

Assessment of standardization gaps for safe automated driving

Industry Connections Activity Initiation Document (ICAID)

Version: 1.0, 17 February 2020

IC20-004-01 Approved by the IEEE SASB 5 March 2020

Instructions

- Instructions on how to fill out this form are shown in red. It is recommended to leave the instructions in the final document and simply add the requested information where indicated.
- **Shaded Text** indicates a placeholder that should be replaced with information specific to this ICAID, and the shading removed.
- Completed forms, in Word format, or any questions should be sent to the IEEE Standards Association (IEEE-SA) Industry Connections Committee (ICCom) Administrator at the following address: industryconnections@ieee.org.
- The version number above, along with the date, may be used by the submitter to distinguish successive updates of this document. A separate, unique Industry Connections (IC) Activity Number will be assigned when the document is submitted to the ICCom Administrator.

1. Contact

Provide the name and contact information of the primary contact person for this IC activity. Affiliation is any entity that provides the person financial or other substantive support, for which the person may feel an obligation. If necessary, a second/alternate contact person's information may also be provided.

Name: Riccardo Mariani
Email Address: rmariani@nvidia.com
Employer: Nvidia
Affiliation: Nvidia

IEEE collects personal data on this form, which is made publicly available, to allow communication by materially interested parties and with Activity Oversight Committee and Activity officers who are responsible for IEEE work items.

2. Participation and Voting Model

Specify whether this activity will be entity-based (participants are entities, which may have multiple representatives, one-entity-one-vote), or individual-based (participants represent themselves, one-person-one-vote).

Specify: "Entity-Based"

3. Purpose

3.1 Motivation and Goal

Briefly explain the context and motivation for starting this IC activity, and the overall purpose or goal to be accomplished.

Describe the motivation and goal

ICT drives the evolution of Advanced Driver Assistance Systems (ADASs). It enables higher levels of automated driving and ultimately fully Autonomous Vehicles (AVs).

AVs of the future will allow broader mobility offers including end-to-end Mobility-as-a-Service (MaaS). They will incorporate latest ICT technologies like TSN/Ethernet, wireless communication, high definition maps, sensing and various Machine Learning (ML) techniques to implement novel functions and features. AVs will embed high performance computing platforms and an unprecedented amount of SW.

Safety comes first for automated driving. Policy makers expect that AVs will significantly reduce the number of road fatalities ('zero-accident' vision). New technologies impose new challenges on safety engineering:

- Inductive reasoning
- Blackbox functionality
- Governance of algorithmic decision making
- Novel ICT oriented vehicle architectures
- Redundancies and tradeoffs between enabling technologies
- Verification and validation of automation levels

Existing standards need to be evolved and new standards are needed to ensure safety despite increasing automated driving complexity.

Standards may specify functions, architectures or processes.

Various standardization initiatives are ongoing in various SDOs and Industry Alliances. Some have been recognized centers of competence for decades. Others are becoming relevant due to technology innovations, mainly in ICT.

While there is a high level understanding of which SDOs and Industry Alliances address safety related topical areas through standards related activities there is no common view on what exactly is covered by all these activities and what is missing in order to master increasing automated driving complexity.

It is not sufficient to map standards related activities and list them to understand what is missing or where there is duplication of work. The scope of work and underlying problem statements of various standardization activities need to be analyzed, commonalities and differences need to be determined to finally identify and assess standardization gaps.

NOTE: Competing standards are not necessarily bad. There may be different approaches seemingly promising. It is the responsibility of the manufacturers to decide which standards they implement in their products and solutions. However, safety may not be the

realm to compete. Rather it is a common necessity to build trust of consumers and the general public in future mobility solutions.

Goals of this activity will be to:

- Identify relevant SDOs and Industry Alliances and other relevant organizations
- Identify, analyze and assess existing standards and ongoing standardization activities
- Identify alternative approaches
- Identify overlaps
- Identify standardization gaps
- Identify options to bridge standardization gaps
- Develop and submit PARs to bridge standardization gaps
- Identify SDOs to partner with and develop recommendations for the level of engagement:
 - explore the mutual interest to enter a formal agreement
 - set up liaison relationships
 - harmonize work programs
 - joint development
- Serve as a collaborative platform to exchange information about ongoing standards related activities and synchronize these activities as needed

3.2 Related Work

Provide a brief comparison of this activity to existing, related efforts or standards of which you are aware (industry associations, consortia, standardization activities, etc.).

