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Project Acronym: MeBeSafe

Project title: Measures for behaving safely in traffic

Deliverable 6.5

Final project report

Period covered by D.6.5: from 01/05/2017 to 31/10/2020 (M1 – M42)

Periodic reporting periods covered: (1st, 2nd, 3rd)

[1] The term 'project' used in this template equates to an 'action' in certain other Horizon 2020 documentation

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1. Summary

Deliverable *D6.5 – Final project report* gives an overview over the 42 months of the MeBeSafe project, which means May 2017 (M1) – October 2020 (M42).

MeBeSafe focused on behavioural feedback measures to be provided to vehicle drivers and cyclists, with the objective of stimulating safer behaviour in common traffic situations carrying an elevated risk, making users better preserve safety margins. Nudging measures allowed for choosing freely between different behaviours, but the choice was presented in a way to predispose users towards making a desired choice in the immediate situation. Coaching interventions aimed at educating people towards adopting safer behaviour when or after a certain hazardous situation has occurred.

The overall objectives of the project included getting drivers to take a break, making them use ADAS to prevent close following, making them more attentive to potential hazards, achieve behavioural change via car- and HGV-driver coaching, prompting drivers and cyclists to reduce their speed in hazardous road sections, and guiding them along a safe trajectory.

The novelty of the current research is in the use of sensors and sensor data by algorithms that intend to predict the likelihood of a detected and pre-defined situation leading to a dangerous one. Preserving safety margins reduces the risk (for the individual) and occurrence/severity of accidents (for society). MeBeSafe has brought the development in each objective to a level beyond the state of the art and demonstrated the applicability in the field trials. Future research should aim at including these measures into future traffic, developing our findings further, and replicate them in multiple environments.

2. Objectives

The project's objectives have been addressed as follows:

O1: Driver alertness feedback
The focus of O1 was to get 20% more drowsy drivers to take a break within 10 minutes of receiving an in-vehicle drowsiness warning. In the field trial, a fleet of *N* = 49 drivers were provided with an additional incentive (a gift card type of reward) to stop and take a break when the Driver Alert Control (DAC) system indicated that a break would be beneficial, that is, when high levels of drowsiness had been detected in the driver. The incentive offer was displayed on an additionally installed in-vehicle screen whenever DAC triggered. The proportion of drivers who stopped within 20 minutes of a Driver Alert Control (DAC) warning almost doubled when drivers were offered an additional incentive. The objective was achieved successfully.
O2: Usage of safety ADAS to prevent close following
The focus of O2 was to reduce close following by 40% by getting drivers to use Adaptive Cruise Control (ACC) more often. A fleet of *N* = 49 drivers were provided with nudging that consisted of different types of visual in-vehicle feedback on the extent to which they were using Adaptive Cruise Control (ACC) while driving. Two types of visual feedback were tried: A) an Ambient Display concept and B) a Competitive Leaderboard concept. In the field trial, drivers on average increased their normal level of ACC usage with about 46 % when being nudged with the Ambient Display concept. Drivers on average increased their normal level of ACC usage with 118 % when being nudged with the Leader Board concept. The objective was achieved successfully.
O3: Attention to potential hazards
The focus of O3 was to improve timely attention to a forecasted hazard by 20% of drivers. We evaluated this with a road trial with test vehicles. We developed and implemented an HMI solution to direct a driver's attention towards forecasted and detected hazards before they pose a critical risk, and promised to demonstrate that

this increases the timely perception of this hazard by 20%. The field trial involved *N* = 22 naïve drivers who drove a prescribed 1-hour route through central Eindhoven (NL) twice. Each driver received a nudge at unsignalized intersections, to direct their attention towards areas of the intersection where view obstructions would hide a possibly approaching bicyclist. When the HMI is activated, the drivers in the field trial spend on average 20% more time in looking into the direction of a potential hazard at a distance of 20-30 m before entering the intersection. *N* = 10 out of *N* = 18 participants increased their gaze in the direction of the possible hazard when the HMI was activated. The objective was achieved successfully.
O4: Behavioural change through online driver coaching
O4 promised to increase the effectiveness of the nudges implemented to realise objective O2 by 50% through online coaching. It was determined that ACC oriented coaching would have its largest impact not on drivers who are already using ACC, but rather on drivers who do not use ACC at all. Since nudging toward increased ACC usage only can be applied on drivers who already use the function, non-users must first become users before nudging can be applied. Experience from previous studies of non-users have shown that reluctance to use ACC often stem from underlying uncertainties about how to activate it as well as about what to expect if one does (i.e. what will happen?). To address such worries, an in-vehicle, app-based coaching concept was developed where drivers step by step are talked through how to activate ACC while driving, as well as what to expect from the car in each step. The in-vehicle coaching app was pilot tested in three different countries. The outcome of those pilots was successful, in the sense that many who previously characterized themselves as "determined" non-users successfully activated ACC. A key assumption in the WP5 field trial planning for this app (based on previously collected driving data) was that 20-30% of the drivers in the fleet recruited for Objective 2 would be determined non-ACC users who would not respond to the ACC nudging concepts. These non-users would thus provide the test group for coaching. As it turned out, this

assumption did not hold. All drivers who participated in the Objective 2 field trial, including the ones who did not use ACC in Baseline, did use ACC during treatment. While positive in the sense that the Objective 2 nudges were more successful than predicted, this also meant that there literally was no-one left to coach for an Objective 4 field trial. The latter therefore had to be cancelled, and efforts were instead focused on making the Objective 2 field trial more informative by deploying a second nudging concept, rather than just one as was the initial plan.
O5: HGV driver behavioural change through coaching
The focus of O5 was to increase objective harsh braking safety performance of Professional Heavy Goods Vehicles (HGV) drivers by 50% by a combination of online and offline coaching. After the development process of coaching scheme and a first version of the Drivemate App, two fleets of company drivers were recruited, one in Norway and one in the UK. However, due to delays in the development of the coaching app, the field trial start was delayed until late February 2020. This in turn placed the field trial start right at the onset of the COVID19-pandemic, which severely affected both the two companies recruited for the field trial and the traffic environment in which they normally drive. Therefore, the test period was limited and, in addition, the COVID-19 pandemic placed severe restrictions upon the possible interpretations of the field trial results. It was not possible to conclude with any level of significance whether coaching changed driver behaviour.
O6 and O7: Safe speed/trajectory on inter-urban roads
The focus of O6 was to reduce average vehicle speed at a certain location by 10% to be tested within field trial via comparison of average speeds with nudging measures present vs. not present. Directly linked to this was O7, which aimed at getting 40% fewer drivers deviating from a preferred trajectory at a certain location. The field trial took place on an exit lane in Eindhoven, Netherlands, where roadside marking lights were installed in such a way that drivers who entered the exit lane at speeds above a predefined threshold could be exposed to

systematically varying light patterns along the lane. Results of the field trial show that mean speed can be reduced by 4.9 % and the ratio of speeding drivers could be decreased by up to 40 % (scenario 4: red static lights with every 4th light activated). Insights from behavioural analyses gave even further insights into differences between scenarios. Nudged drivers in all tested light conditions decelerated earlier and drove slower in the curve, which leads to a lower radial acceleration and, thus, higher margin of safety. An on-site survey and online resident-survey revealed a positive attitude of drivers towards the solution. O6 was achieved successfully. Leading drivers along a safe trajectory (O7) can be achieved by reducing speed via the developed nudging measures (for details, see D3.2). The nudge clearly reduces the speed of fast drivers and the ratio of speeding vehicles. It therefore contributes to a safer speed and safer trajectory. O7 was therefore achieved successfully.
O8: Cyclists' speed reduction
O8 focused on getting 20% more cyclists to reduce their speed below a threshold speed when approaching urban intersections. The field trials involved cyclists passing two test sites implemented in Gothenburg, Sweden, as well as cyclists who passed a test site implemented in Eindhoven, the Netherlands. In both instances, passing cyclists were visually nudged by transverse lines on the bicycle lane that got closer to each other as the distance to the respective intersection decreased. Cyclists passing these sites were tracked in baseline and treatment conditions respectively. Furthermore, at each test sites short interviews with random cyclists were completed. In addition, from the Swedish test sites, $N = 10 + 7$ cyclists were recruited and had their bikes instrumented with video recording equipment. Both trials showed positive effects on cyclist behaviour. In the Gothenburg trial, 9-17% more cyclists reduced their speed in treatment depending on location and other factors. In the Eindhoven trial, cyclist speeds were reduced, and deceleration rates were also higher during treatment. We consider O8 to be achieved successfully.

3. Explanation of the work carried out per WP

This chapter provides an overview of the work carried out and results achieved per work package (WP) within the three individual reporting periods. Figure 1 illustrates the WP structure.

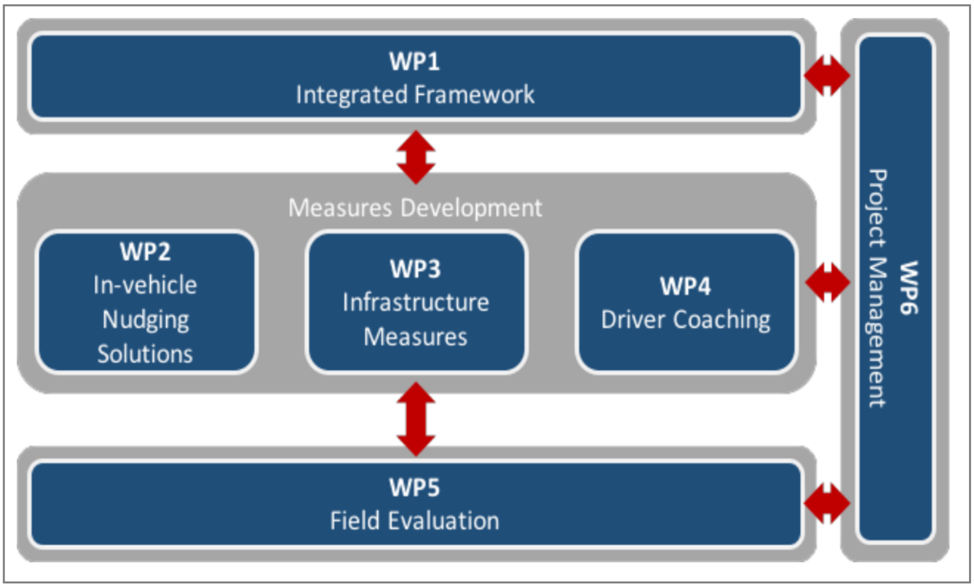


Figure 1: WP-structure of the MeBeSafe project.

