INCLUSIVE DESIGN CHALLENGE

STAGE II

Submission Instructions, Submission Requirements, and Judging Criteria

U.S. Department of Transportation

This document provides information on Stage II of the Inclusive Design Challenge. This description expands on the information provided in the Stage I Challenge Statement. Participation in Stage II is only open to teams selected by U.S. Department of Transportation (DOT) to advance from Stage I (herein referred to as "Semifinalists").

STAGE II OVERVIEW

In Stage II, the Semifinalists selected to advance from Stage I will develop their concepts into functional prototypes of an inclusive design solution. Solutions will focus on hardware, software, or full vehicle design solutions for use in automated vehicles, particularly Automated Driving Systems-Dedicated Vehicles (ADS-DV) that are operated exclusively at Levels 4 and 5.

Stage II will also include several engagement events that will offer an opportunity for teams to receive input and feedback from both U.S. DOT and its stakeholders. Semifinalists must engage in a DOT design charrette during Stage II, anticipated to be held in Summer 2021, and at least four virtual forums (e.g., webinars) with supporting interim communications materials. DOT expects to identify opportunities to showcase Semifinalists, collect feedback to help inform projects, participate in technical standards development, and engage students and early stage professionals. Information on interim activities such as these will be provided in spring 2021.

PRIZES

Stage II Prototype/Demonstration: Total prize funds available = $2,000,000

- Winner (1st place) will receive $1,000,000
- 2nd place receives $700,000
- 3rd place receives $300,000

SUBMISSION MATERIALS

Semifinalists must provide the following materials to be eligible to compete for a Stage II prize.

1) Written summary of the solution (20-page maximum).

Provide an overview of the work performed throughout Stage II leading to the final prototype, including refinements to the Stage I solution, design and engineering, stakeholder engagement, testing, and production feasibility and technology maturity analyses. The summary should address each Stage II judging criterion in detail as well as the following elements:

a) **Team qualifications.** Provide an overview of the qualifications of the team including if/how the team composition has changed since Stage I. The submission must include a resume or bio of key individual (s) who were responsible for developing the idea.

b) **Partners (if applicable).** Describe which partners, if any, the project team collaborated with in the development of the Stage II prototype. Partners can include other entities or organizations as well as individual consultants or advisors.

c) **Addressing Stage II Judging Criteria.** The summary should include a discussion of the following issues in order to document how the Stage II submission meets the judging criteria. The written statement should address these in the order they appear below.

Technical Merit

Areas to Address	Description	Written Submission Requirements
Technical Approach	Submission demonstrates significant development and improvement of the initial proof-of-concept through additional details and refinement of concept. Demonstrates a high level of technical merit for the proposed approach, including approach to integrate with ADS-DV.	• How did the team refine its Stage I concept into the Stage II prototype, including improvements and changes made? • What are the prototype's capabilities? What capabilities differ from the original expectations? What new features were added and why? What original features were discontinued and why? • How is the prototype integrated, or proposed to be integrated, with an ADS-DV?
Team/Expert Consultation	Submission demonstrates significant involvement of disability subject matter experts, industry representatives, and other advisors in the creation and testing of the solution, including responses to comments and how feedback has been incorporated into the design structure. Demonstrates that team members and advisors cover the breadth of expertise required for all aspects of the proposed solution, including technical design, production feasibility, and benefits analysis, and engaged students and early stage professionals.	• How did the team consult with experts from the disability community and/or industry, or other advisors? Specify the role and expertise of industry advisors or partners (e.g., automotive original equipment manufacturer, ADS developer, Tier 1 supplier). • What input/feedback did advisors provide and how did the team incorporate that input/feedback into its prototype design? • How did the team engage students and early stage professionals?
User-Centered Design and Desirability	Submission demonstrates how the proposed solution meets the needs of users and addresses production and commercialization considerations. Demonstrates understanding and use of systems	• How did the team incorporate user input into the design, engineering, and development of its prototype? What input did potential users provide? • How did the team use systems

Areas to Address	Description	Written Submission Requirements
	engineering.	engineering to capture user needs and provide traceability to design elements?
Functions as Intended	Submission demonstrates the prototype performs its intended function as described in the participant's Stage I submission, with any changes from the Stage I submission explained. Supporting documentation thoroughly explains the results of any testing performed through the design, development, and validation process and any challenges overcome.	• Provide results of any testing performed through the design, development, and validation processes. • What challenges did the team overcome through the design and prototyping process? What challenges remain to be overcome?

