



Detroit Region Aerotropolis

Airspace Link AirHub Trial Final Report
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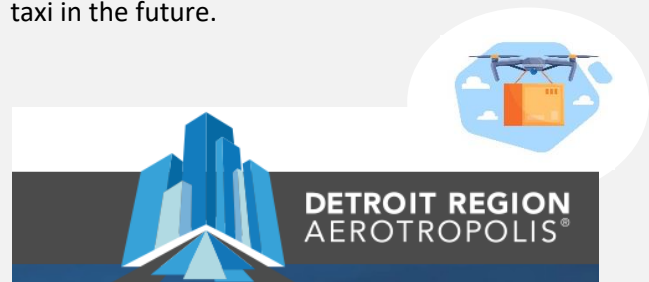
INTRODUCTION

“The Aerotropolis Board has directed me to actively pursue enabling technologies that build on our region’s multimodal transportation network.

Christopher Girdwood
Detroit Aerotropolis Executive Director

The **Detroit Region Aerotropolis** is a four-community, two-county, public-private economic development partnership driving corporate expansion and new investment around Detroit Metro and Willow Run Airports. The Aerotropolis is the premiere location for greenfield expansion in Southeast Michigan, offering 6,000 acres of development-ready land centered in a world-class network of transportation infrastructure. With two world class airports, access to three major interstates and five Class-A rail lines, the Detroit Region Aerotropolis is a prime location for global companies to build, expand, or develop.

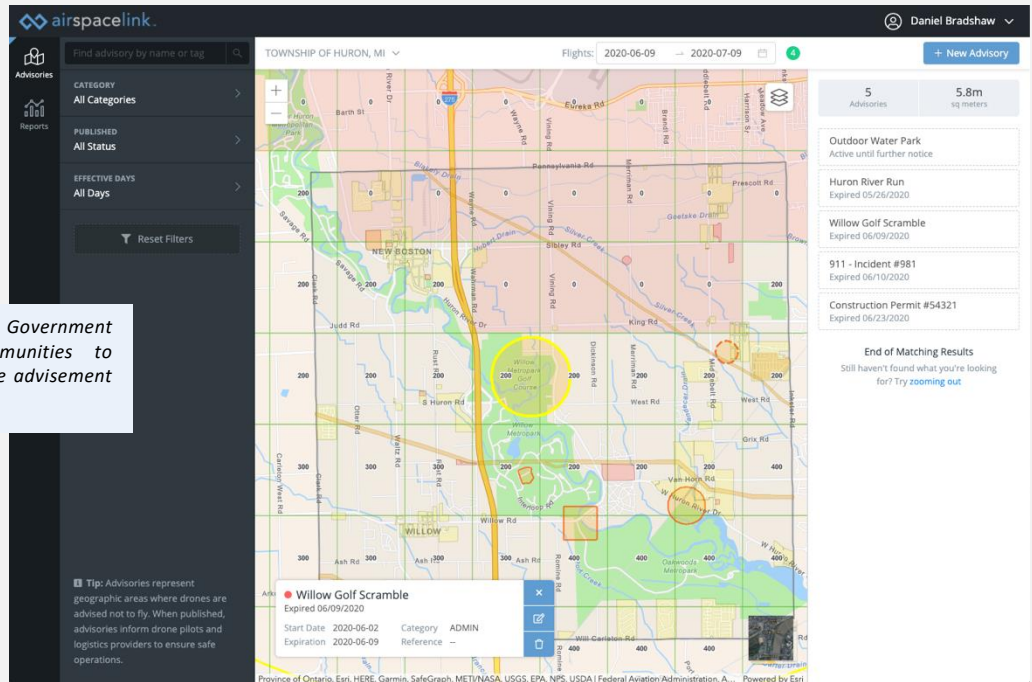
To stay competitive, the Aerotropolis region recently deployed the Airspace Link low altitude drone infrastructure to its local communities and airports to support the safe use of recreational and commercial drone use in the region. These capabilities provide a new type of Smart City mobility infrastructure supporting the growth of drone operations, drone service providers, drone manufacturing, package delivery and air taxi in the future.



