1. PROJECT INFORMATION AND TEAM

1.1 PROJECT INFORMATION

1.1.A. Project Title: **MNDOT's Mobility-as-a-Service Platform: Assessing User Behavior and Measuring System's Benefits**

1.1.B. MnDOT Or LRRB Need Statement Number: **Research was identified thought FTA's AIM grant**

1.1.C. LRRB Knowledge Building Priority Number: **NA**

1.1.D. Total Project Budget: **130,000**

1.1.E. Total Project Duration: **22 months**

1.1.F. Champion's Name: **Elliott McFadden**

1.1.G. Champion's Public Agency/Organization: **MNDOT**

1.1.H. Key Words for Cataloging: **Mobility-as-a-Service, Transit, Multimodal Transportation**

1.1.I. Date Submitted: **July 25, 2022**

1.1.J Justification for project duration longer than 24 months: **NA**

1.2. PROJECT TEAM

1.2.A. Principal Investigator

Name: **Alireza Khani, PhD, PE**
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2. PROJECT ABSTRACT AND OBJECTIVE(S)

The advent of smartphone technology and the emergence of Internet-of-things have made available new and integrated transportation options. A significant breakthrough in this domain is the rise of Mobility-as-a-Service (MaaS), an integrated platform that presents all the available transportation options and allows their booking/e-ticketing. Such integrated platform makes various transportation modes accessible to residents, a benefit that would not have been available without the technology. The accessibility to the integrated mobility options could be beneficial both to individual travelers through better mobility options and to the society through reduced vehicle-miles-traveled (VMT). This research project aims to study Southern Minnesota's MaaS platform that is under development by MNDOT through the FTA's Accelerating Innovative Mobility (AIM) grant. The research team will work closely with the MNDOT's project management team and the platform development team to study the following questions: 1) How do residents of Southern Minnesota region benefit from having access to a variety of mobility options through an integrated MaaS platform? 2) To what extent does the MaaS platform help increase transit ridership thus reduce personal vehicle use? 3) How can the features of the platform, e.g., route planning or pricing, be optimized for higher system efficiency and benefits to the residents.

3. RESEARCH BENEFITS TO MINNESOTA TAXPAYERS

This project will benefit Minnesotans in multiple ways. First, the study of the MaaS will shed light on the benefits of the platform in terms of residents' access to mobility and reduced VMT, thus informing future steps in the platform deployment for maximum travel time/cost saving and equity to the residents. Secondly, a well-studied platform would be more effective in allocation of resources to the system components, thus ensuring better use of public funds coming from taxpayers' money. Thirdly, a timely study of the MaaS would pave the way for MNDOT and other agencies to adopt emerging transportation technologies.

how will these be measured

4. PROJECT SUMMARY

4.1 SUMMARY OF RESEARCH METHODOLOGY (SCOPE)

The research approach is designed around a pre-deployment travel analysis and a post evaluation of the MaaS platform's effectiveness. The general aspects of the research are outlined below, while specific details are to be designed during the project considering data availability and suitability.

In early stages of the platform development, a travel analysis will be conducted using the existing travel data in the region. The analysis will aim to estimate potential customers for and the anticipated benefits from the MaaS system. The research team will work with MNDOT and local agencies as well as the FTA independent evaluator (IE) team to acquire existing travel data in the region, particularly those of transit, nonmotorized, and shared mobility systems. This part of the research will analyze current travel patterns, travelers' choices and, depending on data quality, perceived travel times. The following analysis could be conducted:

from where?

- Documenting current travel patterns and perceived travel time assumptions by travel mode,
- Estimating potential benefit of MaaS to travelers through increased options and reduced travel cost/time and to society through greater access to mobility options,
- Modeling/Analysis of different pricing models on public transit and shared mobility use through the MaaS app.

what is a measurement for increased mobility options?

The post evaluation of the MaaS platform will use MaaS usage data and will develop metrics to ascertain the effectiveness of the platform. Trip information from the MaaS users will be used for analyzing *realized* travel benefits. This analysis could include:

- Analysis of the MaaS platform ability to increase use and sustained utility across the diverse urban to rural environments in the service area over the project period of performance. The transit use increase compared to the before MaaS conditions will be analyzed using ridership data from similar transit systems in Minnesota without MaaS as a control. An estimated number of new trips generated by MaaS platform systems versus control group will be reported to gauge progress towards MnDOT's goal of meeting 90% of public transit demand in Greater Minnesota by 2025.

need data from both MaaS area and non MaaS area - can probably get this from NTD database

how is public transit demand measured?

