



# Highlight of CDOT's Connected and Automated Technology Activities

**No Boundaries Annual Meeting**

Wednesday, May 15th, 2019

Aurora, CO

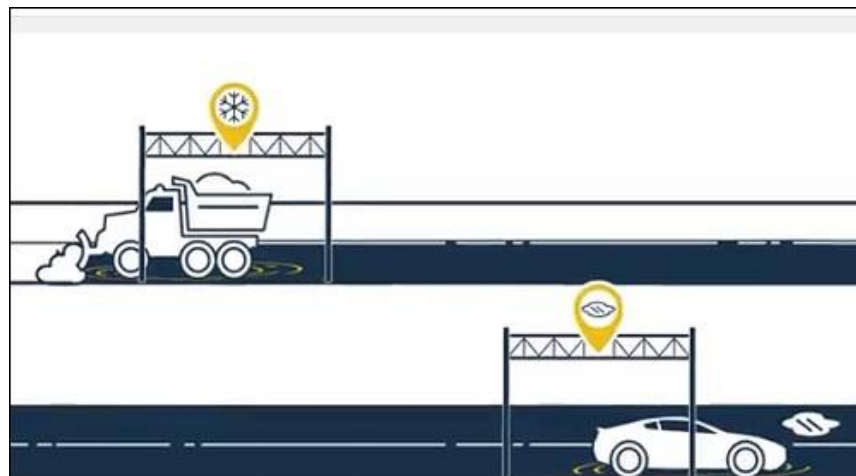
**Ashley Nysten, PMP**

**Connected & Autonomous Technology Program Manager  
Special Project Services Unit**



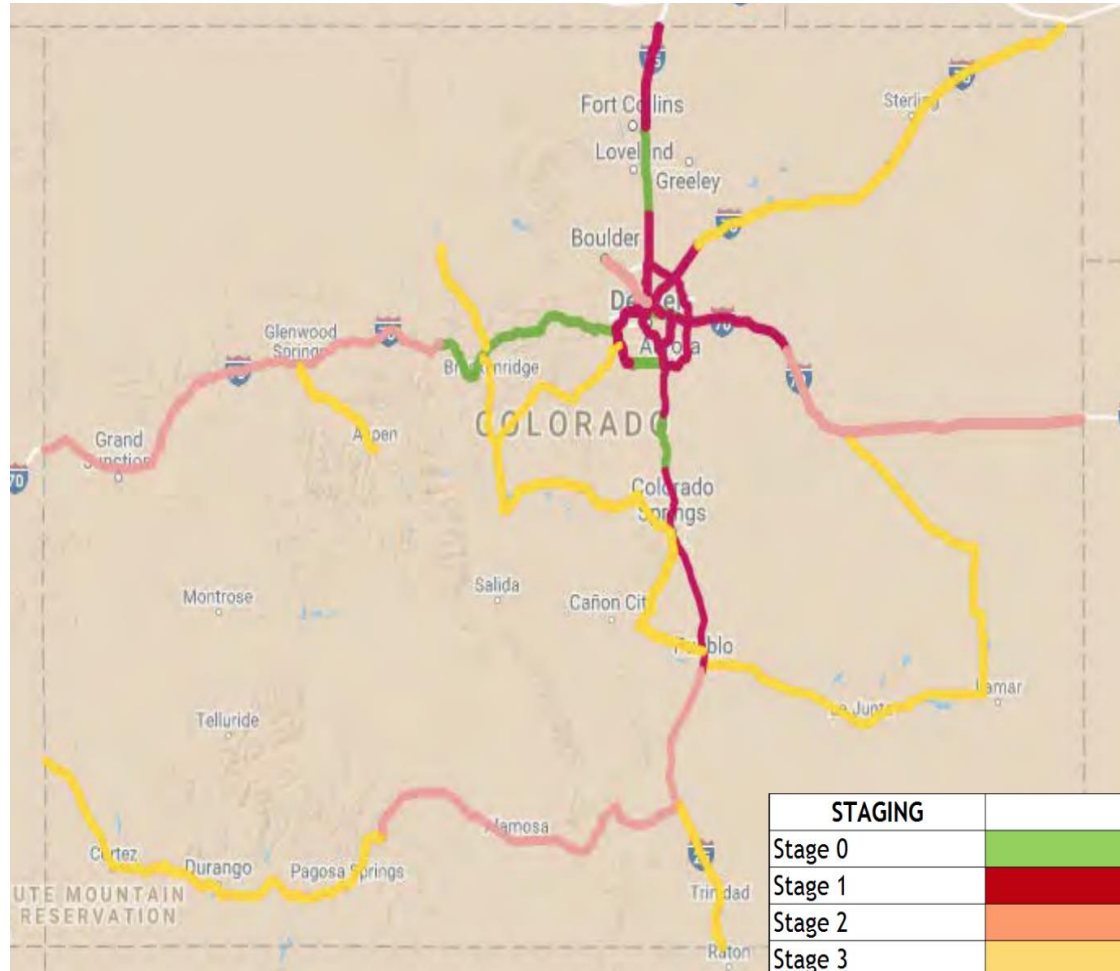
# Presentation Overview

- Introduction
- Connectivity Highlight - ITS Planning
- Project Overview:
  - I-70 Connected Mountain Corridor
  - Data analytics system
  - CDOT's automated vehicle activities
- Questions



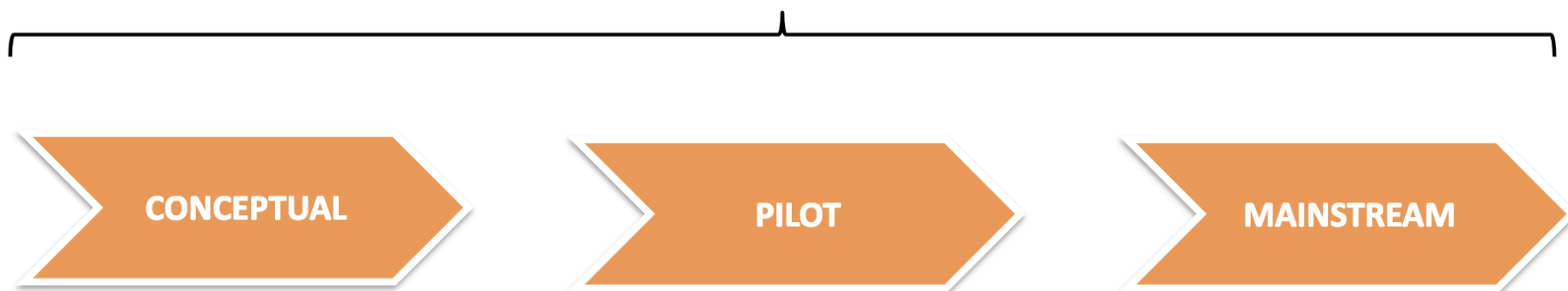
# Building for connectivity and planning for technology

- Fiber
- Smart Mobility Planning



# CDOT Smart Mobility Plan

The Technology Toolbox will Provide a Pipeline for Accelerating Innovation



# CDOT Smart Mobility Plan Approach

Smart Technology Future  
for Colorado

- Transparent, articulate and integrated approach to cutting edge technology deployment in Colorado

Budgetary &  
Institutional Support

- Continued State and Federal support
- Line items for technology projects
