

# MAVEN

## Managing Automated Vehicles Enhances Network



**WP1** Project management and coordination

**Deliverable n°: D1.3 and D1.4**

**Ethics requirements & Protection of personal data**

**Dissemination Level: CO**

Version	Date	Release	Approval
0.5	12-10-2018	Jaap Vreeswijk (MAP)	Robbin Blokpoel (DYN)



## Document Log

Version	Date	Comments	Name and Organisation
0.1	19-01-2017	Initial version	J. Vreeswijk (MAP)
0.2	06-02-2017	Version for consortium meeting	J. Vreeswijk (MAP)
0.3	27-02-2017	Draft version	J. Vreeswijk (MAP)
0.4	28-02-2017	Final version	J. Vreeswijk (MAP) J. Schindler (DLR)
0.5	12-10-2018	Update based on interim EC review	J. Vreeswijk (MAP)

## List of Partners

Beneficiary n° (1 to 5)	Partner	Country
9	MAP	The Netherlands
1	DLR	Germany



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# 1 Executive Summary

This deliverable describes the procedures of the MAVEN project with regards to ethics related to the involvement of human participants, and the collection, processing and protection of personal data. Among others, the informed consent procedure and the data to be collected are provided.



## 2 Introduction

### 2.1 Objective of this document

At the time of submission of the MAVEN project proposal, the ethics self-assessment revealed that two ethics issues may apply to the MAVEN project. These are:

- Does your research involve human participants? **YES**
  - Are they volunteers for social or human sciences research? **YES**
- Does your research involve personal data collection and/or processing? **YES**
  - Does it involve tracking or observation of participants? **YES**

This deliverable describes how the MAVEN consortium intends to address these issues. It includes: 1) the response to ethical requirements regarding the involvement of human participants during testing, evaluation and demonstration of the system concept, and 2) the response to requirements regarding the collection and processing of personal data of participants during system evaluation and demonstration.

### 2.2 Requirements

The following requirements were provided by the European Commission.

#### 2.2.1 Ethics requirements

- Details on the procedures and criteria that will be used to identify/recruit research participants must be provided.
- Detailed information must be provided on the informed consent procedures that will be implemented for the participation of humans.
- Templates of the informed consent forms and information sheet must be submitted on request.
- The applicant must clarify whether children and/or adults unable to give informed consent will be involved and, if so, justification for their participation must be provided.
- Copies of ethics approvals for the research with humans must be submitted.

#### 2.2.2 Protection of personal data

- Copies of opinion or confirmation by the competent Institutional Data Protection Officer and/or authorization or notification by the National Data Protection Authority must be submitted (which ever applies according to the Data Protection Directive (EC Directive 95/46, currently under revision, and the national law).
- If the position of a Data Protection Officer is established, their opinion/confirmation that all data collection and processing will be carried according to EU and national legislation, should be submitted.
- Detailed information must be provided on the procedures that will be implemented for data collection, storage, protection, retention and destruction and confirmation that they comply with national and EU legislation.
- Detailed information on the informed consent procedures that will be implemented in regard to the collection, storage and protection of personal data must be submitted on request.
- Templates of the informed consent forms and information sheet must be submitted.



## 2.3 Structure of this document

Chapter 2 provides an introduction to the MAVEN project and the planned assessment methodology. Chapter 3 gives the response to the ethics requirements and chapter 4 gives the response to the requirements related to protection of personal data.



### 3 MAVEN introduction and assessment methodology

The MAVEN project (Managing Automated Vehicles Enhances Network) aims to provide solutions for managing level-4 automated vehicles (HAV) at (urban) signalised intersections. It will develop algorithms for infrastructure-assisted guidance of HAVs using negotiation processes between vehicles and the infrastructure. HAVs receive advice and/or requests from the road infrastructure to adjust their trajectory and manoeuvring policies, while infrastructure dynamically adapts traffic light timing at single or multiple intersections. This bi-level optimisation is expected to contribute to maximising the economic benefit of traffic flow while reducing energy consumption and environmental impact as well as ensuring traffic safety. Further details can be found in MAVEN deliverable D2.1: User needs, conceptual design and requirements [1].

