



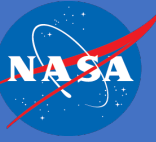
EXPLORE FLIGHT

WE'RE WITH YOU WHEN YOU FLY

Data & Reasoning Fabric (DRF) Outreach
August 2021

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

Mobility Challenges



Transportation shapes society, enabling economic and social interactions.



- The quality of life is impacted by ever growing commute time
- Transportation is increasingly driven by door-to-door logistics

Air Mobility can convert our 2D mobility system to a 3D system, increasing transportation options for both people and goods

Air Mobility Data & Reasoning Challenges



- Urban air operations require decisions based on diverse and dynamic data, including vehicle, airspace, weather, infrastructure, payload, and customer data
- Increasingly, data may be too large or dynamic to centralize. Decisions need to be made where the data exists
- The envisioned density of operations will only be achieved if decision processes continue to move from purely human decisions, to machine-intelligence based decisions with human oversight
- Machine-intelligence generally requires greater volumes of digital data of explicitly known applicability and quality

Air Mobility Planning, Operations, and Performance

- Current Trajectory -

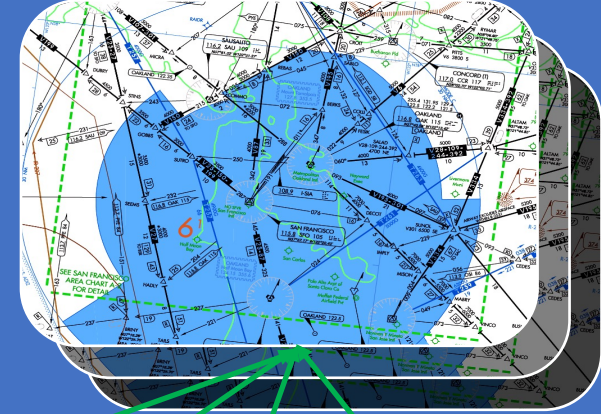


Service Providers

PLANNING

OPERATIONS

PERFORMANCE



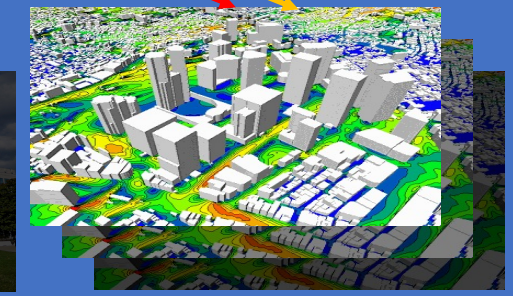
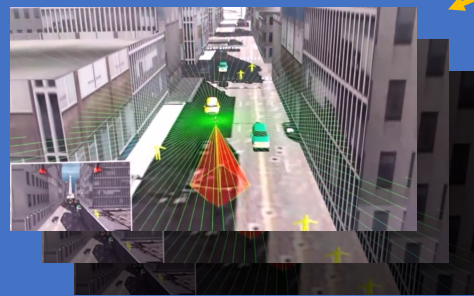
- CASE-BY-CASE DATA
- DISCOVERY
 - AGGREGATION
 - VERIFICATION
 - DATA/\$ TRANSACTIONS