3.1. Work Package 1 - Integrated framework

WP1 – Integrated framework | WP-lead: SAFER/ Chalmers M1 – M7 (May – November 2017) Team: ika, RWTH; SAFER/ Chalmers (lead) ; Volvo Cars; TNO; Shell; SWOV; FCA Italy; Cranfield University; VUFO; BMW Group
<u>**Reporting Period 1** from 01/05/2017 to 31/10/2018 (M1 – M18)</u> **Task 1.1 – Development of integrated conceptual framework** Types of interventions to be developed and implemented include nudging and coaching as well as a combination of which were typified in task 1.1. An integrated model is proposed. In addition to a literature review, further literature has contributed to identifying underlying theories and models of relevance for further understanding road user behaviour. **Task 1.2 – User profiling** This task included identifying and taking road user profiles or characteristics of relevance into consideration. In designing the user studies and field trials, demographical factors need to be controlled. There is limited knowledge on influence of profiles, but there are implications on cultural differences regarding openness to nudging. **Task 1.3 – Refinement of measures** The design of interventions requires a process consisting of iterative steps and decision points. T1.3 involves formulation of design considerations, deduced from literature reviews, interviews, and workshops. The work has also resulted in some generic design guidelines. <u>**Reporting Period 2** from 01/11/2018 to 30/04/2020 (M19 – M36)</u> WP1 was completed within reporting period 1. <u>**Reporting Period 3** from 01/05/2020 to 31/10/2020 (M37 – M42)</u> WP1 was completed within reporting period 1.
D1.1 Integrated framework, M6 (October 2017)

The MeBeSafe project intends to develop, implement and validate interventions that direct road users (drivers and cyclists) towards safer behaviour in common traffic situations which carry an elevated risk. More specifically, the aim is to change habitual traffic behaviour using different nudging interventions, i.e. subconsciously pushing road users in a desired direction without being prohibitive against alternative choices of action. The project will also compare different ways of coaching and evaluate the effect of a combination of nudging and coaching. This deliverable, D1.1 Integrated Framework, describes the work completed within WP1 of the MeBeSafe project. Based on literature reviews, interviews with academic and non-academic experts, discussions and workshops, the deliverable: (i) describes the key characteristics of nudging and coaching respectively; (ii) presents a framework that integrates the two, taking into consideration (in particular) time and frequency; (iii) describes underlying theories and models of relevance for understanding road user behaviour; (iii) explains road user profiles or characteristics of relevance to consider in the design of the interventions (i.e., in WP2, WP3, and WP4), as well as the design and interpretation of the outcome of the field trials (in WP5); and (iv) presents design considerations, i.e. factors that should be observed when improving on the initial ideas and further develop the design of the nudging and coaching interventions. More detailed design guidelines must be developed as part of the work to be completed in WP2, WP3, and WP4.
MS2 Integrated framework, M7 (November 2017)
Delivery of integrated framework, which will be used for the development and refinement of the measures.

3.2. Work package 2 – In-vehicle nudging solutions

WP2 – In-vehicle nudging solutions | WP-lead: TNO M3 – M28 (July 2017 – August 2019) Team: ika, RWTH; SAFER/ Chalmers; Volvo Cars; TNO (lead) ; Shell; SWOV; FCA Italy; CRF (third party FCA Italy) ; Cygnify; BMW Group; OFFIS; Virtual Vehicle
Reporting Period 1 from 01/05/2017 to 31/10/2018 (M1 – M18) **Task 2.1 – Sensing driver and vehicle state** The wireless information and communication equipment (WiCE) was further developed. Particular signal databases that include ACC state information and drowsiness monitoring were set up and made available to the prototypers. A sensor was integrated to determine the direction of driver attention in driving simulation. Simulator- and vehicle-tests proofed functioning. **Task 2.2 – Sensing and predicting cyclist intent** An architecture for model for cyclist's intent prediction was developed. Two observation studies were conducted. AI/machine learning techniques are used to determine typical cyclist manoeuvres. The model aims to predict manoeuvres relying on data from observing the trajectories of the cyclist over the last seconds in view of the vehicle. Interaction of cyclists with other road users is fed into the intent prediction. Relevant scenarios were selected. An HMI was defined. UDRIVE is used to select interaction scenarios for validation. **Task 2.3 – Hazard perception and prediction** The basic architecture for the world model was implemented. A hazard prediction model was constructed. The nudging system is backed up by an existing Cyclist-AEB system in a test car. A simulated environment for development support and to determine the difference between actual and perceived hazard was set up. Accident scenarios from the German GIDAS database are used to derive expectations for in-vehicle nudging solutions. **Task 2.4 – In vehicle nudges** An ACC awareness- and a drowsiness awareness HMI following D1.1 were developed. Potential nudging implementations of encouragement towards higher ACC usage, as well as making drivers take a break when drowsy were developed.

For ACC nudging, 2 different nudging concepts were developed for trial. For drowsy driver nudging, a suitable in-vehicle interface was designed. A driving simulator test is currently prepared. Development is supported by data derived from UDRIVE. The HMI solution for directing driver attention is currently developed.

Task 2.5 – Solution selection

Solution selection uses the CATS accident investigations, added by results from observation studies. Iterative development clinics are conducted. The HMI is prepared for installation in a driving simulator. A virtual testing environment to evaluate performance of nudging measures is set up. It will be used to run simulations to tune and calibrate system parameters that appear in hazard prediction model and HMI activation. The WICE equipment is currently installed in 5 pilot vehicles.

Task 2.6 – Implementation of the nudge solution in the test vehicles

Not started within reporting period I

Reporting Period 2 from 01/11/2018 to 30/04/2020 (M19 – M36)

The wireless information and communication equipment (WiCE) was developed. Signal databases that include ACC state information and drowsiness monitoring were set up. We integrated a sensor to determine the direction of driver attention in driving simulation. Simulator- and vehicle-tests proofed functioning. Architecture for model for cyclist's intent prediction was developed and two observation studies conducted. AI/machine learning techniques are used to determine typical cyclist manoeuvres. Model aims to predict manoeuvres relying on data from observing trajectories of cyclists over the last seconds in view of the vehicle. Interaction of cyclists with other road users feeds into intent prediction. UDRIVE is used to select interaction scenarios for validation. Basic architecture for the world model was implemented. A hazard prediction model was constructed. The nudging system is backed up by existing Cyclist-AEB system in a test car. ACC awareness- and a drowsiness awareness HMI were developed. Potential nudging implementations of encouragement towards ACC usage and making drivers take a break when drowsy were developed. For ACC use, 2 different nudging concepts were developed. For drowsy driver nudging, a suitable in-vehicle interface was designed. Development is supported by data from UDRIVE. The HMI solution for directing driver attention was developed. Solution selection used the CATS accident investigations, added by results from observation studies. Iterative development clinics were conducted. WICE equipment was installed in 5 pilot vehicles. First promising options were selected. The virtual test environment was used to perform a first optimization of the system parameters. Three options were tested in a driving simulator. Simulations supported the design of the driving simulator tests. Nudging system and corresponding HMI was implemented into one test vehicle for validation in a field trial, a TNO Laboratory VW Jetta. A FIAT 500X test car was equipped with AEB Cyclist for testing cyclist prediction model. ACC System was implemented in the selected Volvo Cars cars for the app.

<u>**Reporting Period 3** from 01/05/2020 to 31/10/2020 (M37 – M42)</u>

WP 2 was completed within reporting period 2.

D2.1 Vehicle Measures evaluation, M15 (July 2018)

This report describes different ideas for nudging solutions that can be implemented in vehicles to nudge the driver to:

- Make better use of safety functions onboard state-of-the-art vehicles that are equipped with various advanced driver assistance systems. The ideas for making better use of safety functions will be elaborated as part of the MeBeSafe coaching framework in WP4. In this report only an introduction to this type of in-vehicle solutions has been given.
- Direct their attention to potential hazards on the road. As a use case for this type of nudging, we focus at the interaction between cyclists and passenger cars on the road; representing a large number of traffic casualties which is difficult to address by current advanced driver assistance systems due to the high manoeuvrability of cyclists.

To direct the attention to potential hazards, two basic system components are needed: 1. A model to estimate the level and type of hazard and 2. A human-machine-interface to provide appropriate information regarding this hazard to a driver. The report describes the set-up of such a hazard prediction model and its components: a static world model referring to road layout and traffic rules, a dynamic world model that considers the actual detections of potential hazards on the road, and a cyclist trajectory prediction model that is intended to predict where a cyclist is going in the upcoming couple of seconds. Al the information from these components is integrated to estimate a hazard level in an approach of a cyclist intersection.

Moreover, different options for transferring information regarding the estimated hazard to the driver have been identified. The report shows which design rules and approach need to be followed to develop these options into an effective human-machine-interface.

Both in the hazard model as in the HMI-options, there is room for selecting parameter values that influence the effectiveness of the combined nudging-solution. In a next step in MeBeSafe WP2, tests with simulations and test with simulators will be used to determine the most promising in-vehicle nudging solution that will actually be implemented as a prototype in one FIAT 500X vehicle for testing in WP5.

D2.2 Report simulation environment, M 22 (February 2019)

This report describes the simulation studies that are conducted to find the most promising in-vehicle nudging solution to direct the attention of drivers of passenger cars towards potentially hazardous situations.

Therefore different simulation studies have been carried out.

- Study on different human machine interface (HMI) designs with 24 volunteers: six different designs have been tested with 12 female and 12 male participants and all of them hold a driving license.
- Driving simulator study to compare the driver behaviour without a nudging HMI with the behaviour using some different nudging HMIs.

- The driving simulator experiment was on nudging HMI used a within-subject-design, in which each of the 30 participants was exposed to different test conditions in the different driving scenarios.
- Simulation study on the static hazard model.
- Simulation study to support the development of the dynamic hazard model.

The virtual test environment and driving simulator will be used to perform optimization and for tuning the system parameters.

Based on the results (will be included in D2.3), the most promising nudging solution to direct the attention of drivers to potentially hazardous situations including an appropriate HMI will be implemented into the (FIAT 500X) test car for validation in a field test (WP5).

D2.3 Report test vehicles, M28 (August 2019)

This deliverable describes the results of the driver simulator tests performed by CRF to determine the potential effectiveness of the three main promising HMI options as proposed by OFFIS. The HMI provides in-vehicle nudging information to the driver of a passenger car to direct the attention of the driver towards potentially hazardous areas on the road. Hazards are related to cyclists that possibly cross the trajectory of the ego-vehicle.

The study has been performed with 30 test subjects (15 female), and different type of results were analysed to evaluate HMI performance in comparison to a situation without nudging:

1. Subjective evaluations, by analysis of questionnaires that are completed by the test subjects;
2. The analysis of eye movements and gaze direction, as strong indicators for the direction of attention of the drivers;
3. Analysis of the objective driving performance, such as the braking and steering response upon encounter of a cyclists possible crossing the vehicle's path.

It appears that the nudging option with augmented reality projected in a Head-UP Display on the windscreen is the most favourable option, increasing the attention on the road with 40% compared to the situation without nudging. All three nudging options lead to better performance compared to the situation without nudges. Moreover, most test subjects were very positive regarding the in-vehicle nudging solutions.

For practical reasons, an abstract nudging cross has been implemented on a tablet to be integrated with a test vehicle, either as a Head-Up Display option (reflecting the image in the windscreen) or as an image on the instrument cluster. The report describes the addition of sensors and cameras to the test vehicle, the integration of the computer system for world modelling and hazard prediction and the computer system for cyclist behaviour prediction (based on machine learning), the interfaces between the computer systems and the sensor systems at one hand and the HMI tablet on the other hand.

Though fine-tuning of the system currently continues, the vehicle is ready for performing the first tests on the public road in September. These tests are part of MeBeSafe WP5: Field Operational Tests.

Regarding the concept where drivers are to be nudged towards increased ACC usage, this deliverable describes the background for the nudge, a wider palette of candidate concepts that were generated and evaluated, and then the iterative implementation and evaluation of one of those concepts into a working in-vehicle application. The final usability tests showed that usability is good and ACC usage was influenced in a positive way in the pilot tests.