- Other cost shares where appropriate

Link to Other  
Transportation Planning Efforts

- Broad-spanning partnerships to align larger statewide plan with other relevant planning efforts

Colorado Smart Mobility Plan

- 5 to 10 year summary plan for statewide technology deployment + tech toolbox
- Dynamic technology committee

Regional Technology Plans

- Foundation to build unified support and planning for innovative local & regional technology projects

# I-70 Connected Vehicles Pilot Project

## I-70 MOUNTAIN CORRIDOR (VAIL TO GOLDEN) MAP

**A** I-70 Exit 176 in Vail      **B** I-70 Exit 260 in Golden at C-470





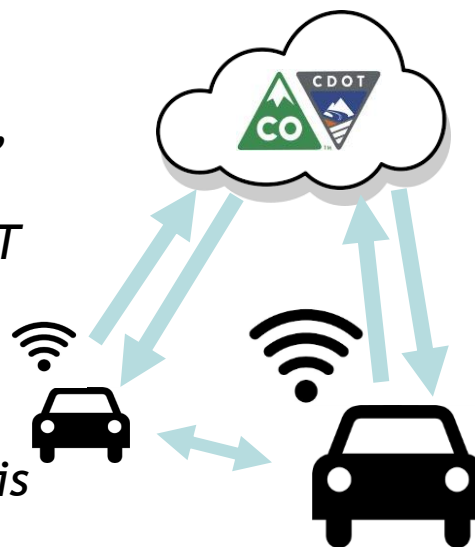
# I-70 Connected Vehicles Phase 1 and Phase 2 Goals

## Phase 1 Goal

CDOT is collecting *scalable*, *secure*, and *usable* data along all of I-70 between Golden and Vail from CDOT equipped vehicles.

## Phase 2 Goal (DRAFT)

Building on the Phase 1 goal, CDOT is distributing *secure*, *relevant*, and *safety-critical information* along all of I-70 between Golden and Vail from CDOT equipped vehicles.