City Planner

Package-As-Service Provider

City Manager

Mobility-As-Service Provider



SMART VEHICLES

SMART AIRSPACES

SMART CITIES

REGULATORY

MICRO-WEATHER

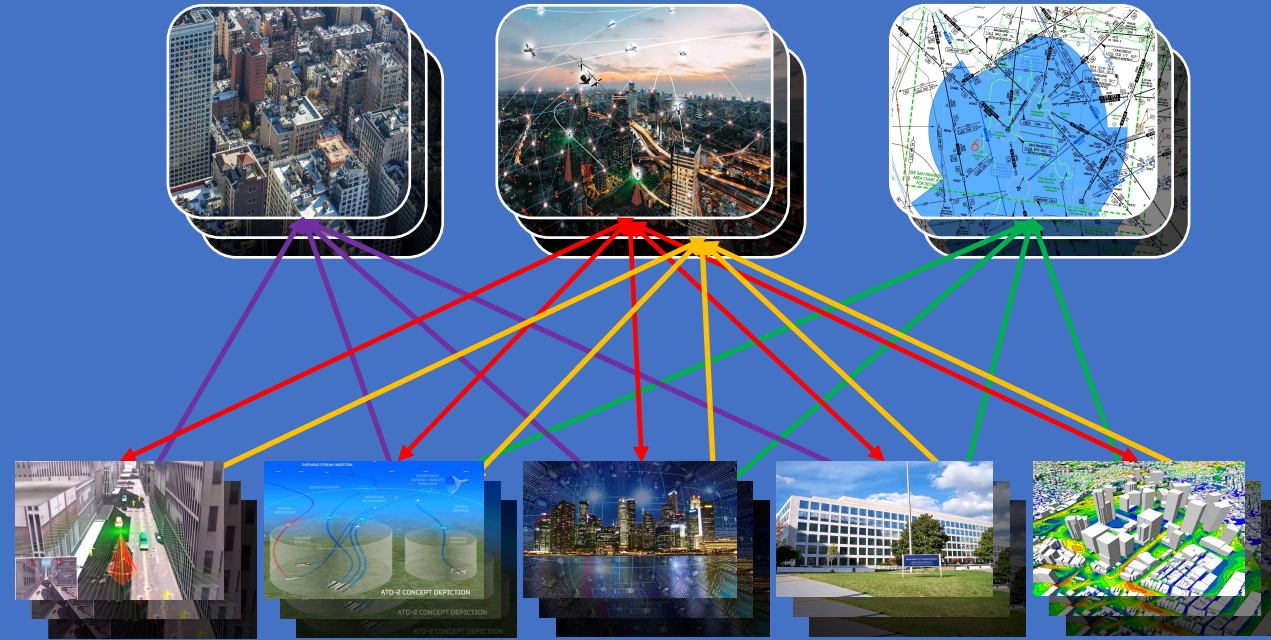
Data & Reasoning Services



Current Air Mobility Trajectory - Concerns



- **Many "stovepipe" efforts**
 - Labor intensive
 - Lack agility
- **Inconsistent implementation and quality**
 - Security vulnerabilities
 - Varying performance
- **Lack of standards**
 - Inconsistent interpretation and exchange of data
 - Ongoing interoperability headaches
- **Lack of common foundation**
 - Difficult to define and revise systemwide policies
 - Difficult to measure systemwide performance, health
 - Difficult to extend system to new missions, technologies over time



The current air mobility trajectory could lead to monopolized markets, leading to a disparate market arena and reduced innovation

