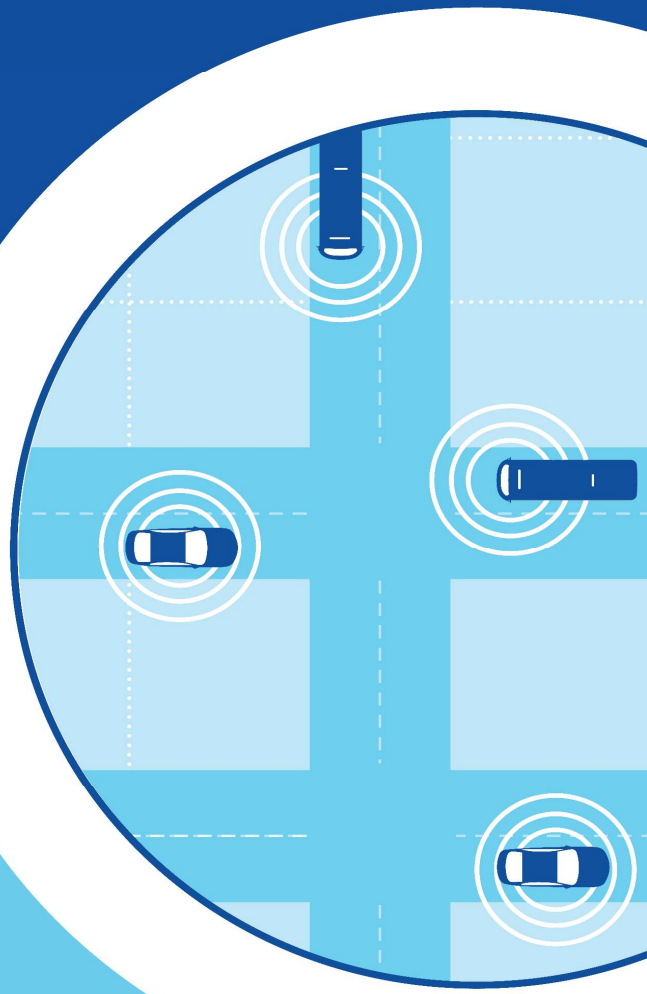
Automated Driving Systems

Timothy Haile
Contra Costa Transportation Authority



INNOVATE 680
IMAGINE THE POSSIBILITIES

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Who We Are

Contra Costa, California

- Public agency formed by voters in to manage county's transportation sales tax program and transportation planning efforts.
- Responsible for maintaining and improving the county's transportation system by delivering critical transportation infrastructure projects.
- Managing entity of autonomous vehicle (AV) testing site: GoMentum Station.

What We Do

PEDESTRIAN
Make improvements to sidewalks, crosswalks, trails, and paths

LOCAL STREETS
Smooth traffic flow on major roads and invest in improvements such as repairing potholes and road surfaces

BUSES
Invest in a reliable, comfortable and convenient bus network

SAFE ROUTES TO SCHOOLS
Focus on programs and projects aimed at bicycle and pedestrian safety for K-12 students

FERRIES
Expand the Bay Area ferry system by looking to ferries as an alternate commute method between West County and San Francisco

BICYCLE
Invest in safe routes and infrastructure improvements for bicyclists

BART
Improve BART service and stations, extend routes and increase parking at

HIGHWAYS
Complete Contra Costa's highway system, and improve air quality and noise protection along these corridors

INNOVATIVE SOLUTIONS
Implement smart transportation infrastructure to reduce congestion and encourage greener travel.

PROGRAMS FOR SENIORS AND PEOPLE WITH DISABILITIES
Enhance transit options to improve mobility for seniors and people with disabilities

Automated Driving Systems

Advancing the next generation of transportation technology

Increased Accessibility, Opportunity

*Transportation Emerges as Crucial to Escaping Poverty, NY Times May 2015

INCREASED SAFETY

36,096

fatalities in motor vehicle traffic crashes in 2019

94%

caused by human error

Automated Driving Systems Grant

A total of 73 applications competed for 8 grant awards. **CCTA was the only local agency to win a grant.** The other winners were state departments of transportation and universities.

