Air Traffic Management-eXploration Testbed for Urban Air Mobility Research and Development

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Testbed Vision

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- Testbed is a distributed air traffic simulation capability to **accelerate** the introduction of technologies in the National Airspace System.

- Its core purpose is to enable **realistic simulations** of proposed air traffic concepts with real systems and data.

- It enables our ATM **community**, consisting of government, industry and academia, to **share** and **leverage** each other's data and tools.

Urban Air Mobility

Outline

- Testbed Goal
- Testbed Features
- Architecture Design
- Progress
- What's Next?
- Take Away

Testbed Goal

- Accelerate National Airspace System Transformation
  - Simulation
  - What-if Analysis
- Create Best Design (NRA 2014-2015)
  - Architecture Design
  - Cost and Benefit Assessment
- Overcome Challenges
  - Data Sharing
  - Scenario Generation

Testbed Features

- Community Pooled Resources (e.g., Data)
- Defined Workflow
  - Automated Scenario Generation
  - Simulation Asset Configuration
  - Simulation Execution
- Defined Interfaces
- Standardized System and Data Connectivity

Architecture Design

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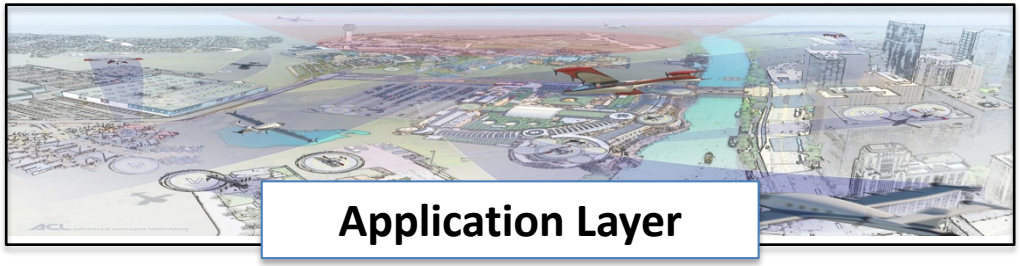
Researchers

Developers

Vendors

Cloud Service Providers



Application Layer

Operator Center Functions

Other ATM Functions

Framework Layer

Application Aware

Communication Middleware

Platform Layer

Application Agnostic

Network Interconnect

Intranet (LAN)

DMZ

Router (WAN)

Intranet (LAN)

DMZ

Router (WAN)

Infrastructure Layer

Architecture Design

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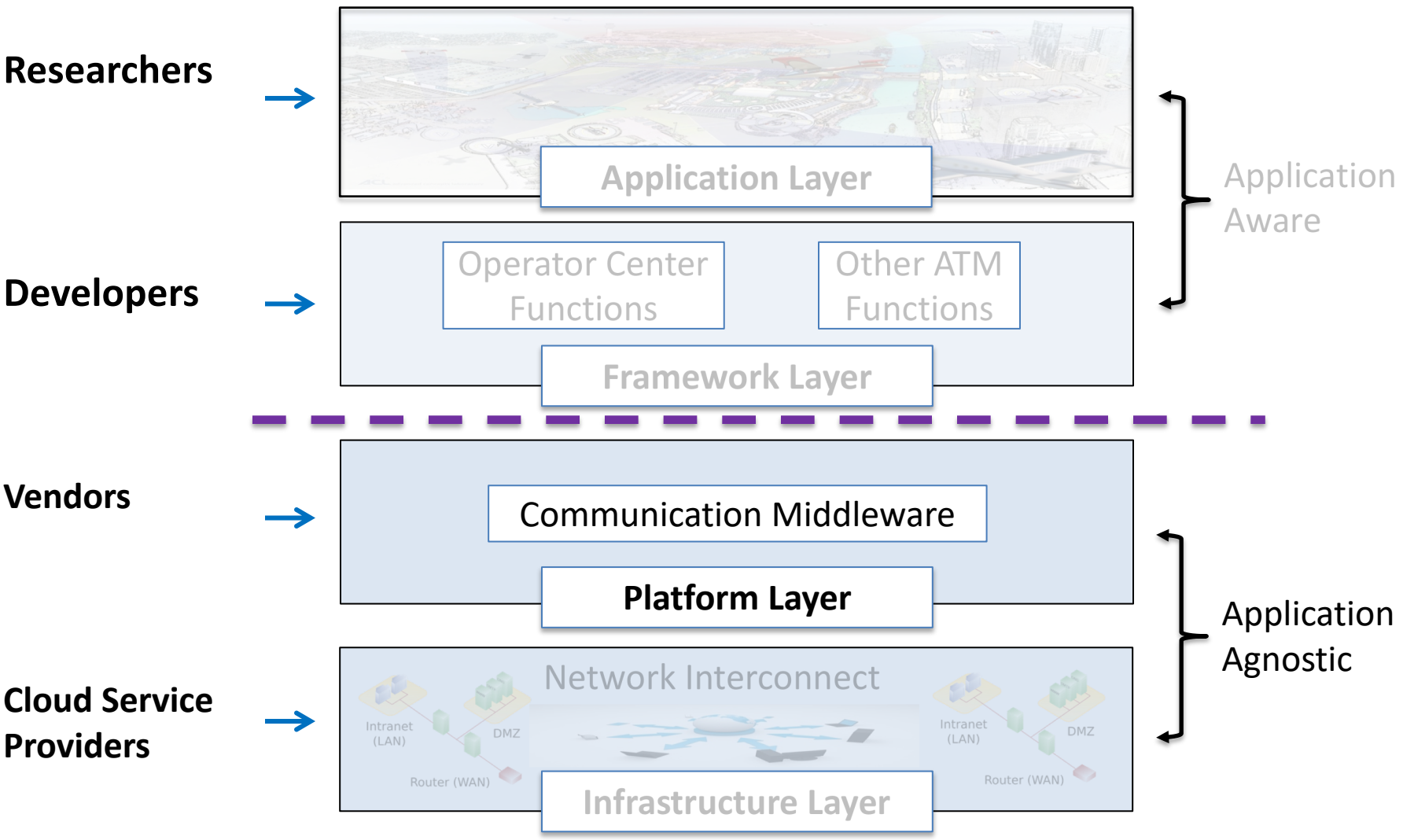