Air Mobility Planning, Operations, and Performance

- DRF Trajectory -



Service Providers

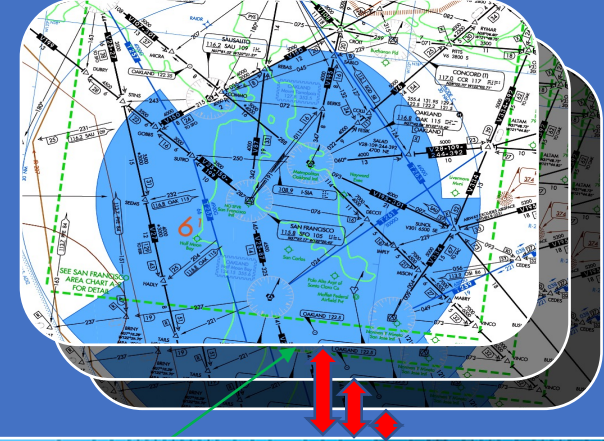
PLANNING



OPERATIONS

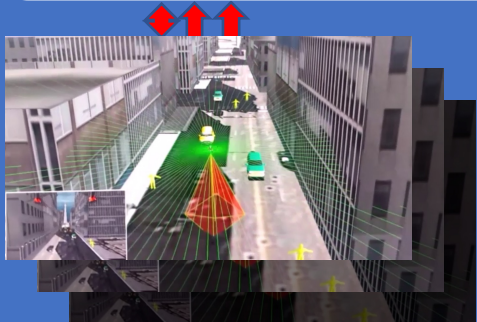


PERFORMANCE



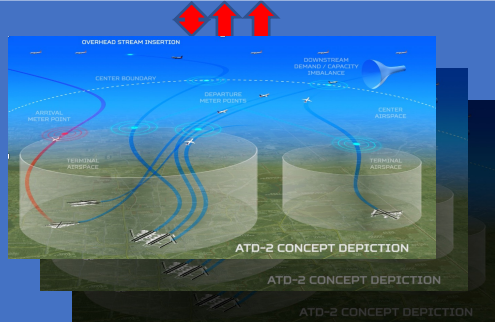
DATA & REASONING FABRIC

- ENABLE EFFICIENT AND PERVASIVE DATA DISCOVERY, AGGREGATION, AND DATA/\$ TRANSACTIONS -

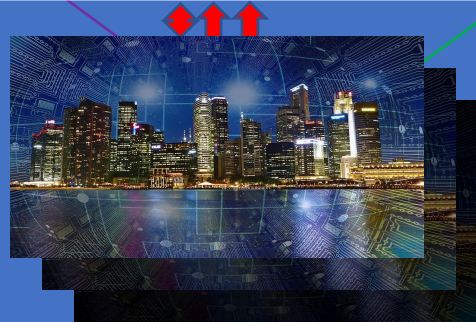


SMART VEHICLES

Data & Reasoning Services



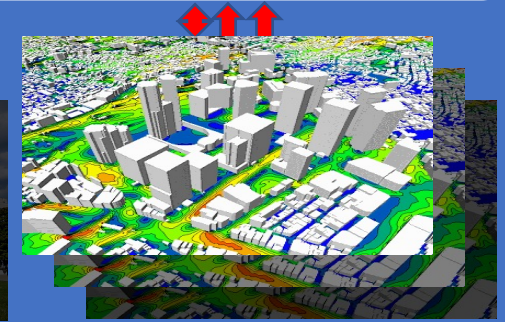
SMART AIRSPACES



SMART CITIES



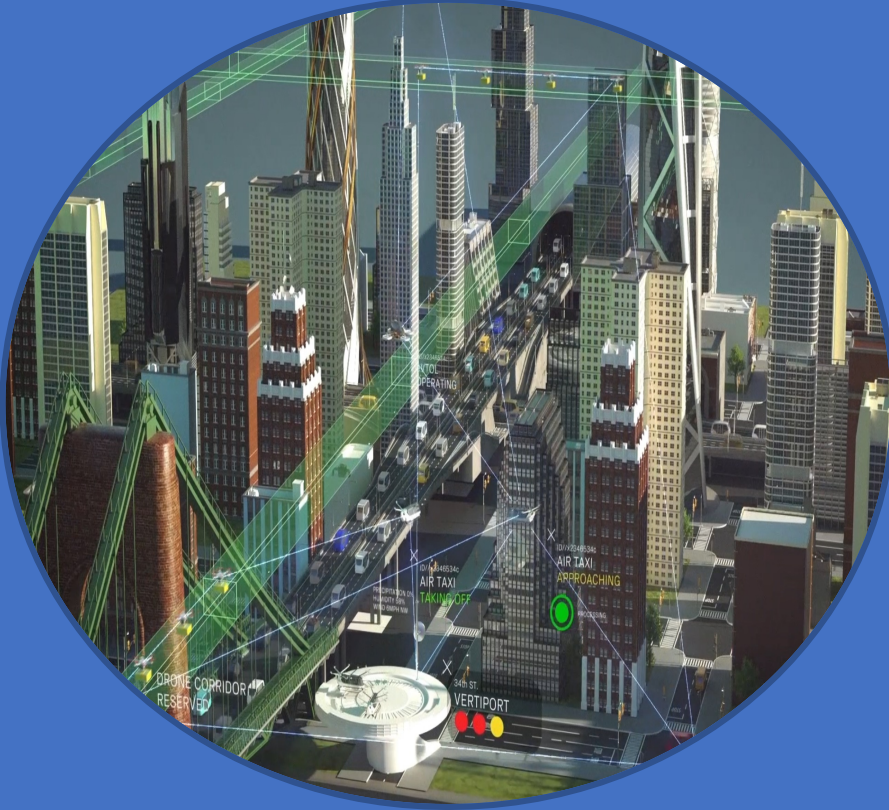
REGULATORY



MICRO-WEATHER



Data & Reasoning Fabric – Trusted Service Discovery and Exchange Backbone for the Future Airspace Ecosystem



DRF is envisioned to provide the foundation for an ecosystem of data and reasoning to support:

- High-density air transportation, even in complex urban environments
- Transportation of people and cargo to places previously not served or underserved by aviation
- Efficient and user-friendly integration of emerging and evolving traditional air transportation capabilities

How:

- DRF will allow 1,000s of small and large enterprises with different assets to exchange data and reasoning in a systemwide marketplace
- More choices and a secure transacting experience
- DRF will be inherently extensible for new data, reasoning, and other services

Allow air transportation systems to be aware of and adapt to all available data, from evolving user intent to real-time environmental, infrastructure, and ground/water transportation systems status

Data & Reasoning Fabric - System-Level Benefits



Reduce Complexity

Reduce complexity of system-level engineering challenges for the traditional and emerging airspace system

Provide Clarity

Provide baseline requirements and architecture clarity to all stakeholders, including the private sector

