

An aerial view of a city, likely New York City, with the Empire State Building prominent in the center. The sky is filled with various aircraft, including a large white fighter jet, a smaller white fighter, a commercial jet, a drone, and a helicopter. The scene is overlaid with a network of white lines connecting different points in the sky and city, suggesting a data or reasoning fabric. The overall color palette is a mix of blue, white, and orange, with a soft glow from the sun or moon.

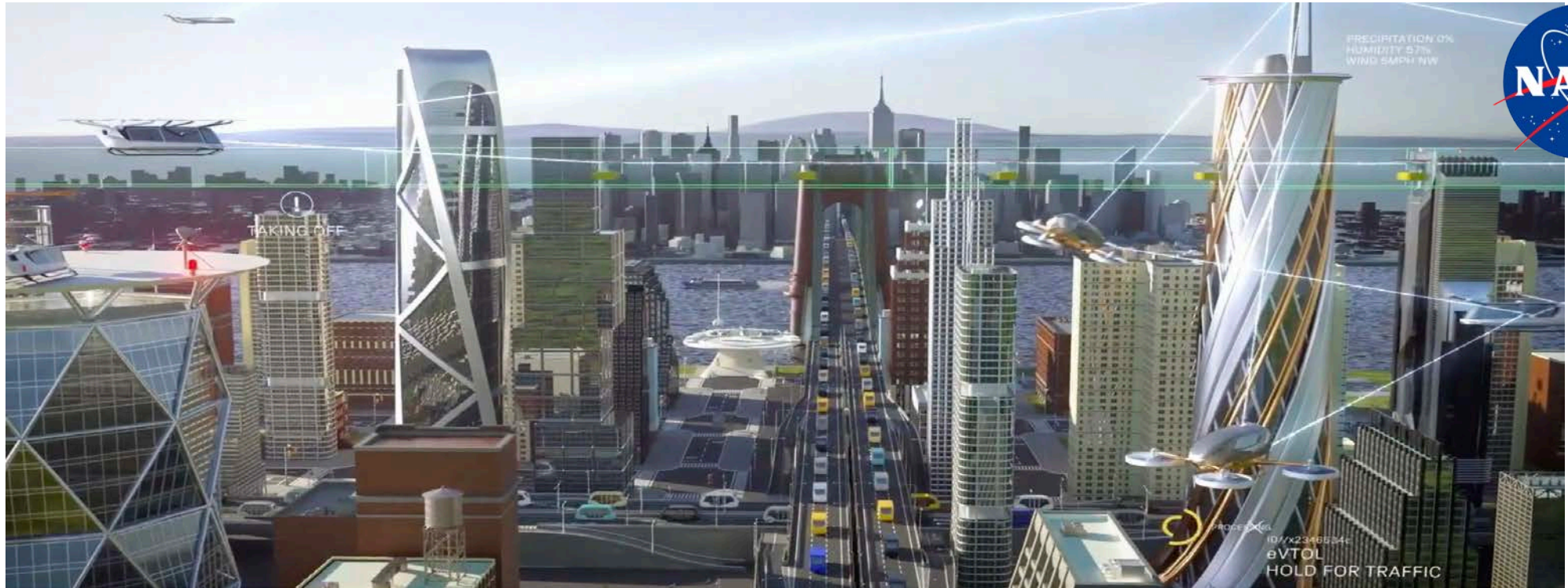
# EXPLORE FLIGHT

WE'RE WITH YOU WHEN YOU FLY

## Data and Reasoning Fabric (DRF)

NASA Aeronautics Research Mission Directorate (ARMD)  
Transformative Aeronautics Concepts Program (TACP)  
Convergent Aeronautics Solutions (CAS) Project  
Data and Reasoning Fabric Team





**Welcome to**

**NASA DATA & REASONING FABRIC (DRF)**



Imagine a not-too-distant future in which a self-operating drone is on its way to deliver goods, air taxi people across town, or even help locate wildfires...





Imagine a not-too-distant future in which self-operating drones deliver goods, air taxi people across town, or even help locate wildfires...



