# Partial Automation for Truck Platooning

## FHWA Exploratory Advanced Research Project

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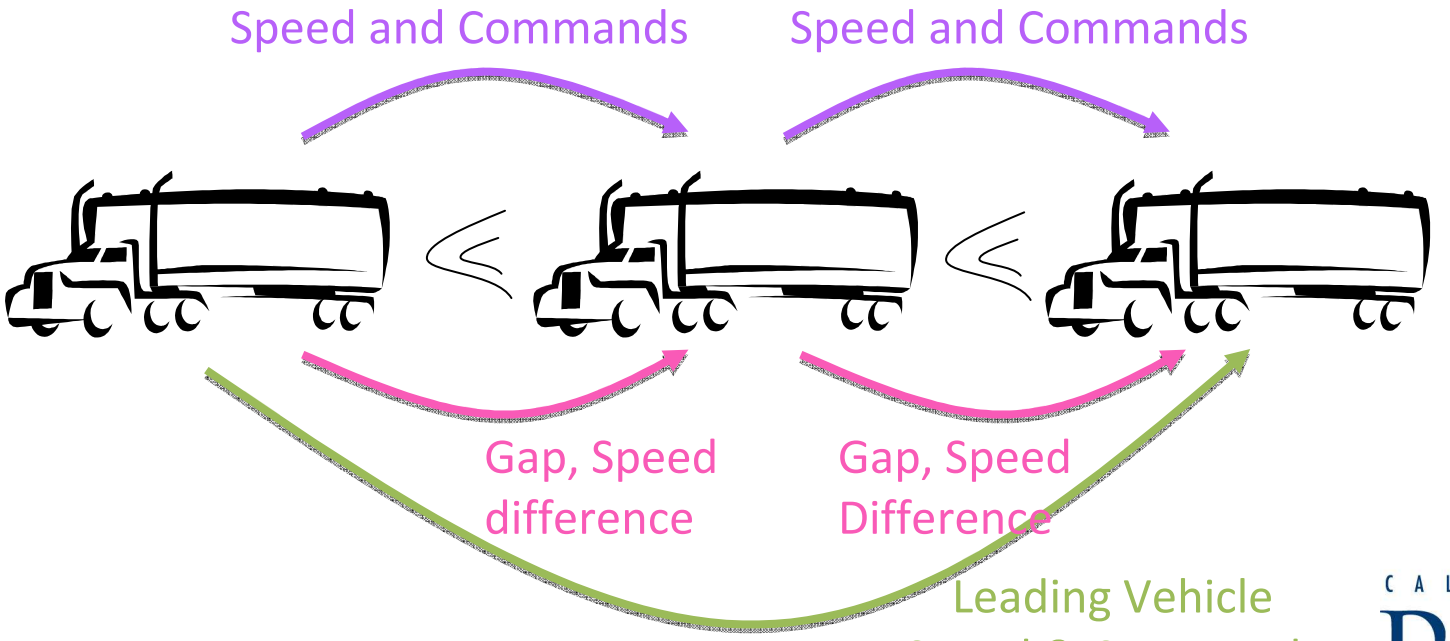
# Cooperative Adaptive Cruise Control (CACC) for Class-8 Trucks

- **Start with commercially-available Volvo truck adaptive cruise control**
- **Add vehicle-vehicle (V2V) data communications to enhance performance**
- **Driver chooses following gap and controls steering**

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# Project Goals/Objectives

- **Research questions:**
  - **Performance achievable with truck CACC in mixed traffic?**
  - **Driver preferences for CACC time gaps?**
  - **Energy savings at preferred time gaps?**
  - **Benefits in truck lane capacity, energy and emissions?**
- **Public policy:**
  - **Deployment strategies for truck CACC**
  - **Synergy with I-710 truck lane development**
  - **Attractiveness to public and officials**

