Business plan for a DIN SPEC project according to the PAS procedure on

"Human performance regarding the dynamic driving task for the specification of AI in ATO"

Status:

For the development of DIN SPEC 91516 after adoption on 04.07.2024

Requests to participate in the project and/or comments on the business plan are to be **submitted by 28.06.2024** to **claudia.reinel@din.de**[1]

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, 19.07.2024 (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.

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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 SPEC project. Any interested party can take part in this project and/or comment on this business plan. Please send any requests to participate or comments by e-mail to claudia.reinel@din.de.

  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 SPEC after adoption on 04.07.2024**

  No Changes to the previous version 01:

2. Initiator and other consortium members

- Initiator:

Person/Organization	Short description
Dr. Rustam Tagiew German Centre for Rail Traffic Research at the Federal Railway Authority	Rustam Tagiew is a scientific officer in Department 85 "Technology" of the German Centre for Rail Traffic Research at the Federal Railway Authority. He conducts in-house research and supervises awarded research projects in the field of commissioning approval of driverless trains on mainline railways. He has expertise in AI and interdisciplinary research and has organised the international workshop series "Experimental Economics and Machine Learning". German Centre for Rail Traffic Research at the Federal Railway Authority is an independent, technical-scientific departmental research institution of the Federal Government. It elaborates the rail sector's central issues as defined in a Federal Research Programme for Rail Transport and provides solutions for them. Supporting research and technological development is intended to launch and accelerate necessary innovation processes in the field of rail transport.

- Other potential participants:

This DIN 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

– Manufacturer of train's path monitoring systems
– Testing institutes and companies for train's path monitoring systems
– Research institutions for driverless vehicles
– Rail vehicle manufacturers
– Suppliers of rail vehicle manufacturers
– Software developers
– Standardisation organisations
– etc.

take part in the development of this DIN SPEC.

- Organizations[2] that have registered for participation:

Person	**Organization**
Dr. Rustam Tagiew	German Centre for Rail Traffic Research at the Federal Railway Authority
Dr. Ralf Röhrig	Tüv Rheinland
Michael Karner	SETLabs Research GmbH
Alex Haag	Futurail
Prof. Dr. Harald Schaub	IABG
Sebastian Drexler	Infoteam Software AG
Lucas Greiner-Fuchs	KIT
Dr. Martin Lauer	KIT
Dr. Henrik Gommel	GOTECH Fahrzeugentwicklungs- und Konstruktionsgesellschaft mbH
Jürgen Großmann	Fraunhofer FOKUS
Jens Ziehn	Fraunhofer IOSB
Felix Heizler	DZSF
Dr. Claudia Reinel	DIN e. V.

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

Person	Organization
Dr. Rustam Tagiew	German Centre for Rail Traffic Research at the Federal Railway Authority
Dr. Ralf Röhrig	Tüv Rheinland
Michael Karner	SETLabs Research GmbH
Alex Haag	Futurail
Dr. Stefan Kothe	PTB
Prof. Dr. Harald Schaub	IABG
Sebastian Drexler	Infoteam Software AG
Lucas Greiner-Fuchs	KIT
Dr. Martin Lauer	KIT
Dr. Henrik Gommel	GOTECH Fahrzeugentwicklungs- und Konstruktionsgesellschaft mbH
Sebastian Graf	Siemens Mobility GmbH
Dr. Maria Hirsch	infoteam
Dr. Gereon Weiß	Fraunhofer IKS
Jürgen Großmann	Fraunhofer FOKUS
Jens Ziehn	Fraunhofer IOSB
Abderraouf Boussif	Université Gustave Eiffel
Fabian Hampel	IFS RWTH Aachen
Baris Cogan	TU Berlin
Dr. Esther Bosch	DLR
Birte Thomas-Friedrich	DLR
Dr. Claudia Reinel	DIN e. V.

3. Objectives of the project

3.1. General

The functions of a train driver (German: Triebfahrzeugführer, Tf) or driver (German: Fahrzeugführer, Ff) can be replaced by an AI in driverless train operation. This AI needs specifications that describe the performance of the Tf or Ff. This document is intended to summarise the research results to date on the performance of a Tf or Ff depending on their function. This document is intended to support the implementation of the requirements from the mobility sector of the German Standardization Roadmap on AI (2nd Edition). The results of this document can be incorporated into the design of the technical systems with regard to sensor selection and algorithms.