3 Projects supporting the future of mobility

Rossmoor First Mile/Last Mile Shared Autonomous Vehicles

County Hospital Accessible Transportation

Personal Mobility on Interstate 680

Automated Driving System (ADS) Demonstration

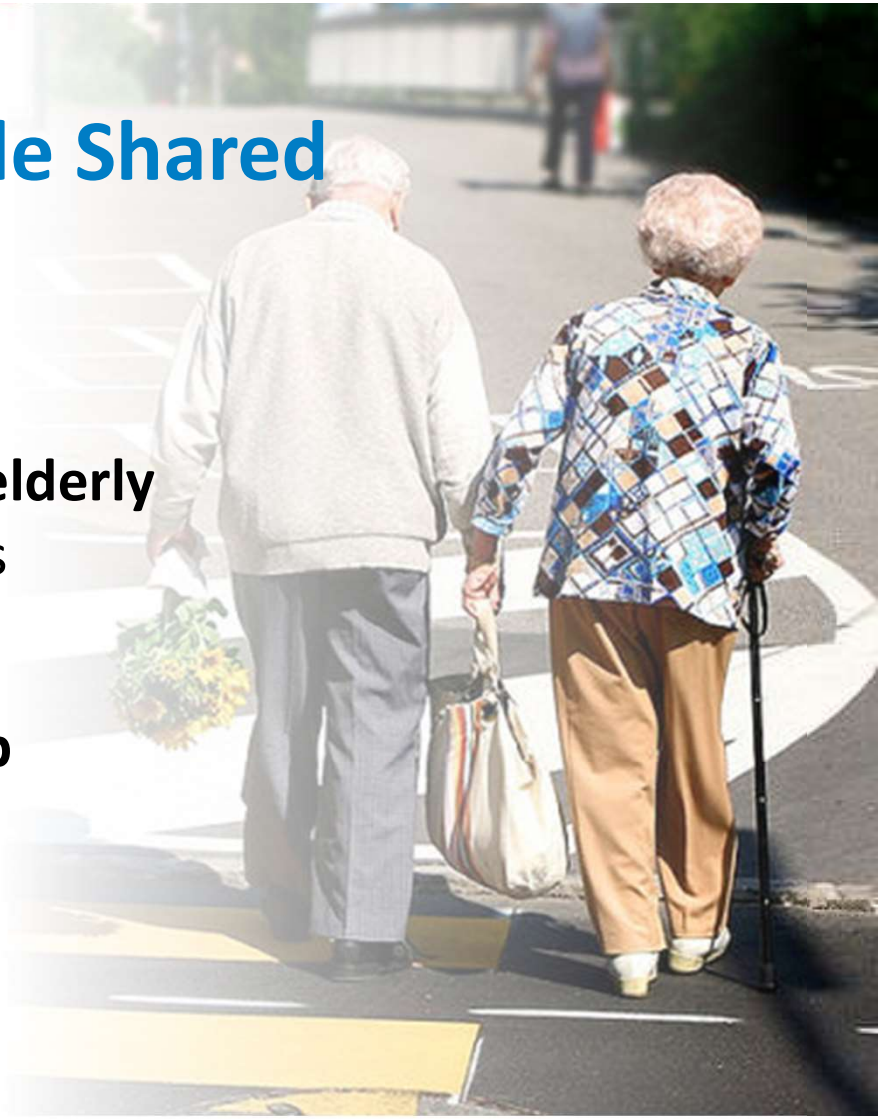
GOALS

- **Advance safety** of automated driving systems
- Facilitate data collection to **support rulemaking and development of ADS safety performance standards**
- Provide unprecedented **mobility choices to transportation-challenged, underserved communities**
- **Expand shared mobility** options

Rossmoor First Mile/Last Mile Shared Autonomous Vehicles

Walnut Creek, California

- **Increase transit accessibility for the elderly** community using shared autonomous vehicles (SAVs)
- Data gathered will be used to **develop safety performance measures**



Rossmoor First Mile/Last Mile SAVs

- **Level 4 low-speed SAV shuttles** (up to 25mph)
- **Fixed route SAV service** with multiple stop locations
- **User interface able to identify desired stop, Q'STRAINT automated securement and restraint systems**

