Contributions (**Total Project Value: \$188,650**)
- All pilot operations for BSHH operations were **funded through State of Michigan's** Office of Future Mobility; Michigan Economic Development Corporation
  - **Alignment with statewide initiatives:** 40-mile “Autonomous Corridor” from Detroit to Ann Arbor
  - **States leading the way in Advanced Mobility:** ND, MI, OH, NC, TX, UT

The primary objective of the pilot project was to enable a real-world operation to demonstrate how drones can be used as a new mode of sustainable, affordable, and reliable transportation for last-mile medical package delivery.

## Four quantifiable sections as focus areas to support deliverables & data collection:

- #1 Understanding of Transport time
- #2 Reduction in vehicle miles and/or minutes traveled
- #3 Understanding of operational logistics procedures and execution
- #4 Economic and community impacts

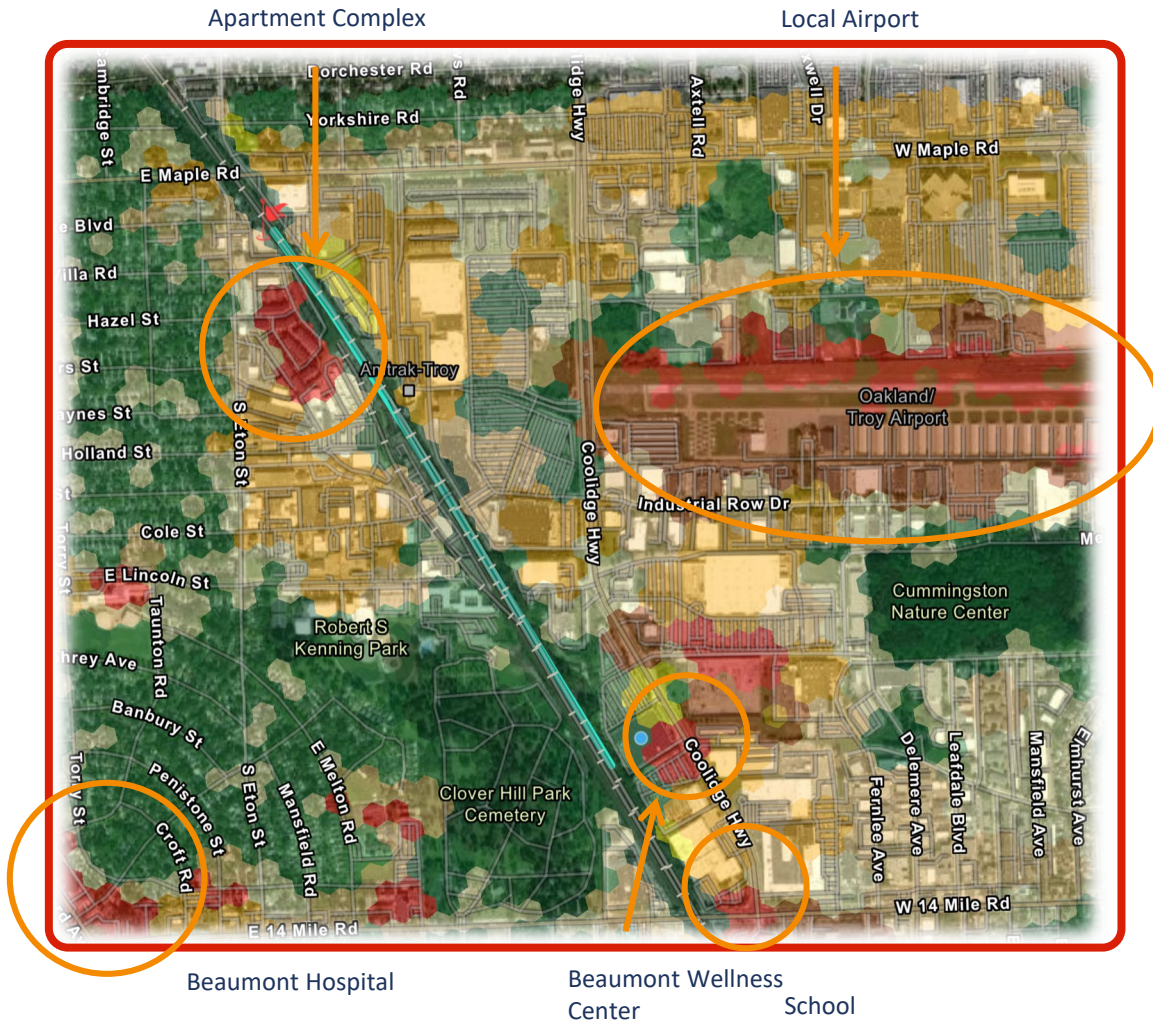
Source: **OFME Grant:** <https://www.michigan.gov/whitmer/news/press-releases/2021/09/15/governor-whitmer-announces-grants-to-accelerate-mobility-and-ev-investments-in-the-state>