“A means to safely open low altitude airspace for commercial activity”

Christopher Girdwood

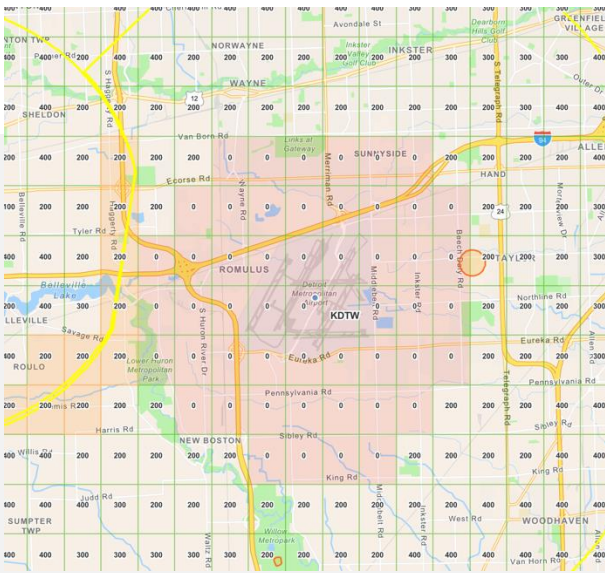
Detroit Region Aerotropolis



AirHub for Government empowers communities to participate in the advisement of local airspace.

Mobility has become as much about bits and bytes as it is about physical infrastructure. In smart cities, integrated mobility systems that include shared mobility services and autonomous vehicles, the Internet of Things, and advanced analytics enable people and goods to move faster, safer, cheaper and cleaner. Drones, also referred to as unmanned aircraft systems (UAS), encompass both the unmanned vehicle itself along with the ground-based controller and the system connecting the two.

Today, the uses and applications of UAS are increasing and diversifying. This expansion is enabled by technological advances, policy changes, and significant cost reduction in parts and manufacturing. In addition to recreational drone use, UAS and UAV are used across our Nation to support firefighting and search and rescue operations, to monitor and assess critical infrastructure, to provide disaster relief by transporting emergency medical supplies to remote locations and to aid efforts to secure our borders. These uses case are only a subset of all the potential applications of UAS technology that AirHub is designed to support.



OVERVIEW

In late December 2018, Gatwick Airport suspended all flights due to drone activity. The drone disrupted pre-Christmas flights in and out of London’s Gatwick airport for 33 hours costing airlines an estimated \$64.5 million. The reports caused major disruption, affecting approximately 140,000 passengers and 1,000 flights. This was a major wake-up call for airports and surrounding communities. Detroit Aerotropolis Region wanted to take action to better understand the risk of drones near the airport while supporting the growth of the industry.

The region is also seeking to promote economic growth and a high standard of living for its citizens by staying competitive and truly offering something that other communities can’t offer today. The Detroit Aerotropolis implemented a strategic plan to support the establishment of a low altitude drone infrastructure in its region.

CHALLENGE

The challenge was how to integrate Federal Aviation Administration (FAA), local Air Traffic Control (ATC), state, local governments and the drone industry into one centralized and standardized system, to ensure the safest possible conditions for vehicles in the air and people on the ground.

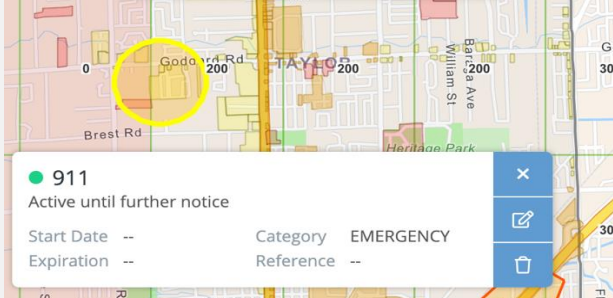
With the growth of drone activity, a new system of traffic control is needed in the skies above. Although entities, such as the FAA in the United States, have long had protocols for maximizing safety for manned aircraft, managing millions of drones in low altitude is a new challenge.