Collaboration

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- NASA Provides
  - Web Access for Simulation Setup
  - Adapter Example
  - ATM simulators & systems
  - ATM Data: e.g., System Wide Information Management
  - Application Programming Interface
- Required for Partnering with NASA
  - Space Act Agreement
  - Interconnection Security Agreement

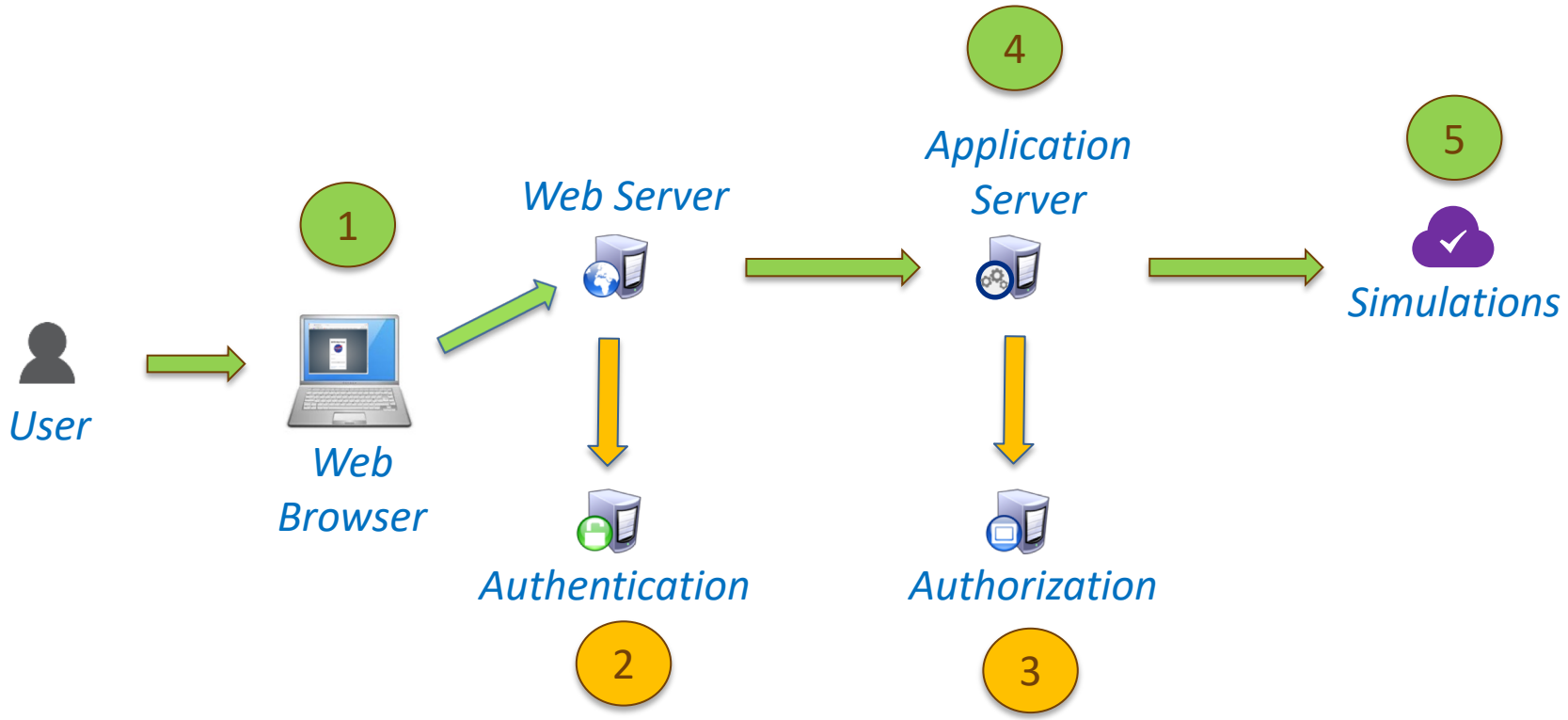
Partner Provides

Application and Framework