The assessment methodology of MAVEN is illustrated in Figure 1. The assessment tools in the upper layer relate to one or more of the assessment dimensions in the lower layer. Preliminary test and evaluation plans are summarized below. Further details can be found in MAVEN deliverable D7.1: Impact assessment plan [2], which is due in May 2017.

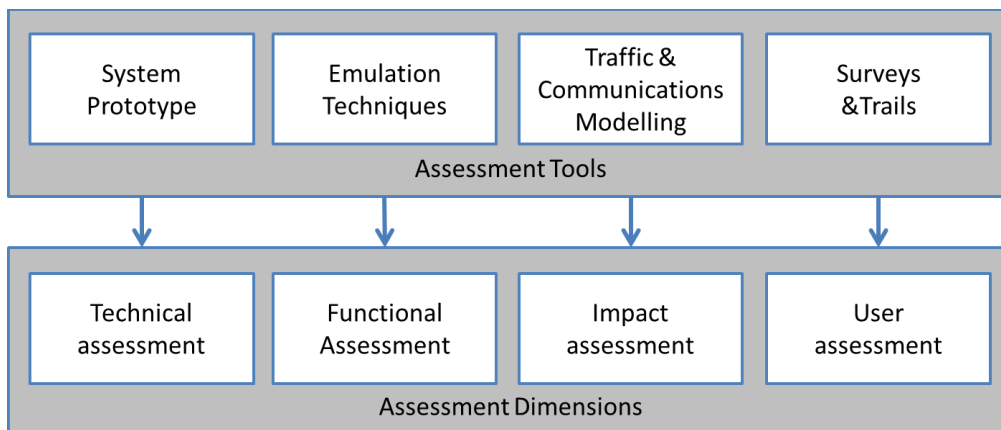


Figure 1 MAVEN assessment methodology

*System prototype* - MAVEN will develop an operational system prototype, including both vehicle and infrastructure elements, to be assessed in real-life conditions. Already equipped urban roads in Braunschweig (D) and Helmond (NL) will serve as proving grounds, primarily for technical assessment of the system prototype. Both sites consist of a corridor of intersections equipped with communication and sensor hardware which are configurable by the consortium. It allows for modifications to traffic light control algorithms and V2X communication protocols. In Braunschweig sets of cameras for the online detection of vehicles and vulnerable road users are present. Highly automated vehicles from DLR and Hyundai will be used for a feasibility study of the platoon organization and negotiation algorithms developed in MAVEN. Additionally, MAVEN will strongly interact with automated vehicle initiatives in Greenwich and the wider smart city community to learn from each other and to position the MAVEN concept in a wider perspective. This is particularly relevant in the context of passenger transport and mobility service delivery.

*Emulation techniques* - To overcome limitations related to low market penetration of automation and cooperative vehicles, emulation techniques will be used to allow functional assessment and to some extent impact assessment in real-world environments. Using hybrid evaluation methods real test vehicles (with and without automation) can interact with virtual surrounding vehicles. One method combines a real-life test track with a traffic simulation model of that same test track, which allows the test vehicles to interact with vehicles in the simulation model. As the MAVEN algorithms will also be applied in the virtual traffic network, actual negotiations can take effect and the outcomes such as speed and lane changes or platoon formation can be directly experienced in the test vehicles. Another method involves the use of hemispherical cameras for complex traffic measurements with





a fish-eye lens adjusted in a downward direction and able to film the horizon all around. Those cameras allow a holistic knowledge of the traffic situation at an intersection at a given time, comprising velocity profiles, traffic demands, lane-wise densities, turning relations and so on. Similar to the other approach, the camera data will be transferred to floating car data as if all vehicles are cooperative vehicles. Again, this places test vehicles in a virtualized fully cooperative environment, which also allows comparison of e.g. the emission performance of equipped and conventional vehicles. As the assessment of systems like the MAVEN concept is still a very new and novel topic, especially in real-world conditions, emulation techniques could become a key component in system assessment.

