



U.S. Department  
of Transportation

# Transportation Transformation Action Plan (TTAP) Interactive Session

Alasdair Cain

2023 CUTC Summer Meeting

June 21, 2023

# TTAP Interactive Session - Agenda



9.50 – 10.00: Transformation Action Plan – Context and Progress Update

10.00 – 10.45: Key Questions - Interactive Discussion

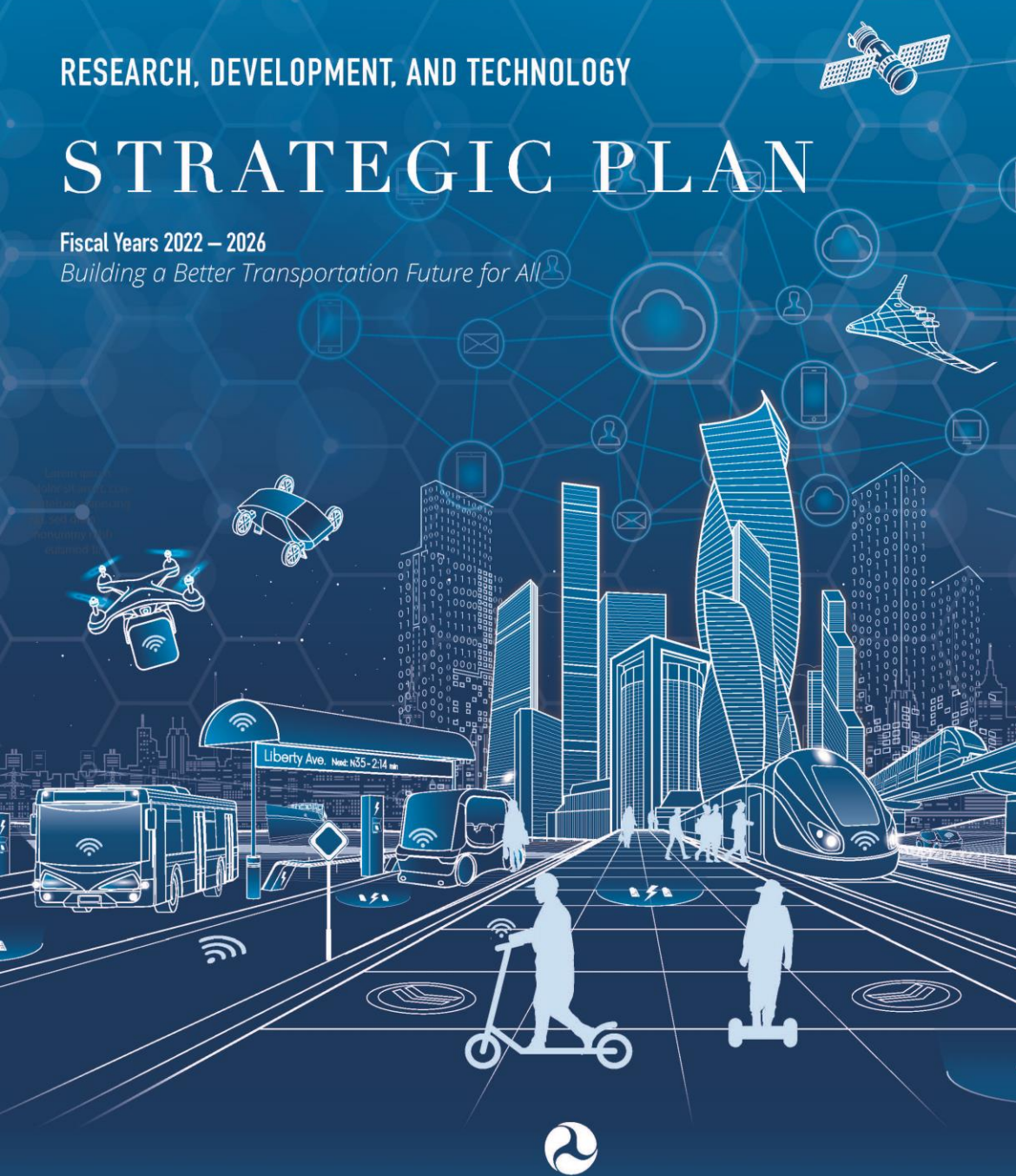
10.45 – 10.50: Closing Remarks/Next Steps

