PD ISO/TR 21959-2:2020

BSI Standards Publication

Road vehicles — Human performance and state in the context of automated driving

Part 2: Considerations in designing experiments to investigate transition processes

bsi.

National foreword

This Published Document is the UK implementation of ISO/TR 21959-2:2020.

The UK participation in its preparation was entrusted to Technical Committee AUE/12, Ergonomics (Road vehicles).

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Published by BSI Standards Limited 2020

ISBN 978 0 580 98877 6

ICS 43.020

Compliance with a British Standard cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 March 2020.

Amendments/corrigenda issued since publication

Date	Text affected

PD ISO/TR 21959-2:2020

TECHNICAL REPORT

ISO/TR 21959-2

First edition
2020-02-28

Road vehicles — Human performance and state in the context of automated driving —

Part 2: Considerations in designing experiments to investigate transition processes

Véhicules routiers — Etat et performance humaine dans le contexte de la conduite automatisée —

Partie 2: Principes expérimentaux pour etudier les processus de transition

Reference number
ISO/TR 21959-2:2020(E)

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 39, *Ergonomics*.

A list of all parts in the ISO 21959 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Although automation technology is advancing at a rapid pace, the majority of automated driving levels (as defined by SAE J3016, 2016[1]) still require a human to fulfil specific remaining (driving related) tasks. The safety-critical human's task is the takeover task in transition from a higher level to a lower level of automated driving. Researchers and developers continue to seek system design and human machine interface improvements for better takeover performance. Researchers face a challenge in understanding the limitations of a human's ability to perform the takeover task, which involves different human factors. Developers work to evaluate systems to see whether the takeover process is effective at minimum risk in specific scenarios. There are a wide variety of experiments to evaluate takeover performance in transition for many different purposes. This document contains information to consider in the takeover scenario, some of which is still under investigation, in order to help readers design experiments to evaluate takeover performance and design appropriate experiments.

TECHNICAL REPORT **ISO/TR 21959-2:2020**

Road vehicles — Human performance and state in the context of automated driving —

Part 2: Considerations in designing experiments to investigate transition processes

1 Scope

This document focuses on system-initiated and human-initiated transitions (Clause 6) from a higher level to a lower level of automated driving. Human factors and system factors that can influence takeover performance are included (Clauses 7 and 8). Although some are still under investigation, there is a need to appropriately set these factors as variables to better understand their effects or to better control/eliminate their influence. This approach will aid research design by ensuring that important factors are considered and support consistency across studies enabling meaningful comparisons of findings. This document also includes information on considerations in test scenario design (Clause 9), common measures for human takeover performance (Clause 10) and considerations in choosing a testing environment (Clause 11) to help readers design experiments comparable to other studies.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 List of Acronyms

DDT	Dynamic Driving Task
DMS	Driver Monitor System
ECG	Electrocardiogram
EEG	Electroencephalogram
HMI	Human-Machine Interface
KSS	Karolinska Sleepiness Scale
MRM	Minimal Risk Manoeuvre
NDRT	Non-driving Related Task