## Phase 2 - Definitions - DRAFT

### Secure

Meets all local and regulatory standards for wireless and cellular message transmission

Infrastructure encrypted with national SCMS data (also promotes interoperability)

Protects privacy of Colorado's traveling public

Systems security plan evolves as threats (both physical and virtual) to the system evolve and are known

### Relevant

Fully supports prioritized CV applications identified by the state

Augments the state's overall real-time and predictive data intelligence plan

### Safety-Critical

System can send and receive safety critical messages

Life-safety decisions (crashes, predictive crashes, dangerous queue, dangerous roadway, etc)



## I-70 Mountain Corridor Connected Vehicles Project Scope Overview

### Product *(Software)*

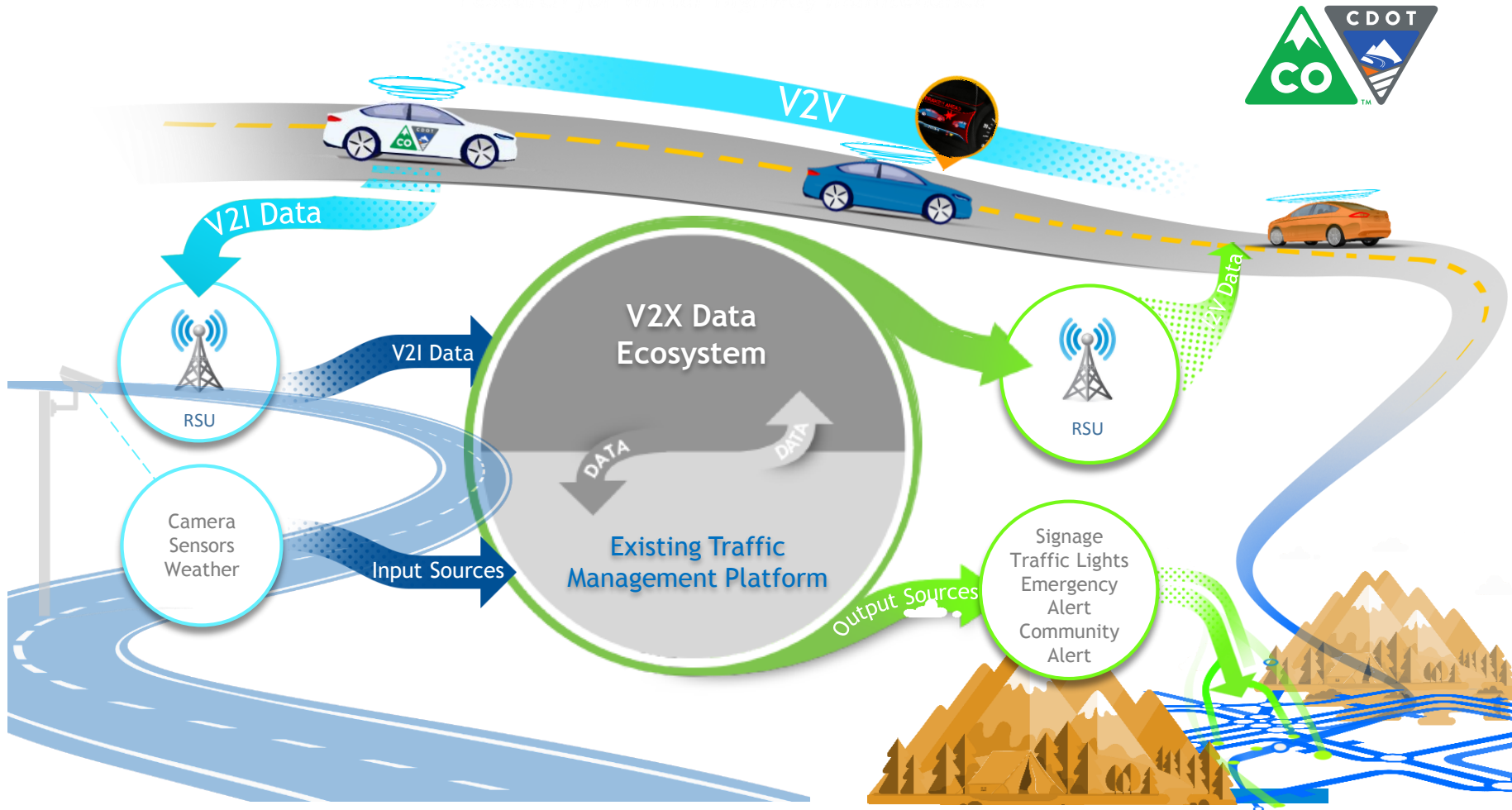
- Connected vehicle data ecosystem
- Safety critical alerts

