

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

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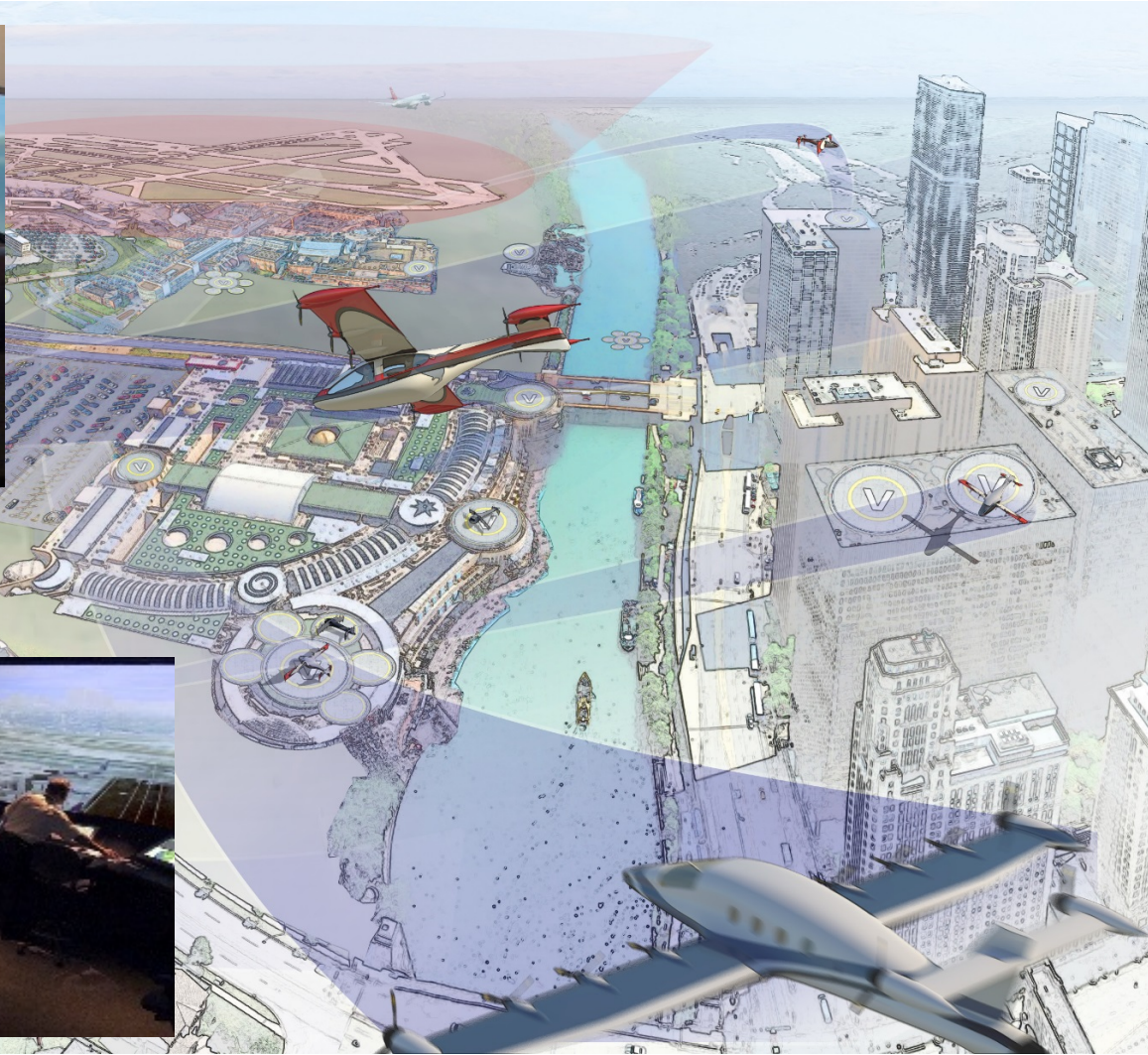
June 28, 2018

