2019 UDOT RESEARCH PROBLEM STATEMENT

****** Problem statement deadline is <u>Feb. 6, 2019</u>. Submit statements to UTRAC@utah.gov. ******

Title: The Impact of the Mobility as a Service Mode on Transit Access **No. (Office Use):** 19.05.02

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Select ONE Subject Area
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☒ Planning ☐ Perf Mgmt/Data Analytics ☐ Public Transportation ☐ Other

1. Describe the problem to be addressed:

In 2017, a UTRAC grant supported research to estimate the impact of Connected Autonomous Vehicles (CAV) on VMT in Utah. The research considered the emergence of CAV technology alongside a new travel mode, Mobility as a Service (MaaS), and projected their joint impacts in a 2040 forecast horizon. The work found that this technology-mode combination could result in a 1-7% increase in trip making and a 4-9% increase in VMT when compared to the 2040 Base Case.

This work utilized the Wasatch Front Travel Model to help estimate these impacts, which also included some shift in mode share from all other modes – drive alone, carpool, non-motorized and transit – to MaaS.

An important impact of MaaS that was **not** considered in this research was the utilization of MaaS as a first mile-last mile mode for transit access. The objective of this proposed UTRAC research is to follow up the 2017 study, for which the final report is currently being drafted, with an effort to effectively model MaaS as one of the first mile-last mile options for accessing transit (transit access options incorporated into the current WF model are park and ride, kiss and ride and non-motorized). Addressing this important aspect of MaaS will give a more complete answer to the question of how the combined CAV-MaaS technology will affect travel demand in the future.

This work is nearing completion, having Mobility as a Service (MaaS) travel mode has impacted the transportation industry in recent years and this impact (mode share) is expected to grow significantly in future. It is expected the introduction of Connected or/and Autonomous Vehicles (CAV) to boom the MaaS mode by lowering the cost of the mode through elimination of driver's cost for "as-service" providers (e.g. Uber and Lyft).

MaaS will impact mobility in a variety of ways. MaaS will deliver mobility to low mobility demographics such as elderly, disabled, and children. MaaS will reduce the burden of long travel times by enabling passengers to focus on tasks other than driving. MaaS will have significant impact on mode shares of other travel modes. MaaS provides lower travel times and superior trip comfort compared to public transit which may result in decline in public transit ridership. On the other hand, public transit agencies are evaluating partnership with TNC providers to use MaaS for access and egress to/from public transit services which may result in increase in public transit ridership.

These effects suggest that MaaS will play an important role in future mobility specially in Utah due to projected 1.5 million population growth by 2040. RSG and University of Utah have teamed up and added MaaS mode to Wasatch Front travel model. The study estimated the trip production increase for low mobility demographics and added MaaS as a new mode to WF travel model. This research focuses on improving the MaaS mode in WF travel model by:

1. Combining MaaS 2+ and MaaS 3+ into MaaS shared ride mode;
2. Adding MaaS + Transit mode: MaaS as first mile-last mile feeder to public transit;

This research approach is designed to result in clearer estimate of future travel demand related to various possible scenarios of MaaS and MaaS + Transit penetration into the Utah travel fleet, and net impact on UTA ridership.

2. Write the project objective (25 words or less):

The objective of this project is to estimate the effect of the combined CAV-MaaS technology, as a first mile-last mile mode, on future transit ridership and, as a consequence, on VMT.

3. Explain why this research is important:
(In response, consider addressing specific UDOT goals, applicability in Utah or other states, etc.)

1. Utah is currently the fastest growing state in the U.S., and this growth will most likely translate into increased VMT. Current long-range planning in Utah deals with the CAV-MaaS technology in only a qualitative way. This research proposes to address this gap by providing solid quantitative modeling to answer key questions about future VMT and travel behavior.
2. MaaS and its interaction with other modes, particularly public transit, will play a significant role in future demand management and transit ridership. However, the possible impact and magnitude of MaaS on travel demand is not well understood.
3. Finally, this research can provide a foundation from which additional MaaS questions can be investigated:
   i) How will different demographic groups respond differentially to the CAV-MaaS technology?
   ii) What is the impact of zero-occupant vehicle trips (repositioning trips)?
   iii) What is the impact of CAV-MaaS on trip lengths?