- Application/Model that Is Shareable/Reusable
- How to Apply/Use your Model in Testbed
- Data if Not Available in Testbed (e.g., adaptation data needed by the model)
- Domain Expertise (e.g., to determine appropriateness or correctness)
- Test or Conduct the Simulation

Progress

Concept of Operations



Simulation Design User Interface

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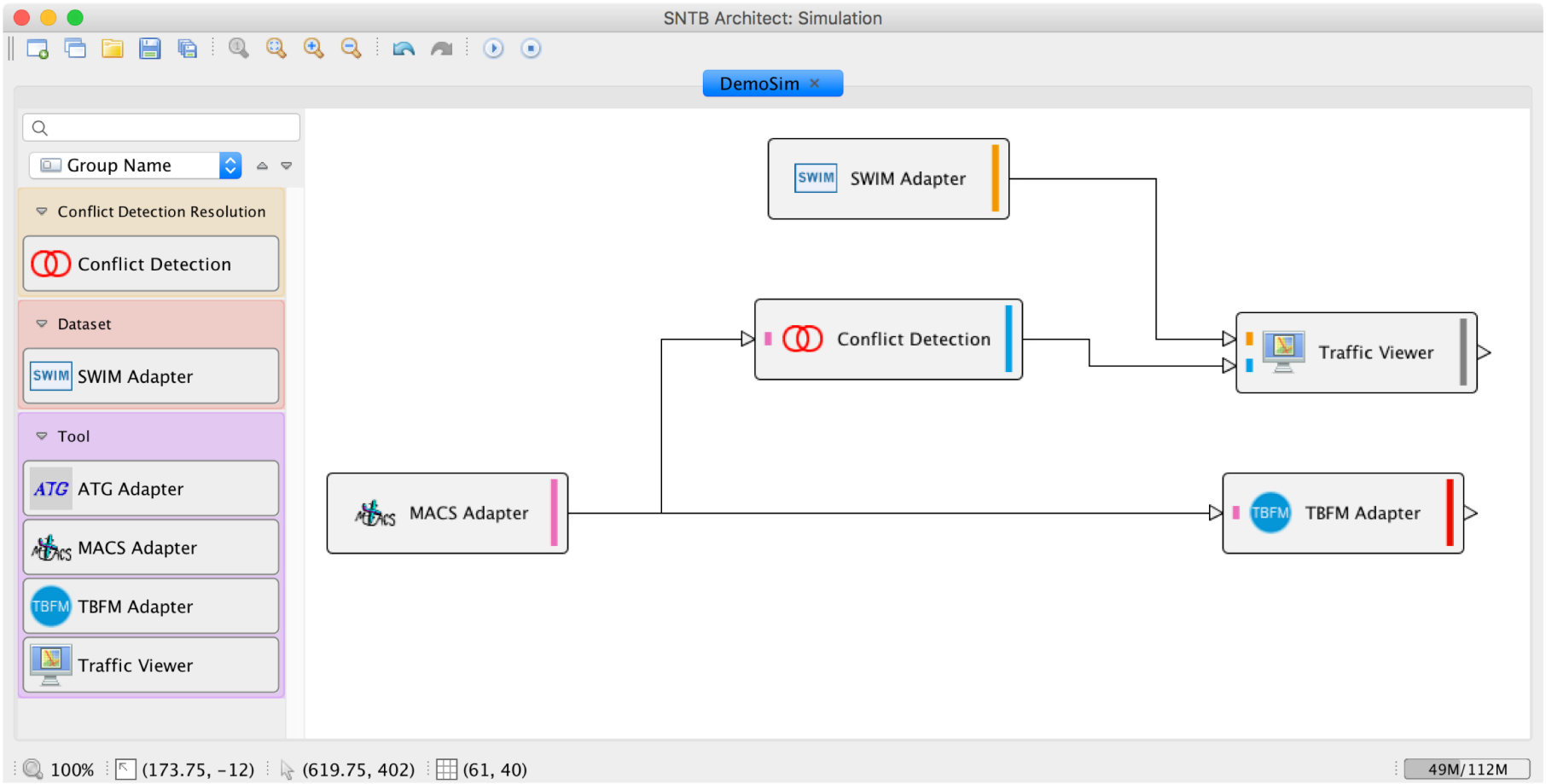

