Business plan for a DIN SAE SPEC project according to the PAS procedure on **"Metadata Standard for Traffic Scenes in Automated Driving and Traffic Safety"**

Status: **for developing DIN SAE SPEC after adoption on 15.07.2024**

Requests to participate in the project and/or comments on the business plan are to be **submitted by 05.07.2024**[1]**.** The request to participate as well as commenting are submitted via **https://www.din-events.de/**[2] with the log-in code ***ds91518***.

Recipients of this business plan are requested to name **all patent rights** known to them to be relevant to the project and to make available all supporting documents.

Berlin, 24.07.2024 (Version 2)

[1] Applications for participating in the project and comments on the business plan that are not received by the deadline do not need to be taken into consideration. Once constituted, the project workshop will decide whether or not to consider the comments received in good time.

[2] If registration or commenting via the link is technically not possible, please send them to Yihan.Chen@din.de.

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1. Status/version of the business plan

- **For public commenting (Version 1)**

  This business plan is intended to inform the public of a new DIN SAE SPEC project. Any interested party can take part in this project and/or comment on this business plan. The request to participate as well as commenting are submitted via https://www.din-events.de/[3] with the log-in code *ds91518*.

  Once this business plan is published, the Chairman of DIN's Executive Board decides whether or not the project is to be carried out.

  If the project is accepted, all those who have applied for participation or have commented on the business plan by the deadline will be invited to the kick-off meeting of the project consortium.

- **For developing the DIN SAE SPEC after adoption on 15.07.2024**

  Changes to the previous version 1:
  - Title page, Section 1: status changed to “For developing DIN SAE SPEC after adoption on 15.07.2024”, as well as an update of the consecutive revision number (version 1 → version 2)
  - Section 2: Table of participating organizations added
  - Section 7: Information on consortium leader added

2. Initiator and other consortium members

- Initiator:

Person/Organization	Short description
Jens Ziehn Fraunhofer IOSB	The Fraunhofer Institute of Optronics, System Technologies and Image Exploitation IOSB develops solutions in decision making, optimizing processes, and intelligent control of autonomous systems within the areas of innovative vision systems, the use and combination of sensors, and processing and evaluating the resulting data streams.

- Other potential participants:

[3] If registration or commenting via the link is technically not possible, please send them to Yihan.Chen@din.de.

This DIN SAE SPEC will be developed in a consortium (temporary body) that is open to any interested party. The participation of other experts would be helpful and is desired. It is recommended that

- Automotive companies,
- Automotive suppliers,
- Traffic and accident researchers,
- Urban rail automation researchers,
- Research establishments for automated, connected, and intelligent mobility and transportation systems,
- Developers in the field of automated, connected, and intelligent mobility and transportation systems,
- Equipment suppliers for automated, connected, and intelligent mobility and transportation systems,
- IT system providers,

take part in the development of this DIN SAE SPEC.

Organizations[4] that have registered for participation:

Person	Organization
Dr. Janina Stompe	understand.AI
Thorsten Püschl	dSPACE
Dr. Cathrina Sowa	dSPACE
Maria Pohle	Fraunhofer IVI
Dr. Mirjam Fehling-Kaschek	Fraunhofer EMI
Florian Lüttner	Fraunhofer EMI
Dr. Robin Moss	Fraunhofer EMI
Dr. Benjamin Lickert	Fraunhofer EMI
Dr. Masoud Roschani	Fraunhofer IOSB
Jens Ziehn	Fraunhofer IOSB
Dr. Martin Lauer	KIT – Karlsruhe Institute of Technology
Silke Forkert	PTV Group
David Unger	Allianz SE
Marcel Borrack	Allianz SE
Dr. Henrik Gommel	GOTECH GmbH
Andreas Forster	Continental Automotive Technologies GmbH
Beate Irmer	Spiegel-Institut
Dr. Stephan Hammer	Spiegel-Institut
Marius Dupuis	ASAM
Dr. Rustam Tagiew	DZSF German Centre for Rail Traffic Research

[4] Organizations are participating legal entities that send the experts to the DIN SAE SPEC consortium and are assigned to a corporate structure as defined by § 15 of the German Stock Corporation Act or § 271 paragraph 2 of the German Commercial Code.

Person	Organization
Yihan Chen	DIN e. V.