RESEARCH, DEVELOPMENT, AND TECHNOLOGY

# STRATEGIC PLAN

Fiscal Years 2022 – 2026

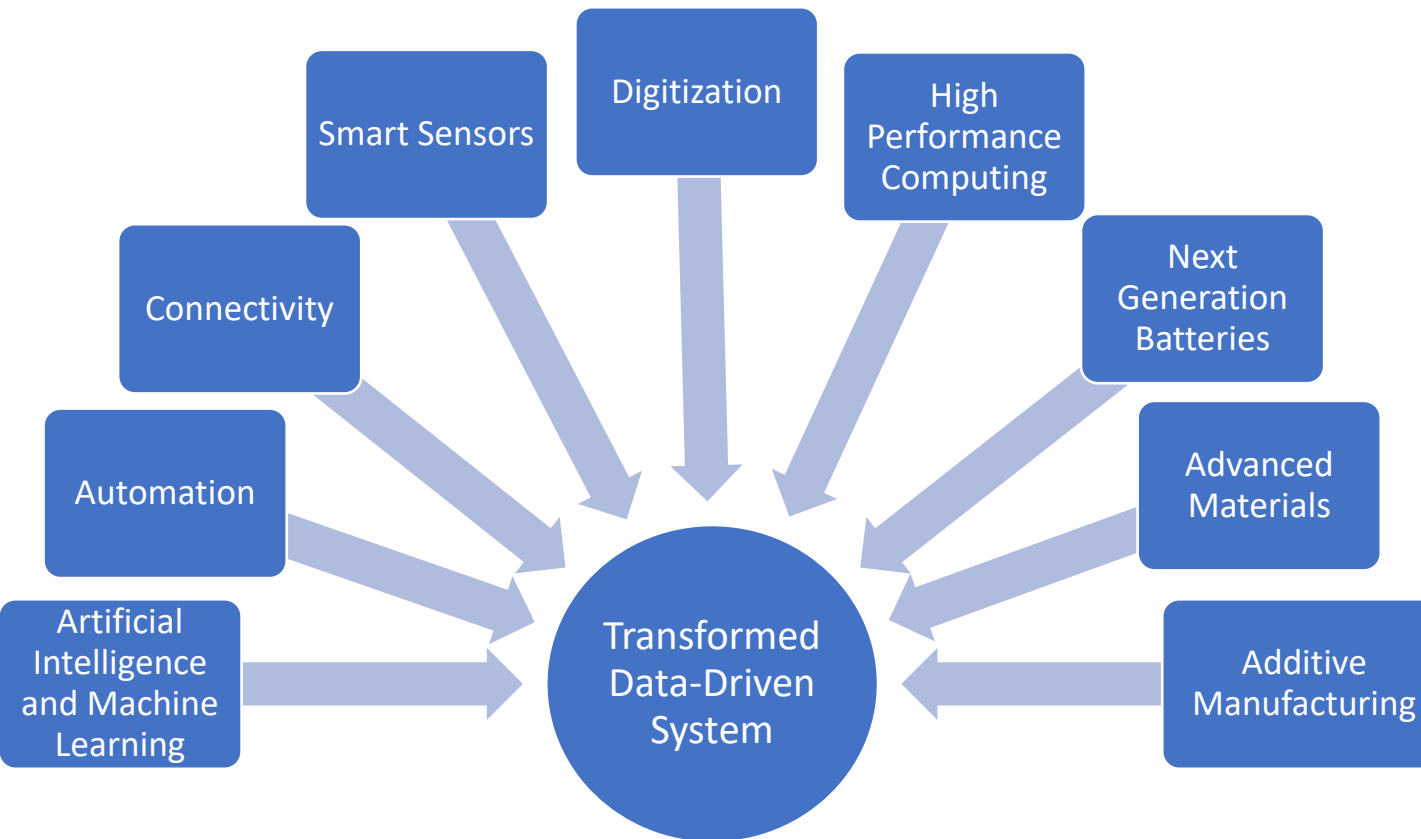
Building a Better Transportation Future for All



U.S. Department of Transportation

STRATEGIC GOALS	GRAND CHALLENGES
Safety	Zero Fatalities
Economic Strength and Global Competitiveness	Resilient Supply Chains
Equity	Equitable Mobility for All
Climate and Sustainability	Net-Zero Emissions
Transformation	The Future Transportation System-of-Systems