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County Hospital Accessible Transportation

Martinez, California

- **On-demand, wheelchair accessible**, autonomous vehicle (AV) **shuttle service**
- **Provide accessible transportation** to public health facility to **improve quality of life** and **address medical appointment absenteeism**
- Gather Data to **advance ADS safety performance standards**

County Hospital Accessible Transportation

Martinez, California

- **Level 3, Level 4 medium speed shuttles** (up to 50mph)
- **Smartphone app and dial-a-ride service**
- Q'STRAINT **automated securement and restraint systems**
- **Optional wearable device** for seniors and minimally ambulatory individuals

Personal Mobility on I-680

San Ramon, California

- Prepare a **2-mile segment of the I-680 Corridor for future CAVs**
- **Install new and upgraded V2I and V2V 4G/5G communications** to accommodate CAV technology
- **Implement innovative operational strategies**
- **Level 3, Level 4 high-speed AVs** (up to 65mph)
- **Utilize ADS technologies such as HD dynamic mapping** to collect data for further development of AV technologies

ADS: System of Systems

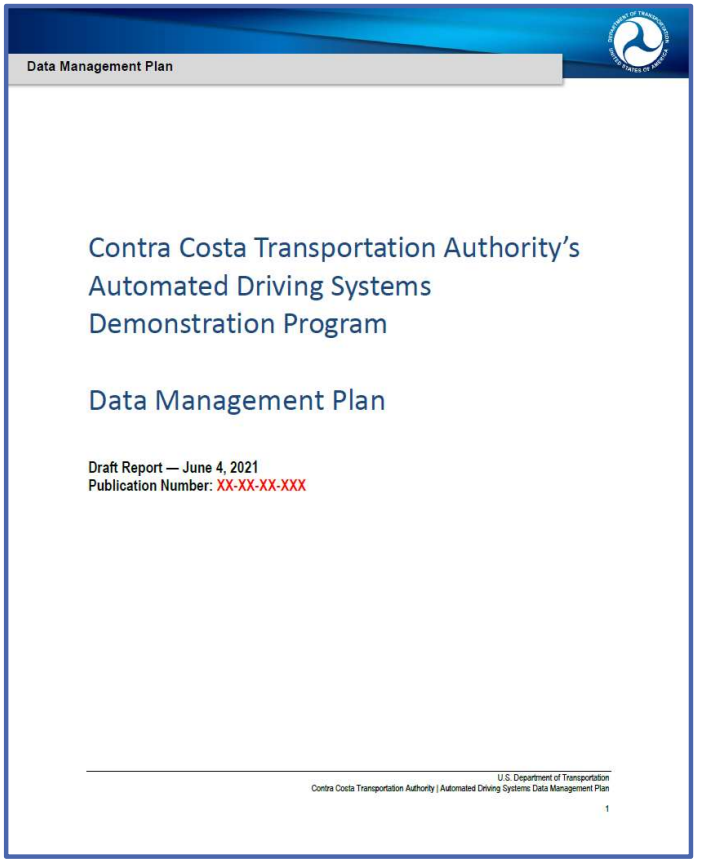
- Complex System made of several independent connected Systems, operating in real-time and sharing data
- During the initial phase of the project, we will define:
  - what data we will collect (and why)
  - where we will store the collected data (i.e., local storage or cloud)
  - how we will process and visualize the stored data (i.e., tools)
- We will use Model Based Systems Engineering (MBSE) for the creation of computable models of the ADS Data Management System using SysML/UML, and do Quick-Prototyping/POCs, to show what we are doing
- Connectivity between Systems will be implemented at the model level first (e.g., POC), then handed-off to each System owner for its implementation or configuration, integration and validation

Proposed Data Elements

- Vehicle-Based Data Elements
  - The most significant elements in revealing driving scenarios and safety implications
- V2I Infrastructure Data
  - Through the RSU and backhaul communications network
  - Could include SPaT data or other V2I messages (if being used)
- Traffic Operations and Environment Data
  - Traffic condition data from roadside sensors and traffic management center
  - Speeds, occupancy, road environment data such as potholes, and any road hazards (e.g., incidents, construction areas, closed lanes, etc.)
  - Weather
- All data above accessible in CCTA cloud

