Hi-Drive

Designing Automation

Deliverable D5.1 /

Description of “Operations”

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Table of contents

List of figures

List of tables

Executive summary

The Hi-Drive addresses a number of key challenges, which are currently hindering the progress of developments in vehicle automation. In this document, the current description of planned operations of the Hi-Drive project can be found. Operations are conducted by the Vehicle owners, with the participation of the Enabler owners and the help of the Analysis partners. The planned operations involve 45 technology enablers to extend the operational design domain (ODD) of new or existing AD Functions.

Each operation has been described with a template filled in by operation owners. In this document you will find a summary of each operation, with the most relevant aspects, including (according to July 2022 status): AD function, Enabler, Use cases, Operation purpose and description, number of vehicles and participants involved, location and planning.

Most of the 47 operations, led by 20 operation owners, are related to technical aspects. But some of them are more focused on user perspectives. All these operations are spread over 11 European countries, and are mostly on open roads or test tracks, and are sometimes performed in a simulation environment (see Figure 0.1). More user-related experiments will take place in sub-project "Users" SP6 Users, and are not included in this deliverable.

According to the plan, more than 262 drivers, either ordinary, employees or professional safety drivers will have the chance to be in the driver seat of 30 prototype cars (see Figure 0.1). A majority of operations will be executed in a motorway environment, but a significant part of operations is deployed in urban environment. Various use cases will be studied, from harsh environments to specific infrastructures, with other participants like pedestrians or connected vehicles. The Hi-Drive project expects many relevant and challenging driving scenarios to be collected and analysed.

A defined list of data will be collected during these operations. Further studies in the Hi-Drive project will confirm the relevance of each enabler tested during these operations with AD function, regarding its impact to extend the operational design domain of AD functions or to enhance AD performance.

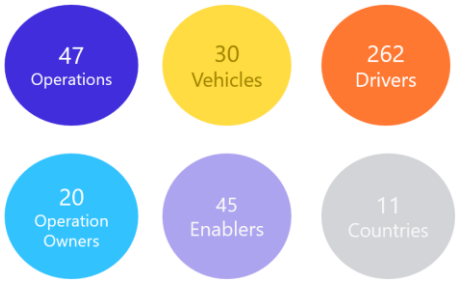


Figure 0.1: Overview of planned Hi-Drive operations according to status July 2022.

1 Introduction

1.1 Hi-Drive - Addressing challenges toward the deployment of higher automation

Connected and Automated Driving (CAD) has become a megatrend in the digitalisation of society and the economy. CAD has the potential to drastically change transportation and to create far reaching impacts. SAE level 3 (L3) automated driving functions were piloted in Europe by the EU flagship pilot project L3Pilot in 2017-2021. The Hi-Drive project builds on L3Pilot results and advances the European state-of-the-art from SAE L3 'Conditional Automation' further up towards 'High Automation' by demonstrating in large-scale trials the robustness and reliability of CAD functions in demanding and error-prone conditions with special focus on:

- Connected and automated vehicles (CAVs) travelling in challenging conditions covering variable weather and traffic scenarios
- Connected and secure automation providing vehicles/their operators with information beyond the line of sight and on-board sensor capabilities
- Complex interaction with other road users in normal traffic
- Factors influencing user preferences and reactions including comfort and trust – and eventually, enabling viable business models for AD.

The project's ambition is to extend considerably the operational design domain (ODD) from the present situation, which frequently demands the take-over of the vehicle control by a human driver. As experienced in L3Pilot, on the way from A to B, a prototype AV will encounter a number of ODD factors, leading to fragmented availability of the AD function. The Hi-Drive project addresses these key challenges, which are currently hindering the progress of driving automation. The concept builds on reaching a widespread ODD, where automation can operate continuously for longer periods, and interoperability is assured across borders and brands. The Hi-Drive project strives to extend the ODD and reduces the frequency of the takeover requests by selecting and implementing technology enablers leading to highly capable CAD functions, operating in diverse driving conditions including, but not limited to, urban traffic and motorways. The removal of fragmentation in the ODD is expected to give rise to a gradual transition from a conditional operation towards higher levels of automated driving.