APPROACH

Airspace Link provided the Aerotropolis community a one-time implementation and setup of the AirHub platform along with training and a lightweight assessment that worked across five dimensions impacting technology adoption. Aerotropolis community participants provided GIS data, answered a few questions and reviewed the results generated by Airspace Link. After the Airspace Assessment was completed the results were compiled into recommendations. Airspace Link used the data to guide Aerotropolis community participants in training personnel and defining drone advisories and risk areas within the community over a 3 month test period.

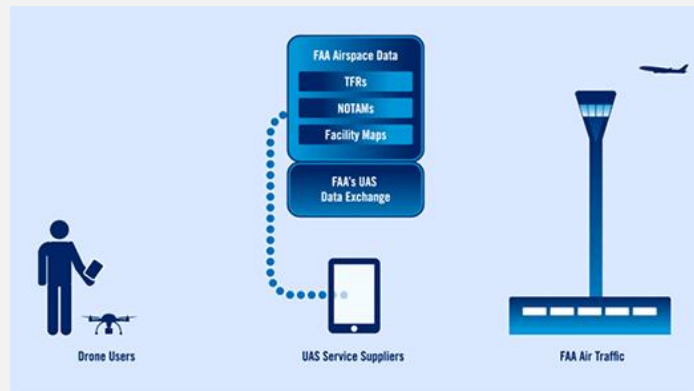
RESULT

The AirHub platform and data provided state and local governments a synergetic relationship between community and UAS operators by providing an automated system to inform operators about avoiding high risk areas and allow communities to understand the underlying demand of local commercial UAS activity.



Creating UAS Solutions

To help meet the demands of drones in local airspace, the FAA has introduced the UAS Data Exchange, a partnership between government and Airspace Link facilitating the sharing of airspace data between the two parties. Under this umbrella of cooperation, the first program available to drone pilots today is known as the Low Altitude Authorization and Notification Capability (LAANC). In the United States, the LAANC program is intended to directly support the integration of UAS vehicles into national airspace. Regulators are interested in supporting technology innovation while still providing air traffic professionals with visibility into where and when drones are operating.



Local governments such as those within the Aerotropolis region play an important role in supporting this industry and remain the strongest resource for the most up-to-date, on-the-ground information and local operational awareness capabilities. The Geographic Information Systems (GIS) data already being maintained by the Detroit Region Aerotropolis communities is paving the way for the construction of a new UAV infrastructure.

In January 2020, Detroit Aerotropolis licensed the Airspace Link AirHub platform in partnership with Michigan PlanetM (Mobility) and Michigan Unmanned Aerial Systems Consortium (MUASC) to establish and test a new low altitude drone infrastructure in the region. The complete AirHub platform including AirHub for Pilots and AirHub for Government was developed and implemented for all four Aerotropolis communities. Data from the communities, county, state, local and commercial sources were collected, processed and analysed to identify relevant hazards and risks associated with UAS operations occurring within Aerotropolis used for building safe "Highways in the Sky" that are in harmony with Aerotropolis community interests.



AirHub

For Government

The AirHub platform provides a near real-time data exchange between the FAA, state, local government and the drone pilots enabling the sharing of FAA UAS, local government and drone flight authorization data. For example, the FAA provides UAS facility maps, special use airspace, airspace classes, Temporary Flight Restrictions (TFRs) and Notices to Airmen (NOTAMs).