# Testbed Vision



- 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



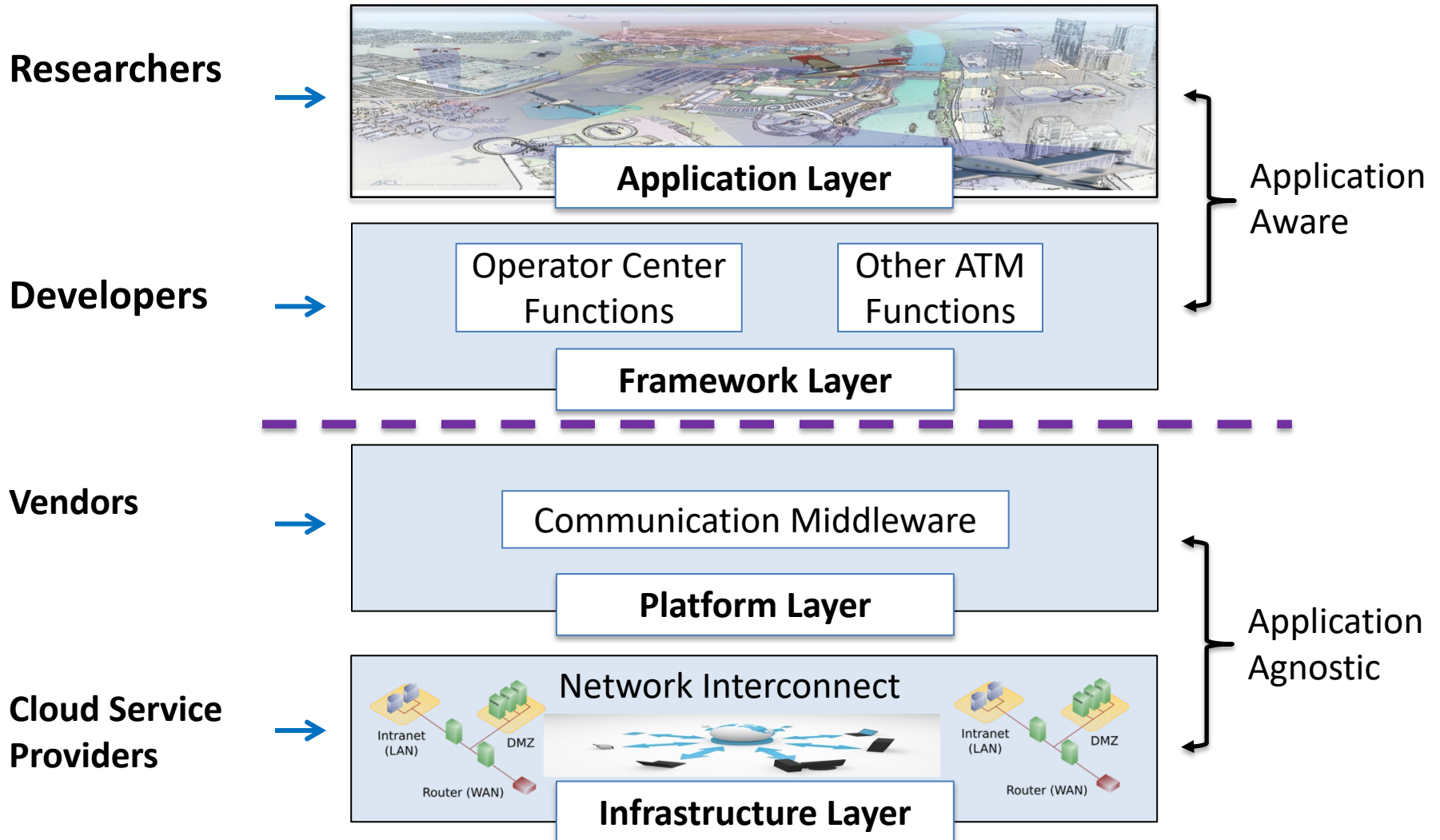
- Accelerate National Airspace System Transformation
  - Simulation
  - What-if Analysis
- Create Best Design (NRA 2014-2015)
  - Architecture Design
  - Cost and Benefit Assessment
- Overcome Challenges
  - Data Sharing
  - Scenario Generation