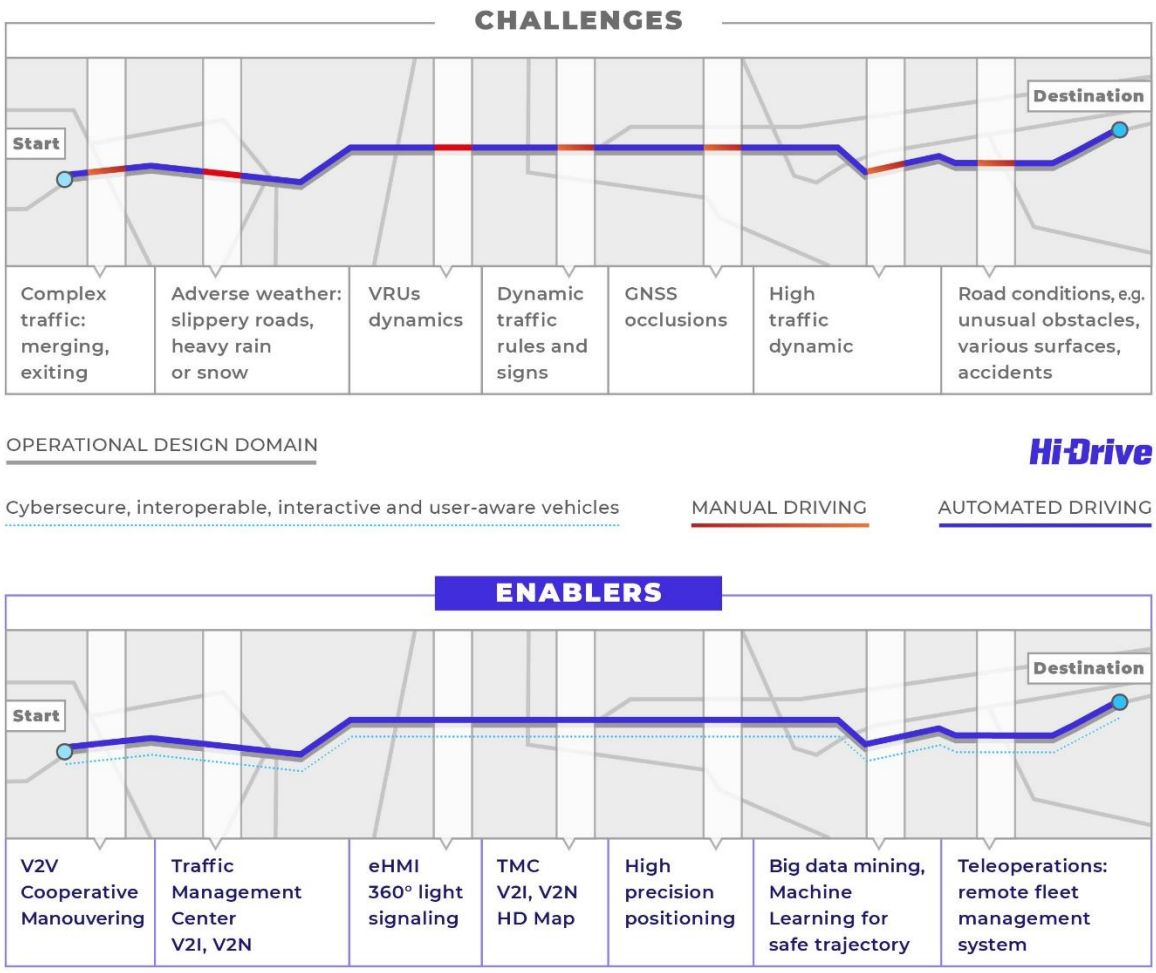


Figure 1.1: Hi-Drive concept towards High Automation – Fewer limits for ODD

The work in Hi-Drive started with the collection and description of the different automated driving functions, enabling technologies and ODDs. When testable functions and use cases are defined, research questions and hypotheses are formulated leading to the specification of data needed for evaluation and then actual recording of vehicle-driver behaviour. Testing will focus on three evaluation areas: 1) users; 2) AD availability and performance; 3) societal impacts (namely, on safety, efficiency, environment, mobility, transport system, and society). Furthermore, these assessments serve as input to determine whether the socio-economic benefits outweigh the costs. The project also engages in a broad dialogue with the stakeholders and the general public to promote the Hi-Drive project results. Dissemination and communication are boosted by a demonstration campaign to show project achievements.