### Deployment *(Infrastructure)*

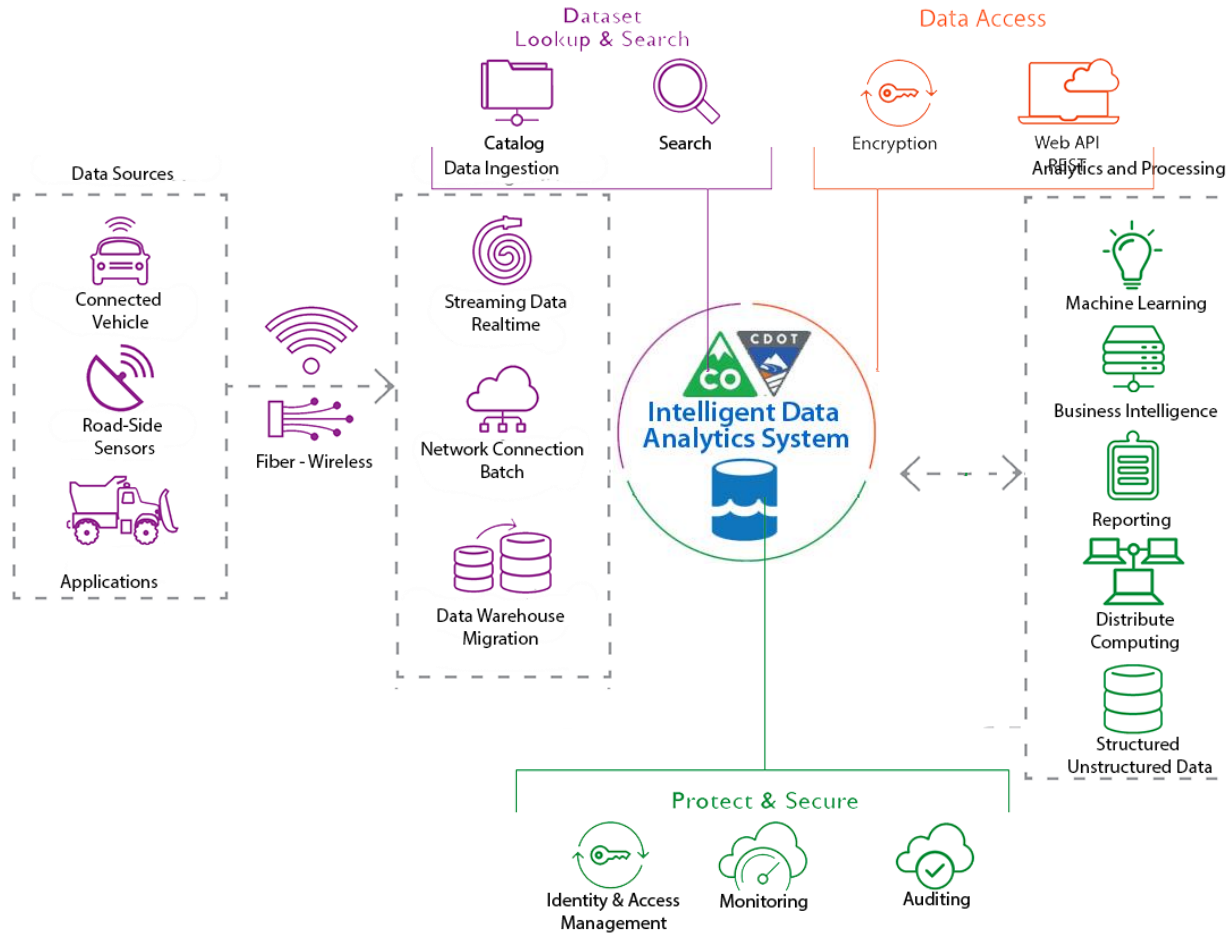
- Road side units
- On board units

# NO BOUNDARIES

Roadway Maintenance Practices



# DAISy: Data AnalYTics Intelligence System



# Autonomous Mobility Task Force



**COLORADO**  
Department of  
Transportation



**COLORADO**  
Department of Revenue

Colorado Department of Transportation

Colorado State Patrol

Colorado Department of Revenue

*Division of Motor Vehicles*





First Regular Session | 72nd General Assembly

## Colorado General Assembly

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SESSION SCHEDULE | BILLS | LAWS | LEGISLATORS | COMMITTEES | INITIATIVES | BUDGET | AUDITS | PUBLICATIONS

SB17-213

### Automated Driving Motor Vehicles

Concerning authorization for automated driving systems to control motor vehicles throughout Colorado.