To safely complete its flight, that drone will require ongoing access to important information, including but not limited to:

- Weather conditions
- Air traffic information
- A flight path from the origin to the destination
- Decision-making support for emergency response





## NASA DATA & REASONING FABRIC (DRF)

### **This is where DRF comes in...**

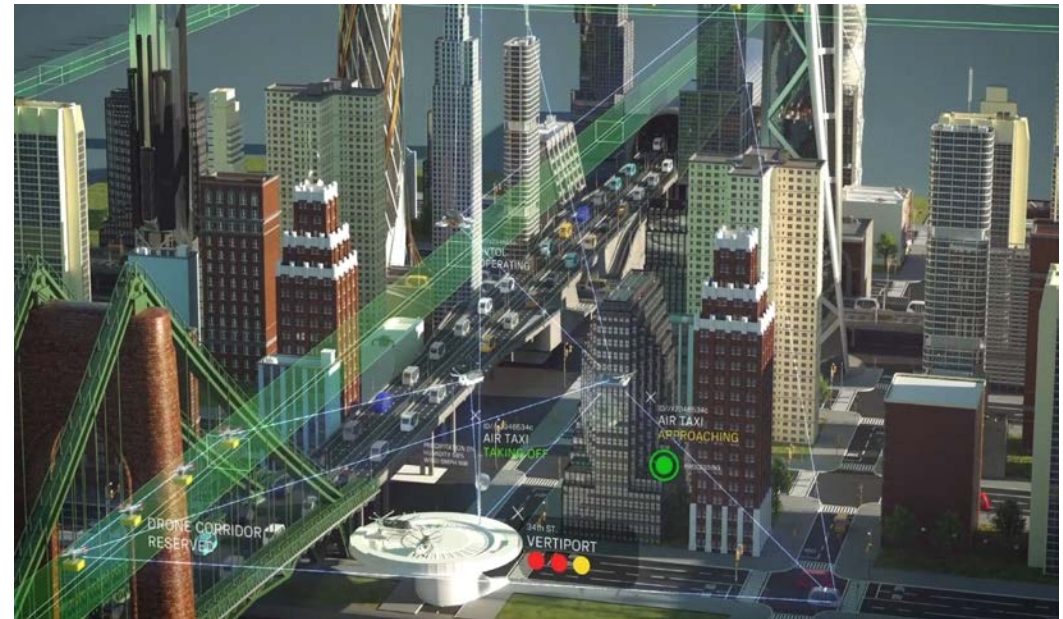
Data & Reasoning Fabric (DRF) is NASA's innovative self-sustaining and decentralized ecosystem which aims to increase awareness of EVERYTHING affecting air transportation.

# NASA DATA & REASONING FABRIC (DRF)



*DRF helps realize the full potential of future air mobility to advance human society.*

*This information discovery and exchange ecosystem enables the transportation of people and cargo to places previously not served or underserved by aviation.*



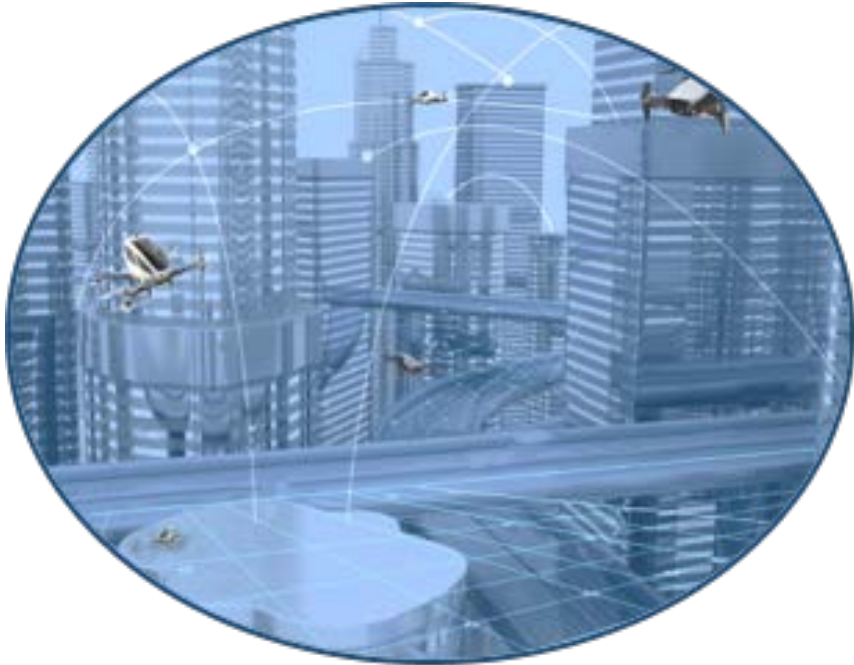
## NASA DATA & REASONING FABRIC (DRF)