As for the concept where drivers are to be incentivized towards taking a break when the in-vehicle drowsiness monitoring system (Driver Alert) indicates that they are very drowsy, the necessary backend for this nudge has been defined. Various incentives, as well as means for distributing them, have been evaluated. For the field trials, given the relative infrequency of these alerts, it was decided not to spend effort on setting up a distribution scheme involving companies outside of the MeBeSafe consortium (e.g. gas stations). Instead, personnel from the Volvo 24/7 response ready accident investigation team will take on monitoring of Driver Alerts

form the test fleet, so that when a Driver Alert is triggered and other qualifying conditions are met that test person will receive their incentive via their preferred means (call, e-mail, text message) within 1-2 minutes of actually stopping the car to take a break.
MS3 First driving simulator studies, M12 (April 2018)
Commencement of driving simulator studies with recruited subjects in WP2 and WP3.
MS4 Hazard prediction model implemented for off-line tests, M14 (June 2018)
Model implemented in software code and ready to process input of historical traffic data.
MS7 First trial of WP2 measures in a test vehicle, M22 (February 2019)
First trial of WP2 measures on a vehicle driven on a test track by test drivers.
MS9 Delivery of tested in-vehicle measures to be evaluated in field trials, M28 (August 2019)
Self-explanatory.

3.3. Work package 3 – Infrastructure measures

WP3 – Infrastructure measures | WP-lead: ika, RWTH M6 – 29 (October 2017 – September 2019) Team: ika, RWTH (lead; fka mbH (third party ika, RWTH) ; ISAC, RWTH; SAFER/ Chalmers; STA (third party SAFER/ Chalmers) ; TNO; Heijmans; SWOV; BMW Group
<u>**Reporting Period 1** from 01/05/2017 to 31/10/2018 (M1 – M18)</u> **T3.1 – Driver nudge** Experts designed first nudging measures. A first driving simulator study was completed. Data analysis identified promising nudging interventions. Light-emitting spots that fit the needs of the intended nudging measures are developed. Traffic flow in Eindhoven has been measured. Results ensure nudging measures meet real world requirements, backed up by statistics and contextual analysis as well as Monte Carlo-simulations. **T3.2 – Cyclist nudge** Workshops were conducted to generate ideas for speed reducing nudges. Experimental tests were done (indoor and outdoor). A concept evaluation was done on a public road in Gothenburg. A real-life experiment assessed impact of pre-defined visual nudges. One experiment was set up re bicyclists' trajectories at critical points. Discussions with Gothenburg City to prepare for WP5 are initiated. **Task 3.3 – Instrumentation** Task 3.3 started in reporting period 2. <u>**Reporting Period 2** from 01/11/2018 to 30/04/2020 (M19 – M36)</u> Selected designs were tested in driving simulator, and most effective designs for real world testing were identified, improved, and evaluated in virtual modelling. Driving simulator studies were performed. A pre-study for developing the technical system on the test track was performed. Workshops were conducted to generate ideas for speed reducing nudges for cyclists. Concept evaluations were conducted on public roads. A real-life experiment assessed impact of pre-defined visual nudges. An experiment was set up re bicyclists' trajectories at critical points. We

developed haptic concepts, feasibility tests, and evaluation in a controlled outdoor environment. The necessary instruments, their attributes, and the communication interfaces between the instruments were specified. Instrumentation systems were developed and built. Instrumentation performance was validated after installation on a test field and the test track. Values for measurement and needed equipment for cyclist nudge were defined and validated.

Reporting Period 3 from 01/05/2020 to 31/10/2020 (M37 – M42)

WP3 was completed within reporting period 2.

D3.1 Specification of nudges, M28 (August 2019)

Intersection scenarios between cars and bicycles are regarded as among the most dangerous situations in traffic, and 8 out of 10 car-bike accidents have been found to occur there. This is due to both driver and cyclist behaviour, and both aspects are addressed within the MeBeSafe project. Car drivers have reported that cyclists simply appear in front of them out of nowhere, with no time to spot them. If both cyclists and car drivers adapt their speed ahead of an intersection, there will be more time to spot each other and react.

This report describes the development of a nudge to make cyclists reduce their speed and increase their attention to traffic. It also describes various ways to influence cyclists' trajectories.

The process has involved researching current literature and holding a focus group on traffic problems, coming up with various ideas, testing the ideas and changing them based on the results and finally evaluating the most promising ones, all based on results, opinions and requirements from various stakeholders. Both visual and haptic nudges have been tried.

Six different visual nudges to reduce speed were tried. Adaptive digital speed signs showed the greatest speed reduction, but is dependent on the signs being seen. Transverse stripes placed increasingly closer together as well as progressively narrowing down the road had an equal but somewhat smaller effect (12% greater decrease than baseline scenarios). However, these latter two are completely

independent of being noticed, indicating that they act upon cyclists on a subconscious level. All visual nudges were accepted by cyclists. Six different haptic nudges to reduce speed were also tried. These included softer variants of speed bumps and rumble strips, soft asphalt, spongy asphalt and coarse asphalt and an upward slope. The speed reductions were very small, and appreciation very mixed. Cyclists clearly preferred visual nudges. In addition, trajectory-altering nudges were tried. It was found that lines when merging two biking lanes together may help make collisions less likely. A plan was set up for how to measure the nudges' effect over time, and nudges were selected based on formulated requirements.
D3.2 Report Infrastructure measures, M28 (August 2019)
Excessive speeding and an unsafe trajectory are seen as some of the key factors contributing to fatal crashes. Since MeBeSafe aims to prevent traffic accidents, both factors are addressed within MeBeSafe project. The aim is to design nudging measures that gently nudge drivers to a safer driving behaviour in terms of a safe, reduced driving speed and an appropriate trajectory. This report provides detailed insights on state of the art for technology, the process from researching relevant literature, over the results of focus groups on useful measures, to the testing of the most promising nudging measures in driving simulator experiments and the evaluation of these nudging measures, as well as implications for further research. The chosen approach for the nudging measures targeting driving speed are based on the concept of optic flow and function by the illusion of driving faster than the actual driving speed. This is achieved by lights, moving towards the driver and thus altering the optic flow. Promising results were revealed in both quantitative and qualitative results of the simulator studies: Participant's driving behaviour was influenced by the lights by showing earlier braking in the condition with the lights moving against the driver. A second simulator study revealed that the light interventions have an effect on drivers' attention on the road and don't influence driver's workload negatively. The simulator study on the trajectory nudge is not

conducted yet, however the report provides insights into the details of the planned simulator study. The Monte Carlo Simulation gives first estimations for different scenarios based on the available data base, and results revealed that especially those drivers who are driving riskily should be nudged.

The research conducted within WP3 provides important information for the field test in Eindhoven (WP5) that will evaluate the efficiency of the nudging measure in a real life situation.

D3.3 Infrastructure measures, M28 (August 2019)

MeBeSafe aims to nudge drivers and cyclists to reduce speed and increase attention, which in turn will increase traffic safety. The deliverable outlines both cyclists and driver nudging measures and depicts the technological challenges and requirements as well as conducted tests to validate the instrumentation performance.

Two infrastructure cyclist nudges were selected. One nudge is based on flat transverse stripes on the road, which are getting gradually closer. When biking over the nudge, cyclists perceive their speed as higher than it actually is, and have been found to slow down. This nudge has been tried and measured in real traffic and will be installed in Gothenburg, Sweden at accident-prone intersections. Data will be collected through cameras, personal interviews and GPS-logging equipment. The other cyclist nudge uses lane markings at intersections and bottlenecks to influence the cyclists towards a safer trajectory. This nudge is evaluated using cameras and an automated video analysis tool.

The selected infrastructure driver nudge is based on lights on the left and right side of the lane that light up if a vehicle is approaching with inappropriate speed. LED road studs were carefully chosen by weighing different requirements. For data collection, thermal cameras were selected as they work both day and night and under almost every weather condition. A Decision Control Logic was developed to decide whether a car needs to be nudged, and initiates the measure. The collected data can later be used to evaluate the effectiveness of the nudging measure. The

technical components were first tested individually at different locations and later combined and validated at the field test location in Eindhoven, the Netherlands.
MS3 First driving simulator studies, M12 (April 2018)
Commencement of driving simulator studies with recruited subjects in WP2 and WP3.
MS6 First trial implementation of infrastructure measures, M21 (January 2019)
Implementation of infrastructure measures on test track.
MS10 Delivery of infrastructure measures to be evaluated in field trials, M27 (July 2019)
Report specifying the infrastructure and cyclist nudges.

3.4. Work package 4 – Driver coaching

WP4 – Driver coaching | WP-lead: Shell M5 – M29 (September 2017 – Sept 2019) Team: Volvo Cars; Shell (lead) ; SWOV; Cranfield University; Cygnify; BMW Group; Virtual Vehicle
<u>**Reporting Period 1** from 01/05/2017 to 31/10/2018 (M1 – M18)</u> **T4.1- – Driver profiling** Key Performance Indicator variables were identified. For coaching, we use feedback from their trips. We identified the ACC users to benefit from coaching. Naturalistic field test data was analysed for usage patterns. **T4.2– Research methodology** A detailed coaching plan was developed for HGV drivers. For increasing ACC use, we determined subjective data to be sufficient. In-depth interviews showed first ACC activation to be the biggest hurdle toward usage. **T4.3– Design of coaching schemes** A basic app for HGV drivers and a quick guide for increasing ACC use were developed. **Task 4.4 – Data back-end – evaluation of coaching schemes** Task 4.4 started in reporting period 2. <u>**Reporting Period 2** from 01/11/2018 to 30/04/2020 (M19 – M36)</u> Key Performance Indicator variables were identified. For coaching, we used feedback from their trips. We identified the ACC users to benefit from coaching. Naturalistic field test data was analysed for usage patterns. A detailed coaching plan was developed for HGV drivers. For increasing ACC use, we determined subjective data to be sufficient. In-depth interviews showed 1st ACC activation to be the biggest hurdle toward usage. A basic app for HGV drivers was developed. Short surveys were developed. Off-line coaching schemes were developed. An in-vehicle test drive concept was developed for increasing ACC use. Feedback from several user studies was implemented. Back-end system for HGV coaching-app was developed. Preliminary version of the app was used for pilot testing. A pilot test

with limited scope was conducted as proof of concept and technical trial. The ACC coaching app ecosystem was integrated with the back-end systems consisting of VIN-lookup, dialogue platform, speech recognition and the Volvo Cars Connectivity cloud. Pilot tests were run and the app was refined further. **Reporting Period 3** from 01/05/2020 to 31/10/2020 (M37 – M42) WP4 was completed within reporting period 2.
D4.1 Driver profiles and situations, M9 (January 2018)
One of the objectives in MeBeSafe is the coaching of drivers, in particular heavy goods vehicle (HGV) drivers, on their driving behaviour. Risky driving behaviour can lead to crashes but by coaching drivers on their driving behaviour we can reduce risky driving behaviour, therefore reducing crashes and as a result increase traffic safety. The deliverable serves as a progress report. The objective was to investigate what data is needed for coaching of heavy goods vehicle drivers, how we can collect these data, what variables are relevant for driver profiling and how we can use these variables for driver profiling. With regards to technology, our recommendation is to collect data on driving behaviour and driving context with a mobile phone, augmented with inward- and outward-facing cameras where possible. In terms of driver profiling we aimed to capture "the tendency to behave a certain way *in a certain situation or context*" and distinguish meaningfully between different situations or contexts in which a particular type of behaviour occurs. Therefore driver profiles were developed using driving behaviour variables measured by telematics, including context information. "The Traffic Safety Wheel" was developed, a representation of driver profiles where we can compare driver behaviour with fleet behaviour across varying driving contexts. Based on the results further decisions can be made on how to proceed in this MeBeSafe project.
D4.2 Coaching methodology, M13 (May 2018)