- Analysis or reporting on whether the incorporation of new Demand Response Transactional Data Specifications increases the utility of the MaaS platform. Where possible, subset information for equity focus demographics will be reported.

could really only be obtained through surveys? or maybe an experiment timing the MaaS vs other booking

- Analysis or reporting on whether the MaaS platform reduces user time spent planning, booking, and paying for trips/services through consolidation of said services in a single application. Where possible, subset information for equity focus demographics will be reported.
- Analysis of any combined increase in public transit ridership or decrease in operational costs as it relates to the cost of introducing the MaaS technology (ROI).
- Comparison of NTD trip data, fare collection, and operational cost between the public transit agencies involved in the project and others as control. ridership, fares, operating costs before and after MaaS,

In conducting the analysis, travel time and cost of trips will be calculated and compared with that of trips without the MaaS platform. For instance, travel time of a user who takes demand response from A to B and fixed route transit from B to C will be compared with their potential trip from A to C by transit only or by driving. Such comparison will determine the benefits of the platform in providing first-mile access to transit to allow drivers to switch to transit and to allow transit users to take more efficient multimodal trips.

4.2 POTENTIAL IMPACTS DUE TO COVID-19 (NEW)

A longer project duration (22 months) is considered to ensure successful completion of the project. New outbreaks of COVID-19 may impact the use of public transit and shared mobility that could make it more difficult to determine the effectiveness of MaaS technology on ridership during the study period.

5. TASK DESCRIPTIONS, DURATIONS, AND SCHEDULED DATES

Task 1: Pre-deployment Analysis
Description: Existing travel data from transit and other mobility options in the region will be acquired in collaboration with MNDOT and IE. Using the data, users' travel patterns and travel times by different modes will be analyzed. By developing statistical models on the existing travel data, potential benefits of the MaaS system will be estimated and pricing strategies for ridership increase will be presented.
Anticipated Start Date: September 1, 2022
Scheduled Date to Submit Draft Deliverable: March 31, 2023
Scheduled Date for Task Final Approval: May 31, 2023
Duration: Nine months including two months for review and approval
Deliverable: Technical memorandum on research findings

Task 2: Post-deployment Analysis
Description: Realized benefits of the MaaS system will be evaluated by analyzing the MaaS trip record data and comparing them with control systems. MaaS benefits could include riders' time/cost savings and the number of new trips attracted to existing or demand response transit. Equity impacts will be evaluated by incorporating population demographics in the analysis. Other metrics such as ridership increase, fare collection, or operating cost reduction due to the MaaS system integration will be documented.
Anticipated Start Date: April 1, 2023

Scheduled Date to Submit Draft Deliverable: November 30, 2023
Scheduled Date for Task Final Approval: January 31, 2024
Duration: Ten months including two months for review and approval
Deliverable: Technical memorandum on research findings

Task 3: Draft Final Report
Description: Findings from the previous tasks will be compiled in a draft report for submission to the sponsor and for further dissemination.
Anticipated Start Date: January 1, 2024
Scheduled Date to Submit Draft Final Report for TAP review: February 28, 2024
Scheduled Date for Final Report Approval: April 30, 2024
Duration: Four months including two months for review and approval
Deliverables: Draft Final Report

Task 4: Editorial Review and Publication of Final Deliverables
Description: The draft final report will be reviewed and edited for publication.
Scheduled Start Date: May 1, 2024
Scheduled End Date: June 30, 2024
Duration: two months (required)
Deliverables: Final Publishable Report that meets MnDOT's Editorial Guidelines and standards

6. KEY MILESTONES

Table 1: Key Milestones

Key Milestone	Target Date	Description
1. Kick off Meeting	September 2022	Discuss and finalize research plan
2. Mid-project Meeting 1	April 2023	Present findings from Task 1 and incorporate feedbacks to future tasks
2. Mid-project Meeting 2	December 2023	Present findings from Task 2 and incorporate feedbacks to future tasks
3. Final Meeting	March 2024	Present final results for approval