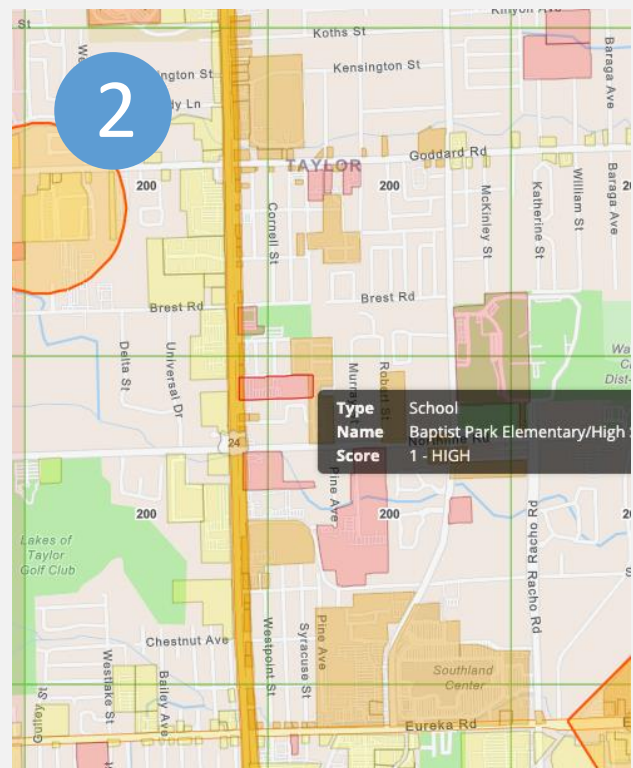
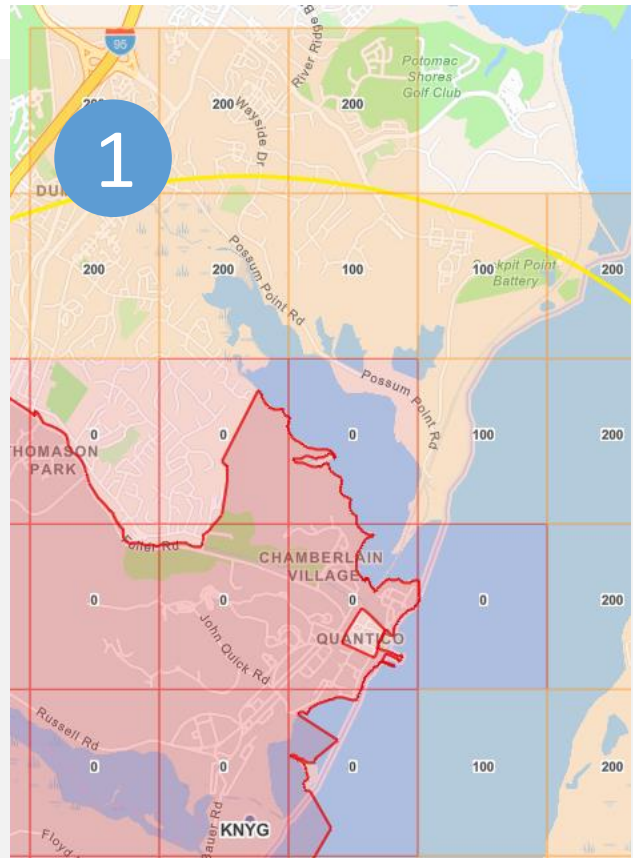
State & local government share authoritative ground base risk data, events and emergency locations. Local GIS data such as schools, hospitals, government buildings, helicopter pads, airports, stadiums, land use, zoning, population density (different times of the day), road rights-of-way, rules, regulations, and ordinances. Drone pilots in return provide locations of where and when they will be flying in controlled airspace.

1 Realtime Aviation Data

Airspace Link provides federal aviation data in real-time and ensures pilots meet piloting requirements before authorizing operations.

2 State & Local Authoritative Data

Enriched with local data, Airspace Link provides the most accurate operational data to pilots using the AirHub Platform.



Outcome / Lessons Learned

After reviewing the data and records captured throughout the trial Airspace Link captured key outcomes and lessons learned which apply to the Detroit Region Aerotropolis and other regional communities specifically within Michigan and the United States. They are as follows:

- Aerotropolis GIS data was a viable source of data for effective hazard identification and risk modelling. It especially paired well with other sources of data (Federal / State / County / Commercial)
- Success of AirHub initiative presented a strong requirement to identify ideal group(s) within the organization to manage advisories. Candidates include IT, Police, Fire, Public Works, EOC. A regional approach could be used as well where a single representative creates advisories on behalf of all communities.
- Communities have a strong interest in integrating CLEMIS / 911 / First Responder event and incident data into AirHub to support the automated generation of emergency related advisories.
- Community sees primary benefit of Airspace Link technology as platform to build future UAS infrastructure to attract commercial stakeholders and business to support innovation in community development.
- Community leaders expressed a strong interest in how UAS infrastructure development supports economic development.
- Trial generated significant interest from the First Responder communities in tactical areas.
- Investment into UAS infrastructure is effective in drawing interest from commercial UAS stakeholder and makes community a strong candidate for UAS development. Once UAS infrastructure was in place a significant uptick of commercial interest in partnering with the community to grow UAS activity increased.
- Continued collaboration between community, Airspace Link and UAS commercial stakeholders required to ensure continued growth of UAS ecosystem and growth in related economic activity.
- Regional groups such as Aerotropolis play a critical role in championing community facing innovation and pulling in stakeholders to collaborative efforts.
- Messaging from and through community stakeholders through existing channels key to informing community pilots about resources (i.e. AirHub for Pilots) to safely fly recreational and part 107 operations key to taking initial steps to managing local UAS activities