*Traffic and communications modelling* - Additionally, an important part of MAVEN will be traffic and communications modelling tools for impact assessment on the traffic network. For this task the open source traffic simulation model SUMO will be used and extended with V2X communications and emission modules. MAVEN will evaluate the impact of platoon organization, negotiation algorithms, adaptive traffic light optimization, and trajectory and manoeuvre planning on traffic performance and emissions. The impact will be evaluated for different intersection and corridor geographies, traffic demands and rates of penetration and compliance, relative to currently implemented control algorithms. Finally, MAVEN will include an assessment of the related V2X communications schemes through suitable simulation tools like iTETRIS, as communication aspects may drive the design of the MAVEN negotiation algorithms and protocols. Already modelled and calibrated networks of Helmond and Braunschweig will be used, whereas Prague will offer an additional case to study network effects as rich data from different sensors such as inductive loops, video detection, RFID tag detection or dedicated V2I communication is readily available.

*Surveys and trials* - The acceptance and compliance of drivers are crucial and MAVEN will address user assessment in several ways. An online survey will be prepared including video material that captures the concepts of MAVEN to evaluate the opinion of the general audience. Additionally, citizens of the pilot cities will be invited to drive in the test vehicles as a passenger. Finally and also at the pilot sites, the acceptance of drivers in unequipped vehicles surrounding the automated ones will be assessed by asking participants to follow and observe the behaviour of the test vehicles.



## 4 Involvement of human participants

Following the ethics self-assessment of the H2020 programme [3] ‘involvement of human participants’ applies to the MAVEN project. Based on the assessment methodology described earlier, human participants (not being employees of MAVEN beneficiaries) may be involved in the following ways:

1. Passenger of MAVEN highly automated vehicle
2. Driver of MAVEN non-automated vehicle
3. Passenger of MAVEN non-automated vehicle
4. Regular traffic participant (e.g. vehicle driver or vulnerable road user)
5. Respondent to online survey

The following sections will describe the MAVEN response to specific requirements related to the involvement of human participants.

### 4.1 Procedures and criteria to identify/recruit research participants

Participants of the field trials (number 1-3 from the list above) will be selected from existing databases of DLR (Brunswick) and TNO (Helmond). Two selection criteria apply: age between 18 and 70 and in possession of a valid driving license. In addition, the age of the selected participants should be balanced across the sample.

Respondents to the online survey will be recruited through existing social media channels and communities. An innovation to complete the online survey together with an URL to the online survey will be published. Apart from targeting specific communities (e.g. people with an interest in vehicle technology), the MAVEN project has no control over the selection criteria.

Regular traffic participants concern vehicle drivers and/or vulnerable road users who are on the public road during the field trial and in the vicinity of the MAVEN vehicles. Due to the nature of public roads, the MAVEN project has no control over the recruitment and selection of traffic participants which is therefore entirely random.

In general, the MAVEN project has no interest in, and therefore will not target, vulnerable categories of individuals such as children, patients, people subject to discrimination, minorities, people unable to give consent, people of dissenting opinion, immigrant or minority communities, sex workers, etc.

### 4.2 Informed consent procedures for the participation of humans

Participation to the field trial and the online survey will be entirely voluntary. Before participation to the field trial an informed consent form will be obtained from each participant by means of a signature on the form. The informed consent form will:

- Be written in the local language, being German in Brunswick and Dutch in Helmond.
- Describe the aims, methods and implications of the research, the nature of the participation and any benefits, risks or discomfort that might ensue.
- State how data will be collected, protected during the project and either destroyed or reused subsequently.
- Explicitly state that participation is voluntary and that anyone has the right to refuse to participate and to withdraw their participation or data at any time — without any consequences.
- Indicate that additional information and clarification can be provided by the trial instructor.



An example informed consent for Brunswig (in German) is provided in Annex A. This form will be amended to the MAVEN project once the assessment plan is finalised and translated to Dutch.

#### **4.3 Templates of the informed consent forms and information sheet**

The preliminary template (in German) is provided in Annex A.

