**DSSAD GUIDANCE DOCUMENT**

**1. Introduction:**

*DSSAD refers to a capability of a vehicle to monitor the performance of its Automated Driving System (ADS). This document provides recommendations to enable evaluations of ADS performance.*

*This document has been prepared to support WP.29 deliberations under the 1958, 1997, and 1998 Agreements.*

**2. Terms and Definitions:**

This section defines terms used in this document. Use of these terms and their definitions is recommended in the development of legal requirements related to ADS and ADS vehicles.

*Source: WP.29 GRVA Guidelines and recommendations for Automated Driving System safety requirements, assessments, and test methods to inform regulatory development.*

2.1 ***Automated Driving System (ADS***) means the vehicle hardware and software that are collectively capable of performing the entire Dynamic Driving Task (DDT) on a sustained basis.[[1]](#footnote-2)

2.2 ***(ADS) Function*** means an ADS hardware and software capability designed to perform a specific portion of the DDT.

2.3 ***ADS feature*** means an ADS designed specifically for use within an Operational Design Domain (ODD).

2.4 ***ADS vehicle*** means a vehicle equipped with an ADS.

2.5 ***Driver*** means a human user who performs in real time part or all of the DDT and/or DDT fallback for a particular vehicle.

2.6 ***Dynamic Driving Task (DDT)*** means the real-time operational and tactical functions required to operate the vehicle.

2.6.1. When the ADS is in operation, the DDT is always performed in its entirety by the ADS which means the whole of the tactical and operational functions necessary to operate the vehicle (i.e., the ADS performs “the entire DDT” as stated in the definition of an “Automated Driving System” under paragraph 2.1.). These functions can be grouped into three interdependent categories: sensing and perception, planning and decision, and control.

2.6.1.1. Sensing and perception include:

* Monitoring the driving environment via object and event detection, recognition, and classification.
* Perceiving other vehicles and road users, the roadway and its fixtures, objects in the vehicle’s driving environment and relevant environmental conditions.
* Sensing the ODD boundaries, if any, of the ADS feature.
* Positional awareness.

2.6.1.2 Planning and decision include:

* Predicting actions of other road users.
* Response preparation.
* Maneuver planning.

2.6.1.3 Control includes: ·

* Object and event response execution
* Lateral vehicle motion control
* Longitudinal vehicle motion control.
* Enhancing conspicuity via lighting and signaling.

2.7 ***ADS fallback response*** means a system-initiated deactivation of the ADS or an ADS-controlled procedure to place the vehicle in a minimal risk condition.

2.8 ***Fallback user*** means a user designated to perform the DDT pursuant to an ADS fallback response.

2.9 ***Minimal Risk Condition (MRC)*** means a stable and stopped state of the vehicle that reduces the risk of a crash.

2.10 ***Operational Design Domain (ODD)*** means the operating conditions under which an ADS feature is specifically designed to function.

2.11 ***System-initiated deactivation of the ADS*** means a procedure by which the ADS initiates the transfer of performance of the DDT from the ADS to a vehicle user.

2.12 ***User initiated deactivation of the ADS*** means a procedure by which the user initiates the transfer of performance of the DDT from the ADS to a vehicle user.

2.13 ***(ADS) User*** means a human user of an ADS vehicle.

2.14 ***Failure*** means the termination of an intended behaviour of an element or an item.

2.15 ***(DSSAD) Triggering Event*** means a time stamped data element which triggers the recording and storing of time series data elements

2.16 ***Emergency manoeuvre*** is a manoeuvre performed by the system in case of an event in which the vehicle is at imminent collision risk and has the purpose of avoiding or mitigating a collision.

2.17 ***Imminent collision risk*** describes a situation or an event which leads to a collision of the vehicle with another road user or an obstacle which cannot be avoided by a braking demand with lower than 5 m/s2.

3. **Data Storage and Security**

3.1 The data storage system should be sufficient to record and store the DSSAD time stamped data elements and time series data elements listed in Paragraph 6.

3.2 The DSSAD shall be protected against both unauthorized access and manipulation.

3.3 In the case of the data intended to be stored off-board the vehicle cannot be transmitted, it should remain stored on the vehicle.

**4. Data Format:**

4.1 Each data element listed in Paragraph 6 should be available in a standardized and readable format.

4.2 Time stamp data format

4.2.1. Time stamp data should be recorded in a clearly identifiable way with following data:

4.2.1.1. The time stamped data element, as listed in paragraph 6.2.1.

4.2.1.2. The additional information noted in 6.2 for each time stamped data element as appropriate.

4.2.1.3. Date (Resolution: yyyy/mm/dd);

4.2.1.4. Timestamp

4.2.1.4.1 Resolution: hh/mm/ss timezone e.g. 12:59:59 UTC;

4.2.1.4.2 Accuracy: +/- 1.0 s.

4.2.2. A single timestamp may be allowed for multiple elements recorded simultaneously within the time resolution of the specific data elements. If more than one element is recorded with the same timestamp, the information from the individual elements shall indicate the chronological order.]