SESSION: 2017 Regular Session

SUBJECT: Transportation & Motor Vehicles

#### BILL SUMMARY

The bill declares that the regulation of automated driving systems is a matter of statewide concern, and, therefore, local authorities are prohibited from setting different standards for these systems than for human drivers. The use of automated driving systems is authorized if the system is capable of conforming to every state and federal law applying to driving. If not, a person testing a system is required to obtain approval from the Colorado state patrol and the Colorado department of transportation.

(Note: This summary applies to the reengrossed version of this bill as introduced in the second house.)

#### PRIME SPONSORS



Senator  
Owen Hill



Senator  
Dominick



Representative  
Faith Win



Representative  
Jeff Bridge

# An Act

#### SENATE BILL 17-213

BY SENATOR(S) Hill and Moreno, Baumgardner, Cooke, Cr Gardner, Holbert, Lambert, Lundberg, Marble, Smallwood, Tate, Williams A., Zenzinger, Grantham; also REPRESENTATIVE(S) Winter and Bridges, Lundeen, Becker K., Buckner, Covarrubias, Garnett, Ginal, Gray, Hansen, Ke Kraft-Tharp, Lawrence, Liston, Melton, Nordberg, Saine, Singer, Wist, Young, Coleman, Hooton, Jackson, Michaelson Jenet, Pabor Duran.

CONCERNING AUTHORIZATION FOR AUTOMATED DRIVING SYSTEMS TO CONTROL MOTOR VEHICLES THROUGHOUT COLORADO.

Be it enacted by the General Assembly of the State of Colorado:

**SECTION 1. Legislative declaration.** (1) The general assembly hereby finds and declares that:

(a) Innovative technology in the form of automated driving systems can save lives and improve mobility;

(b) In 2016, more than 600 people died on Colorado roads and highways, but because human error contributes to most crashes, the use of automated driving systems could reduce traffic fatalities by up to 90

*Capital letters indicate new material added to existing statutes; dashes through words indicate deletions from existing statutes and such material not part of act.*

and, in such case, will take effect on the date of the official declaration of the vote thereon by the governor.



Kevin J. Grantham  
PRESIDENT OF  
THE SENATE



Crisanta Duran  
SPEAKER OF THE HOUSE  
OF REPRESENTATIVES

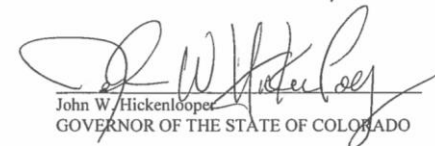


Effie Ameen  
SECRETARY OF  
THE SENATE



Marilyn Eddins  
CHIEF CLERK OF THE HOUSE  
OF REPRESENTATIVES

APPROVED 10:54 am 6/1/17



John W. Hickenlooper  
GOVERNOR OF THE STATE OF COLORADO

February 2018



# Autonomous Mobility Task Force Checklist

## AUTONOMOUS CERTIFICATION PROCESS

The state of Colorado believes in a shared vision of a safer highway system by advancing the deployment of autonomous vehicle technologies. The autonomous certification process outlines the expected safety, driver, vehicle and insurance certifications prior to deployment and following Senate Bill 17-213 should the vehicle not currently be able to meet all driving rules and regulations.

### Submittal Requirements

Provide written narrative and/or submittal document for each category for final certification.

|                    |  |
|--------------------|--|
| Operational Domain | <p>Narrative to discuss the proposed operation domain of the autonomous vehicles including:</p> <ul style="list-style-type: none"> <li>• LOCATION             <ul style="list-style-type: none"> <li>○ Outline requested testing routes, any required changes, modifications to the transportation system to operate</li> </ul> </li> <li>• OPERATIONAL DEFINITION             <ul style="list-style-type: none"> <li>○ Define the Automated Driving System (ADS) Operational Design Domain (ODD) including the operating parameters and limitations of the system including:                 <ul style="list-style-type: none"> <li>▪ Operational aspects including steering, braking, accelerating and monitoring the vehicle and the roadway</li> <li>▪ Operational domain including where and when the ADS is designed to</li> </ul> </li> </ul> </li> </ul> |
|--------------------|--|



## AV Deployments in Colorado



EasyMile at the 61<sup>st</sup> and Peña Station



CDOT Automated Truck Mounted Attenuator

# Autonomous Truck Mounted Attenuator Video Demonstration

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<https://www.youtube.com/watch?v=xBd6CmTGjFk&feature=youtu.be>

# THANK YOU!

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Connected & Autonomous Technologies  
Program Manager

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