Data Management Plan

- Data Management Architecture
- Data Overview
- Data Standards
- Data Dictionary
- Data Stewardship



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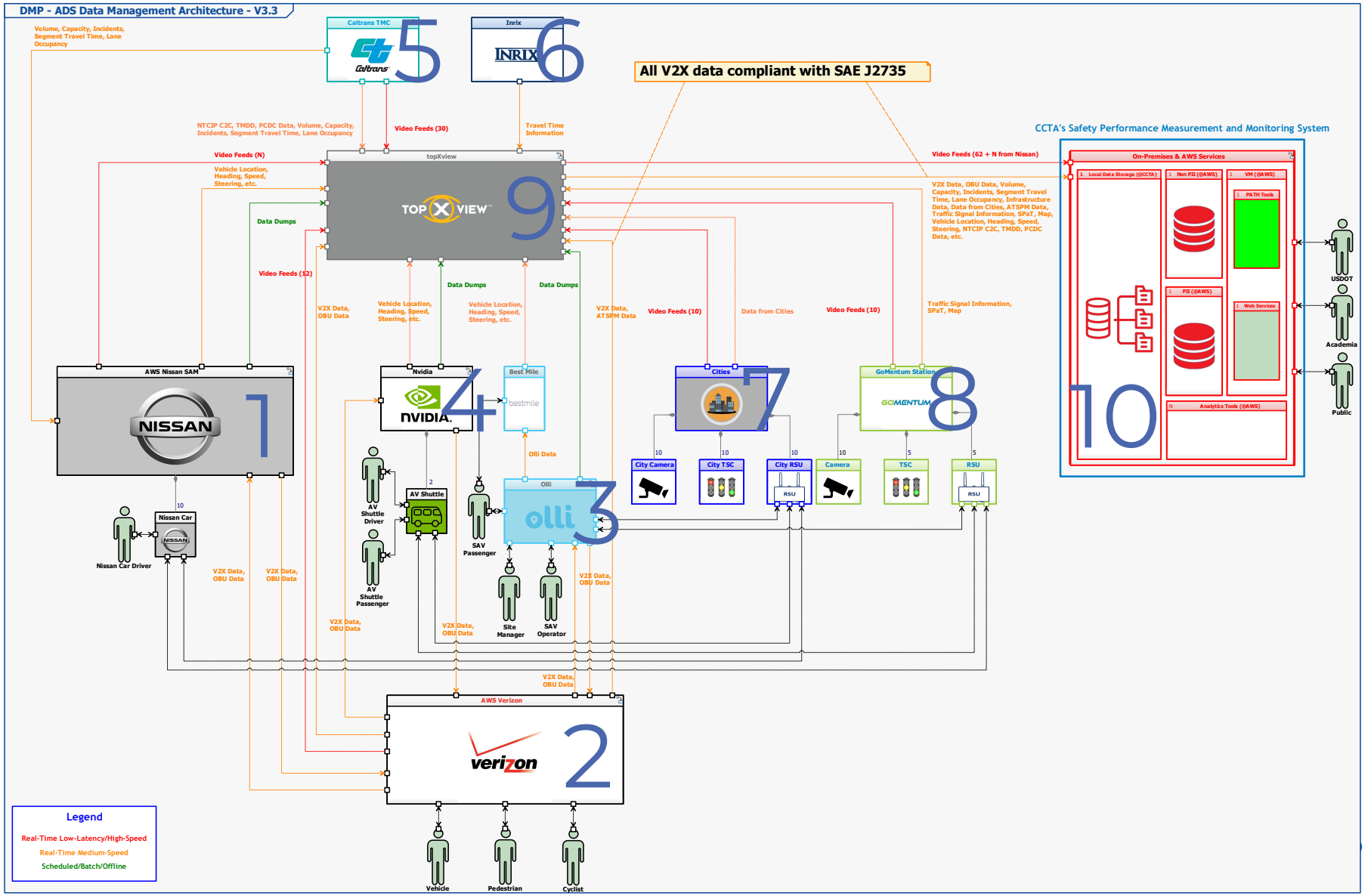
Data Management Architecture



Thank You

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