- Organisations that have adopted this business plan (consortium members):

Person	Organization
Dr. Darjan Kozic	ALP.Lab GmbH
Thomas Martlbauer	AVL Deutschland GmbH
Andreas Forster	Continental Automotive Technologies GmbH
Dr. Rustam Tagiew	Deutsches Zentrum für Schienenverkehrsforschung beim Eisenbahn-Bundesamt
Dr. Cathrina Sowa	dSPACE
Dr. Sabine Burgdorf	ETO GRUPPE TECHNOLOGIES GmbH
Mathias Langenbacher	ETO GRUPPE TECHNOLOGIES GmbH
Benjamin Lickert	Fraunhofer Ernst-Mach-Institut, EMI
Florian Lüttner	Fraunhofer Institut für Kurzzeitdynamik, Ernst-Mach-Institut, EMI
Jens Ziehn	Fraunhofer IOSB
Maria Pohle	Fraunhofer IVI
Dr. Mirjam Fehling-Kaschek	Fraunhofer-Institut für Kurzzeitdynamik, Ernst-Mach-Institut, EMI
Dr.-Ing. Robin Moss	Fraunhofer-Institut für Kurzzeitdynamik, Ernst-Mach-Institut, EMI
Dr. Henrik Gommel	GOTECH Fahrzeugentwicklungs- und Konstruktionsgesellschaft
Michael Strobelt	Porsche Engineering
Jingxing Zhou	Porsche Engineering Group GmbH
Nicole Neis	Porsche Engineering Group GmbH
David Hermann	Porsche Engineering Group GmbH
Leon Eisemann	Porsche Engineering Group GmbH
Dr.-Ing. Matthias Pfriem	PTV Planung Transport Verkehr GmbH
Lisa Spellman	SAE Industry Technologies
Dr. Janina Stompe	understand.ai
Dr. Marcos Nieto	Vicomtech

3. Objectives of the project

3.1. General

Background: The AVEAS project

The AVEAS project (www.aveas.org), with a total budget of around EUR 10 million and funded by the German Federal Ministry of Economics and Climate Action (BMWK), aims to develop scalable and sustainable methods over its duration from 2021 to the end of 2024, to specifically identify critical situations in real road traffic and transfer these into models for scenario generation and simulation. This data and models are then used to virtually validate automated driving (AD) functions in more realistic simulations and to further develop measures to increase road safety.

To derive well-founded conclusions about the safety of future AD functions in mixed traffic, consisting of automated and human road users, from data that can be acquired today, AVEAS focuses, among other things, on the interaction of AD functions with human traffic behavior – through large-scale and systematic data acquisition using road vehicles, light aircraft and infrastructure sensors, enabling the subsequent derivation of behavioral simulations.

Acquired data

The data obtained through the different acquisition methods – road vehicle cameras, road vehicle laser scanners, aerial cameras, infrastructure-based infrared cameras and laser scanners at intersections, as well as data from human in the loop studies in driving simulators – are to be mapped onto a common format, so that users can use the data consistently without having to concern themselves with the different acquisition methods.

A detailed overview of the project content can be found in the publication L. Eisemann et al., “An Approach to Systematic Data Acquisition and Data-Driven Simulation for the Safety Testing of Automated Driving Functions,” 2023.

A common property of all acquired data is that it shows trajectories of road users (with around 10 frames per second) as time series of bounding boxes with class information. These can then be used to derive behavioral models for human driving behavior or to extract critical traffic situations as test scenarios for AD functions.

Format specification within the project framework

Within the AVEAS project framework, an initial data format was specified that uses two existing standards operated by ASAM e.V.: On the one hand, the ASAM OpenDRIVE standard is used to define road networks; on the other hand, the time series of traffic situations are stored in the ASAM OpenLABEL format.

To this end, about 100 parameters were established and described in the project which aim to unify information across the different data acquisition

methods, and to create a reproducible data basis that can be processed independently of detail knowledge about the data acquisition methods.

Standardization objective

The definitions made as part of the AVEAS project have been implemented for use within the project in conjunction with the OpenLABEL and OpenDRIVE formats but are not strictly dependent on specific file formats.

The long-term added value of the specification is to enable a common domain understanding to achieve compatible, interchangeable data acquisition efforts in this domain: A sound, comprehensive data basis is the prerequisite for safe intelligent transportation systems, not least in terms of the European AI Act, and accordingly also a consistent understanding of metadata and data requirements.

The AVEAS project, with its three-year duration, was not conceived to cover the current, let alone future, data requirements for these applications. Instead, the project is intended to highlight ways in which future projects on this topic can proceed methodically and technically in order to significantly improve the data situation for validation.