To understand how DRF will address the needs of Advanced Air Mobility (AAM) let's look at the three core concepts which drive this technology:







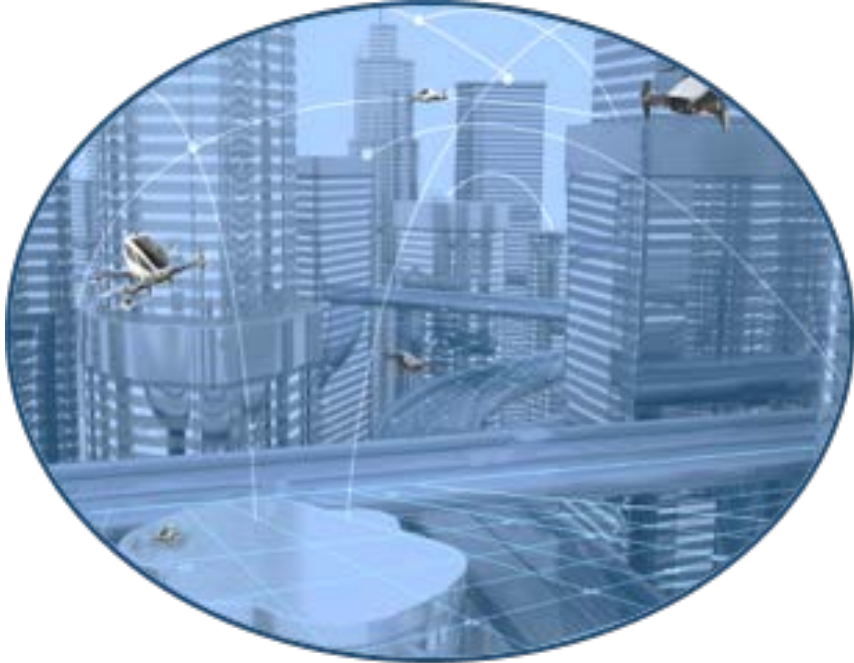
## Data Services

Data services in the DRF ecosystem ensure **quality, consistency, and democratization of data** for the future of air mobility operations.

Many of these data services will be used autonomously by smart, unmanned, and/or artificial intelligence agents to help operators understand the airspace conditions.



## Some Data Services examples:



- **Weather services** to identify if the conditions are safe to fly. Weather services can forecast high winds, dust storms, thunderstorms, etc.
- **Traffic overview** of the airspace the aircraft will fly through.
- **Vertiport status** of where the aircraft will takeoff from or land at.
- **Population density** of the area the aircraft is flying over.





## Reasoning Services



Reasoning Services in the DRF ecosystem leverage **Artificial Intelligence (AI)** and **Machine Learning (ML)** with Data Services.

Combining Reasoning and Data Services provides operators with decision-support tools to take the safest and most efficient course of action.

## NASA DATA & REASONING FABRIC (DRF)



Many people are already familiar with a Reasoning Service, in the form of a navigation app on their phone.

Different kinds of data – maps, accident reports, traffic conditions, roadwork status – are drawn in by the app, which then sorts through it all and tells the driver the best route to take at the time.

Similar services are needed for mobility within in a 3-Dimensional space, to address growing complexity and increased congestion in the future airspace.



## NASA DATA & REASONING FABRIC (DRF)



### Some Reasoning Services examples:



- **Vehicle trajectory (flight path) generation** to help the aircraft operators fly the most optimal route.
- **Diagnostics and monitoring** of the vehicle health before and during flight. A **battery health service** ensures safety in operations by alerting drone operators if they do not have sufficient battery to complete their trajectory.

Reasoning Services enable information management and environmental situational awareness, so operators make decisions based on the most accurate, reliable, and current data available to humans and machines.