# Testbed Features

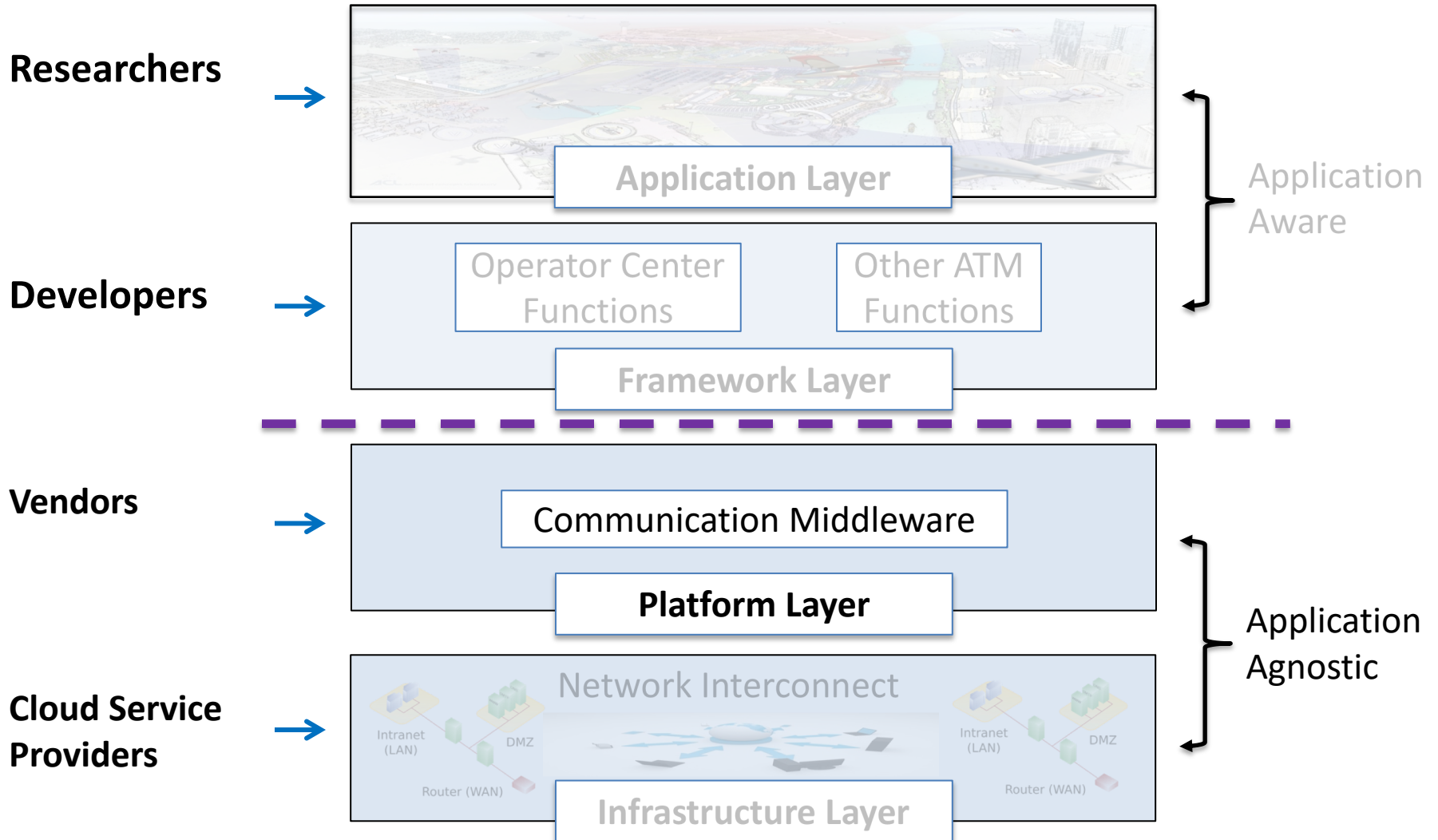


- Community Pooled Resources (e.g., Data)
- Defined Workflow
  - Automated Scenario Generation
  - Simulation Asset Configuration
  - Simulation Execution
- Defined Interfaces
- Standardized System and Data Connectivity

