ARTS22 Breakout Session:
153-ADS Standards Hot Topics: Operational Design Domain (ODD) & Operating Envelope Specification (OES)

Session Contact/Organizers:
- Jim Andrews, Emerging Technology Consultant, EY-Parthenon
- Gil Amid, Chief Regulatory Affairs Officer, VP Operations, Foretellix
- Shawn Kimmel, PhD, Executive Director, EY-Parthenon
- Ed Straub, Vice President, Land Systems, SAE ITC
- Jack Weast, Vice President of Automated Vehicle Standards, Mobileye
- Rob Heilman, Director of Highly Automated Systems Safety (HASS) Center of Excellence (COE), US Department of Transportation Office of the Assistant Secretary for Research and Technology
- Siddartha Khastgir, Head of Verification & Validation, Intelligent Vehicles, University of Warwick
- Chris Bartholomew, Standardization Lead, DENSO International America
- Ed Griffor, Associate Director of Cyber Physical Systems, National Institute of Standards and Technology (NIST)
- Steffen Kuhn, Head of Consulting, Elektrobit
- Mahmood Nesheli, PhD, Project Manager - Smart Vehicles, CSA Group
- Kevin Gay, Head of Safety & Autonomous Delivery, Uber
- Ben Engel, Chief Technology Officer, ASAM
- Andreas Richter, PhD, Engineering Program Manager Operational Design Domains, Volkswagen
- Matteo Oldoni, AI & Autonomous Driving Standards, NVIDIA

Session Description
Returning to ARTS by popular demand, this year's standards session will provide a deep dive into a couple current hot topics in the ADS standards space - operational design domain (ODD) and operating envelope specification (OES), along with relevant past, present, and future standards for these concepts. Participants will learn about standards that may be important to their positions and companies from a variety of stakeholders across the transportation ecosystem. They will also hear from a panel of ODD/OES standards experts and have the chance to participate in activities and ask questions on taxonomies and considerations for the future of ADS deployment.

Goals/Objectives/Outputs
- Understand how the ADS community is using ODD and why ODD standardization is needed
- Describe the current ODD standards landscape and what gaps still need to be addressed to support ADS safety standardization
- Highlight various ODD taxonomies and other tools that may be needed (e.g., OES) to support ODD usage
- Clarify and resolve confusion with respect to ODD definitions (ODD vs OES vs usage vs capabilities)

Agenda

1:30 PM – 1:40 PM Introduction

Description: This will include an overview of the scope of the breakout session and set the stage for answering key questions relative to ODD/OES. Why is there a recent proliferation of standards activities surrounding ODD? For what purposes are organizations using ODD? Why is standardization needed - for whom and to what end? Who is involved in developing standards related to ODD/OES, and what are some of the key upcoming activities?

- *Presented by Jim Andrews, Emerging Technology Consultant, EY-Parthenon*

1:40 PM – 2:25 PM Current and Planned Standards Activities for ODD/OES

Description: Updates on efforts across the ADS community to standardize taxonomies, definitions, and formats for representing ODD and OES. While presentations will primarily focus on four key efforts in this area, other relevant standards (e.g., AVSC ODD taxonomy, BSI PAS 1883) will be discussed briefly in this section as well.

- SAE J3259: *Presented by Ed Straub, Vice President, Land Systems, SAE ITC*
- ISO 34503: *Presented by Siddartha Khastgir, Head of Verification & Validation, Intelligent Vehicles, University of Warwick*
- ASAM OpenODD: *Presented by Gil Amid, Chief Regulatory Affairs Officer, VP Operations, Foretellix*
- NIST OES Concept: *Presented by Ed Griffor, Associate Director of Cyber Physical Systems, National Institute of Standards and Technology (NIST)*

2:25 PM – 2:45 PM "Beat the Experts"

Description: Audience members will be able to provide their thoughts, feedback, and/or concerns on the current state of ODD/OES standardization efforts through interactive polling. Audience responses to targeted questions will highlight potential gaps, issues, or misunderstandings that may need to be addressed by the experts developing these standards.

- *Moderated by Jim Andrews, Emerging Technology Consultant, EY-Parthenon and Gil Amid, Chief Regulatory Affairs Officer, VP Operations, Foretellix*

2:45 PM – 3:00 PM Break

3:00 PM – 3:45 PM How is ODD Being Used?

Description**:** Exploration of topics highlighting various ways in which organizations are using ODD across the ADS community. This includes approaches for regulation, developing performance requirements, applying relevant models and tools, and scenario-based testing.

- ODD-based Scenario Testing Framework - UNECE Proposal by Matteo Oldoni (CLEPA/NVIDIA): *Presented by Gil Amid, Chief Regulatory Affairs Officer, VP Operations, Foretellix*
- UK Regulatory Perspective: *Presented by Siddartha Khastgir, Head of Verification & Validation, Intelligent Vehicles, University of Warwick*
- Matching ODD to OEM Requirements: *Presented by delegate of Andreas Richter, PhD, Engineering Program Manager Operational Design Domains, Volkswagen*
- Assumptions for Models in Safety-Related Automated Vehicle Behavior (IEEE P2846)*: Presented by Kevin Gay, Head of Safety & Autonomous Delivery, Uber*

3:45 PM – 4:20 PM Where Do We Go From Here?

Description**:** Panel Q&A focusing on what's next for ODD standardization and what else may be needed to facilitate increased industry usage of ODD. This discussion will start with a few guided questions from the moderator directed to the panel, and then audience members will be free to ask open questions to the panel.

- *Panelists:*
  - *Gil Amid, Chief Regulatory Affairs Officer, VP Operations, Foretellix*
  - *Siddartha Khastgir, Head of Verification & Validation, Intelligent Vehicles, University of Warwick*
  - *Delegate of Andreas Richter, PhD, Engineering Program Manager Operational Design Domains, Volkswagen*
  - *Kevin Gay, Head of Safety & Autonomous Delivery, Uber*
  - *Ed Straub, Vice President, Land Systems, SAE ITC*
- *Moderator:*
  - *Jim Andrews, Emerging Technology Consultant, EY-Parthenon*

4:20 PM – 4:30 PM Session Wrap-up

Description**:** Summary of key takeaways from the breakout session and highlighting resources available for organizing key standards information (e.g., SAE CAVSource roadmap).

- *Presented by Jim Andrews, Emerging Technology Consultant, EY-Parthenon*