This document describes the research methodologies employed within Work Package 4. WP4 focuses on the development of driver coaching schemes, supporting coaching software/apps, and evaluations of such systems. WP4 consists of various tasks. Some of these are directly related to each other (e.g. concerning coaching of Heavy Goods Vehicle drivers), such that their research methodologies are closely aligned; whereas others can and will be executed more independently (e.g. concerning coaching private vehicle drivers on the use of ACC) and therefore have their own methodology. For all tasks, we distinguish between the methodology for development and the methodology for evaluation, each of which is described in some detail. Each of the research methodologies has at this point been sufficiently defined and where necessary aligned, such that we can move forward with the development and small-scale evaluation of the coaching methods and apps within WP4, and subsequent larger-scale evaluation in the field test of WP5. A point of concern is that within WP4 we will not be able to do pilot testing with many drivers, meaning that we cannot come to statistically sound results to guide decisions about the final coaching schemes and apps in WP5; however, the pilots and simulations will give sufficient insights into whether the apps and coaching schemes are ready for use in WP5.
D4.3 Final coaching scheme, M26 (June 2019)
This deliverable describes the coaching interventions developed for heavy goods vehicle (HGV) and car drivers in WP4 of MeBeSafe. Coaching is usually defined as a developmental and educational relationship between people (i.e. offline coaching), but has been extended in this work to guidance delivered by technical systems (i.e. online coaching). The aim of the coaching implemented in WP4 is to effect a change towards safer driver behaviour. For HGV drivers, the report includes brief descriptions of the coaching support functions in the DriveMate app, principles applied for the coaching scheme, and behavioural techniques taught to the drivers. Furthermore, one section describes

possible future development of the app and associated coaching, including functions for goal setting, driver input, positive feedback, etc. For car drivers, the report includes an overview of the reasons underlying the chosen approach toward coaching in the context of increasing the use of Active Cruise Control (ACC) in privately owned vehicles, principles applied for the coaching scheme, and the resulting implementation that will be used during the field trials.
D4.4 App to induce behavioural change, M28 (August 2019)
This deliverable is a short description of the DriveMate app that was developed within WP4 of the MeBeSafe project. The app supports the coaching scheme developed for Heavy Good Vehicle (HGV) drivers (see *D4.3 – Final coaching scheme*).
D4.5 Report on effective feedback, M28 (August 2019)
This deliverable describes the results of the pilot test with the coaching scheme and DriveMate app for Heavy Good Vehicle (HGV) drivers and the app (to increase ACC use) for Volvo drivers. The coaching scheme for HGV drivers consists of an online (app based) and offline (face-to-face coaching) part. Because of the unfortunate delay in the development of the app, the pilot test was very limited in scope, and no face-to-face coaching was initiated. The analysis of the preliminary data collected with the DriveMate app does seem to indicate that, with the exception of some errors, the system is generally working as planned concerning the data gathered. The DriveMate app (as part of the coaching scheme for HGV drivers) needs to be improved considerably before it can be used in the field trial. With the current (V1) version we expect to achieve only a small effect of online and offline coaching, which is not expected to show up in the field trial. The further development of the app is dependent on a pending amendment request. For the pilot test with Volvo drivers, a collaboration between the MeBeSafe pilot test and another (in-house) Volvo project called In-Car Test Drive was set up. An Adaptive Cruise Control (ACC) activation coaching function was developed, and the feedback and experiences from customers involved in the In-Car Test Drive pilots were analysed. The results show that the app based coaching was highly

successful in terms of coaching drivers to use ACC. First time usage was accomplished for a number of individuals who would otherwise never have tried to activate ACC. However, it also became very clear that the app itself did not provide a sufficiently robust, natural and trustworthy interaction for drivers with limited interest in new technology and in activating functions like ACC (in other words, the intended target group for ACC coaching in MeBeSafe). As a much more sophisticated app design would be required to overcome those difficulties, it was decided that the best way forward would be to employ a Wizard of Oz-approach in the field trial. This makes it possible to understand to which degree the target group of non ACC users are coachable into ACC usage without spending a prohibitively large sum of money on further app development first.
MS5 Coaching schemes defined for first design trials, M15 (July 2018)
Coaching schemes described and ready for first pilot tests in T4.3.
MS8 Delivery of the coaching measures for the field trials (coaching schemes), M26 (June 2019)
Report detailing the final proposed coaching scheme.

3.5. Work package 5 - Field evaluation

WP5 – Field evaluation | WP-lead: Volvo Cars
M27 – M42 (July 2019 – October 2020)
Team: ika, RWTH; ISAC, RWTH; SAFER/ Chalmers; STA (third party SAFER/ Chalmers); Volvo Cars (lead); TNO; Shell; Heijmans; SWOV; University of Firenze; FCA Italy; Cranfield University; Cygnify; VUFO

Reporting Period 1 from 01/05/2017 to 31/10/2018 (M1 – M18)

WP5 started in reporting period 2.

Task 5.1 – Trial design
Task 5.2 – Fleet preparation
Task 5.3 – Location preparation
Task 5.4 – Data collection
Task 5.5 – Remove instrumentation
Task 5.6 – Analysis

Reporting Period 2 from 01/11/2018 to 30/04/2020 (M19 – M36)

Detailed trial protocols for each field trial were defined, including the required trial durations, population sizes, and other defining parameters for successful field trials. Vehicle fleets necessary to perform each field trial were set up. Field test locations were prepared with needed equipment. Back-end for in-vehicle nudges were prepared. Trials for O1 and O2 are ongoing. Test for first nudging concept for O2 was concluded. Data collection for O3, O6, O7, and O8 was completed, analysis is ongoing. Data collection for O4 has started. Data collection for O4 is on hold due to COVID-19. Data analysis was initiated and is ongoing. Impact calculation was designed.

Reporting Period 3 from 01/05/2020 to 31/10/2020 (M37 – M42)

WPs 2-4 focused on the development of in-vehicle nudging measures (2), infrastructure nudging measures (3) and coaching measures (4) according to the design guidelines of the integrated framework. Expected behaviour was deducted based on literature, driving simulators and simulations and laboratory testing was

used where applicable. The results fed into the field trials (**WP5**), whch have been finalised. For details, please see chapter 2 of this report and D5.5 – Final measures.
D5.1 Trial design, M27 (July 2019)
The main objective of WP5 is to run a set of field trials with naïve users (i.e. not experts involved in the development of the measures) for all nudging and coaching measures developed in WP2-4. This deliverable describes the designs of those field trials, on a per project objective basis.
D5.2 Instrumented vehicles, M29 (September 2019)
The main objective of WP5 is to run a set of field trials with naïve users (i.e. not experts involved in the development of the measures) for all nudging and coaching measures developed in WP2-4. This deliverable describes how the vehicles are prepared for the field trials. All these activities have taken place in Task 5.2 (Fleet preparation).
D5.3 Locations ready for field trials, M29 (September 2019)
The main objective of MeBeSafe WP5 is to run a set of field trials with naïve users (i.e. not experts involved in the development of the measures) for all nudging and coaching measures developed in WP2-4. This deliverable describes how the field trial locations have been prepared for the field trials that involve physical locations. It also describes the (digital) back-ends and processes devised to support the in-vehicle nudges. All these activities have taken place in Task 5.3 (Location preparation).
D5.4 Results of field trials, M39 (July 2020)
The main objective of WP5 is to run a set of field trials with naïve users (i.e. not experts involved in the development of the measures) for all nudging and coaching measures developed in WP2-4. Field trials with naïve users are necessary in order to validate the estimated effectiveness of each measure. The field trials were set up in as realistic settings as possible, given the possibilities to implement/distribute each measure. This deliverable gives a short description of the field trial setup for each measure, and then reports the effects of the nudge on road user behaviour.
D5.5 Final measure, M40 (August 2020)

The main objective of MeBeSafe was to develop a set of nudging/coaching countermeasures that were expected to have a significant positive impact on traffic safety if widely implemented, and then run a set of field trials with naïve users for all measures developed to verify that these expectations can be met in reality. This deliverable describes the results of all the Field Trials that were set up to evaluate the effectiveness of the nudging and coaching measures. It also describes the impact on traffic safety, which these measures would have if implemented on the EU-27 level, along with suggestions for improvements as well as predicted costs for implementing them in practice. First, the final results from each Field trial are described in detail (Chapters 4- 10). Next comes the safety and socio-economic Impact Assessment (Chapter 11), an evaluation of what could be improved with the Measures (Chapter 12) and finally an estimation of the costs involved in deploying these measures (Chapter 13).
MS11 Initiation of field trials, M27 (July 2019)
Trial design for all trials to be performed.
MS12 Field trial data collection volume according to plan, M34 (February 2020)
Comparison of data collection volume with target volume specified in D.5.1.
MS13 Evaluation of measures, and final proposed measures, M40 (August 2020)
After the field phase all measures have been tested extensively in real life scenarios. Analysis and interpretation of results but also lessons learned during the field trial will reveal recommendations for each measure developed and pre-tested in WPs 2, 3, and 4 respectively. Includes: Report summarizing the results of field trials and report summarising the final measures proposed, and their impact This Milestone enables to feed back relevant knowledge gained through field evaluations to the respective results gained in WP 2, 3, and 4 and takes it into consideration. --> See report to be delivered in D5.5.
MS1 Recommendations for adjustments on measures, M41 (September 2020)
After the field phase all measures have been tested extensively in real life scenarios. Analysis and interpretation of results but also lessons learned during the

field trial will reveal recommendations for each measure developed and pre-tested in WPs 2, 3, and 4 respectively.

3.6. Work package 6 – Project management

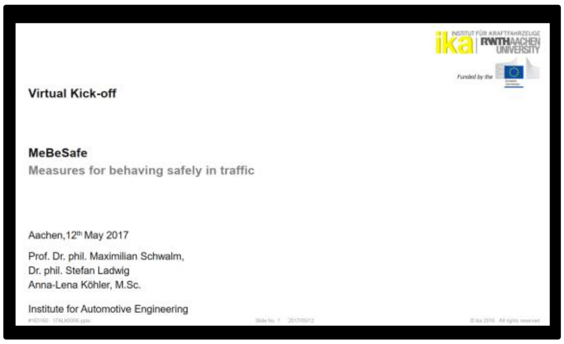
WP6 – Project management | WP-lead: ika, RWTH M1 – M42 (May 2017 – October 2020)
Task 6.1 – Project coordination M1 - M42 (May 2017 - Oct 2020) ika, RWTH (lead)
Reporting Period 1 from 01/05/2017 to 31/10/2018 (M1 – M18) A project management plan describes indicators, reporting procedures, schedules project progress and supports project monitoring. A consortium agreement was signed. Financial coordination includes management of financial aspects like payments, financial reporting, reallocations, etc. **Reporting Period 2** from 01/11/2018 to 30/04/2020 (M19 – M36) Project management plan describes indicators, reporting procedures, schedules project progress and supports project monitoring. Scientific progress and project finances are monitored continuously. Deviations are monitored and reported to the EC. **Reporting Period 3** from 01/05/2020 to 31/10/2020 (M37 – M42) A project management plan describes indicators, reporting procedures, schedules project progress and supports project monitoring. Scientific progress and project finances are monitored continuously. Deviations are monitored and reported to the EC.
D6.1 Project handbook, M1 (May 2017)
The deliverable clarifies the project structure and aims to give all project partners an overview over the organizational and administrative aspects of the project coordination. It is supposed to be a living document serving as a guideline. The Project Handbook is considered as a living and dynamic document and will be updated as required throughout the project.
D6.2 Kick-off meeting report, M3 (July 2017)