## The Fabric

A connected interwoven web of digital systems and services is referred to as the "Fabric".

This web-like ecosystem supports Advanced Air Mobility (AAM) by allowing all users to connect, find, and use data and reasoning services from many different sources.





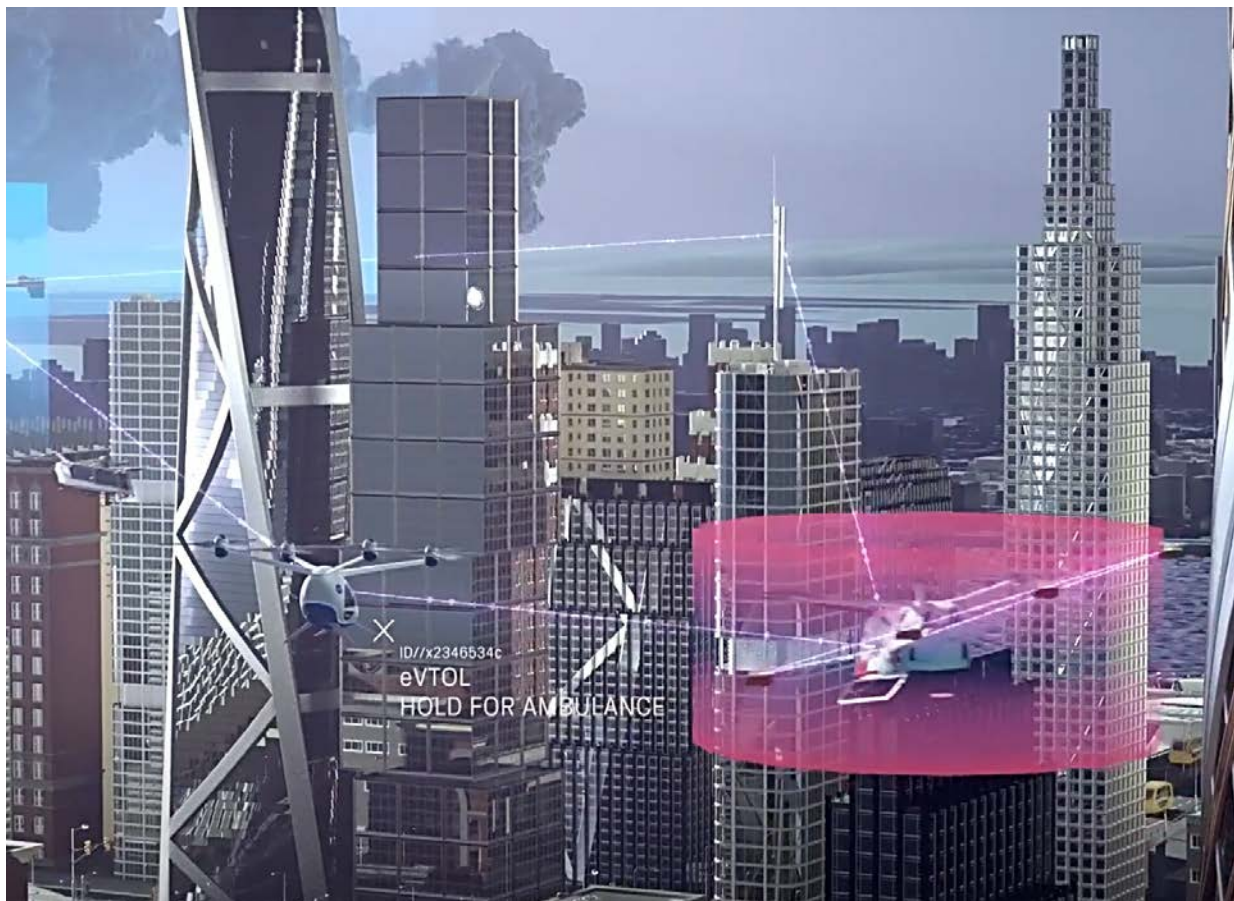


## The Fabric

The Fabric is a dynamic information infrastructure that connects operators and autonomous aircraft with specific and tailored information, wherever they are.

This infrastructure can one day enable the vision of a “smart” city and airspace.





## Connect With Us

To learn more about DRF visit us at:

<https://drf.nasa.gov/>