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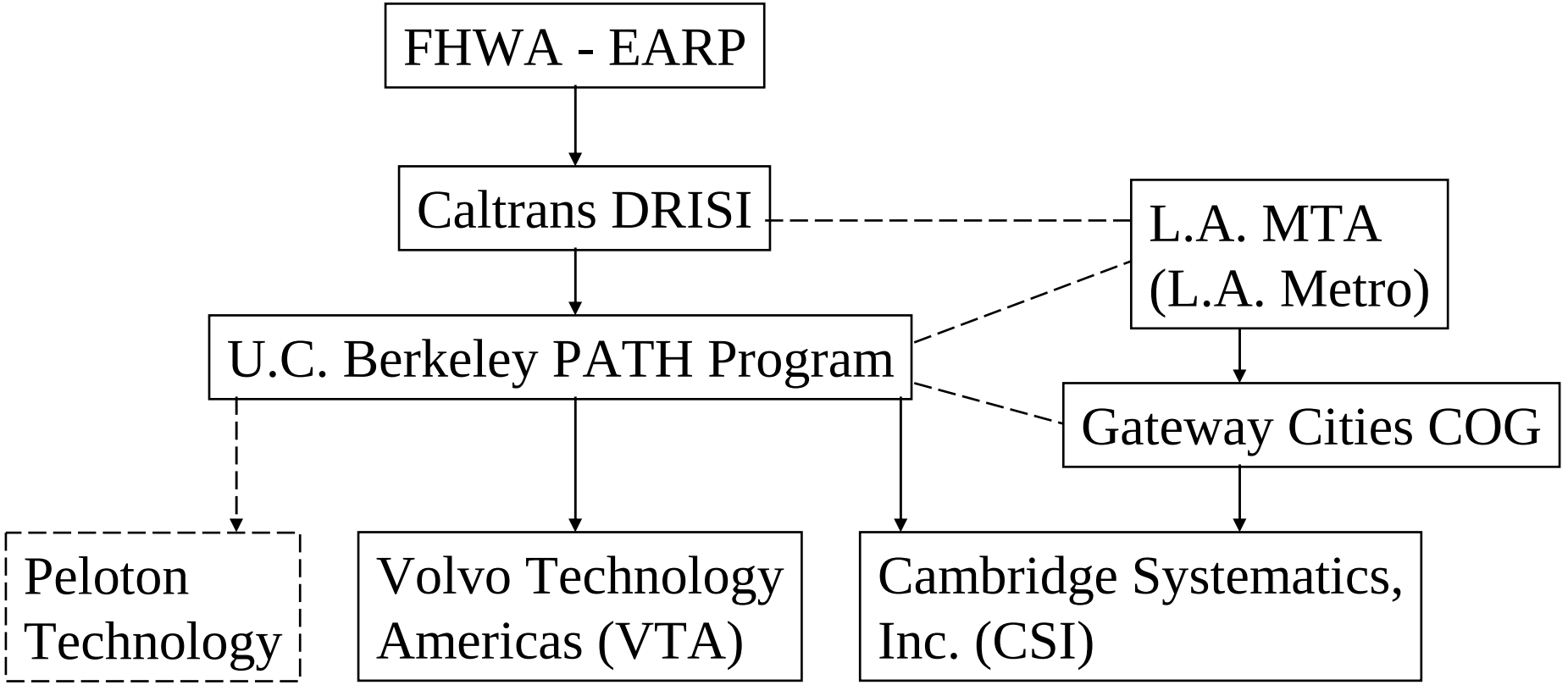
# Project Team



# Relevant PATH Experience

- Development and testing of truck automation systems on closed test sites since 1998
  - Wind-tunnel tests of drag reductions on scale model trucks at USC since 1995 – potential saving up to 25% by follower
- Two-truck platoon development and testing 2000-2003 for Caltrans (constant-spacing gaps 3 – 10 m)
  - Leader saved 10%, follower saved 12% fuel
- Three-truck platoon development and testing for FHWA, 2007-2011 (constant-spacing gaps 4 - 10 m)
  - Leader saved 4%, followers saved 10-14% fuel
  - At sea level and highway cruising speeds, could have saved 1.5X more
- CACC simulated, implemented and tested on cars and crossovers

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# System Description

- Cooperative ACC with constant time-gap vehicle following (not a close-coupled platoon)
  - For passenger cars, shortest gap was 0.6 s (58 ft gap at 65 mph)
- Based on production ACC system on Volvo trucks + Denso WSU DSRC radios
- DSRC provides enhanced and earlier information about motions of and commands issued to preceding trucks
- Three Class-8 tractors to be equipped and tested

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# Project Experimental Work Planned

- **Develop truck CACC, starting from existing Volvo ACC (2014-15)**
  - **Tighter control of gaps**
  - **Option to choose shorter gaps**
  - **Driver interface based on simulator tests**
- **Test driver preferences for gap settings (2015)**
  - **Formal human factors experiment, with representative truck drivers**
- **Measure energy savings at preferred gaps (2016)**
- **Public demonstration in southern California (2016)**

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