Overall, Hi-Drive strives to create a deployment ecosystem by providing a platform for strategic collaboration. Accordingly, the work includes EU-wide user education and driver training campaign and series of Code of Practices (CoPs) for the Development of ADFs and Road Testing Procedures, while also leading the outreach activities on standardization, business innovation, extended networking with the interested stakeholders and coordinating parallel activities in Europe and overseas.

1.2 Objectives of Sub-project "Operations" SP5 and "Operation Preparation" work-package

Sub-project "Operations" SP5 has the objective to test and demonstrate the functionality of highly automated vehicles in demanding traffic scenarios across Europe. In detail, this covers the following tasks:

- Carry out pre-tests across the test sites.
- Investigate use cases common to several test sites, as well as site-specific CAD functions in mixed traffic, and demanding urban and inter-urban conditions, and across borders.
- Test CAD performance in variable and challenging conditions on TEN-T corridors and urban nodes across Europe.
- Compare the performance of CAVs with human drivers.
- Create, test, and demonstrate a holistic approach to cyber-security.
- Organise large demonstration events and showcases across EU.

Tests and operations of the Hi-Drive project are performed by exploring ODDs and the challenges within the different levels of driving automation as classified in Figure 1.2.

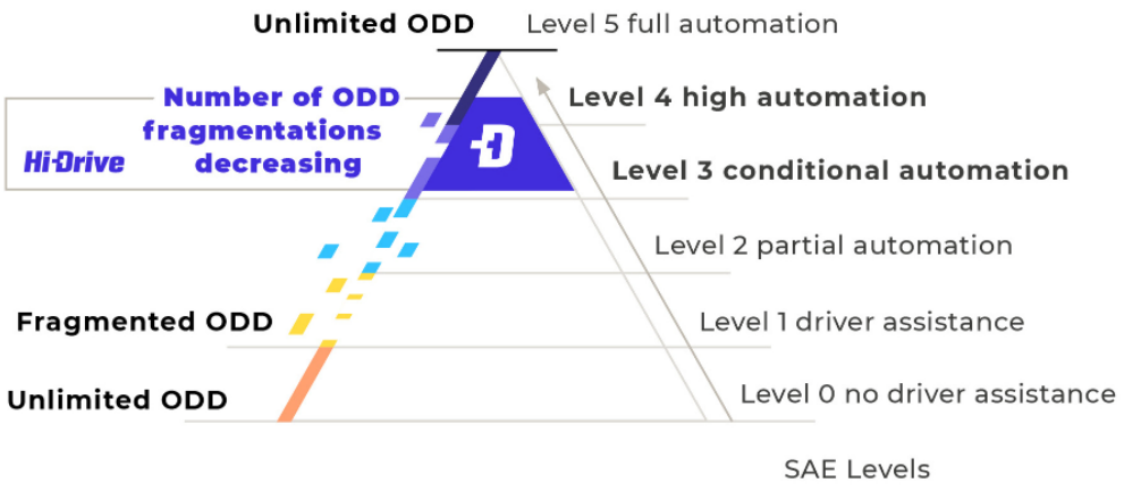


Figure 1.2: Hi-Drive: Exploring Operational Design Domains (ODDs) and the challenges within the different levels of Driving Automation

Each car/enabler owner will pre-test their vehicles/enablers in their test environment according to their internal procedures in cooperation with the sub-project "Methodology" SP4. This sub-project defines for Hi-Drive the minimum set of procedures, methods and tests to ensure that the experimental design of the experiments is fit for evaluation. Work-package "Operations preparation" is then in charge of establishing these specific procedures. As for numerical simulations, pre-testing could consist of preparing the hardware, tools, and inputs for these simulations.

One of the first tasks of the partners was to describe the tests they will be doing in Hi-Drive. For this, each vehicle owner had to fill in a template, called identity card (I.D.), built by the work-package "Operation Preparation" partners, for their "operations". The outcome of these descriptions is this deliverable "Description of operations".

Work-package "Operations preparation" consists of two tasks: "Description of tests" and "Preparation". Deliverable "Description of Operations" is the result of the first task "Description of tests". This deliverable provides a description on how and where the road tests and demonstration will be carried out.