#### **4.4 Involvement of children and/or adults unable to give informed consent**

As indicated in section 3.1, children, adults unable to give informed consent or other vulnerable categories of individuals will not be involved.

#### **4.5 Copies of ethics approvals for the research with humans**

If required, copies of ethics approvals will be provided.



## 5 Personal data collection and/or processing

Following the ethics self-assessment of the H2020 programme [3] ‘personal data collection and/or processing’ applies to the MAVEN project. As described in the previous chapter, personal data collection and/or processing may apply to five categories of human participants:

1. Passenger of MAVEN highly automated vehicle
2. Driver of MAVEN non-automated vehicle
3. Passenger of MAVEN non-automated vehicle
4. Regular traffic participant (e.g. vehicle driver or vulnerable road user)
5. Respondent to online survey

The following sections will describe the MAVEN approach regarding specific requirements related to personal data collection and/or processing. Regarding data collection in the MAVEN project the following general principles apply:

- Data will always be collected and stored in a way that anonymity and confidentiality is guaranteed.
- There will be no information collected that could lead to any form of stigmatization of participants.
- Strict accordance with applicable international, EU and national law, especially the EU directive 96/46/EC is guaranteed and any related updates will be observed.
- Images created by vehicle and/or roadside (optical) sensors will be converted into object data without any references that allows identification (e.g. license plate number or vehicle colour), and thereafter deleted. Objects tracking for example along corridors is not planned.
- GPS-type data (e.g. position and time) will be collected for only the MAVEN highly automated vehicles, which have their own data encryption key.
- No sensitive personal data (e.g. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction) will be collected.
- Only anonymised personal data will be collected (e.g. age and possession of driving license). No data that allows identification of individuals (e.g. name and contact details) will be collected.

### 5.1 Copies authorization or notification by the National Data Protection Authority

As of the 25<sup>th</sup> of May 2017 the new European Privacy Regulation will take effect and applies to the MAVEN project (both Brunswig and Helmond). According to this regulation, a priori reporting on data collection and/or reporting of personal data at a National Data Protection Authority is no longer required. However, the main obligation of the MAVEN project is to document the organisational and technical procedures applied by the project. These have to be in line with the European law and as such the MAVEN project is accountable to its actions. A more detailed privacy impact assessment and/or a dedicated data protection officer might be demanded when a large privacy impact is expected. For the MAVEN project this does not seem to be applicable.

### 5.2 Opinion/confirmation of a Data Protection Officer

The MAVEN project will comply with the new European Privacy Regulation which takes effect on the 25<sup>th</sup> of May 2017. This regulation does not require the opinion/confirmation of a Data Protection Officer or National Data Protection Authority.



### **5.3 Procedures for data collection, storage, protection, retention and destruction**

Aforementioned general principles apply to the data collection, storage and destruction in the MAVEN project. The procedures will comply with the new EU legislation on privacy, which is to be further reviewed and its implications to be considered.

Aforementioned data will be collected by DLR, Hyundai and Dynniq and stored on their systems for analysis. NO data which can be traced back to individuals will be stored. Also NO video data will be stored. Images will be converted to a list of objects which are given a random ID and are tracked while moving through the area. The object data will be processed and removed afterwards. However, in Helmond snapshots (photos) from an infrastructure camera will be stored to capture interesting situations during testing. The photos will be stored for analysis on a server with access restrictions and data storage in accordance to ISO 27001 for which the applicable beneficiary is accredited.

Survey data, which is all anonymised, will be stored on a cloud server hosted by Survey Monkey. Hardcopy surveys, which are also fully anonymised, will be stored by Czech Technical University.

### **5.4 Informed consent procedures to the collection, storage and protection of personal data**

See section 3.2 and 3.3.

### **5.5 Templates of the informed consent forms and information sheet**

See section 3.3 and Annex A.