This deliverable presents a summary of the MeBeSafe Kick-Off Workshop that took place in Aachen Germany, on June 26-27 2017. It also includes the agenda, the list of participants, the meeting minutes and the presentations from the workshop.
D6.3 Project periodic report I, M19 (November 2018)
Self-explanatory.
D6.9 : Project periodic report II, M37 (May 2020)
Self-explanatory.
D6.5 : Final project report, M42 (October 2020)
Self-explanatory.
Task 6.2 – Communication and dissemination M1 - M42 (May 2017 - Oct 2020) SAFER/ Chalmers (lead)
<u>Reporting Period 1 from 01/05/2017 to 31/10/2018 (M1 – M18)</u> A project communication as well as media plan has been developed, a presentation and media materials for dissemination were produced. <u>Reporting Period 2 from 01/11/2018 to 30/04/2020 (M19 – M36)</u> Communication and social media plan were developed, presentation template and media materials for dissemination were produced. Social media accounts were created. News articles, newsletters, press releases, videos, and interviews were produced. The website was redesigned. An image film was initiated. Visibility and outreach of MeBeSafe was increased. <u>Reporting Period 3 from 01/05/2020 to 31/10/2020 (M37 – M42)</u> Communication and social media plan were developed, presentation template and media materials for dissemination were produced. Social media accounts were created. News articles, newsletters, press releases, videos, and interviews were produced. An image film was completed. Visibility and outreach of MeBeSafe was increased.
D6.4 Project website, M6 (October 2017)

The MeBeSafe webpage will be set up and launched in M6 (October 2017) and act as a hub for all public information on the project. The website is set up to be kept running for two years after the project end, until October 2022. The website content is thereafter planned to be migrated to a subdomain of the coordinator.
D6.6 Dissemination plan, M6 (October 2017)
The purpose of the Dissemination Plan is to and determine and to strategically plan communication and dissemination activities during the project lifetime and make it available through different communication channels. This will ensure that all interested stakeholders and target audiences get access to project information, public reports, links to publications in scientific or professional journals, information about conferences and events where dissemination or presentation of the project results will be made and where it can be found. In order to ensure the long-term sustainability of the project results after the project end in October 2020 (M42) and access to the deliverables, the web page will be available for two more years, until January 2022. After that it will be migrated to the Coordinator's webpage, at ika RWTH Aachen.
D6.7 Exploitation plan, M6 (October 2017)
The deliverable is an updated version of D6.7 Exploitation Plan. It describes the key results of the project (i.e., new knowledge, new models, methods and tools, and new technical solutions/designs) that will, in different ways, be exploited by one or more partners in the consortium beyond the lifetime of the project. It presents the plans for exploitation in terms of dissemination, use (not all results can be commercialised) and commercialisation within six months, one year and three years from the end of the project (i.e., Oct 31, 2020) and the role of project partners in these actions. The deliverable also provides a description the expected impact of the results on organisations/businesses and society at large.
D6.8 Activity reports I, M12 (April 2018)
Self-explanatory.
D6.8 Activity reports II, M24 (April 2019)

Self-explanatory.
D6.8 Activity reports III, M36 (April 2020)
Self-explanatory.
D6.8 Activity reports IV, M42 (October 2020)
Self-explanatory.

Workshops and meetings within WP6 Coordination



<u>Virtual Kick-Off</u>

Date: May 12th, 2017
Participants: MeBeSafe Consortium (ika, RWTH; ISAC, RWTH; Chalmers/ SAFER; Volvo; TNO; Shell; Heijmans; SWOV; University of Firenze; FCA Italy; Cranfield University; Cygnify; VUFO; BMW Group; OFFIS; Virtual Vehicle)
Host: Institute for Automotive Engineering (ika), RWTH Aachen University, Aachen, Germany
Purpose: Official project Kick-Off
Location: Virtual telephone conference

<u>Kick-Off</u>
Date: June 26th - 27th, 2017
Participants: MeBeSafe Consortium (ika, RWTH; ISAC, RWTH; Chalmers/ SAFER; Volvo; TNO; Shell; Heijmans; SWOV; University of Firenze; FCA Italy; Cranfield University; Cygnify; VUFO; BMW Group; OFFIS; Virtual Vehicle)
Host: Institute for Automotive Engineering (ika)
Purpose: First face to face consortia meeting/ workshop
Location: Institute for Automotive Engineering (ika)), RWTH Aachen University, Aachen, Germany

1st General Assembly Meeting
Date: February 9th, 2018
Participants: MeBeSafe Consortium (ika, RWTH; ISAC, RWTH; Chalmers/ SAFER; Volvo; TNO; Shell; Heijmans; SWOV; University of Firenze; FCA Italy; Cranfield University; Cygnify; VUFO; BMW Group; OFFIS; Virtual Vehicle)
Host: Chalmers University/ SAFER
Purpose: 1st regular consortia meeting on project updates and political project inherent decisions
Location: Chalmerska Huset, Gothenburg, Sweden

2nd General Assembly Meeting
Date: September 13th, 2018
Participants: MeBeSafe Consortium (ika, RWTH; ISAC, RWTH; Chalmers/ SAFER; Volvo; TNO; Shell; Heijmans; SWOV; University of Firenze; FCA Italy; Cranfield University; Cygnify; VUFO; BMW Group; OFFIS; Virtual Vehicle)
Host: Shell
Purpose: 2nd regular consortia meeting on project updates and political project inherent decisions
Location: Shell, The Hague, The Netherlands

<u>3^{rd} General Assembly Meeting</u>
Date: March 14^{th} - 15^{th}, 2019
Participants: MeBeSafe Consortium (ika, RWTH; ISAC, RWTH; SAFER/ Chalmers; STA (linked third party SAFER/ Chalmers) ; Volvo; TNO; Shell; Heijmans; SWOV; University of Firenze; FCA Italy; Cranfield University; Cygnify; VUFO; BMW Group; OFFIS; Virtual Vehicle)
Host: FCA Italy
Purpose: 3^{rd} regular consortia meeting on project updates and political project inherent decisions
Location: Hotel Cristina Sorrento, Sant'Agnello di Sorrento/ Naples, Italy

<u>4^{th} General Assembly Meeting</u>
Date: September 26^{th}, 2019
Participants: MeBeSafe Consortium (ika, RWTH; ISAC, RWTH; SAFER/ Chalmers; Volvo; TNO; Shell; Heijmans; SWOV; University of Firenze; FCA Italy; Cranfield University; Cygnify; VUFO; BMW Group; OFFIS; Virtual Vehicle)
Host: Virtual Vehicle Research Centre
Purpose: 4^{th} regular consortia meeting on project updates and political project inherent decisions
Location: Virtual Vehicle Research Centre, Graz, Austria

5th General Assembly Meeting
Date: February 13th, 2020
Participants: MeBeSafe Consortium (ika, RWTH; ISAC, RWTH; SAFER/ Chalmers; STA (linked third party SAFER/ Chalmers) ; Volvo; TNO; Shell; Heijmans; SWOV; University of Firenze; FCA Italy; Cranfield University; Cygnify; VUFO; BMW Group; OFFIS; Virtual Vehicle)
Host: TNO
Purpose: 5th regular consortia meeting on project updates and political project inherent decisions
Location: TNO, Helmond, The Netherlands

6th General Assembly Meeting
Date: September 2nd, 2020
Participants: MeBeSafe Consortium (ika, RWTH; ISAC, RWTH; SAFER/ Chalmers; STA (linked third party SAFER/ Chalmers) ; Volvo; TNO; Shell; Heijmans; SWOV; University of Firenze; FCA Italy; Cranfield University; Cygnify; VUFO; BMW Group; OFFIS; Virtual Vehicle)
Host: digitally hosted by Institute for Automotive Engineering (ika), RWTH Aachen University
Purpose: 6th regular consortia meeting on project updates and political project inherent decisions
Location: digital

<u>MeBeSafe Final Event digital</u>
Date: September 3rd, 2020
Participants: MeBeSafe Consortium (ika, RWTH; ISAC, RWTH; SAFER/ Chalmers; STA (linked third party SAFER/ Chalmers); Volvo; TNO; Shell; Heijmans; SWOV; University of Firenze; FCA Italy; Cranfield University; Cygnify; VUFO; BMW Group; OFFIS; Virtual Vehicle)
Host: digitally hosted by Institute for Automotive Engineering (ika), RWTH Aachen University
Purpose: Digital final event to make the project results from 3.5 years of research available to an interested public in order to mitigate the cancellation of the on-site event due to the impact of the outbreak of Covid-19 in Europe
Location: digital

List of submitted deliverables

Public deliverables can be downloaded via the MeBeSafe project website.

WP No	Del No	Title	Lead Beneficiary (GA)	Deliverable lead	Nature	Dissemination Level	Status
Periodic Project Report I							
WP6	D6.1	Project handbook	RWTH Aachen	ika, RWTH	Report	Confidential	Approved
WP6	D6.2	Kick-off meeting report	RWTH Aachen	ika, RWTH	Report	Confidential	Approved
WP7	D7.1	H - Requirement No. 1	RWTH Aachen	ika, RWTH	Ethics	Confidential	Approved
WP1	D1.1	Integrated framework	CHALMERS	SAFER/ Chalmers	Report	Public	Approved
WP6	D6.4	Project website	CHALMERS	SAFER/ Chalmers	Websites , patents filling, etc.	Public	Approved
WP6	D6.6	Dissemination plan	CHALMERS	SAFER/ Chalmers	Report	Confidential	Approved
WP6	D6.7	Exploitation plan	CHALMERS	SAFER/ Chalmers	Report	Confidential	Approved
WP4	D4.1	Driver profiles and situations	SHELL INT	SWOV	Report	Public	Approved
WP6	D6.8	Activity reports	CHALMERS	SAFER/ Chalmers	Websites , patents filling, etc.	Public	Approved
WP4	D4.2	Coaching methodology	SHELL INT	Cygnify	Websites , patents filling, etc.	Public	Approved
WP2	D2.1	Vehicle Measures evaluation	TNO	TNO	Report	Public	Approved
WP6	D6.3	Project periodic report I	RWTH Aachen	ika, RWTH	Report	Confidential	Approved
Periodic Project Report II							
WP2	D2.2	Report simulation environment	TNO	Virtual Vehicle	Report	Public	Approved
WP4	D4.3	Final coaching scheme	SHELL INT	Cranfield University	Report	Public	Approved
WP5	D5.1	Trial design	Volvo Cars	Volvo Cars	Report	Public	Approved
WP2	D2.3	Report test vehicles	TNO	TNO	Report	Public	Approved
WP3	D3.1	Specification of nudges	CHALMERS	Safer/ Chalmers	Report	Public	Approved
WP3	D3.3	Infrastructure measures	RWTH Aachen	ISAC, RWTH	Report	Confidential	Approved
WP4	D4.4	App to induce behavioural change	SHELL INT	Shell	Other	Public	Approved
WP4	D4.5	Report on effective feedback	Volvo Cars	Shell	Report	Public	Approved

WP5	D5.2	Instrumented vehicles	Volvo Cars	Volvo Cars	Other	Confidential	Approved
WP5	D5.3	Locations ready for field trials	Volvo Cars	Volvo Cars	Other	Confidential	Approved
WP3	D3.2	Report Infrastructure measures	RWTH Aachen	ika, RWTH	Report	Public	Approved
WP6	D6.9	Project periodic report II	RWTH Aachen	ika, RWTH	Report	Confidential	Approved
Periodic Project Report III / Final Report							
WP5	D5.4	Results of field trials	Volvo Cars	Volvo Cars	Report	Public	Approved
WP5	D5.5	Final measures	Volvo Cars	Volvo Cars	Report	Public	Approved
WP6	D6.5	Final project report	RWTH Aachen	ika, RWTH	Report	Public	Approved