Recommendations

After reviewing the data and records captured throughout the trial Airspace Link along with key outcomes and lessons learned Airspace Link Proposes the following recommendations to Detroit Region Aerotropolis to transition from trial to production.

1 Tactical Recommendations

- Recommend Communities identify ideal organizational role to support and manage community advisories.
- Recommend Communities develop a public relations campaign to increase public awareness of the availability of maturing UAS infrastructure and resources necessary to support recreational and professional UAS.
- Recommend Communities increase advisories and maintain GIS required to keep hazard and risk data current.

2 Strategic Recommendations

- Recommend the development of site and market prospectus for UAS with community stakeholders.
- Recommend Communities develop a marketing campaign to increase commercial stakeholder and investor awareness of the availability of maturing UAS infrastructure and resources necessary to support commercial UAS operations.
- Recommend the development of Commercial UAS Stakeholder Candidate list to identify potential investors and commercial operators.
- Recommend further coordination, collaboration, and integration of Aerotropolis region with Michigan Transportation and UAS Corridor.
- Recommend exploration of further coordination with regional municipal airport managers.

Benefits Today and in the Future

Detroit Region Aerotropolis was the first ever local government that has gone live with AirHub for Government system providing communication tools from its communities to the drone industry. Drone pilots get free access to this data and FAA (ATC) flight authorization through AirHub for Pilots app.

Detroit Region Aerotropolis has enhanced its ability of the communities to compete in an international economy, to serve as a catalyst for economic growth of the state and to improve the quality of life in the region. They are taking steps to ensure their part in facilitating smart cities and technology supporting how and where drones can and will operate in their community. *“Our partnership with Airspace Link sent a strong message to inventors, investors and innovators to come to Aerotropolis to fly these new highways in the sky”*. Said Christopher Girdwood, Detroit Aerotropolis Executive Director. Many stakeholders are benefiting in many ways from AirHub for Government, Pilots & Business. For example:

1

Drone Industry

Providing free apps to safely and legally fly drones in controlled airspace and in the communities. Supporting use of recreational and part 107 commercial pilots in the region. Providing software, data and infrastructure, enabling the communities to promote and invite drone service providers and manufacturing companies a location for testing.

2

Residents

Tools for protecting safety, privacy and security. Enabling clear guidance on where and when to safely fly drones near the airport. Apps for communicating drone operational risk maps to its residents. Supporting the safe use of drones within the neighbourhoods.

3

Transportation / Infrastructure

Clearly map drone highways in the sky, safely move goods from one location to another with drones. Aids the development and maintenance of managing drone transportation infrastructure of the public, ensures efficient, safe and accessible use of drones, use drones to conduct transportation tasks.

4

Economic Development

Attract and expand the growing drone industry (Industry diversification), reduce economic loss from drone interference near airports and venues, increase revenue through authorizing complex business drone flights (toll road), create a path for revenue/ROI for drone infrastructure, future proof the community (fortification).

Benefits, Continued

5 Public Safety

Protect the general public from drone related accidents by knowing where and when a flight will occur. Clearly understand drone rules and regulations, situational awareness, by faster response, saving time & lives, in support of humanitarian aid & disaster relief using public safety drones.