The AVEAS consortium is therefore striving to standardize the metadata definitions for corresponding acquisition campaigns, independently of specific file formats such as OpenLABEL and OpenDRIVE, but using these in a reference implementation of the principles. This is to ensure that other formats (e.g., generic JSON, as well as XML-based formats, simple CSV exchange formats or binary formats) can also benefit from standardized terminology, definitions, as well as measurement and calculation principles. The aim is to support a data ecosystem that allows application-specific format selection, but at the same time enables the consistent use of important measured values across applications and sectors.

In particular, the approach is also intended to promote privacy-safe traffic data acquisition through a comprehensive, standardized set of information that can be obtained via a wide variety of methods, and which renders the transfer of personally identifiable information (PII) unnecessary for a broad range of requirements, as well as ensuring clear interfaces for data exchange and intended uses in the domain.

3.2. Planned scope

This document defines terms and requirements for the consistent, multi-application acquisition and storage of spatiotemporal data of ground-based traffic scenarios as a metadata standard.

This document defines terms for measured parameters and derived parameters, e.g., with respect to scenarios, vehicle interior and passenger states, acquisition conditions, traffic situation, including:

- for each such parameter: information about units of measurement and value ranges;
- for each such parameter: information about data quality by stochastic uncertainty models;
- for each such parameter: information about measurement, processing or annotation principles;
- for each such parameter, if applicable: information about temporal and contextual referencing with other parameters or external data;
- for each such parameter, if applicable: references to or harmonization with literature or existing standards in the field;
- for each such parameter, if applicable: information on compatibility with or methods of conversion towards established interfaces, for example for simulations or existing external data format standards.

This document is applicable to spatiotemporal data of individual traffic participants both from real-world data acquisition and from simulations for motorized and non-motorized road traffic, pedestrian traffic, rail traffic, or a combination of these.

3.3. Related activities

The subject of the planned DIN SAE SPEC is not at present the subject of a standard. However, there are committees, standards and/or other technical rules that deal with related subjects and thus need to be taken into account - and involved or incorporated, where necessary - in this project:

- ISO 26262-1, Road vehicles — Functional safety — Part 1: Vocabulary
- ISO 21448, Road vehicles — Safety of the intended functionality
- ISO/CD PAS 8800, Road Vehicles — Safety and artificial intelligence
- ISO/IEC 22989, Information technology — Artificial intelligence — Artificial intelligence concepts and terminology
- ASAM OpenSCENARIO
- ASAM OpenDRIVE
- ASAM OpenLABEL
- ASAM OpenODD
- mobilityDCAT-AP
- BSI PAS 1883: Operational Design Domain (ODD) Taxonomy for ADS Specification
- ISO 34503, Road Vehicles — Test scenarios for automated driving systems — Specification for operational design domain
- DIN SPEC 91516: Human performance regarding the dynamic driving task for the specification of AI in ATO

4. Work programme

The aim of the project is to develop a DIN SAE SPEC according to the PAS procedure (see www.din.de/go/din-spec-en). The DIN SAE SPEC shall be consistent with the body of German standards and shall not be in conflict with any DIN Standard.

The kick-off meeting took place on 15.07.2024 online. The project duration will be about 6 months.

At this kick-off meeting, the consortium for developing the DIN SAE SPEC was constituted, further organizational issues were decided on and clarified, and, where possible, work on the subject matter began.

A draft for public commenting will not be published.

A total of 2 project meetings (kick-off meeting and work meetings) and 3 web conferences will be held, during which the content of the DIN SAE SPEC will be presented, discussed and approved. The content of the DIN SAE SPEC can be drawn up by individual consortium members or in working groups.

Dates of further meetings and/or web conferences are to be agreed on within the consortium in consultation with DIN.

The DIN SAE SPEC will be drawn up in English (language of meetings, minutes, etc.). The DIN SAE SPEC will be written in English.

NOTE The calculation covers only one language version. Please keep in mind the fact that other language versions involve additional expenses; for this reason, they shall be agreed on separately. If another language version is desired, Beuth/DIN can provide a translation. Requests for translations are to be submitted after the DIN SAE SPEC manuscript has been approved for publication.

5. Resource planning

Each consortium member shall bear the expenses he/she incurs as a result of participation in the project.

If the DIN Executive Board approves the project, the initiator of the project will then conclude a contract with DIN.

Consortium membership and participation in the project meetings is free of charge, as the costs incurred by DIN throughout the performance of this project will be financed by funding from the research project "Modul F5 – KI-Geschäftsstelle 2021-2024" funded by the Federal Ministry for Economic Affairs and Climate Action of Germany (BMWK) as per the funding announcement “Förderung von Technologie- und Innovationstransfer aus Kapitel 0901 Titel 685 01 des Bundeshaushaltes 2021 bis 2024” (funding ref. no.: 46DINF5).