This task consists of describing in detail what the operations will really consist of: objectives; use cases addressed; enablers to be tested; challenges to be solved; experimental procedures in place; whether the tests will be conducted on tracks or on open roads, or via numerical simulations; the testing approach; the test environment; test participants; limitations for testing; whether the operations are conducted cross borders; whether they are conducted in cooperation between which partners, etc. More user related experiments will take place in sub-project "Users" SP6 Users, and are not included in this deliverable.

Each vehicle owner had to fill in an I.D. for their "operations". This I.D. structure and contents were defined by a core team, especially based on what has been proposed and successfully used in L3Pilot. The I.D. is synthetized and mapped to give a general overview and propose some statistics of the operations conducted in Hi-Drive. These elements are presented as:

- A one-page description template for Operation Description
- List of Vehicle/Simulator Owners
- List of Enabler Owners
- Cross-list of Enablers with target Vehicle/Simulator
- For each Vehicle/Simulator Owner, list of sub-project "Effects" SP7 partners for preferred analysis partner.
- More details will be given in the following chapters.

The next step for work-package "Operation Preparation" is the second task which concerns the preparation of the operations. When each vehicle is ready for being driven/tested on tracks or open roads (by sub-project "Vehicles" SP3), they will be pre-tested for a few hundred kilometres. "Pre-testing" means that the readiness of the whole chain (enablers + vehicles) has been checked and is functional to start the actual experiment operation. The procedure will include subject selection and recruitment; approval of trials by authorities and insurance; tests sites check; collected data checks; data conversion check; experimental procedures; simple analysis of data performed; questionnaires to be tested, etc. All these tasks should be done by the work-package "Operation Preparation" at the end of 2022.

1.3 Liaison with other Sub-Projects / Work-Packages

Sub-project "Operations" SP5 is the part of the Hi-Drive project in which, trials of highly automated vehicles' piloting are conducted encompassing technology enablers that support AD functions in addressing the operational domain challenges. The Operations are formed as the combination of specific enablers (developed in sub-project "Enablers" SP2), vehicles (prepared in sub-project "Vehicles" SP3), use cases (derived in Hi-Drive "Use cases" task), test environments and experimental procedures (considered by sub-projects "Enablers" SP2 and "Methodology") and partnerships required for operations execution (that have been formed by sub-project "Operations" SP5 / work-package "Operation Preparation").

The work features a large scope of experiments that need to be carefully monitored to ensure operational consistency among the numerous test sites and timely delivery of the data to be collected and converted to agreed format to be analysed by sub-projects "Enablers" SP2, "Users" SP6 and "Effects" SP7.

For the coordination of the operations across test sites, several cross-sub-projects connections had to be made and maintained in order to ensure that:

- The methodology developed in sub-project "Methodology" SP4 - work-packages "Research Questions", "Methods for user evaluation" and "Methods for effects evaluation" is considered;
- The experimental designs and data management scheme developed by work-packages "Experimental procedures" and "Data requirements" in "Methodology" SP4 respectively are agreed and progress to fulfil operations' time plan requirements by sub-projects "Enablers" SP2 and "Vehicles" SP3 are monitored (enablers' integrations, fleet update);
- Give feedback to work-package "Vehicles pre-testing" w.r.t pre-testing so that the vehicles' preparation time plan is in line with pre-operation phase;
- The data collected are verified on each test site according to data verification rules developed by work-package "Data engineering tools and databases"; monitoring the data delivery from the data owners to the analysis selected partners, according to the common data sharing framework as proposed by work-package "Data requirements".
- Coordinate the preparation of the showcases.

These connections are highlighted in Figure 1.3 below.