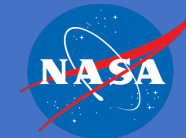
Provide Incentive

Provide core elements of a framework supporting marketplace functions for data, operations and policies that provides a clarifying economic incentive to the private sector to bring the relevant innovations, products and services to market

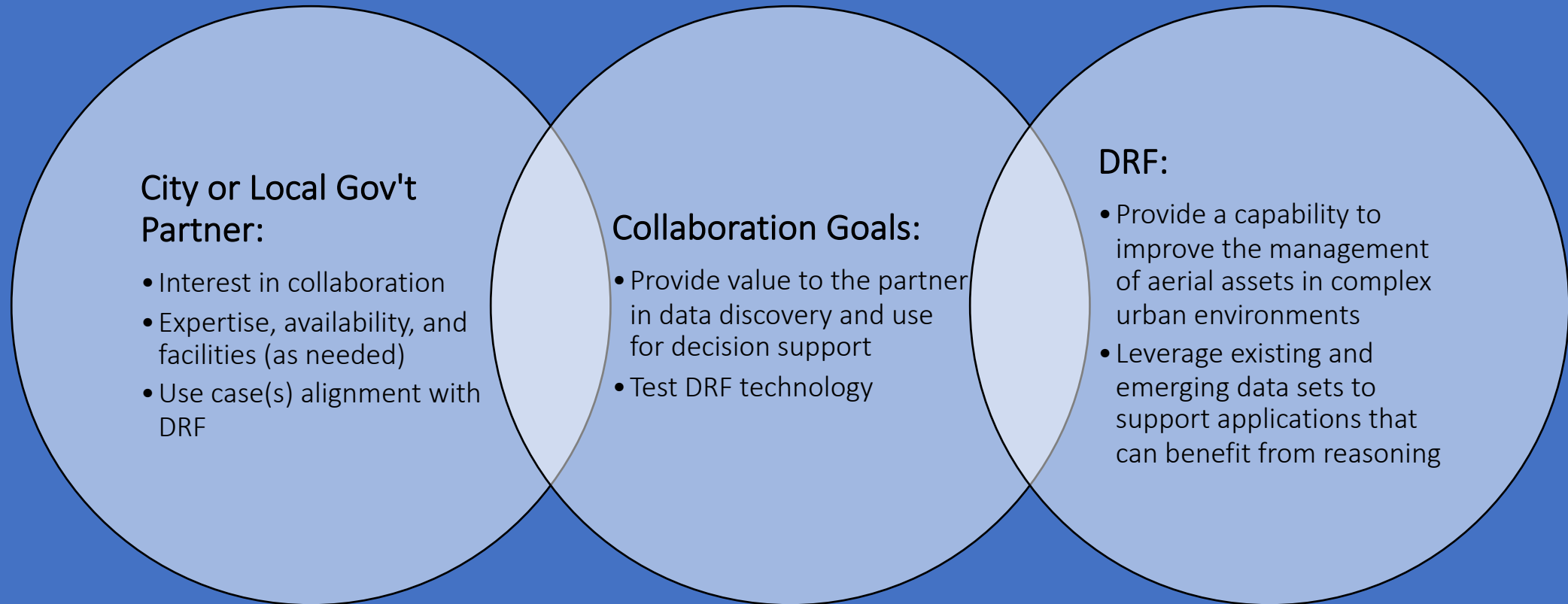
Provide Flexibility

Build in the flexibility and extensibility of the data systems supporting the National Airspace System to give all stakeholders confidence in a path to continued innovation and increased capability in the traditional and emerging airspace system

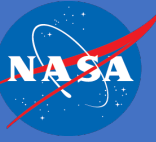
Vision of Future Air Mobility



DRF is searching for a city or local government to partner with in January/February of 2023.



Questions?



Initial Engagement/Contact



- Operations:
 - What do you see as your top opportunities for utilizing aerial assets within your city in the next 3-5 years?
 - Why are these goals not currently possible in the context of airspace operations (roadblocks/pain points)?
 - Do you have any use cases you would like DRF to consider?
- Assessment:
 - What is the current data collection and use for aerial asset management?
 - Where are the opportunities in your data collection and processing methods?
 - What is time consuming in your data processing methods currently?
 - What is the current level of automation in your process and would you like to use more?
- If DRF can help, would you be interested in working with us to develop this further?
 - How do you think DRF will be able to assist with your goals?
 - What could you accomplish if DRF can overcome these obstacles or assist with your goals?
- Do you have any questions for us?