6 Planning & Zoning

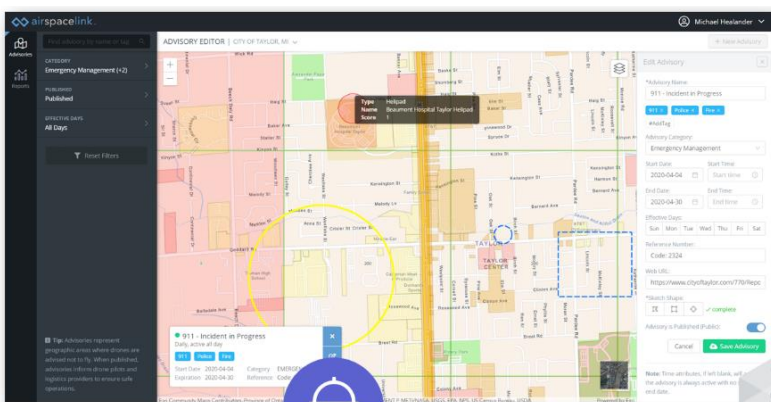
Clearly map drone friendly areas, easily publish recommended drone boundaries and appropriate regulations ensuring ground-based risk data for safe drone flights, measure present and future movement of drone traffic, measure safety of persons and property.

7 GIS / IT

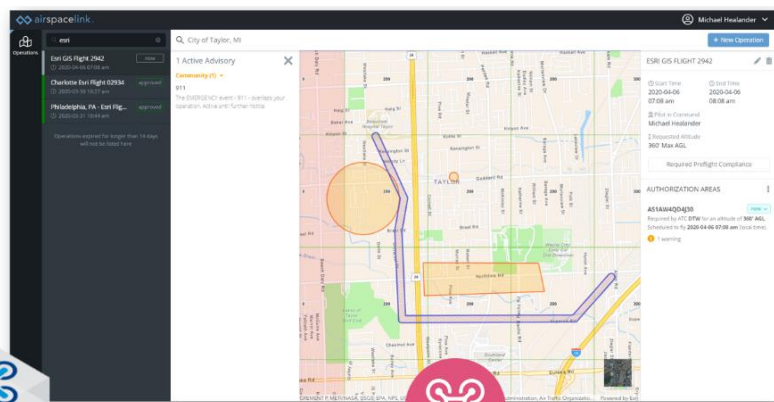
Centralize, standardize, publish and authorize data and flights. Simple installation and maintenance system ensure smooth integration with existing community systems, data capturing, managing, analysing, and displaying all forms of geographically referenced drone information.

8 Local Gov Administration

Promote citizen safety by understanding and identifying drone “hot spots” or high activity areas within your community. Help increase staff productivity and safety. The community can limit liability and risk by having a management system that provides an on-going heighten awareness of drone activity.



**State & Local Gov
AirHub for Government**



**Drone Industry
AirHub for Pilots**



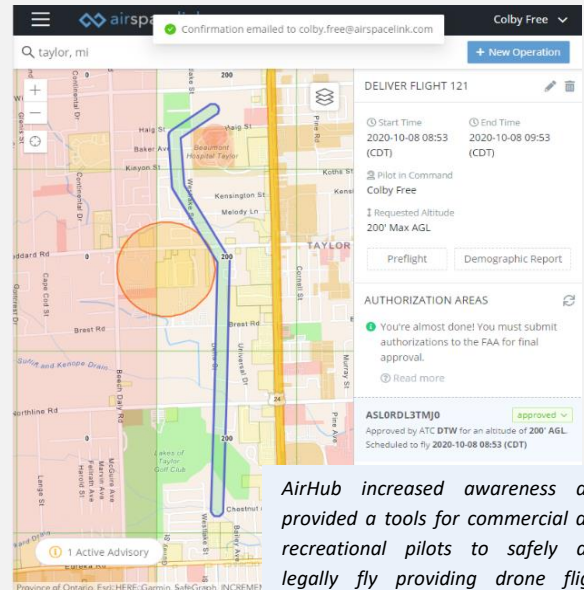
**FAA-Approved
Low Altitude Authorization &
Notification Capabilities**

Regional Trial Operations Metrics*

AirHub Analytics & KPI's were used to measure & report the usage of airspace in selected Michigan test locations focusing on the trial's two major objectives.