# Architecture Design



# Architecture Design





# Collaboration



- **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

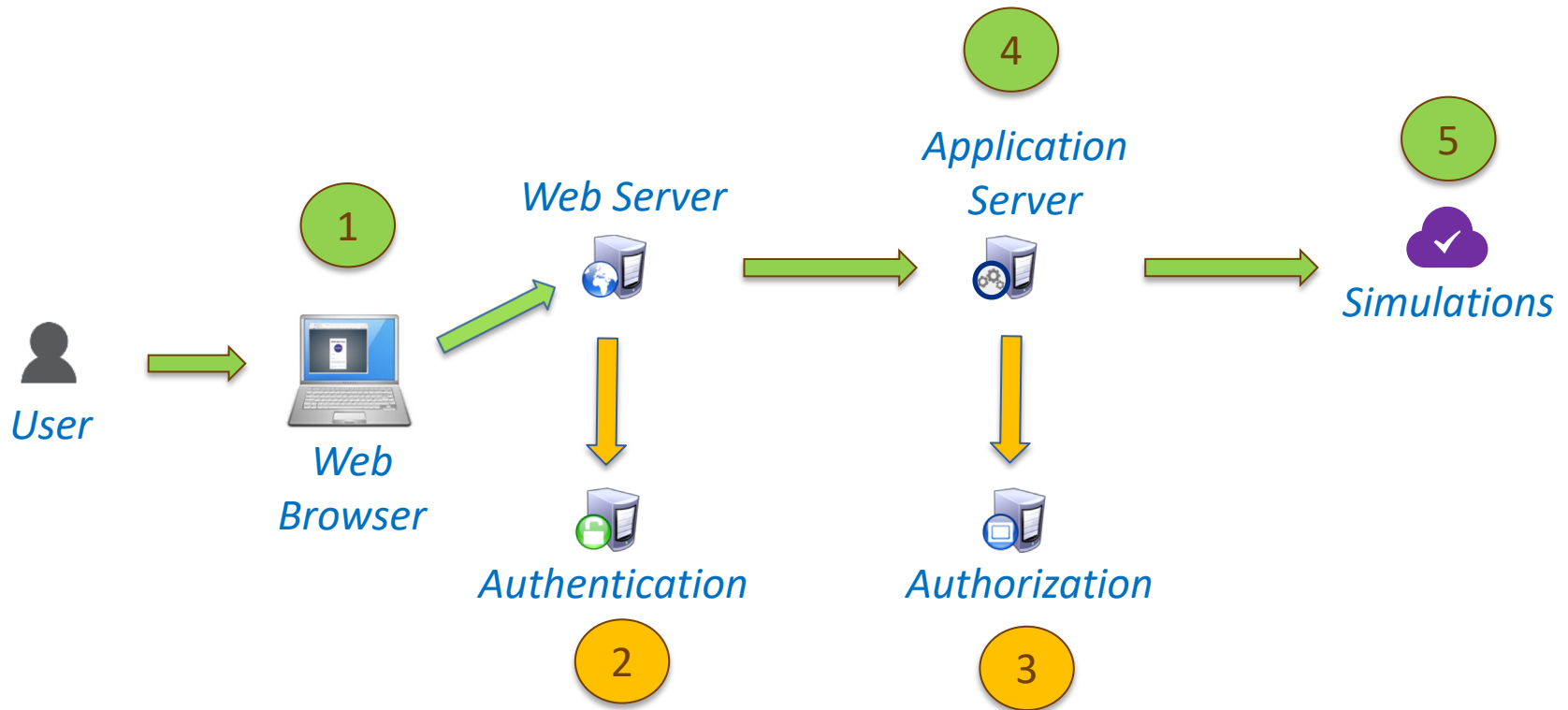
Partner

NASA

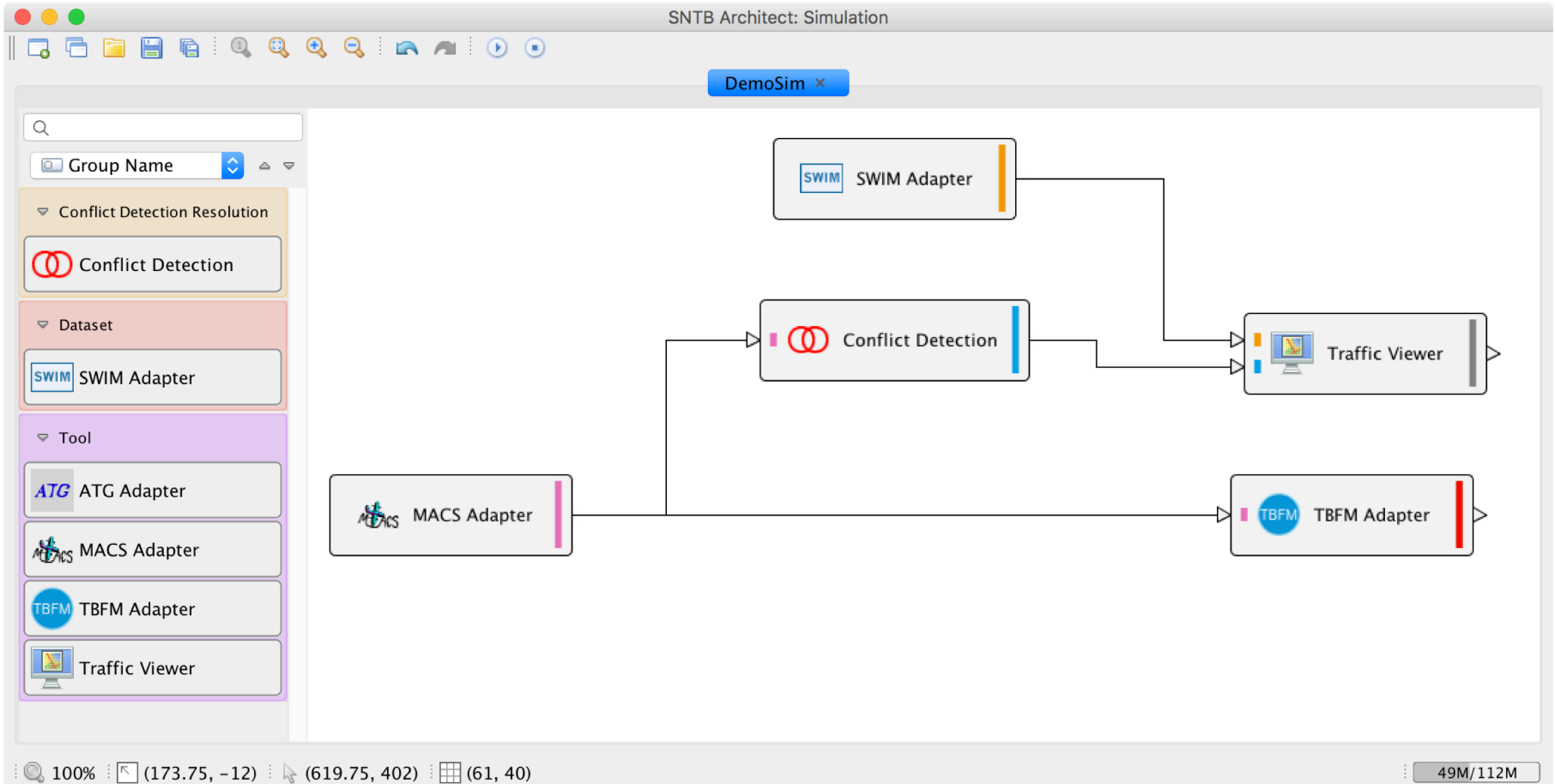


# Progress

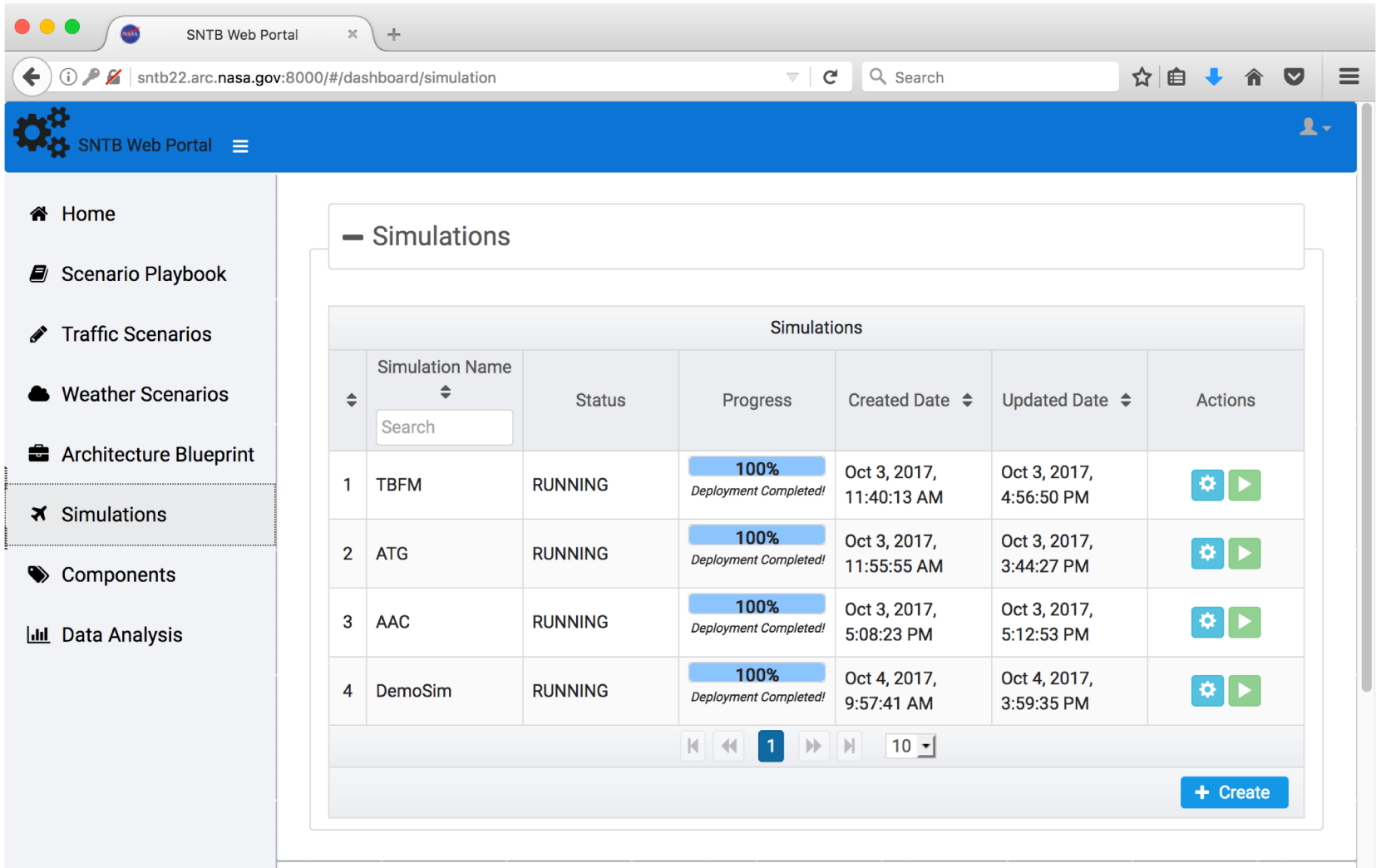
# Concept of Operations











# Simulation Design User Interface



# Library User Interface



The screenshot shows a web browser window with the URL `sntb22.arc.nasa.gov:8000/#/dashboard/simulation`. The page title is "SNTB Web Portal". The left sidebar contains navigation links: Home, Scenario Playbook, Traffic Scenarios, Weather Scenarios, Architecture Blueprint, Simulations (highlighted), Components, and Data Analysis. The main content area is titled "Simulations" and displays a table of simulation records.

Simulations						
	Simulation Name	Status	Progress	Created Date	Updated Date	Actions