   To help address these questions, a foundation of understanding related to MaaS market penetration needs to be established, which is the key objective of this research problem statement.

4. List the major tasks:

1. Stakeholder meetings: assemble a group of stakeholders from UDOT, UTA, WFRC, MAG, and other transportation planning organizations to advise the research. A total of three meetings is envisioned: 1) kick off and introduce the project; 2) present the MaaS improvements and method for adding MaaS + Transit mode; and 3) present findings from an Exploratory Analysis.
2. Review analytical methods: Review the most recent methods in incorporating the MaaS and MaaS + as transit access modes in travel models. Identify the most suitable method for improving MaaS mode and adding MaaS + Transit mode to WF travel model.
3. WF model improvements: following the review analytical methods, the research team will implement the improvement to existing MaaS mode and add MaaS + Tranist mode to WF travel model. The research team will also perform multiple test runs to ensure the implemented improvements are working correctly. Before proceeding to task 5, Scenario Testing, the research team will meet with the stakeholder group (meeting #2) to ensure the proposed and implemented improvements are satisfying.
4. Scenario development: following the review analytical methods, the research team will develop an Exploratory Modeling and Analysis (EMA) framework for investigating the macro-level demand impacts of CAV-MaaS. The EMA approach mirrors that used in the 2017 UTRAC research. EMA: 1) specifies a range of input assumptions to vary and; 2) uses an experimental design to define a set of model runs to test the varying assumption.. The proposed scenarios will be based on most recent research and stakeholders' input.
5. Scenario testing: After establishing agreement on the model improvements and experimental design with the Stakeholder group, we will modify and parameterize the WF travel demand model to conduct a total of 9 model runs (3 MaaS mode costs scenarios X 3 MaaS + Transit mode costs scenarios).
6. In travel modeling parlance, this refers to changing the MaaS mode cost function (e.g. cost per mile cost, cost per travel time, and initial cost). A similar set of 3 scenarios will be developed for MaaS + Transit mode costs. Before proceeding to Task 5, Scenario Testing, the research team will meet with the stakeholder group (meeting #3) to propose the 3X3 experimental design, with 3 MaaS mode costs scenarios and 3 MaaS + Transit mode costs scenarios.

7. Travel models such as the WF travel model are useful for evaluating a subset of the questions relating to MaaS that impact travel demand. At the end of the research, the transportation planning community will have greater confidence in mode share forecasts incorporating specific assumptions about CAV-MaaS market penetration and use.

5. List the expected deliverables (reports, manual, specification, design method, training, etc.):

1. Updated WF travel model, inclusive of improved Mode Share model.
2. Three PowerPoint presentations: 1) Review analytical methods; 2) WF model improvement and Scenario development; and, 43) Final results
3. Final report

6. Describe how the research results will be implemented:
(In response, consider addressing UDOT leader support, process or standard improvement, etc.)

The research will inform the Long Range Transportation plans of UDOT, UTA, WFRC, and MAG. It is clear that, CAV-MaaS penetration will increase over the time frame of the analysis, to 2040. Not adequately accounting for the impacts of CAV-MaaS will put future mode share, trip generation, and travel demand estimates into question. This research will result in greater certainty surrounding the impacts CAV-MaaS especially the impact of possible future partnerships between UTA and Transportation Network Companies (TNCs).

7. Requested from UDOT: $50,000 **Other/Matching Funds:** $50,000 **Total Cost:** $100,000
(or UTA for Public Transportation)

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

The schedule assumes a May 2019 start date and a 9- to 12- month research plan, with final report delivery in March-May 2020.

Task 1: Review analytical methods – one month (August 2019).
Task 2: Stakeholder Outreach – 3 meetings over 7 months:
i) Project introduction and findings from review analytical methods. (July 2019);
ii) Presentation of improvements to WF travel model and proposed EMA scenarios (September 2019);
iii) Presentation of preliminary findings (February 2020).
Task 3: WF model improvement – 2 months (July-October 2019)
Task 4: Scenario Development – 1 month (September 2019)
Task 5: Scenario Testing -- 6 months (September 2019-February 2020)
Task 6: Final Report – 1 month (March 2020)