Describe the related work.

The following examples are indicative only

ISO 26262	Road Vehicles - Functional Safety
ISO/PAS 21448	Road vehicles - Safety of the intended functionality (SOTIF)
ISO 19157	Geographic information – data quality
ISO 19158	Geographic information – Quality assurance of data supply
ISO/IEC/IEEE 14288	Road Vehicles: System and software engineering
IEEE P2846	Formal Model for Safety Considerations in Automated Vehicle Decision Making
IEEE P2851	Standard for Exchange/Interoperability Format for Functional Safety Analysis and Functional Safety Verification of IP, SoC and Mixed Signal ICs
IEEE P1228	Standard for Software Safety
ISO/SAE CD 21434	Cybersecurity engineering
SAE	
SAE ITC IAMTS	International Alliance for Mobility Testing and Standardization
SAE ITC AVSC	Automated Vehicle Safety Consortium

3.3 Previously Published Material

Provide a list of any known previously published material intended for inclusion in the proposed deliverables of this activity.

List the previously published material, if any.

- O. Maler: Computing Reachable Sets – An Introduction, 2007
- D. Amodei, C. Olah, J. Steinhardt, P. Christiano, J. Schulman, D. Mane: Concrete Problems in AI Safety, 2016
- R. Mariani: A Perspective on Safety Standards and New Opportunities, 2018; IEEE SA Workshop: Standards for Connected and Autonomous Transportation - Nurturing the Era of e2e Mobility as a Service (MaaS); <https://standards.ieee.org/content/ieee-standards/en/events/e2e-maas/2018.html>
- P. Koopman, B. Osyk, J. Weast: Autonomous Vehicles Meet the Physical World: RSS, Variability, Uncertainty, and Proving Safety, 2019
- P. Koopman, U. Ferrell, F. Fratrick, M. Wagner: A Safety Standard Approach for Fully Autonomous Vehicles, 2019
- Aptiv, Audi, apollo, BMW, Continental, Daimler, FCA, Here, Infineon, Intel, Volkswagen: Safety First For Automated Driving, 2019

3.4 Potential Markets Served

Indicate the main beneficiaries of this work, and what the potential impact might be.

Describe the potential markets.

Electrified, SW intensive and increasingly automated vehicles will shape the automotive markets in the 2020s. Future fully automated driving complexity will involve many more stakeholders including the automotive OEMs, tier-x suppliers, ICT companies, road operators, telecom operators, various service providers and many specialized technology providers. Policy makers have to address automated driving and consumers have to be confident in autonomous vehicles.

3.5 How will the activity benefit the IEEE?

IEEE has established itself as a leader on autonomous systems technology and policy. This activity benefits the IEEE by applying its thought leadership and standardization expertise to an application specific focus area. Additionally, it will elevate IEEE's stature in automotive and mobility issues and standards. This is an area where IEEE has been engaged as one of many SDOs, but not previously recognized for standardization leadership. The holistic approach of this activity provides an opportunity to escalate IEEE's position in this field, and to help attract new standards projects that will address this rapidly emerging field.

4. Estimated Timeframe

Indicate approximately how long you expect this activity to operate to achieve its proposed results (e.g., time to completion of all deliverables).

Expected Completion Date: 03/2022

IC activities are chartered for two years at a time. Activities are eligible for extension upon request and review by ICCom and the IEEE-SA Standards Board. Should an extension be required, please notify the ICCom Administrator prior to the two-year mark.

5. Proposed Deliverables

Outline the anticipated deliverables and output from this IC activity, such as documents (e.g., white papers, reports), proposals for standards, conferences and workshops, databases, computer code, etc., and indicate the expected timeframe for each.

Specify the deliverables for this IC activity.

