Stage 1 Evaluation Plan Guidance

The purpose of this guidance is to assist grant recipients in developing their Stage 1 Evaluation Plan for the Strengthening Mobility and Revolutionizing Transportation (SMART) grant program.

Grant recipients are not required to use this guidance, though it is highly recommended. The objective of the Evaluation Plan is to help prepare you for the Implementation Report. The USDOT intends to use information from both the grant recipients' Evaluation Plans and Implementation Reports to prepare the required program-level reports on the effectiveness of the grant recipients in meeting the original expectations projected in their grant applications.

Reporting Requirement:

The SMART grant agreement states that Stage 1 grant recipients must submit an Evaluation Plan that provides:

- an overview of how the proof-of-concept or prototype will be evaluated
- a description of the anticipated impact areas (i.e., goals) of the project if implemented at scale and the methods that will be used to estimate the anticipated benefits and costs associated with implementation
- robust performance metrics and measurable targets based on the project goals to inform whether the proof-of-concept or prototype meets expectations and whether full implementation would meet program goals

Guidance will be provided to assist applicants selected for a Stage 2 Grant to update this Evaluation Plan.

This guidance outlines the 4 sections expected in the Evaluation Plan:

- Part 1 of 4: Introduction and Project Overview
- Part 2 of 4: Project Goals and Objectives for At-Scale Implementation
- Part 3 of 4: Performance Measures for the Proof-of-Concept or Prototype
- Part 4 of 4: Evaluation Methodology for the Proof-of-Concept or Prototype

Part 1 of 4: Introduction and Project Overview

The introduction and project overview should provide a thorough description of the project and an overview of the evaluation process. In general, the plan should be accessible to an audience that is not familiar with the project and has only a high-level understanding of the technologies deployed. Language from your grant application may be used in the description; however, it is critical that you review the text and make adjustments for this context.

The title page and/or introduction should include:

- Project title
- Recipient name
- Fiscal year of award
- Period of performance
- Organization(s) preparing the evaluation plan
- Date the evaluation plan is submitted

1) Provide a description of your project, including:

   - The real-world issues and challenges that would be addressed with at-scale implementation
   - The technology(ies) being deployed
     - Please reference the following categories in your description of the specific deployments (as applicable): coordinated automation, connected vehicles, intelligent sensor-based infrastructure, systems integration, commerce delivery and logistics, innovative aviation technology, smart grid, and smart technology traffic signals.
   - The goals and desired outcomes for at-scale implementation
     - Please reference the following program benefit areas (as applicable): safety and reliability, resiliency, equity and access, climate, partnerships, and integration.
   - Any other information that may be relevant

2) Describe the proof-of-concept or prototype to be assessed in Stage 1. What is the scale of the deployment during Stage 1? The measure of scale may vary by technology (e.g., the number of on-board units [OBUs], roadside units [RSUs], equipped intersections, partners with signed agreements, size/population of service area). Describe the anticipated scale of a Stage 2 deployment.

3) For the Stage 1 proof-of-concept or prototype, summarize the project evaluation process, including a list of the project stakeholders (project team, partners, evaluation team) and their roles and responsibilities, particularly with respect to data collection and completing the evaluation. In addition, provide an evaluation schedule in terms of months with project milestones.

Part 2 of 4: Project Goals and Objectives for At-Scale Implementation

Part 2 of the Evaluation Plan should focus on your expectations for at-scale implementation of the project (Stage 2). By starting with the goals of the project at-scale, the evaluation of the proof-of-concept or prototype can be tailored to provide informative results and actionable insights.

4) To satisfy the baseline performance measurement requirements established in the Stage 1 SMART grant agreement, all grant recipients must provide *qualitative* descriptions of the anticipated impacts of at-scale implementation in each of the following goal areas.[1] Quantitative estimates of the anticipated impacts are encouraged where possible but not required.

   To the best of your ability, the qualitative descriptions should indicate the expected direction of change or level (e.g., reduce travel speeds, achieve a minimum of 85% detection rate).

   - Safety and reliability: Improve the safety of systems for pedestrians, bicyclists, and the broader traveling public. Improve emergency response.
   - Resiliency: Increase the reliability and resiliency of the transportation system, including cybersecurity and resiliency to climate change effects.
   - Equity and access: Connect or expand access for underserved or disadvantaged populations. Improve access to jobs, education, and essential services.
   - Climate: Reduce congestion and/or air pollution, including greenhouse gases. Improve energy efficiency.
   - Partnerships: Contribute to economic competitiveness and incentivize private sector investments or partnerships, including technical and financial commitments on the proposed solution. Demonstrate committed leadership and capacity from the applicant, partners, and community.
   - Integration: Improve integration of systems and promote connectivity of infrastructure, connected vehicles, pedestrians, bicyclists, and the broader traveling public.

5) What are the estimated costs of the proof-of-concept or prototype carried out using the grant? What are anticipated costs of at-scale implementation?

6) Is any historical data currently available that could be used to inform project goals, performance measures, or performance targets for at-scale implementation? Provide a high-level summary of the data and how it has informed the evaluation plan. (Please organize this information by goal area.)

[1] If particular goal areas are not relevant to your project, then you can note that project does not anticipate impacts in that area.

Part 3 of 4: Performance Measures for the Proof-of-Concept or Prototype

Part 3 of the Evaluation Plan should focus on the proof-of-concept or prototype being deployed during Stage 1. One objective of evaluating the proof-of-concept or prototype is to better understand what would be realistically achievable through at-scale implementation. The evaluation findings should refine your expectations, so it is necessary to select informative performance measures.

7) In context of the goals described in Part 2 for at-scale implementation, complete the following table regarding evaluation questions, performance measures, and performance targets for the prototype or proof-of-concept.

   For each evaluation question, list one or more performance measure(s) for the proof-of-concept or prototype assessed in Stage 1 and a performance target. Ensure measures are sufficiently detailed.

Evaluation Question	**Performance Measure**	**Performance Measure Target**
Example Row: 1. How quickly could an alert message be displayed?	Time between detection, confirmation, and alert	3 seconds between detection and confirmation 2 seconds between confirmation and alert
Example Row: 2. To what extent does the system detect a potential conflict faster than the average driver?	Time between alert and point of potential conflict.	7 seconds between alert and point of potential conflict
Example Row: 3. How well does the system function during irregular conditions?	Detection rate with high traffic volumes.	90% of the detection rate under normal conditions
Example Row: 3. How well does the system function during irregular conditions?	Detection rate during extreme temperatures.	85% of the detection rate under normal conditions

Part 4 of 4: Evaluation Methodology for the Proof-of-Concept or Prototype

In Part 4 you should summarize your evaluation methodology. To assess success, you will have to compare the performance measurements to a baseline. Whether the deployments for this project are compared to a pre-deployment baseline, an alternative technology, or industry standards, the type of comparison will shape your conclusions.

8) Provide an overview of how the proof-of-concept or prototype will be evaluated.

9) Describe the methods that will be used to estimate the anticipated benefits and costs associated with at-scale implementation. Describe the type and source of baseline data that will be used.

10) Provide a brief overview of how challenges, best practices, and recommendations for future deployers will be collected across the project team throughout the duration of the project.

11) Provide a table with any relevant technical terms or acronyms and their definitions.