# #OperationMiracleMile (Operations Overview)

- Risk Assessment
- 10 days; 40 Flights; 3 Healthcare Locations
- Brief Video

# Safety Assessment – Concept of Operations

## Risk Assessment



## Flight Path (1 mile)





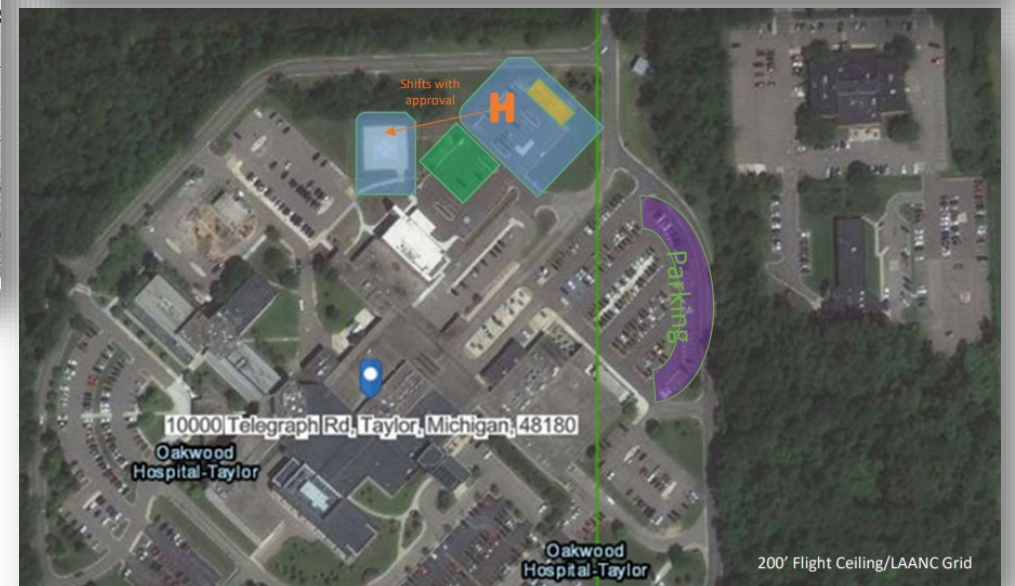
# Operation Miracle Mile – Type Operation Overview

## ConOps & Payload:

- 10 Days; 45 flights in total
- Parking lot to Parking Lot Delivery (1 mi drone leg – 1.5-mile drive)

## Payload Options:

- Small (5 lbs. or less)
- Large (15-20 lbs.)



Takeoff/ Landing Areas (Helipad)



Spectator Area



Operational Areas



Parking Area

# Success Metrics

## OPERATIONAL DATA

Total Flight Target: 40 flights (4 per day)  
 Achieved: 45; 5.5 canceled due to weather (12%)

Flight Time:

Drive time (current): 16 minutes

Drone (tested): 3.57 minutes

Hurdles: LOS, BVLOS = 25-50% reduction

Driver Cost p/mile: Hourly shift wages + fuel costs + vehicle purchase = \$20 p/mile

Drone Cost p/mile: Price per kw/hr (\$0.02 - \$0.50) + vehicle purchase/lease = \$10 p/mile

CO2 Emissions Calculation: Medium car with petrol produces 192 g/km (100 g/km exempt from car tax)

Data Chart



Source: Beaumont & MissionGo Data collected during Case Study and Real World Operational period (June 2022); Electricity costs: <https://www.rapidtables.com/calc/electric/electricity-calculator.html>; CO2: <https://ourworldindata.org/grapher/co2-transport-mode> - <https://e-amrit.niti.gov.in/co2-calculator>.

# Value Proposition

- Benefits for Improving Patient Care
- Use Cases & Medical Applications

# Value Proposition

How can drones facilitate greater patient care?

- 1. At-Home Delivery** – OTC medications, pharmaceuticals, Implants, Tissues, Blood, Test Kits, Vaccines, Pet Meds
- 2. Faster Patient Care** – Faster diagnosis with Blood testing, Specimen & Lab testing, Virus testing
- 3. Time Savings** – Telehealth can expand, beds can remain open for critical patients, and home delivery can keep the sick, elderly, or mobility-challenged individuals' home and comfortable.
- 4. Better for the Economy** – more economical than ground vehicles, reduced traffic, accidents, & CO2 emissions



## Value Proposition, continued

What are the medical use cases where drones can add value?

**Courier & Ad Hoc Delivery** – drones can run routine or independent operations at all times of the day or as needed; reducing labor and fuel costs, vehicle maintenance, and the need for hiring taxis

**Time Critical Delivery** – minutes matter when blood/platelets/plasma, or organs & biopsies need to move fast

**Campus Supply Chain** – routine deliveries to restock supplies and moving items between healthcare facilities

**Rural or Urban Package Delivery** – direct-to-consumer (patient) delivery, either on-site, at work, or at home

**Emergency & First Response** – AED deliveries, EpiPens or other equipment; imaging for the scene investigation



# Value Proposition

## Proposed Cost/Benefit Analysis Model



### BIOMEDICAL SAMPLES

Samples delivery in numbers (Rouen)



**4** hospitals



**55** units delivered per day per hospital



**57k** Biomedical samples delivered per year



**6.3** kilometres average delivery distance



**60** minutes (maximum) for each delivery completion



e-van



**1** e-van per hospital



**4** e-vans in total



**4** couriers



**42** minutes until delivery



**4.59** EUR per delivery

VS



Drones



**2.5** drones per hospital



**10** drones in total\*



**2** drone operators



**15** minutes until delivery



**1.92** EUR per delivery\*

\*Drones equipped with GPS and EGNOS operating in urban environment – open sky

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# Thank you...

Alice Griffith ◉ [alice.griffith@airspacelink.com](mailto:alice.griffith@airspacelink.com)

Melanie Fisher ◉ [melanie.fisher@beaumont.org](mailto:melanie.fisher@beaumont.org)

Ryan Henderson ◉ [ryan@missiongo.io](mailto:ryan@missiongo.io)