

2016 UDOT RESEARCH PROBLEM STATEMENT

*** Problem statement deadline is March 14, 2016. Submit statements to Tom Hales at tahales@utah.gov. ***

Title: Scenario Planning for Automated Vehicles

No. (office use): 16.05.04

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UDOT Champion (suggested): Jeff Harris, Angelo Papastamos

Select One Subject Area

Materials/Pavements

Maintenance

Traffic Mgmt/Safety

Preconstruction

Planning

Public Transportation

1. Describe the problem to be addressed.

Transportation agencies such as UDOT and WFRC are tasked with developing long-range plans that seek to envision regional transportation systems and operations into the future, in order to best plan for projects to be pursued and policies to consider. Yet such existing planning methods do not currently consider automated vehicles (AVs) and connected vehicles (CVs) which appear set to arrive by or before the end of the decade. While these vehicles could have the ability to dramatically impact the transportation system, a great deal of uncertainty exists surrounding the nature and timeline of how such impacts will be realized. This research project seeks to conduct an examination of multiple AV and CV implementation scenarios, in order to assist planners in understanding the range of potential future outcomes, and preparing for their impacts.

2. Explain why this research is important.

AVs and CVs have the potential to impact the transportation system in numerous ways. Enhanced system efficiencies enabled through communication and automation may ease congestion on freeways and at signals. Crash rates may fall, as driver errors are minimized or transferred to much safer self-driving vehicle operation. Yet as former drivers are freed to perform other tasks, vehicle miles traveled (VMT) may increase due to falling perceived burdens of in-vehicle travel time and resulting higher trip-making rates and average trip distances. Other uncertainties will emerge with the rise of new travel modes such as fleets of on-demand shared autonomous vehicles (SAVs, i.e., driverless taxis or shuttles), where travelers may come to rely on such systems instead of personally-owned vehicles. Through the use of scenario planning, the breadth of this uncertainty may be assessed and ultimately incorporated into future planning efforts and facility designs.

3. List the research objective(s):

1. Identify, select, and develop a set AV and CV scenarios for in-depth evaluation, in consultation with the Technical Advisory Committee (TAC).
2. Evaluate changes to VMT, travel times, operating speeds, and other system-wide travel and operational impacts, across each scenario.
3. Summarize each of the tested scenarios, resulting impacts, and potential implications for transportation planning.

4. List the major tasks:

1. Synthesize literature. Identify, review, and critically synthesize relevant published literature regarding potential implications of AVs on travel demand, system operations, and other travel behavioral aspects, at various levels of market penetration.
2. Identify and scope scenarios. Develop a list of preliminary potential scenarios based on literature synthesis, and work with the TAC to identify approximately 3 AV and CV scenarios for further evaluation. Such scenarios may include factors such as differing market penetration levels, changes to perceived travel time burdens, use and availability of shared AV systems, empty-miles from unoccupied AV travel, and other factors.
3. Scenario development and testing. Develop and test selected scenarios using modifications to regional travel demand models, assisted via the use of supplemental external analytical tools and statistical modeling, as appropriate.
4. Scenario evaluation. Document anticipated changes to VMT, travel times, operating speeds, and other system-wide travel and operational impacts, across each scenario based on results from Task 3. All alternative scenarios will be compared against a baseline scenario, which will assume 0% AV and CV market penetration.
5. Submit final report. A Final Report will be prepared and submitted that documents the entire research effort, including preliminary literature synthesis, scenario identification, development, testing and evaluation, incorporating feedback received from the TAC. Task 5 activities will follow UDOT Research Division's Final Report Process.

5. List the expected results:

1. Estimation of potential changes in VMT, operating speeds, travel times across the Salt Lake City region, across each of the analyzed scenarios.
2. Analysis of implications of each scenario for transportation planning, and preliminary recommendations on how current planning practices could be adapted to best take account of potential scenario results.

6. Describe how this research will be implemented.

Findings will be presented to UDOT transportation planning staff, as well as staff from the WFRC. These individuals may use the information stemming from this research in order to better anticipate the potential impacts of AVs and CVs on the Salt Lake City metro region's transportation system, and adapt planning practices accordingly.

7. Requested from UDOT: \$50K

Other/Matching Funds: \$40K

Total Cost: \$90K

*A proposal for the \$40K in matching funds will be submitted to the Mountain Plains Consortium, the U.S. DOT Regional University Transportation Center for Federal Region 8, which shall be used to supplement scenario evaluation activities.

(or UTA for Public Transportation)

8. Outline the proposed schedule, including start and major event dates.

The proposed timeline will begin Sept. 1, 2016 and end Dec. 31, 2017, with major tasks as follows:

- Task 1 Synthesize Literature (2 months): Sept. 1, 2016 – Oct. 31, 2016
- Task 2 Identify and Scope Scenarios (2 month): Nov. 1, 2016 – Dec. 31, 2016
 - Meeting with TAC around Dec. 1
 - Technical memorandum detailing outcomes of first two tasks Dec. 31
- Task 3 Scenario Development and Testing (8 months): Jan. 1, 2017 – Aug. 31, 2017
 - Technical memorandum detailing outcomes task three Aug 31
- Task 4 Scenario Evaluation (2 months): Sept. 1, 2017 – Oct. 31, 2017
 - Meeting with TAC around Sept. 30
- Task 5 Submit Final Report (2 months): Nov. 1, 2017 – Dec. 31, 2017