## 6 Conclusion

The objective of this deliverable was to describe how the MAVEN consortium intends to address: 1) ethical requirements regarding the involvement of human participants during testing, evaluation and demonstration of the system concept, and 2) requirements regarding the collection and processing of personal data of participants during system evaluation and demonstration. The MAVEN consortium is aware of regulatory privacy and security concerns, yet it is sometimes ambiguous what precautionary measures are demanded by the authorities and when exactly they apply. An assessment by the MAVEN consortium showed that the data which is needed for system evaluation and demonstration does not require sensitive personal data and therefore will be fully anonymised. The project management team will monitor the data collection efforts as they further develop to ensure conformance to privacy and data security legislation.



## 7 References

- [1] Pribyl, O. et al. (2017), User needs, conceptual design and requirements, MAVEN deliverable D2.1, version 1.0, January 2017
- [2] Pribyl, O. et al. (2017), Impact assessment plan, MAVEN deliverable D7.1, due in May 2017
- [3] H2020 Programme, Guidance How to complete your self-assessment, version 5.2, 12 July 2016, European Commission



## Annex A: example informed consent form



**Deutsches Zentrum  
für Luft- und Raumfahrt e.V.**  
in der Helmholtz-Gemeinschaft

Institut für Verkehrssystemtechnik  
Lilienthalplatz 7  
38108 Braunschweig

Datum \_\_\_\_\_

### Fragebogen für Versuchsfahrer

Wir freuen uns, dass Sie Interesse an Versuchsfahrten bei uns am Institut für Verkehrssystemtechnik haben. Wir würden Sie bitten, die nachfolgenden Fragen zu beantworten. Selbstverständlich werden ihre Daten vertraulich behandelt und nur für die Auswahl passender Versuchsfahrer innerhalb des Instituts für Verkehrssystemtechnik verwendet. Passen Sie bei kommenden Experimenten in die relevante Stichprobe, würden wir Sie kontaktieren und wenn Sie Zeit und Lust haben, zu einem Versuchstermin einladen. Voraussetzung für eine Teilnahme an unseren Versuchen ist der Besitz eines Führerscheins der Klasse B oder höher.

**Ich bin einverstanden, dass meine Daten in der Testfahrerdatenbank des Instituts für Verkehrssystemtechnik gespeichert und intern verwendet werden. Zudem bin ich damit einverstanden, vom Institut für Verkehrssystemtechnik kontaktiert zu werden.**

Ja       Nein

Sollten Sie mit den oben genannten Bedingungen nicht einverstanden sein, können Sie leider nicht an Versuchen bei uns teilnehmen. Falls Sie einverstanden sind, füllen Sie bitte nachfolgenden Fragen zur Ihrer Person vollständig aus.

Name, Vorname \_\_\_\_\_

Straße, Nr., PLZ, Wohnort \_\_\_\_\_

Arbeitgeber/Uni (Name, Ort) \_\_\_\_\_

Geburtsdatum \_\_\_\_\_

Telefon (privat) \_\_\_\_\_

Telefon (geschäftlich) \_\_\_\_\_

Mobilnummer \_\_\_\_\_

Emailadresse \_\_\_\_\_

Telefon (privat) \_\_\_\_\_

Geschlecht       männlich       weiblich

1







Seit wann sind Sie im Besitz eines Führerscheins der Klasse B (JJJ)?  
\_\_\_\_\_

Was für ein Kraftfahrzeug fahren Sie?

Marke \_\_\_\_\_

Wie hoch ist Ihre jährliche Fahrleistung?

- < 3.000 km     < 9.000 km     < 12.000 km  
 < 20.000 km     < 30.000 km     < 50.000 km     > 50.000 km

Haben Sie Erfahrung mit einem der folgenden Fahrerinformations- und Assistenzsysteme?

- |   |  |
|---|--|
| <input type="checkbox"/> Navigationssystem    | <input type="checkbox"/> Adaptive Cruise Control (ACC) |
| <input type="checkbox"/> Nachtsichtassistent  | <input type="checkbox"/> Tempomat                      |
| <input type="checkbox"/> Einparkassistent     | <input type="checkbox"/> Notbremsassistent             |
| <input type="checkbox"/> Spurverlassenswarner | Sonstiges .....  |
| <input type="checkbox"/> Spurhalteassistent   | Sonstiges .....  |
| <input type="checkbox"/> Spurwechselassistent | Sonstiges .....  |

Sind Sie Berufskraftfahrer?  Ja     Nein

Falls ja, welchen Beruf als Kraftfahrer üben Sie aus?