- March 2020 – October 2020: Whitepaper: The Safety Standardization Eco-System for Road Vehicles
- November 2020 – April 2021: Report: Gap analysis (using White Paper as a basis)
- By mid 2021: Proposals for standards related activities including PARs as needed

5.1 Open Source Software Development

Indicate whether this IC Activity will develop or incorporate open source software in the deliverables. All contributions of open source software for use in Industry Connections activities shall be accompanied by an approved IEEE Contributor License Agreement (CLA) appropriate for the open source license under which the Work Product will be made available. CLAs, once accepted, are irrevocable.

Will the activity develop or incorporate open source software (either normatively or informatively) in the deliverables?: No

6. Funding Requirements

Outline any contracted services or other expenses that are currently anticipated, beyond the basic support services provided to all IC activities. Indicate how those funds are expected to be obtained (e.g., through participant fees, sponsorships, government or other grants, etc.). Activities needing substantial funding may require additional reviews and approvals beyond ICCom.

Specify funding requirements and sources, if any.

No immediate funding is required. Most meetings will be via teleconference and any in-person activities will seek participating companies to act as meeting hosts. The basic support services provided to IC activities will be sufficient to meet the needs of this activity.

7. Management and Procedures

7.1 Activity Oversight Committee

Indicate whether an IEEE committee of some form (e.g., a Standards committee) has agreed to oversee this activity and its procedures.

Has an IEEE committee agreed to oversee this activity?: Yes

If yes, indicate the IEEE committee's name and its chair's contact information.

SIEEE Committee Name: Computer Society STC Reliable, Safe, Secure, and Time-Deterministic Intelligent Systems

Chair's Name: Riccardo Mariani

Chair's Email Address: rmariani@nvidia.com

Additional IEEE committee information, if any. Please indicate if you are including a letter of support from the IEEE Committee that will oversee this activity.

IEEE Computer Society/Standards Activity Board (SAB): Riccardo Mariani

IEEE Vehicular Technology Society/Intelligent Transportation Systems (VT/ITS): Tom Kurihara

IEEE Computer Society/Design Automation (C/DA): Stanley Krolikoski

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7.2 Activity Management

If no Activity Oversight Committee has been identified in 7.1 above, indicate how this activity will manage itself on a day-to-day basis (e.g., executive committee, officers, etc).

Activity officers will be elected at the start to manage the work of the program.

7.3 Procedures

Indicate what documented procedures will be used to guide the operations of this activity; either (a) modified baseline *Industry Connections Activity Policies and Procedures*, (b) Standards Committee policies and procedures accepted by the IEEE-SA Standards

Board, or (c) Working Group policies and procedures accepted by the Working Group's Standards Committee. If option (a) is chosen, then ICCom review and approval of the P&P is required. If option (b) or (c) is chosen, then ICCom approval of the use of the P&P is required.

The Industry Connections Activity baseline entity P&Ps will be used.

8. Participants

8.1 Stakeholder Communities

Indicate the stakeholder communities (the types of companies or other entities, or the different groups of individuals) that are expected to be interested in this IC activity, and will be invited to participate.

Specify types of entities or groups of individuals.

- Manufacturers of autonomous vehicles
- OEMs for autonomous systems
- Tier-x suppliers
- ICT companies
- Service providers
- Technology providers
- Policy makers
- Consumer representatives

8.2 Expected Number of Participants

Indicate the approximate number of entities (if entity-based) or individuals (if individual-based) expected to be actively involved in this activity.

Number of entities or number of individuals.

- OEMs:5
- Tier 1 Suppliers: 5
- Technology Providers: 5
- SW Vendors: 3

8.3 Initial Participants

Provide a number of the entities or individuals that will be participating from the outset. It is recommended there be at least three initial participants for an entity-based activity, or five initial participants (each with a different affiliation) for an individual-based activity.

Use the following table for an entity-based activity:

Entity	Primary Contact	Additional Representatives
Nvidia	Riccardo Mariani	
BMW	Simon Fuerst	
Intel	Jack Weast	
Volkswagen		
Aptiv		
Fujitsu		