3.2. Planned scope

This document defines terms, metrics, measurement methods and sample measurements related to the performance of a train driver (German: Triebfahrzeugführer, Tf) or driver (German: Fahrzeugführer, Ff) for driverless train operation. Previously relevant regulations are summarized. The functions of the Tf or Ff to be replaced are listed. Metrics for measuring performance for each of the mentioned functions are described. Previous sample measurements for the performance of Tf and Ff are provided. This document does not provide specific information on non-moving activities such as coupling. This document does not specify any requirements for safety and health protection, such as the detection of persons in a danger zone. This also applies to so-called assistance systems. This document is not suitable for the application of general automated systems. This document is not applicable to means of transport other than those in accordance with EBO and BOStrab. This document does not include the determination of performance values for the commissioning authorization of driverless train operation. This document can be used as a guide by developers of perception and control systems for driverless train operation.

3.3. Related activities

The subject of the planned DIN 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:

- NA 043-01-42 GA DIN/DKE Gemeinschaftsarbeitsausschuss Künstliche Intelligenz
- NA 087 DIN Normenausschuss Fahrweg und Schienenfahrzeuge (FSF) Gremium
- NA 052-00-36 AA Fahrzeugsicherheit
- NA 052-00-32 AA E/E-Komponenten und allgemeine Systemanforderungen
- NA 052-00-39 AA Ergonomie, Sicht und Licht
- DKE/K 351 Elektrische Ausrüstungen für Bahnen
- DKE/GK 914 Funktionale Sicherheit elektrischer, elektronischer und programmierbarer elektronischer Systeme (E, E, PES) zum Schutz von Personen und Umwelt
- DKE/K 931 Systemaspekte der Automatisierung
- DIN SPEC 92001-2:2020-12, Artificial Intelligence – Life Cycle Processes and Quality Requirements – Part 2: Robustness
- VDE SPEC 90012, VCIO based description of systems for AI trustworthiness characterization
- German Standardization Roadmap on AI (2nd Edition)
- DIN/DKE SPEC 99002 Terminology – AI in railway applications (under development)
- COMMISSION IMPLEMENTING REGULATION (EU) No 402/2013
- BOStrabNA

4. Work programme

The aim of the project is to develop a DIN SPEC according to the PAS procedure (see www.din.de/go/din-spec-en). The DIN 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 virtually on 04.07.2024. The project duration will be about 6 months.

At this kick-off meeting, the consortium for developing the DIN SPEC will be constituted, further organizational issues will be decided on and clarified, and, where possible, work on the subject matter will be begun.

A draft for public commenting will not be published.

A total of 1 project meetings (kick-off meeting and work meetings) and 5 web conferences will be held, during which the content of the DIN SPEC will be presented, discussed and approved. The content of the DIN 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 SPEC will be drawn up in English (language of meetings, minutes, etc.). The DIN 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 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 "Geschäftsstelle KI" funded by the Bundesministerium für Wirtschaft und Klimaschutz/BMWK (funding reference no.: 46DIN21F5).

6. Rules of cooperation in the DIN 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[2]. 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 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 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

[2] Organizations are legal entities and natural persons, insofar as they participate in business transactions on a commercial or freelance basis. If several legal entities are part of a group or a corporate structure within the meaning of Section 15 of the German Stock Corporation Act (§ 15 Aktiengesetz) or Section 271 (2) of the German Commercial Code (§ 271 Absatz 2 Handelsgesetzbuch), they are deemed to be one organization.

conferences shall be organized by the DIN Project Manager in consultation with the consortium leader.

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

All consortium members who voted for the publication of the DIN 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 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 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 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 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 SPEC project	2024																						2025									
	Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec		Jan		Feb		Mar		Apr		May	
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 SPEC drawn up																																
6. DIN SPEC approved by consortium																																
Publication																																
7. Review and release by DIN																																
8. Publication of DIN SPEC																																
Meilensteine									**K**		**W**		**M**		**W**		**W**		**W / A**													

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