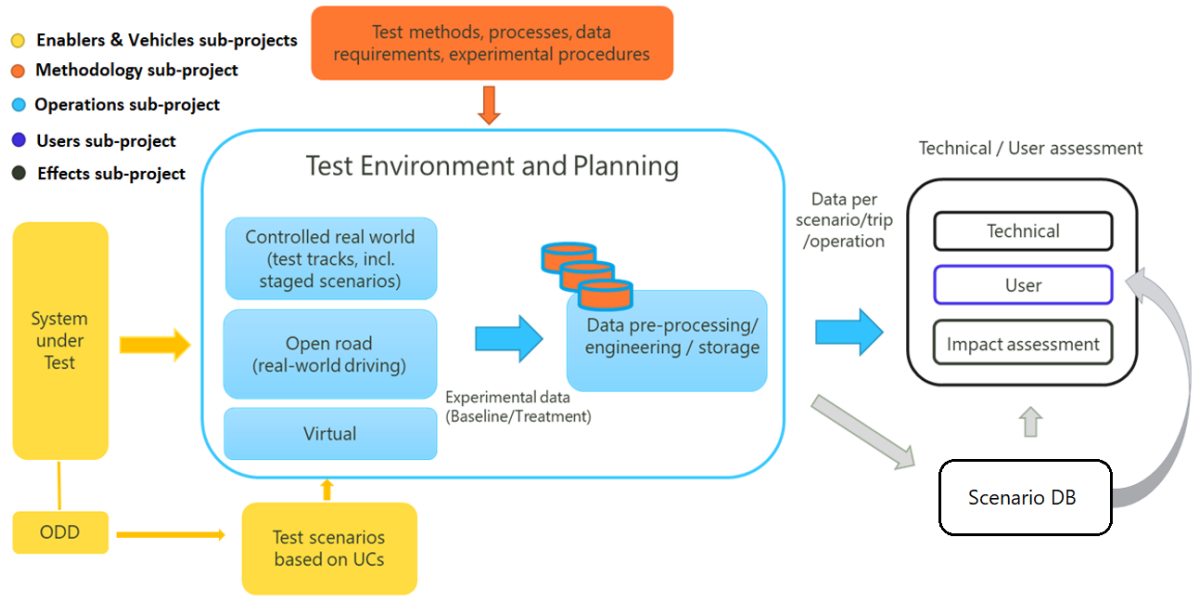


Figure 1.3: Connection between Hi-Drive sub-projects

Specifically, for the work implemented towards the preparation of the operations, cooperation and input as well as bilateral connections were needed with regards to the relevant work produced across sub-projects, as described hereafter:

- Coordination for the preparation and the implementation of the enablers in the vehicles to be tested, as addressed in sub-project "Enablers" SP2 and the description in deliverable "Enablers description and how they support AD/CAD functions" D2.1. (Taken into account in Operation Description template Identity card (I.D.), see sec. 2.3.1)
- Description of the AD functions and the Hi-Drive Use Cases as addressed in sub-project "Vehicles" SP3 and deliverable "Use cases definition" D3.1, as well as logging tools recommendations deriving from deliverable D3.2. (Taken into account in Operation Description template Card I, see sec. 2.3.1)
- Vehicles' preparation testing and design of data logging tools are performed in sub-project "Vehicles" SP3 and are part of getting the vehicle ready for the Operations. (Taken into account in Operation Description template Cards II and III, see sec. 2.3.1)
- Sub-project "Methodology" SP4, and the work under work-packages "Data requirements", and "Experimental procedures", with respective deliverables D4.2 Data for evaluation, and D4.3 Experimental procedure, which are building the methodological framework of the experimental procedures, data requirements, research questions and methodology/evaluation plan (taken into account in Operation Description template Cards I, II and III, see sec. 2.3.1).

2 Methodology for operation description

2.1 Operation description

In the Hi-Drive project, many terms are used in particular the two terms below:

- Operation is the execution of experiment(s) in a defined place and time.
- Experiment consists of a series of test runs / trips to investigate a common aspect (ADF, Enabler, and User) and is conducted under comparable circumstances. It is made up of several test runs / trips. Experiment types include open road, test track, driving simulator, simulation models, etc.

In the Hi-Drive project, operations are planned and conducted by the Vehicle owner, with the participation of the Enabler owner and the help of the Analysis partner. For each operation, at least two members of the Hi-Drive consortium are involved.

