Operational Design Domain (ODD) Standardisation activities: BSI PAS 1883 and ISO 34503

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ASAM OpenODD Ideation workshop 23 April 2020



Agenda

- Introduction
- Ongoing standardisation projects
- Conclusions



Operational Design Domain (ODD)

"Operating conditions under which a given driving automation system or feature thereof is specifically designed to function, including, but not limited to, environmental, geographical, and time-of-day restrictions, and/or the requisite presence or absence of certain traffic or roadway characteristics."

- SAE J3016 (2018)



Evaluation continuum

- We needed to create new facilities and capability, desirable to industry
- This was through our proposed continuum of approaches: simulation, simulated environment and real-world trials/testing and deployment

Public Environments

Controlled Environments

Modelling and Simulation

MIDLANDS FUTURE MOBILITY







Why is ODD important?

Number of miles driven?

11 Billion miles¹ To demonstrate with 95% confidence that AVs are 20% better than human drivers

1 N. Kalra and S. M. Paddock, "Driving to safety: How many miles of driving would it take to demonstrate autonomous vehicle reliability?," *Transp. Res. Part A Policy Pract.*, vol. 94, no. December, pp. 182–193, 20163



Why is ODD important?

- Number of miles driven?
- Types of scenarios experienced?







Why is ODD important?

- Number of miles driven?
- Types of scenarios experienced?
- Types of scenarios as a function of ODD



Introduction

- Crowded landscape
- Niche areas

Major committees:

- **BSI (UK)**: PAS 1883 (1880-83)
- ISO: TC 204 WG14, TC22 SC33 (WG9/WG16)
- ASAM: OPENLabel, OPENOntology, OPENODD?
- **SAE**: ORAD
- **UL**: 4600









BSI PAS 1883: ODD Taxonomy

"This PAS provides requirements for the minimum hierarchical taxonomy for specifying an Operational Design Domain (ODD) to enable the safe deployment of an automated driving system (ADS). The ODD comprises the static and dynamic attributes within which an ADS is designed to function safely.

This PAS is applicable to Level 3 and level 4 ADS.

NOTE For more information on Level 3/4 ADS see SAE J3016.

This PAS is for use by trialling organizations developing safety cases for automated vehicle trials and testing. This PAS is also for use by manufacturers of Level 3/4 ADS to define the operating capability. It is also of interest to insurers, regulators, service providers, national, local and regional government to enable them to understand possible ADS deployments and capabilities.

This PAS does not cover the basic test procedures for attributes of the ODD. It does not cover the monitoring requirements of the ODD attributes."



BSI PAS 1883: ODD Taxonomy



Siddartha Khastgir (UK) – Lead author



BSI PAS 1883: ODD Taxonomy

- Project started: October 2019
- Around 20 member PAS steering committee: OEMs, tier-1, simulation suppliers, Research organisation, local authorities etc.
- Public consultation: 17 March 14 April 2020
- Target publication: June/July 2020 (freely available)



ISO 34503: ODD Taxonomy



- Building on PAS 1883
- Under the aegis of ISO TC22 SC33 WG9
 - Convenorship: CATARC, China
- Ensure attributes have international relevance
 - Main additions:
 - Measurability of environmental elements
 - Format for ODD definition (across the evaluation continuum)
 - Restrictive format
 - Extensible

Siddartha Khastgir (UK) & Kunimichi Hatano (JP) – Lead authors



ISO 34503: ODD Taxonomy



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Road type	Motorways (M) Radial roads (A) Distributor roads (B) Minor roads		Yes Yes No	For lane type we allow [traffic lane]. We do not allow [bus lane, cycle lane, tram lane, emergency lane]. For direction of travel, we allow [left hand drive]
Lane specification	Number of lanes		lanes Minimum 3.7	m
	Lane type	Bus lane Traffic lane Cycle lane	No Yes No	
		Tram lane Emergency lane Other special purpose lane	No No No	
	Direction of travel	Right hand drive	No	
		Left hand drive	Yes	
Road geometry	Horizontal plane	Straight roads	Yes	

We do not allow [minor roads].

For road type, we allow [motorways, radial roads, distributor roads].



Summary

Connected and Autonomous Vehicles standardisation is gaining traction internationally (both countries and organisations).

Safety is paramount for all countries

Operational Design Domain definition is fundamental for ensuring safety

Existing BSI and ISO committees are working on standardisation of ODD taxonomy and ODD definition format. We need to ensure we align and complement various standardisation initiatives.

Success will be dependent upon suitable collaboration and data sharing, nationally and internationally.







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