List of achieved milestones

WP No	MS No	Name	Lead Beneficiary (GA)	Milestone lead	Status
Periodic Project Report I					
WP1	2	Integrated framework	CHALMERS	SAFER/ Chalmers	Achieved
WP2, WP3	3	First driving simulator studies	RWTH Aachen	ika, RWTH, FCA Italy, CRF (third party FCA Italy), TNO	Achieved
WP2	4	Hazard prediction model implemented for off-line tests	TNO	TNO	Achieved
WP4	5	Coaching schemes defined for first design trials	SHELL INT	Shell	Achieved
Periodic Project Report II					
WP3	6	First trial implementation of infrastructure measures	RWTH Aachen	ika, RWTH , ISAC, RWTH, Heijmans, SAFER/ Chalmers	Achieved
WP2	7	First trial of WP2 measures in a test vehicle	TNO	TNO	Achieved
WP3	11	Initiation of field trials	Volvo Cars	Volvo Cars	Achieved
WP5	9	Delivery of tested in-vehicle measures to be evaluated in field trials	TNO	TNO	Achieved
WP3	10	Delivery of infrastructure measures to be evaluated in field trials	RWTH Aachen	ika, RWTH , ISAC, RWTH, SAFER/ Chalmers	Achieved
WP4	8	Delivery of the coaching measures for the field trials (coaching schemes)	SHELL INT	Shell	Achieved
Periodic Project Report III / Final Report					
WP5	12	Field trial data collection volume according to plan	Volvo Cars	Volvo Cars	Achieved
WP5	13	Evaluation of measures, and final proposed measures	Volvo Cars	Volvo Cars	Achieved
WP5	1	Recommendations for adjustments on measures	Volvo Cars	Volvo Cars	Achieved

List of exploitation and dissemination

Talks, Presentation & Papers

Event	Date	Location	Partner	Talk	Presentation & Paper
6th Annual International Cycling Safety Conference	2017 Sep 21st - 22nd	Davis, California, US	Divera Twisk (SWOV) Stefanie de Hair-Buijssen (TNO)		MeBeSafe: Developing and testing infrastructure & car based nudges to improve cyclist safety
26th Aachen Colloquium Automobile and Engine Technology 2017	2017 Oct 9th – 11th	Aachen, Germany	Dr. Phil. Mikael Ljung Aust (Volvo Cars) Prof. Dr. phil. Maximilian Schwalm (ika, RWTH)		Nudging: The Art of Running a Minimal Interference Safety Play
German Police University (Deutsche Hochschule der Polizei, DHPol	2018 May 24th	Münster, Germany	Anna-Lena Köhler, M.Sc. (ika, RWTH) (presenting author) Dr. phil. Stefan Ladwig (ika, RWTH) Prof. Dr. phil. Maximilian Schwalm (ika, RWTH)	H2020-Projekt MeBeSafe – Unfallprävention durch "Nudging" – sicheres Verhalten im Straßenverkehr	
6th Humanist Conference	2018 June 13th - 14th	The Hague, The Netherlands	Reinier Jansen (SWOV)		Harsh braking by truck drivers: a comparison of thresholds and driving contexts using naturalistic driving data will be presented
MHF Tylösand seminar on traffic safety	2018 Sep 4th	Halmstad, Sweden	MariAnne Karlsson (SAFER/ Chalmers)	Nudging	
Bizplay 2018	2018 Sep 26th	Karlsruhe, Germany	Armin Gräter (BMW Group)	MeBeSafe	
37th FISITA World Automotive Congress	2018 Oct 2nd – 5th	Chennai, India	Dr. Olaf Op den Camp (TNO) Ir. Jeroen Uittenbogaard (TNO)		Nudging drivers to engage safe behaviour in traffic

			Dr. Bram Bakker (Cygnify)		
27th Aachen Colloquium Automobile and Engine Technology 2018	2018 Oct 8th – 10th	Aachen, Germany	Dr. Olaf Op den Camp (TNO) Ir. Jeroen Uittenbogaard (TNO) Prof. Dr. phil. Maximilian Schwalm (ika, RWTH) Dr. Bram Bakker (Cygnify) Marie-Christin Harre (OFFIS) Dr. Antonella Toffetti (CRF) Dr. Anita Fiorentino (FCA Italy)		Nudging the attention of drivers towards possibly hazardous situations
7th International Cycling Safety Conference	2018 Oct 10th – 11th	Barcelona, Spain	Ir. Jeroen Uittenbogaard (TNO) Dr. Olaf Op den Camp (TNO) Dr. Bram Bakker (Cygnify)	Nudging the attention of drivers towards possibly hazardous situations with cyclists	
1st International Conference on Human Systems Engineering and Design (Future Trends and Applications)	2018 Oct 25th – 27th	Reims, France	Anna-Lena Köhler, M.Sc. (ika, RWTH) Dr. phil. Stefan Ladwig (ika, RWTH) Prof. Dr. phil. Maximilian Schwalm (ika, RWTH)		Slowing down speeders via dynamic infrastructure nudging measures
SAFER lunch seminar	2019 Feb 19th	Gothenburg, Sweden	Pontus Wallgren (SAFER/ Chalmers) Victor Bergh Alvergren (SAFER/ Chalmers)	Nudging bicyclists	
Dissemination event to the stakeholders of the city of Naples	2019 Mar 15th	Sorrento/ Naples, Italy	Thomas Chiarappa (TNO) Olaf Op den Camp (TNO)	MeBeSafe: in-vehicle nudging to direct driver attention	

MeBeSafe Dissemination Workshop *(subsequent to the 3rd General Assembly Meeting)*	2019 Mar 15th	Sant'Agnello di Sorrento/ Naples, Italy	Stefan Ladwig (ika, RWTH)	Measures for Behaving Safely in Traffic: an introduction of applied nudging and coaching in transportation research	
MeBeSafe Dissemination Workshop *(subsequent to the 3rd General Assembly Meeting)*	2019 Mar 15th	Sant'Agnello di Sorrento/ Naples, Italy	MariAnne Karlsson (SAFER/ Chalmers) Anna-Lena Köhler (ika, RWTH)	MeBeSafe psychological approach	
MeBeSafe Dissemination Workshop *(subsequent to the 3rd General Assembly Meeting)*	2019 Mar 15th	Sant'Agnello di Sorrento/ Naples, Italy	Mikael Ljung Aust (Volvo Cars)	MeBeSafe; Coaching using an app	
MeBeSafe Dissemination Workshop *(subsequent to the 3rd General Assembly Meeting)*	2019 Mar 15th	Sant'Agnello di Sorrento/ Naples, Italy	Thomas Chiarappa (TNO) Anita Fiorentino (FCA Italy)	MeBeSafe approach for vehicle automation	
MeBeSafe Dissemination Workshop *(subsequent to the 3rd General Assembly Meeting)*	2019 Mar 15th	Sant'Agnello di Sorrento/ Naples, Italy	Anna-Lena Köhler (ika, RWTH)	MeBeSafe approach: Nudging drivers towards an appropriate speed via infrastructure measures	
13th ITS European Congress	2019 June 3rd- 6th	Eindhoven, Netherlands	Anna-Lena Köhler, M.Sc. (ika, RWTH) Olaf Op den Camp (TNO) Milou van Mierlo (Heijmans) Dr. phil. Stefan Ladwig (ika, RWTH)		Nudging Drivers Towards Higher Safety Margins – Applications of the H2020-project MeBeSafe

			Prof. Dr. phil. Maximilian Schwalm (ika, RWTH		
Swedish Vision Zero meeting	2019 June 11th	Gothenburg, Sweden	Pontus Wallgren (SAFER/ Chalmers) Victor Bergh Alvergren (SAFER/ Chalmers)	Nudging bicyclists	
28th Aachen Colloquium Automobile and Engine Technology 2019	2019 Oct 7th – 9th	Aachen, Germany	Olaf Op den Camp (TNO) Anna-Lena Köhler, M.Sc. (ika, RWTH) Dr. phil. Stefan Ladwig (ika, RWTH) Milou van Mierlo (Heijmans)		Evaluation of Infrastructure and In-Vehicle Nudging Measures – Opportunities and Inhibitions
Nationaal verkeerskundecongres 2019	2019 Oct 31st	The Hague, The Netherlands	Milou van Mierlo (Heijmans); Vincent de Waal (Heijmans)	Nudge met dynamisch licht voor veiliger verkeersgedrag	
World Usability Day Torino	2019 Nov 14th	Torino, Italy	Antonella Tofetti (CRF)	Measures for Behaving Safety in Traffic – Nudging HMI	
International Cycling Safety Conference	2019 Nov 18th – 20th	Brisbane, Australia	Matin Nabavi Niaki (SWOV		Safety effects of lane marking nudge at a bicycle intersection
International Cycling Safety Conference	2019 Nov 18th – 20th	Brisbane, Australia	Pontus Wallgren (SAFER/ Chalmers)		Haptic nudges to influence cyclist behaviour – an experimental study
5th Symposium on Driving Simulation	2019 Nov 20th – 21st	Aachen, Germany	Anna-Lena Köhler, M.Sc. (ika, RWTH) Dr. phil. Stefan Ladwig (ika, RWTH)	Application of the Driving Simulator User Studies	
Aachener Straßenbau- und Verkehrstage (ASVT)	2019 Nov 23rd – 24th	Aachen, Germany	Anna-Lena Köhler, M.Sc. (ika, RWTH) Dr. phil. Stefan Ladwig (ika, RWTH)	InfraDriver Nudge and the general approach of the project	
Swedish National Association for the Advancement of Road	2020 Feb 27th	Gothenburg, Sweden	Cedrik Sjöblom	Nudging – this is how it works	

Safety Nudging evening			(SAFER/ Chalmers) Victor Bergh Alvergren (SAFER/ Chalmers)	MeBeSafe – about behavioural change, tests and insights	
Intertraffic Amsterdam 2020	2020 Apr 21st – 24th *(conference postponed to 2021 due to corona virus)* *2021 Mar 23rd – 26th*	Amsterdam, The Netherlands	Adrian Fazekas (ISAC, RWTH)	Infra Driver Nudge	
8th Transport Research Arena TRA 2020	2020 Apr 27th – 30th *(conference cancelled due to corona virus)*	Helsinki, Finland	Moritz Berghaus (ISAC, RWTH) Dr. Adrian Fazekas (ISAC, RWTH) Prof. Dr. Markus Oeser (ISAC, RWTH)		Technical requirements for real-time traffic detection and dynamic infrastructure measures for safer behaviour
8th Transport Research Arena TRA 2020	2020 Apr 27th – 30th *(conference cancelled due to corona virus)*	Helsinki, Finland	Pontus Wallgren (SAFER/ Chalmers) MariAnne Karlsson (SAFER/ Chalmers) Viktor Bergh Alvergren (SAFER/ Chalmers)		Nudging bicyclists towards a safer behaviour - Experiences from the MeBeSafe project
3rd International Conference on Human Interaction and Human Interaction and Emerging Technologies (IHIET 2020)	2020 Aug 27th - 29th	Paris, France *Virtual Conference*	Marijke van Weperen (TNO) Olaf Op den Camp (TNO) Stefan Ladwig (ika, RWTH)	Determining the effectiveness of measures that nudge people in traffic to behave more safely	
MeBeSafe Final Event digital *(subsequent to the 6th General Assembly Meeting)*	2020 Sep 3rd	Aachen, Germany *Digital Event*	Stefan Ladwig (ika, RWTH) Anna-Lena Köhler (ika, RWTH)	Introduction and Overview	
MeBeSafe Final Event digital *(subsequent to the 6th General Assembly Meeting)*	2020 Sep 3rd	Aachen, Germany *Digital Event*	MariAnne Karlsson (SAFER/ Chalmers)	Guide to the Integrated Framework	