6. Rules of cooperation in the DIN SAE SPEC consortium

This project is governed by the PAS procedural rules. All interested parties and consortium members are to inform themselves of these procedures by going to www.din.de/go/din-spec-en.

The consortium will be constituted during the course of the kick-off meeting. The kick-off meeting will not take place until the business plan has been published and approved by DIN's Management Board. The consortium shall comprise at least three members from different organizations[5]. It is not necessary that these members come from different areas and represent different stakeholders. By approving this business plan, the interested parties declare their willingness to participate in the consortium and will be formally named as consortium members, with the associated rights and duties. Participants at the kick-off meeting who do not approve the business plan are not given the status of a consortium member and are thus excluded from further decisions made during the kick-off meeting and from any other decisions regarding the project.

If an organization (e.g. an association) sends someone who is not an employee to the consortium, this person shall be authorized by the organization, who shall provide proof of this to DIN.

Each consortium member is entitled to vote and has one vote. If an organization sends several experts to the consortium, that organization has only one vote, regardless of how many consortium participants it sends. Transferring voting rights to other consortium members is not permitted. During voting procedures, decisions are passed by simple majority; abstentions never count.

As a rule, the consortium is closed once it is constituted. The current consortium members shall decide whether any additional members will be accepted or not.

During the kick-off meeting, the consortium members shall elect a consortium leader, who is responsible for content management and any decision-making and voting procedures. The leader is supported by the responsible DIN Project Manager, whereby DIN will always remain neutral regarding the content of the DIN SAE SPEC. Furthermore, the DIN Project Manager shall ensure that DIN's rules of procedure, rules of presentation, and the principles governing the publication of DIN SAE SPEC have been observed. Should a consortium leader no longer be able to carry out his/her duties, the DIN Project Manager shall initiate the election of a new leader.

The DIN Project Manager is responsible for organizing and leading the kick-off meeting, in consultation with the initiator. Further project meetings and/or web conferences shall be organized by the DIN Project Manager in consultation with the consortium leader.

If consortium members cannot be present when the DIN SAE SPEC or its draft is approved, an alternative means of including them in the voting procedure shall be used (e.g. in writing, electronically).

[5] Organizations are participating legal entities that send the experts to the DIN SAE SPEC consortium and are assigned to a corporate structure as defined by § 15 of the German Stock Corporation Act or § 271 paragraph 2 of the German Commercial Code.

All consortium members who voted for the publication of the DIN SAE SPEC or its draft will be named as authors in the Foreword, including the organizations which they represent. All consortium members who voted against the publication of the DIN SAE SPEC or its draft, or who have abstained, will not be named in the Foreword.

Any expansion of the consortium at a later date is decided on by the members making up the consortium at that time. It is particularly important to consider these aspects:

a) expansion would be conducive to shortening the duration of the project or to avoiding or averting an impending delay in the planned duration of the project;
b) the expansion would not result in the project taking longer to complete;
c) the new consortium member would not address any new or complementary issues beyond the scope defined and approved in the business plan;
d) the new consortium member would bring complementary expertise into the consortium in order to incorporate the latest scientific findings and state-of-the-art knowledge;
e) the new consortium member would actively participate in the drafting of the manuscript by submitting concrete, not abstract, proposals and contributions;
f) the new consortium member would ensure wider application of the DIN SAE SPEC.

To allow the legal reproduction and distribution of results for the purposes of project work, the consortium members grant DIN rights of use on the basis of the copyright that will accrue to them for the results of their work on the DIN SAE SPEC. The transfer of these utilization rights does not prevent the consortium members from using and further developing the knowledge, experience and findings they bring to the project.

Consortium members are requested to inform DIN of all patent rights known to them to be relevant to this DIN SAE SPEC project.

Subsequent changes to the scope (Section 3.2) or to the resource planning (Section 5) require, in addition to a two-thirds majority of all votes cast, the approval of DIN.

7. Contacts

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Annex: Project schedule (preliminary)

DIN SAE SPEC project	2024																		2025							
	Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec		Jan		Feb		Mar		Apr	
Initiation																										
1. Request and review																										
2. Business plan drawn up																										
3. Publication of business plan																										
Development phase																										
4. Kick-off meeting/consortium constituted																										
5. DIN SAE SPEC drawn up																										
6. DIN SAE SPEC approved by consortium																										
Publication																										
7. Review and release by DIN																										
8. Publication of DIN SAE SPEC																										
Milestones								**K**	**W**		**W**		**W**		**M / A**											

K Kick-off
M Project meeting
W Web conference
A Adoption of DIN SAE SPEC