1 Increase Safe Drone Operations By Reducing Authorization Time

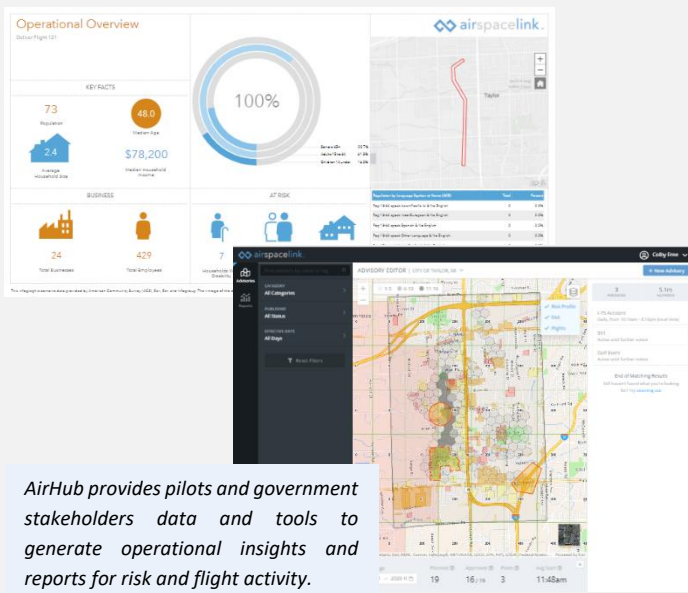
In partnership with the FAA, Airspace Link publicly deployed Airspace Link's AirHub FAA Low Altitude Authorization and Notification Capability (LAANC) in Michigan for Part 44809 (recreational) and Part 107 (commercial) UAV flight authorization, enabling fast and safe drone operations in controlled airspace. The FAA UAS LAANC Data Exchange is a collaborative approach between government and Airspace Link facilitating the sharing of airspace data between the two parties. In doing so Airspace Link enabled Aerotropolis communities to safely grow the drone industry through a *major* reduction of authorization times from **90 days** to under **15 seconds** in Michigan test locations.



AirHub increased awareness and provided a tools for commercial and recreational pilots to safely and legally fly providing drone flight authorization in seconds

2 Increase Drone Operation Safety Data, Reporting & Insights

AirHub Portal & ground-based risk management system(s) was deployed in Detroit Region Aerotropolis select cities (Taylor, Van Buren, Romulus, Huron). Airspace Link analysed and pre-processed ground-based risk data captured through municipality participation and platform tools used to digitize and publish operational data. Communities were enabled to create and publish advisories in real time; reducing risk to operations over people, events and active emergency areas. Operators were able to access operational risk insights and generate reports to measure operational impacts, flight path risk reduction and airspace usage analytics.



AirHub provides pilots and government stakeholders data and tools to generate operational insights and reports for risk and flight activity.

Details related to the AirHub trial Analytics & KPI's were captured and provided to all Aerotropolis communities offering extensive details about local hazards and advisories, regulatory factors, operational risks, local drone operations and more.

Aerotropolis Region Metrics

Community	Area (sq mi)	Airports	Helipads
Taylor	23.63	Willow Run Airport	L&L
Romulus	35.95	Detroit Metropolitan Airport	Beaumont Hospital Taylor Helipad
Huron	35.83		A T I
Van Buren	36.06		
Aerotropolis	131.48		

Flights	Taylor	Romulus	Huron	Van Buren	Aerotropolis
Planned	43	14	14	14	85
Approved	30	9	9	7	55
Pilots	10	8	6	9	33

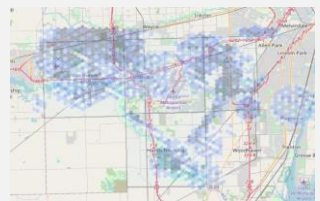
# of Advisories	
Current	10 2.5 % of region
Created and deleted	~25

Controlled airspace	LAANC Covered (%)
Taylor	100.0
Romulus	100.0
Huron	100.0
Van Buren	76.9