Library User Interface

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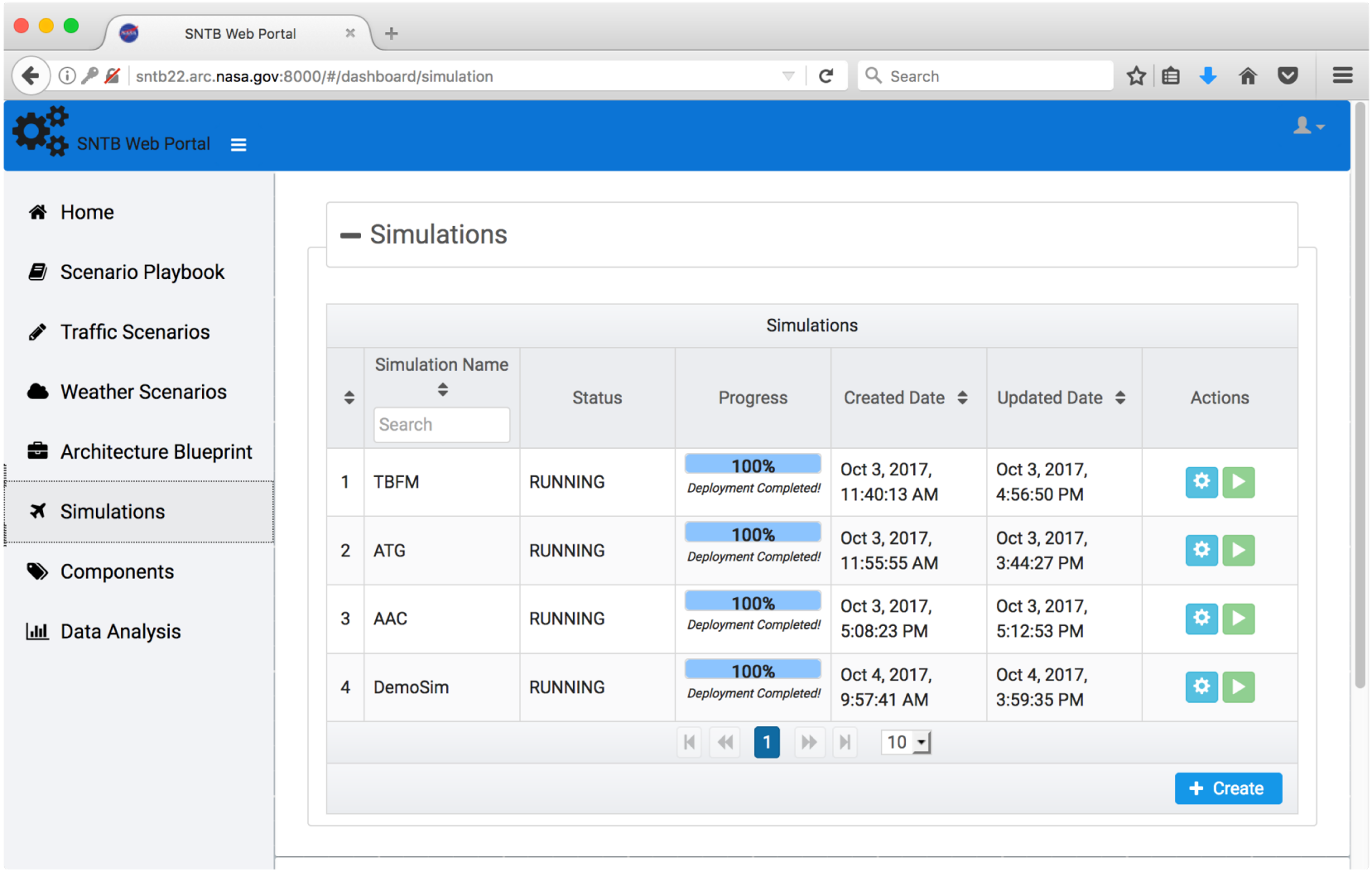
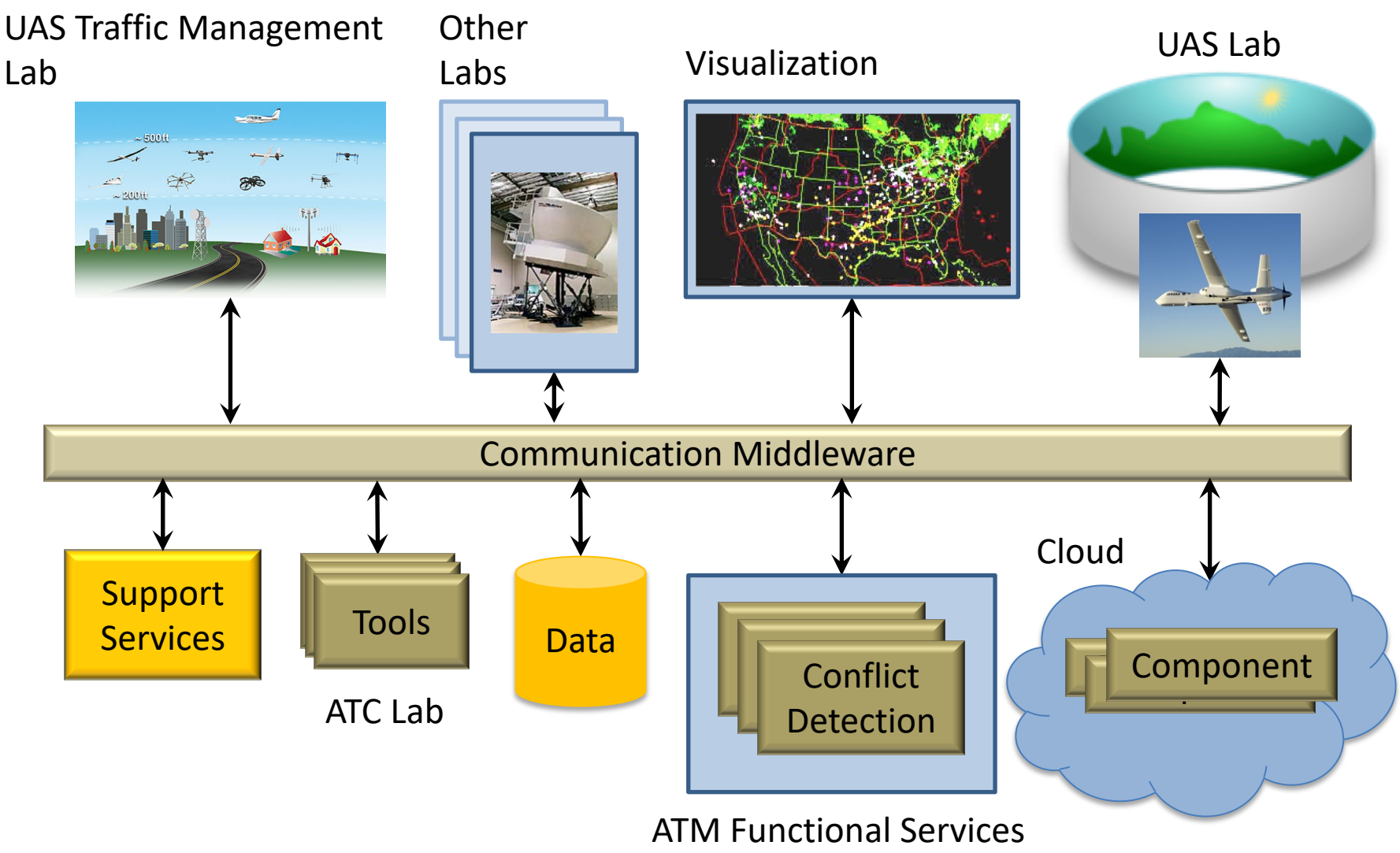


What's Next?

Testbed Architecture



Take Away

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- Testbed is a community resource for accelerating ATM concept and technology development where **partners** can collaborate and leverage each other's data and tools

- Targeted to be transitioned to community in 2020

References

1. Shadow Mode Assessment using Realistic Technologies for the National Airspace System (SMART NAS) Test Bed Development, AIAA Aviation, Dallas, TX, 22-26 June 2015

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3. Automated Scenario Generation for Human-in-the-Loop Simulations, AIAA Aviation, Atlanta, GA, 25-29 June 2018

Questions?

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