MeBeSafe Final Event digital *(subsequent to the 6th General Assembly Meeting)*	2020 Sep 3rd	Aachen, Germany *Digital Event*	Mikael Ljung Aust (Volvo Cars)	Nudging Drowsy Drivers	
MeBeSafe Final Event digital *(subsequent to the 6th General Assembly Meeting)*	2020 Sep 3rd	Aachen, Germany *Digital Event*	Olaf Op den Camp (TNO) Bram Bakker (Cygnify)	In-Vehicle Nudge to Direct Driver Attention	
MeBeSafe Final Event digital *(subsequent to the 6th General Assembly Meeting)*	2020 Sep 3rd	Aachen, Germany *Digital Event*	Anna-Lena Köhler (ika, RWTH)	Infrastructure Driver Nudge	
MeBeSafe Final Event digital *(subsequent to the 6th General Assembly Meeting)*	2020 Sep 3rd	Aachen, Germany *Digital Event*	MariAnne Karlsson (SAFER/ Chalmers) Pontus Wallgren (SAFER/ Chalmers) Matin Nabavi Niaki (SWOV) Olaf Op den Camp (TNO)	Cyclist Nudge	
MeBeSafe Final Event digital *(subsequent to the 6th General Assembly Meeting)*	2020 Sep 3rd	Aachen, Germany *Digital Event*	Saskia de Craen (Shell) Anders af Wåhlberg (Cranfield University)	Coaching Truck Drivers	
MeBeSafe Final Event digital *(subsequent to the 6th General Assembly Meeting)*	2020 Sep 3rd	Aachen, Germany *Digital Event*	Mikael Ljung Aust (Volvo Cars)	Coaching ACC Use	
MeBeSafe Final Event digital *(subsequent to the 6th General Assembly Meeting)*	2020 Sep 3rd	Aachen, Germany *Digital Event*	Johann Ziegler (VUFO)	Impact Assessment	
MeBeSafe Final Event digital *(subsequent to the 6th General Assembly Meeting)*	2020 Sep 3rd	Aachen, Germany *Digital Event*	Stefan Ladwig (ika, RWTH) Anna-Lena Köhler (ika, RWTH)	Wrap-Up	
SAFER Seminar series	2020 Oct 1st	Gothenburg, Sweden *Digital Event*	MariAnne Karlsson (SAFER/ Chalmers)	Nudging for traffic safety - experiences from the	

			Anna-Lena Köhler (ika, RWTH) Pontus Wallgren (SAFER/ Chalmers)	MeBeSafe project	
29th Aachen Colloquium Sustainable Mobility 2020	2020 Oct 5th – 7th	Aachen, Germany *Digital Conference*	Olaf Op den Camp (TNO) Mikael Ljung Aust (Volvo Cars)		Nudging Concepts for Traffic Safety: In-Vehicle Implementations and Field Trial Outcomes
Webinar with the City of Gothenburg (SAFER / Chalmers)	2020 Oct 9th	Gothenburg, Sweden *Digital Event*	Pontus Wallgren (SAFER/ Chalmers)	Can cyclists' behavior be changed with the help of nudging to increase road safety?	
Webinar for stakeholders of cyclist safety (SAFER / Chalmers)	2020 Oct 29th	Gothenburg Sweden *Digital Event*	Pontus Wallgren (SAFER/ Chalmers) Viktor Bergh Alvergren (SAFER/ Chalmers) Cedrik Sjöblom (SAFER/ Chalmers)	Novel and inexpensive nudging measure to increase cyclist safety	
H2020RTR20 (EGVIA, ERTRAC, The European Commission)	2020 Dec 1st	Brussels, Belgium *Digital Event*	Stefan Ladwig (ika, RWTH)	Results from road transport research project	MeBeSafe: General Project Results

Fairs and conferences

Event	Date	Location
SAFER fair	2019 April 11th	Gothenburg, Sweden
13th ITS European Congress	2019 June 3rd - 6th	Eindhoven, The Netherlands
ECC Conference Naples	2019 June 25th – 28th	Naples, Italy
3rd Global Ministerial Conference on Road Safety Pre-event	2020 Feb 19th – 20th	Stockholm, Sweden
Intertraffic Amsterdam 2020	2020 Apr 21st –24th	Amsterdam, The Netherlands

	(postponed due to corona virus) 2021 Mar 23rd – 26th	
8th Transport Research Arena TRA 2020	2020 Apr 27th – 30th (cancelled due to corona virus, although paper has been published)	Helsinki, Finland
9th International Cycling Safety Conference (ICSC2020)	2020 Nov 4th – 6th (postponed due to corona virus) 2021 Nov 10th – 12th	Lund, Sweden

Press releases

Date	Headline	Teaser
2017 Aug17th	MeBeSafe – Making traffic safer through behaviour-changing nudging measures (MeBeSafe press release 1, 2017)	The EU-financed Horizon 2020 project MeBeSafe (Measures for Behaving Safely in Traffic) has successfully celebrated its kick-off. The project aims at reducing the number and severity of road accidents by directly changing our habitual traffic behaviour. Various "nudging" and coaching measures will be used to get tired drivers to take a break and cyclists to reduce their speed in intersections for example.
2018 Feb 8th	Starting point for measurement activities for improving traffic safety within the EU project MeBeSafe in Eindhoven (MeBeSafe press release 2, 2018)	The Horizon 2020 EU project MeBeSafe (Measures for Behaving Safely in Traffic) has successfully started its first baseline measurements within the project in Eindhoven, The Netherlands. The measurements at an Eindhoven motorway exit tracks the current driving behaviour of drivers at this location to build the basis for further research for improving traffic safety by the concept of nudging. The measurements at a busy intersection in the city centre are used to study the variation in cyclist flows and directions during a full week 24/7.
2019 Oct 23rd	MeBeSafe nudges coming to the road (MeBeSafe press release 3, 2019)	Traffic rules only work if people choose to obey them. But the traffic environment could instead be redesigned so that good choices are more likely to be made. MeBeSafe has designed several so-called nudges to make traffic safer, and they are now ready for the roads.
2020 Sep 3rd	MeBeSafe – Consortium presents final results on nudging and coaching measures in traffic (MeBeSafe press release 4, 2020)	The EU-financed Horizon 2020 project MeBeSafe (Measures for Behaving Safely in Traffic) has presented its final results in their Final Event digital. The project partners presented well-evaluated nudges and coaching measures to reduce the number and severity of road accidents. Several nudging and coaching interventions nudge car drivers and cyclists via HMI

		and infrastructure measures as well as coach truck drivers towards safer driving behaviour.

Press interviews

Date	Media	Headline
2017 Oct 11th	Automotive world	Road safety shifts: nudges carry more power than smacks (Automotive World, 2017)
2017 Nov 17th	Automotive world	Is there a psychologist in the house? If not, there should be (Automotive World, 2017)
2018 September 4th	Scientists to lure people into getting calm (in Swedish) (Swedish Radio P4-Halland)	MariAnne Karlsson, professor at Chalmers University of Technology is studying how painted traffic obstacles can make cyclists slow down. The Tylösand seminar is arranged by Motorförarnas Helnykterhetsförbund (The Teetotal Motorists Association). Many aspects are about drunk driving, but this year there is also a focus on modern technology - such as nudging.
2020 Feb 2nd	Evening news (Westdeutscher Rundfunk, 2020)	New safety technology should make dangerous places on the Autobahn safer. Researchers from RWTH University turn on special light signals. "The light is built on both sides of a road at such a place. If a car comes to the place too fast, the lights will always light up. That gives the driver an illusion that something is moving towards them. And the researchers from the Institute of Highway Engineering say this will lead to the driver going slower. The new technology is tested on a place in the Netherlands. The first signs are positive, according to the researchers." (Original in German)
2020 Feb 4th	Nudging - a friendly push (TT Swedish News Agency, 2020)	For two years, researchers in Sweden - and in other EU countries - have been working on ways to use soft methods instead of hard ones to reduce the number of traffic accidents. With nudging - a small push in the right direction - and coaching we can be made to act more road-safe. Subconsciously and without coercion. Pontus Wallgren at Chalmers in Gothenburg is an engineer, doctor and associate professor of consumer technology. He and his colleagues are working to influence cyclists' behaviour with nudging. - We have done several smaller experiments and started a larger one that we will resume when the weather gets better this spring, he says.
2021 March 25th	fka mobility podcast (German)	Episode 29 - MeBeSafe – Measures for Behaving Safely in Traffic In dieser Episode sprechen wir mit Anna-Lena Köhler und Stefan Ladwig (beide vom Institut für Kraftfahrzeuge der RWTH Aachen University) über das EU-geförderte Forschungsprojekt MeBeSafe. Eine der häufigsten Unfallursachen im Straßenverkehr ist das menschliche Verhalten. Genau da hat das Projekt MeBeSafe angesetzt. Mit dem sogenannten Nudging können Verkehrsteilnehmende unbewusst zu einem sichereren Verhalten im Straßenverkehr beeinflusst werden.

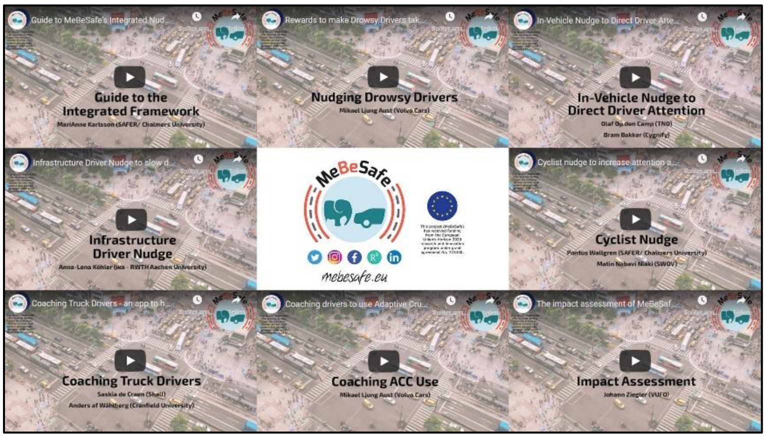
MeBeSafe Newsletter

Date	Volume	Link
2019 March	Volume 1	https://www.MeBeSafe.eu/wp-content/uploads/2019/03/MeBeSafe-Newsletter-March-2019.pdf
2019 June	Volume 2	https://www.MeBeSafe.eu/wp-content/uploads/2019/05/MeBeSafe-Newsletter-June-2019.pdf
2020 January	Volume 3	https://www.MeBeSafe.eu/wp-content/uploads/2020/01/MeBeSafe-Newsletter-January-2020.pdf
2020 June	Volume 4	https://www.mebesafe.eu/wp-content/uploads/2020/06/MeBeSafe-Newsletter-nr-4.pdf
2020 November	Volume 5	https://www.mebesafe.eu/wp-content/uploads/2020/10/MeBeSafe-Newsletter-nr-5.pdf

MeBeSafe Movie

Date	Partner	Title	Link
2020 August	SAFER/ Chalmers	MeBeSafe – What is nudging	https://www.youtube.com/watch?v=LvjNlz-uNxw