	<input type="text" value="Search"/>					
1	TBFM	RUNNING	<div style="width: 100%;"><div style="background-color: #007bff; color: white; text-align: center;">100%</div><small>Deployment Completed!</small></div>	Oct 3, 2017, 11:40:13 AM	Oct 3, 2017, 4:56:50 PM	 
2	ATG	RUNNING	<div style="width: 100%;"><div style="background-color: #007bff; color: white; text-align: center;">100%</div><small>Deployment Completed!</small></div>	Oct 3, 2017, 11:55:55 AM	Oct 3, 2017, 3:44:27 PM	 
3	AAC	RUNNING	<div style="width: 100%;"><div style="background-color: #007bff; color: white; text-align: center;">100%</div><small>Deployment Completed!</small></div>	Oct 3, 2017, 5:08:23 PM	Oct 3, 2017, 5:12:53 PM	 
4	DemoSim	RUNNING	<div style="width: 100%;"><div style="background-color: #007bff; color: white; text-align: center;">100%</div><small>Deployment Completed!</small></div>	Oct 4, 2017, 9:57:41 AM	Oct 4, 2017, 3:59:35 PM	 

At the bottom of the table, there are pagination controls showing "1" of 10 items and a "+ Create" button.

# What's Next?

# Testbed Architecture

UAS Traffic Management Lab



Other Labs



Visualization



UAS Lab



Communication Middleware

Support Services

Tools

ATC Lab

Data

Conflict Detection

ATM Functional Services

Cloud

Component



# Take Away



- 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
2. Development of a High-Fidelity Simulation Environment for Shadow-Mode Assessments of Air Traffic Concepts, Royal Aeronautical Society, London, UK, 14-15 November 2017
3. Automated Scenario Generation for Human-in-the-Loop Simulations, AIAA Aviation, Atlanta, GA, 25-29 June 2018



Questions?

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