**5. Data Accessibility**

5.1 All of the stored data defined in Section 6 of this guidance document should be readily accessible to entities as defined under national law.

5.2 The manufacturer should ensure the data is promptly available in a format that is standardized and readable as outlined in item 4.1. Information on how to interpret the data must be freely available, and interpretation shall not require any proprietary tools or systems.

5.3 The DSSAD data (whether stored on or off-board the vehicle) should be available and retrievable through an electronic communication interface that complies with a publicly available interface standard. It is recommended to use an internationally recognized standard.[[2]](#footnote-3)

5.4 The manufacturer should ensure there is a method to access the data via the electronic communication interface and provide an information package about its usage to authorized entities. The method of accessing data via this interface should be documented by the manufacturer and provided upon the request of the regulatory authority including any tools or software which are required for access. The regulatory authority should not require any proprietary tools or systems to access the data.

5.5 The stored data should be retrievable even when the main onboard vehicle power supply is not available.

**6. Data Elements:**

6.1 The DSSAD should record and store the data elements listed below**.**

6.2 Data elements of time-stamp data

6.2.1. The following table details the data elements of time-stamp data to be recorded, along with any additional information and recording condition.

|  |  |  |
| --- | --- | --- |
| **Event** | **Additional Information** | **Recording condition** |
| Activation of the feature | ADS feature is activated by the:   1. system, or 2. user |  |
| Deactivation of the feature | ADS feature is deactivated by the   1. system, or 2. user | Whilst the feature is active |
| Start of ADS fallback to user, if applicable | System-initiated deactivation of the ADS initiated due to:   1. Planned event, 2. Unplanned event, 3. Detection that fallback user is not available, 4. System failure, 5. Input to the driving controls, or 6. Exit of ODD. | Whilst the feature is active |
| Start of ADS fallback to an MRC | MRC resulting from:   1. exit of ODD, 2. ADS failure, 3. collision detected, 4. Absence of a fallback user, if applicable, or 5. failure in the transition of control to the user, if applicable. | Whilst the feature is active |
| User input to the driving controls, if applicable | Application of:   1. brake control, 2. acceleration control, 3. steering control, or 4. direction indicator. | Whilst the feature is active |
| Prevention of user takeover, if applicable | Prevention of user takeover (if applicable) due to:   1. Unintentional driver input, 2. The current situation being unsuitable, 3. The current situation being unsafe, or 4. The driver not being suitably engaged. | Whilst the feature is active |
| Start of Emergency Manoeuvre |  | Whilst the feature is active |
| End of Emergency Manoeuvre |  | Whilst the feature is active |
| Event Data Recorder (EDR) trigger input[[3]](#footnote-4) |  | Whilst the feature is active |
| Detected collision |  | Whilst the feature is active |
| Detected severe failure[[4]](#footnote-5) | The failure could include the following:   1. ADS 2. Sensor 3. Other vehicle systems (mechanical, electrical, etc.) | Whilst the feature is active |

6.3 Time series data elements

6.3.1. The data elements shall be recorded in compliance with paragraph 6.3.1 if the following thresholds are reached or conditions occur:

a) Detected collision

1. EDR trigger input (excluding last stop trigger)

|  |  |  |
| --- | --- | --- |
| **Data element** | **Condition for requirement** | **Recording interval/time (relative to time stamp)** |
| Detected object distance, longitudinal | Mandatory if available |  |
| Detected object distance, lateral | Mandatory if available |  |
| Detected object relative velocity, longitudinal | Mandatory if available |  |
| Detected object relative velocity, lateral | Mandatory if available |  |
| Detected object classification | Mandatory if available |  |
| Sensor data[[5]](#footnote-6) | Mandatory if ‘Detected object elements’ are not available |  |
| ADS-requested accel demand | Mandatory |  |
| ADS-requested service braking demand | Mandatory |  |
| ADS-requested parking brake demand | Mandatory |  |
| ADS-requested steering demand | Mandatory |  |
| Vehicle acceleration, longitudinal | Mandatory |  |
| Vehicle acceleration, lateral | Mandatory |  |
| ADS-determined vehicle speed | Mandatory |  |

1. This definition is based on SAE J3016 and ISO/PAS 22736 (Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles). These standards define levels of driving automation based on the functionality of the driving automation system feature as determined by an allocation of roles in DDT and DDT fallback performance between that feature and the (human) user (if any). The term “Automated Driving System” is used specifically to describe a Level 3, 4, or 5 driving automation system. [↑](#footnote-ref-2)
2. Contracting parties may further define technical specifications for data accessibility under national law. [↑](#footnote-ref-3)
3. Excluding any last stop trigger [↑](#footnote-ref-4)
4. A failure would be severe if it is one that prevents the ADS from performing the DDT in accordance with the provisions of 5.2 IWG ADS guidance document. [↑](#footnote-ref-5)
5. e.g. camera, radar, LiDAR, used by the ADS for decision making. This shall be documented in the information package provided to the Authorised Entity. This shall include a “Visual Representation“ submitted to the Authorised Entity at the time of providing the DSSAD Data, and shall comply with the requirements of 4.1 and 5.4. [↑](#footnote-ref-6)