MeBeSafe Videos from Final Event digital



Date	Partner	Title	Link
2020 November	MariAnne Karlsson (SAFER/ Chalmers)	Guide to MeBeSafe's Integrated Nudging Framework	https://www.youtube.com/watch?v=4MXny6sIJ-g
2020 November	Mikael Ljung Aust (Volvo Cars)	Rewards to make Drowsy Drivers take a break	https://www.youtube.com/watch?v=d17wQ2WxdqI
2020 November	Olaf Op den Camp (TNO) Bram Bakker (Cygnify)	In-Vehicle Nudge to Direct Driver Attention	https://www.youtube.com/watch?v=sAY9jYIo8z8
2020 November	Anna-Lena Köhler (ika, RWTH)	Infrastructure Driver Nudge to slow down drivers - presentation from MeBeSafe Final Event	https://www.youtube.com/watch?v=XeT3UVmTsvA
2020 November	MariAnne Karlsson (SAFER/ Chalmers) Pontus Wallgren (SAFER/ Chalmers) Matin Nabavi Niaki (SWOV) Olaf Op den Camp (TNO)	Cyclist nudge to increase attention and reduce speed	https://www.youtube.com/watch?v=HeyiaH5Aet4
2020 November	Saskia de Craen (Shell)	Coaching Truck Drivers - an app	https://www.youtube.com/watch?v=_vKGrSjs-fk

	Anders af Wåhlberg (Cranfield University)	to help truckers coach their peers	
2020 November	Mikael Ljung Aust (Volvo Cars)	Coaching drivers to use Adaptive Cruise Control - to increase distances and reduce accidents	https://www.youtube.com/watch?v=zEKhEWpA86o
2020 November	Johann Ziegler (VUFO)	The impact assessment of MeBeSafe - how many lives can be saved	https://www.youtube.com/watch?v=V8hjmbTo-XE

Communication Channels

Channel	Link
Website	https://www.mebesafe.eu/
ResearchGate	https://www.researchgate.net/project/Measures-for-behaving-safely-in-traffic-MeBeSafe
Twitter	https://twitter.com/MeBeSafe
LinkedIn	https://www.linkedin.com/company/mebesafe
Facebook	https://www.facebook.com/MeBeSafe/
Instagram	https://www.instagram.com/mebesafe/
YouTube	https://www.youtube.com/channel/UClGJnekdODO_9jEOJ9_XMLA

3.7. Work package 7 – Ethics requirements

WP7 – Ethics requirements | WP-lead ika, RWTH
Ethics guidelines were provided.
D7.1 H - Requirement No. 1, M3 (July 2017)
The deliverable clarifies the basic ethic principles and responsibilities that are defined by the European Commission regulations on research ethics. It describes the ethics principles and gives general guidelines on where responsibilities lie and how they can be fulfilled.

4. Impact

The impact assessment of the MeBeSafe project is based on the results of the field trials for each measure and gives an overview the expected impact on road safety in the EU-27 by 2025 and 2030. For a detailed description of the methodology and results, please see D5.5.

4.1. Overall Summary

In the impact calculation, first the Euro NCAP Advanced method was used to estimate the number of road traffic accident involved persons for the EU-27 that could be addressed by MeBeSafe measures, depending on predicted levels of user acceptance and three different market penetration scenarios. Below, only the prediction outcomes based on the most realistic of these market penetration scenarios are shown (for numbers on the other scenarios, see D5.5). Next, the results from the impact assessment were used as basis for predicting which economic impact the MeBeSafe measures could have in the EU-27.

The impact assessment is divided into the In-vehicle measures, the coaching part and the infrastructure measures. For details, please see D5.5.

The total number of addressed persons is based on a 100 % market penetration in 2025 and 2030 (Figure 2). According to the market penetration scenario, the MeBeSafe measures could address approximately 1,874 fatalities in 2025 and 1,824 fatally injured persons in 2030. In relation to all fatally injured persons in all road traffic accidents, the MeBeSafe measures achieve a relative share of 9.1 % in 2025 and 9.5 % in 2030 in the group of fatally injured persons.

Additionally, the MeBeSafe measures could address 193,046 seriously and slightly injured persons in 2025 and 227,570 persons in 2030. The relative share in the group of seriously and slightly injured persons is 13.3 % in 2025 and 14.5 % in 2030.

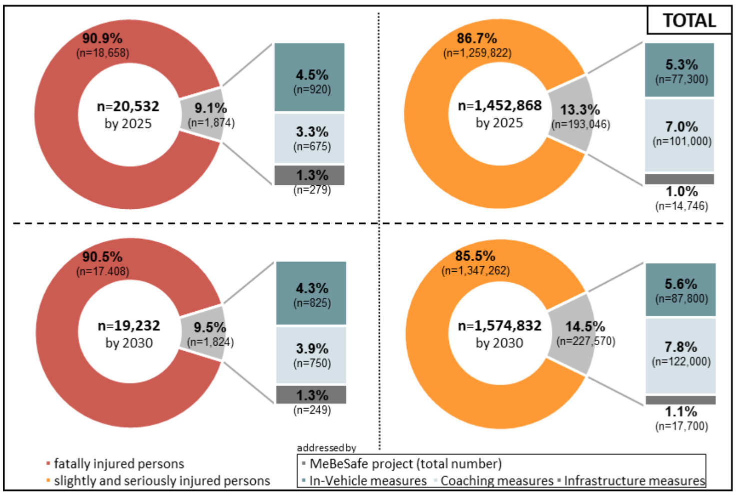


Figure 2: Impact assessment according to the total estimation of the MeBeSafe project to the EU-27 for fatally injured persons (left) and slightly/seriously injured persons (right) in 2025 and 2030

The realistic number of addressed persons is based on the most plausible market penetration scenarios of each MeBeSafe measure. The most realistic scenarios are described in D5.5. Starting from the most plausible market penetration scenario of each MeBeSafe measure, the combined MeBeSafe measures are predicted to be able to address 0.7 % of all fatally injured persons. This corresponds to 189 fatalities (0.9 %) in 2025 and 366 fatalities (1.9 %) in 2030 (Figure 3). In addition, the measures are predicted to address 16,584 seriously and slightly injured persons (1.2 %) in 2025 and 40,053 persons (2.5 %) in 2030.

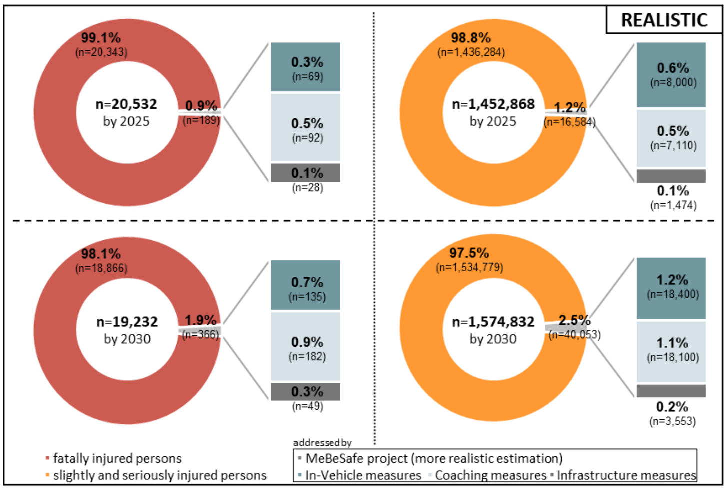


Figure 3: Impact assessment according to the realistic estimation of the MeBeSafe project to the EU-27 for fatally injured persons (left) and slightly/seriously injured persons (right) in 2025 and 2030.

4.2. Economic impact

The economic impact is an estimation of the potential financial savings for the EU-27 if the MeBeSafe measures would succeed in addressing casualties as per the impact calculation above, in 2025 and 2030.

Socio-economic costs of road traffic accidents in the EU-27 represent 1.8 % of the Gross Domestic Product (GDP). These costs include healthcare costs for the management and treatment of injuries, administration costs of liability settlements, damage to public goods, and loss of output from those injured or killed.

Table 1 gives an overview of all standard values depending on the cost components and the injury severity. The values base on the "SafetyCube" project co-founded by the Horizon 2020 Framework Program of the European Union (Wijnen, 2017).

2017	slightly injured persons	seriously injured persons	fatally injured person
Medical cost	€1,439	€16,719	€5,430
Production loss	€2,669	€43,627	€655,376
Human costs	€15,597	€230,385	€1,587,001
Property costs	€5,317	€7,622	€11,555
Administrative costs	€1,876	€4,364	€6,346
other costs	€519	€413	€3,638
Total (unit) costs	**€27,417**	**€303,130**	**€ 2,269,346**

Table 1: Standard values for medical cost components and unit costs for the year 2017 (Wijnen, 2017).

Based on Table 1, the estimation of the medical cost components are calculated with a growth rate of 1.8 % per year until 2025 and 2030. It is assumed that the medical cost components increase to €31.6k for slightly, to €350k for seriously and to €2.6M for fatally injured persons in 2025. For the estimation in 2030 it is expected that the costs increase to €34.5k for a slightly injured person, €382k for a seriously injured person, and €2.8 million for a fatally injured person (Table 2).

	2025	2030
slightly injured persons	€31,623	€34,573
seriously injured persons	€349,632	€382,252
fatally injured person	€2,617,477	€2,861,685
Total (unit) costs	**€2,998,732**	**€3,278,511**

Table 2: Extrapolation of the cost components of medical costs by injury severity until 2025 and 2030

These values are then multiplied with the addressed persons of the MeBeSafe project in 2025 and 2030 according to the total number and in realistic penetration scenario model presented above.

Given these boundary conditions, and assuming a realistic market penetration scenario, it is predicted that the MeBeSafe measures if implemented would lead to financial savings of €2.0 billion in 2025 and €2.2 billion in 2030 (Figure 4).

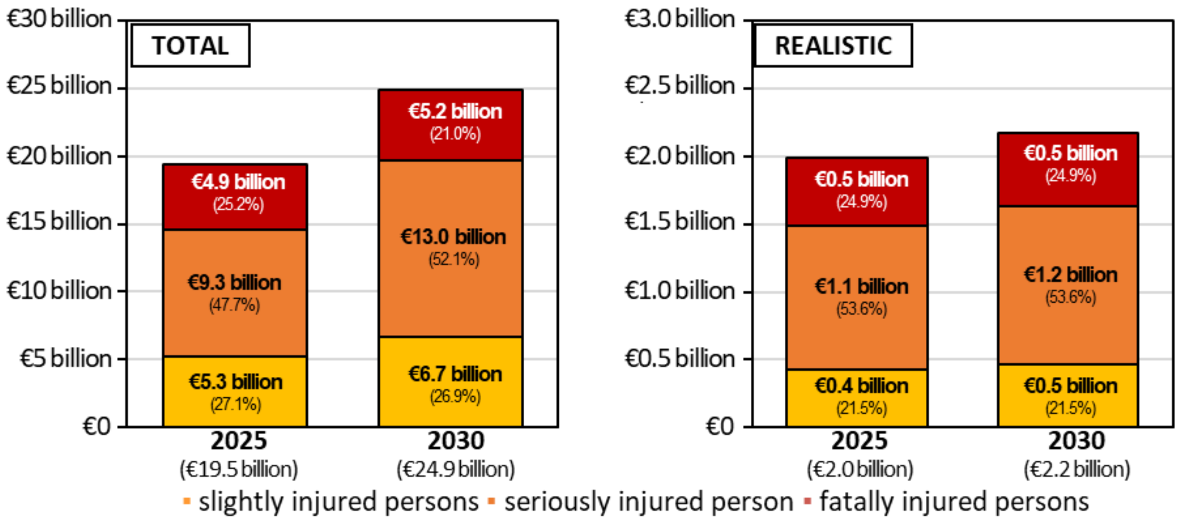


Figure 4: Economic cost estimation according to the accident reduction for the total number (left) and realistic estimation (right) in 2025 and 2030 by the MeBeSafe project.

Note that while safety measures in vehicles usually result in higher market prices, the MeBeSafe in-vehicle measures largely make use of components already present in the vehicle for other purposes, and hence will probably not result in higher costs.