- LKW-Fahrer     Sonstiger .....

Benötigen Sie eine Sehhilfe?  Ja     Nein

Falls ja, welche?

- Brille     Kontaktlinsen     beides möglich

**Danke für Ihre Teilnahme!**

Wir möchten uns ganz herzlich für Ihr Interesse bedanken.





Name, Vorname: \_\_\_\_\_

Ich erkläre, dass ich die Probandeninformation zur wissenschaftlichen Untersuchung

**„Versuchsfahrt im dynamischen Fahrsimulator“**

und diese Einwilligungserklärung erhalten habe.

1. Ich wurde für mich ausreichend mündlich und schriftlich über die wissenschaftliche Untersuchung informiert. Ich erkläre, dass ich freiwillig an den Versuchsfahrten im Labor und im Fahrsimulator teilnehme. Ich kann jederzeit und ohne, dass mir hieraus Nachteile entstehen, von der Versuchsfahrt zurücktreten.
2. Ich bin verpflichtet, jedwede im zeitlichen Zusammenhang mit der Fahrt stehende Zufuhr von Alkohol, Drogen oder Medikamenten vor Antritt der Fahrt mitzuteilen.
3. Treten während der Fahrt Kreislaufprobleme, Übelkeit oder Kopfschmerzen auf, informiere ich umgehend den Versuchsleiter. Die Fahrt kann dann sofort abgebrochen werden. Diese Symptome treten bei Fahrsimulationen gelegentlich auf. Sie sind unangenehm, aber nicht gefährlich. Bitte versuchen Sie nicht, bei auftretender Übelkeit so lange wie möglich durchzuhalten, sondern brechen Sie den Versuch sofort ab. Die Übelkeit kann sonst mehrere Stunden lang anhalten.
4. Ich bin verpflichtet, mit dem Labor, dem Simulationsfahrzeug und den dazugehörigen Geräten sorgfältig umzugehen und den Anweisungen des Versuchsleiters Folge zu leisten. Während der Versuchsfahrt ist die StVO einzuhalten.
5. Mir ist bekannt, dass die erhobenen Daten anonymisiert und in elektronischer Form gespeichert werden, so dass für externe Personen nicht zu erkennen ist, welcher Testfahrer welche Daten geliefert hat. Die Daten können im Rahmen wissenschaftlicher Forschungsvorhaben ausgewertet werden. **Ich bin damit einverstanden, dass die im Rahmen der wissenschaftlichen Untersuchung über mich erhobenen Daten sowie meine sonstigen mit dieser Untersuchung zusammenhängenden personenbezogenen Daten aufgezeichnet und ausgewertet werden.**
6. Es werden weiterhin Videodaten aufgezeichnet, die ebenfalls ohne Namensbezug gespeichert und ausgewertet werden. Es kann sinnvoll sein, Auszüge dieser Videos zu wissenschaftlichen Anlässen zu zeigen, um Personen z.B. gegenüber schlechter Gestaltung von Technik zu sensibilisieren. Es ist bei diesen Aufnahmen nicht auszuschließen, dass Sie auf den Aufnahmen erkannt werden können.

Ich bin mit dem Zeigen dieser Videos zu wissenschaftlichen Zwecken einverstanden.

Ich bin mit dem Zeigen dieser Videos zu wissenschaftlichen Zwecken nicht einverstanden.

7. Schwangere Personen sowie Personen, die an Herzkrankheiten, Kreislaufschwäche oder vergleichbaren Krankheiten leiden sind von der Fahrt im Fahrsimulator wegen besonderer Risiken **ausgeschlossen**. Mit meiner Unterschrift bestätige ich, dass diese Punkte für mich **nicht** zutreffen.

Ich habe diese Erklärung gelesen und verstanden.

38108 Braunschweig, den \_\_\_\_\_  
(Datum)

\_\_\_\_\_  
(Unterschrift)