# of parcels processed for ground hazards	
Taylor	23,987
Romulus	10,200
Huron	6,532
Van Buren	9,582
Aerotropolis	50,301

Ground Risk	Risk 1 High (# of areas)	Risk 1 High (% of area)	Risk 2 Medium (# of areas)	Risk 2 Medium (% of area)	Risk 3 Low (# of polygons)	Risk 3 Low (% area)	Total (# of areas)	Total (% area)
Taylor	32	2.63	196	12.46	256	6.23	484	21.32
Romulus	31	24.01	78	9.28	49	1.52	158	34.81
Huron	13	0.57	3	2.99	154	8.55	170	12.11
Van Buren	23	11.8	45	10.43	0	0	68	22.23
Aerotropolis	99.00	39.01	322.00	35.16	459.00	16.30	880.00	22.07

Ground Risk by CategoryType	Area (%)
Land Use	43.77
Local Government	
Facility	30.12
Right of Way	14.04
Census Data	11.37
Critical Utility	
Infrastructure	8.11
School	4.11
Hospital	0.29
Helipad	0.13
Child Care Center	0.05



Flight Operation Areas



Controlled Airspace



Ground risk

* The full operational and community metrics report can be found as an embedded file in the "Attachments" Section of the document.

Community Impact

Through the course of the AirHub trial Airspace Link closely monitored other studies across the United States that were designed to qualify and quantify the community impact and benefits of large scale UAS operations. One study conducted by the Virginia Tech Office of Economic Development and the Grado Department of Industrial and Systems Engineering provided relevant projections regarding community benefits for metropolitan areas who adopt drone delivery services.

Specifically, the report “... measures the potential impact of drone delivery for consumers, local businesses and communities across the U.S. It examines three representative metropolitan areas to illustrate the benefits of drone delivery as well as the demographic, geographic, technical and policy conditions necessary to realize those benefits. Existing research explores the long-term impact of drone delivery. Uniquely, this study quantifies the short-term benefits within one to five years of introduction, taking a mixed-methods approach that combines qualitative interviews and surveys, traditional consumer surplus modeling and simulation modeling to develop a robust set of findings.”

The report indicates that drone activities in cities such as Detroit could potentially:

- Serve up to **53.9%** of the population;
- Recover up to **\$582.5 million per year** in total time savings for customers
- Support the **3.6-6.6%** of metropolitan residents who lack access to a vehicle (as many as **66,000 people** in a single metropolitan area)
- Help **22,000 people** with mobility challenges to obtain their prescription medication
- Generate up to **\$284,000 per year** in new annual sales for a participating local business (up to **250%** additional sales compared to a scenario without drones)
- Avoid up to **294 million miles per year** in road use and up to **580 car crashes per year**
- Reduce up to **113,900 tons per year** of CO2 emissions, equivalent to **46,000 acres per year** of new forest

Lyon-Hill, S., Tilashalski, M., Ellis, K., & Tavis, E. (2020). *Measuring the Effects of Drone Delivery in the United States* (p. 6, Tech.). Blacksburg, VA: Virginia Tech.

Conclusion

The responsibility of analysing and mitigating risks for this deployment extended beyond a single agency or entity, it required an ecosystem approach.

A collective effort was necessary to support the adoption of this new technology, taking into account emerging and future UAS regulations, applications, implications, and risks. Considering the proliferation of UAS operations and advances in technology, both the risk and the opportunities from UAS will continue to grow.

“ Michigan Unmanned Aerial Systems Consortium is excited to be part of the cast of organizations providing direct support to Airspace Link on a project with the likelihood of influencing national and local policies and processes. The Detroit Region Aerotropolis project provides real time information to current commercial UAS flight operators. The data will build a synergetic relationship by developing an automated system to inform operators about avoiding high risk areas and allow communities to understand the underlying demand of local commercial UAS activity.”

-Jim Makowske MUASC CEO.

As technology advancements push innovation into the skies, transportation managers can lean on GIS data already being generated within their communities to prepare themselves for the Jetsonian future. The Aerotropolis trial demonstrates that now is the time to be part of the solution and can't afford to wait until unmanned vehicles begin operating before considerations are made on how to participate in drone integration and innovation. For more information on how Airspace Link can help you integrate drones into your community safely, visit www.airspacelink.com.