# Transforming Transportation: Key Technology Trends and C



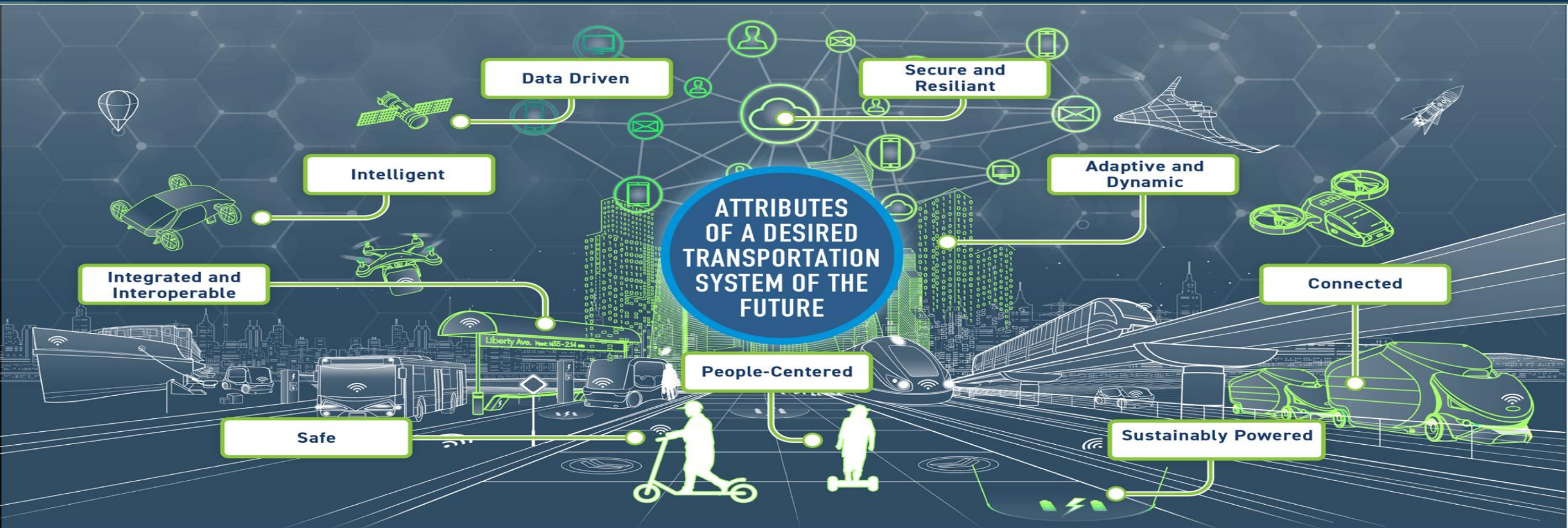
## Where are we now?

- Transportation domains are segregated with non-interoperable architectures
- Transportation operations are modally-based with limited coordination
- Data are disjointed, not shared, not accessible
- Public sector capacities are limited
- Limited/piecemeal integration of new tech

## Where should we go?

- Transportation system operates as a holistically integrated System-of-Systems
- Transportation system based on coordinated and cooperative multi-modal operations
- Integrated, open, and accessible data
- Robust public and private sector capacity
- Accelerated/adaptive integration of new tech

# DOT RD&T Strategic Plan: Integrated Multimodal System-of-Systems



## Research Priorities and Objectives

**1. Integrated System-of-Systems**



**Reference Architecture**

2. *Data-driven Insight*

*Digital Infrastructure*

3. *New and Novel Technologies*

*Connectivity*

# DOT RD&T Strategic Plan – Implementation... Transportation Transformation Action Plan

## Objective: Advance an Integrated Multimodal System-of-Systems (IMSS)

- Build a Conceptual Framework for a Transportation System **Reference Architecture\***
- Describe the critical operational concepts and technologies of an IMSS
- Identify the actions needed by internal and external stakeholders and build consensus

\* A **reference architecture** defines a system and its components and how those components interact with each other.



# Integrated Multimodal System-of-Systems..... Reference Architecture Business Case



*As the transportation system becomes more complex, data-driven, and interconnected, there is a growing need to establish a reference architecture for a future system-of-systems. This reference architecture will promote secure data sharing and interoperability across the multimodal ecosystem to support improved decision making, system development, and technology integration across modes, services, and operations.*

# Existing Reference Architectures

## IMSS Reference Architecture



### **ARC-IT**

Cooperative  
and Intelligent  
Transportation



### **FAA NAS**

Enterprise  
Reference  
Architectures



### **NASA**

Mission-Based  
Architectures



### **Others?**



# Federal Role in Developing an IMSS Reference Architecture

- **Convene and Facilitate:** ensure the architecture is informed by a wide range of perspectives and meets the needs of diverse users and operators by creating forums for dialogue and collaboration.
- **Set Standards and Guiding Principles:** Set vision and goals to ensure that the architecture meets standards for interoperability, data sharing, user-centered design, security, privacy, and resilience.
- **Educate Stakeholders:** Educate stakeholders and the public about the benefits of an integrated, multimodal transportation system, and advocate for the adoption and use of the reference architecture.
- **Integrate Operations and Planning:** Incorporate the reference architecture into federal research and development planning and initiatives.

# Key Questions for Advancing an IMSS.....

- What are the challenges, gaps, and research needs?
- What are the opportunities or enabling new/emerging technologies?
- What reference architectures and frameworks should we consider?
- Who are the major stakeholders that need to be included?
- How can the UTC Directors and members help?  
(interactions, teams, committees, projects, partnerships...)
- What are we missing?

**Any other comments, please email [transformation@dot.gov](mailto:transformation@dot.gov).**



U.S. Department  
of Transportation

# Transportation Transformation Action Plan (TTAP) Interactive Session

Alasdair Cain

2023 CUTC Summer Meeting

June 21, 2023