Production Feasibility

Areas to Address	Description	Written Submission Requirements
Path to Production	Submission demonstrates a reasonable path for implementation and production, including expected obstacles to overcome and how to overcome them. Expands or refines ideas presented in Stage I about feasibility and cost to implement, including potential production volumes, maturity of technical standards, and technology readiness level self-assessment. Provides estimated production costs and market value, and identifies the steps required, but not yet taken, to advance from prototype to production.	• Describe the feasibility of advancing the prototype to production. To what extent has progress toward this already occurred? What challenges will need to be overcome? How would a Stage II prize support deployment? • What remaining testing would need to be performed prior to production, including laboratory testing, user needs testing, validation testing, real-world pilots, safety testing, or otherwise? • Estimate production costs and cost of the proposed solution to the end consumer (including an individual or fleet purchaser of a vehicle or software package, and/or the user of a vehicle in a shared service).
Testing and Deployment Approach	Submission describes a technology transfer plan that includes real-world testing and deployment, safety assurance, and commercialization steps. Demonstrates feasibility of implementation and scalability through validation from industry experts, and cross-	• Describe the technology transfer process that the team would plan to follow upon the completion of Stage II to advance towards commercialization and deployment of its proposed solution.

Areas to Address	Description	Written Submission Requirements
	platform deployment and interoperability (if applicable).	

Impact

Areas to Address	Description	Written Submission Requirements
Intuitive	Submission demonstrates a solution that is easy and intuitive for a prospective user and can be operated independently by a user with one or more of the disability types described in the Challenge statement, with validation from a representative set of target users.	• What steps did the team take to ensure the solution can be easily understood and used by individuals in the target user group(s)? Describe any user feedback on ease of use of the solution. • Describe instructions or training (if any) that would be required for potential users.
Inclusive	Submission demonstrates inclusivity in vehicle design and engineering, laying a foundation for future automated vehicles that can be used by people with physical, sensory, and cognitive disabilities.	• What needs does the solution meet, including all types of disabilities (or combinations of disabilities) as well as complementary needs of users without a disability? • How would a non-disabled individual experience the proposed solution (i.e., to what extent can the same solution meet the needs of users with and without disabilities?)?
Beneficial	Submission describes potential benefit to one or more target user(s) or demonstrates the potential for users, should the solution be developed. Submission includes sufficient detail regarding the functional performance, impact of technology, and degree to which the solution facilitates greater accessibility.	• Describe the user population(s), including characteristics and size. • What are the quantitative and qualitative benefits of the solution to end users? To what extent does it improve upon existing options? • What methodologies did the team use to assess the benefits to the target population and/or broader economic or other benefits? What methodologies would be used if the solution advanced?

2) Prototype Development.

Present a functional prototype to include one or more of the options outlined below, as appropriate given the nature of solution(s) being demonstrated, their sophistication, and the time available. DOT does not require Semifinalists to demonstrate their proposed feature(s) on an actual vehicle or with actual passengers,

although a team may determine that doing so is necessary and/or advantageous to illustrate maturity, production/integration feasibility, or functionality/user experience.

- **Full-size physical prototype, either:**
  - Integrated into a vehicle (the vehicle itself does not need to be automated, but should be reflective of vehicles being developed and tested with Level 4 or 5 driving automation and the written summary should clarify how integration with a Level 4 or 5 ADS-DV would be achieved), or
  - Full-size, standalone demonstration separate from a vehicle. In this case, Semifinalists should be prepared to illustrate how their proposed solution would be integrated into a full-size vehicle, potentially through one of the other prototype approaches listed.

- **Software prototype -** Given that certain solutions or components of broader solutions will entail a software/interface component, Semifinalists can consider functioning software interfaces as prototypes. Integration with a Level 4 or 5 ADS-DV and other vehicle systems should still be demonstrated, using emulation or other approaches to simulate in-situ software interactions.

- **Scale physical prototype -** If a full-size physical prototype is infeasible for the proposed solution given the time and resources available, Semifinalists may consider demonstrating their concept via a scale model. Accompanying demonstration exhibits may complement scale prototypes, particularly to demonstrate engineering feasibility, integration into a vehicle and ADS platform, and usability.

- **Virtual prototype -** DOT will consider the submission of virtual prototypes (3D models, computer-aided design (CAD) drawings, schematics) of physical solutions, but strongly encourages Semifinalists to consider other primary means of demonstrating their solution(s), and to limit the use of virtual prototypes to supporting/secondary exhibits.

3) **A video providing a high-level overview of the solution, its use, and impact (5-minute maximum) and other supporting communications materials.**

Semifinalists must prepare a short video (no more than five minutes in length) to explain the solution and its potential impact in improving accessibility in ADS-DVs to senior USDOT officials and the public. The video should provide a high-level overview of the solution with an emphasis on its use and benefit to the user. It should also address production feasibility and ideas for future adoption. The video should provide closed-captioning and be adequately described to enable accessible viewing.

4) **Demonstration of the prototype.**

Semifinalists must be prepared to conduct a virtual or in-person demonstration (date to be determined) of the prototype for the technical evaluation judging team. The

presentation and demonstration should be no more than ten minutes. An additional 20 minutes will be allotted for questions from the judging team.

TIMELINE

The written summary, prototype development, and video (items 1 - 3) are due to DOT (inclusivedesign@dot.gov) by 4:00 PM Eastern Time on May 1, 2022. Information on scheduling the demonstrations will be provided in spring 2022, with demonstrations expected to occur in June 2022. DOT anticipates making final selections after all demonstrations are complete.