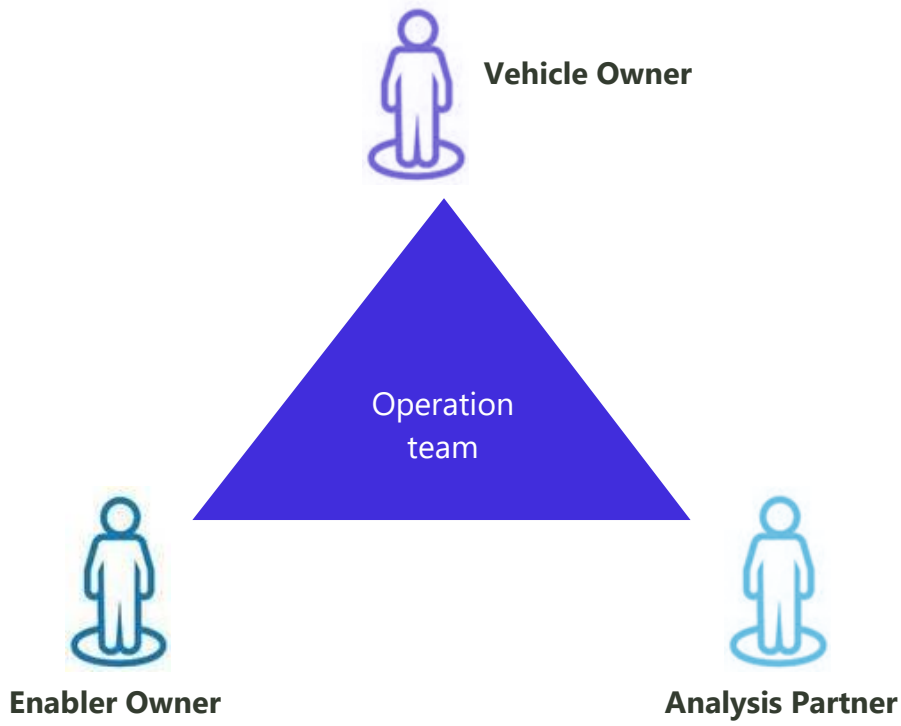


Figure 2.1: Main actors in a Hi-Drive operation

2.2 Phases of Operations

To carry out an operation in the Hi-Drive project, three phases are necessary. These are: Preparation phase, Pre-operation phase and Operation phase. The I.D. card includes for each

phase a checklist and timeline which correspond to vehicles, drivers, infrastructure, test tracks and logging devices requirements.

2.2.1 Preparation phase

Preparation phase is the first step in operation preparation. It concerns the permits checklist: approval of trials by authorities, insurance, etc., but also the technical checklist for the vehicle/fleet set up and the track(s) setup. The goal of this preparation phase is to have all cars administratively and technically ready for driving, i.e. AD function and enabler are correctly installed on each vehicle.

2.2.2 Pre-operation phase

To ensure the smooth running of each operation, pre-operation phase is concerned with the pre-testing checklist that should be fulfilled before validation of this phase. Depending on the test environment of each operation, scenarios and events should be defined. The list of data that will be logged must be defined. Data can come from vehicle internal data or external data sources. Pre-operation is also used to validate the full data processing flow coming from recorded data to final Hi-Drive data bases. A pre-test is then planned for each operation to ensure the good functioning of the different operation steps.

2.2.3 Operation phase

The "Operation phase" is the realisation of the operation. In this phase and for each operation, all the needed information to start operation are available. Number of vehicles participating and the different participant's information are defined: number and type of participants. Also all information about the trip is provided (distance and duration), the ADF and enabler's status (ON / OFF), the scenarios and events for the corresponding test environment and the collected data. According to all these information, test drives and data recording can take place with respect to the operation objectives: environment, scenarios, weather conditions, etc.

2.3 Operation types

The Hi-Drive project uses in total three different types of operation to collect the data needed for the evaluation of the enablers and highly automated driving. Some operation sites plan to combine different operation types. For instance, it might be planned to start data logging on a test track and as soon as the enabler is sufficiently mature and the permissions are available to continue on open roads. Other operations plan data collection on open roads and then use the data in simulation environments to further develop the enabler implementation with the ADF.

2.3.1 On test tracks

Due to regulatory and safety reasons, some of the operation sites plan a data collection on test tracks. This approach has the advantage of a highly controlled road environment without any interfering traffic. On test tracks, it is possible to test enablers repeatedly in controlled and systematically varied conditions. Furthermore, test tracks can be used to stage test scenarios like automated merging with connectivity. On open road, it is challenging to arrange two connected vehicles meeting on a highway entry without other vehicles adding uncontrolled variation to the test scenario. On test tracks, it is easier to stage such scenarios and to vary the conditions systematically. The drawback of test tracks is that the testing environment is always of reduced complexity compared to on-road testing.

2.3.2 On open roads

Whenever possible it is aimed to test the functions on open roads. Compared to testing on test tracks, this approach requires the permission of local road authorities and the implementation of high safety measures to avoid any endangerment of the test vehicle or other traffic participants. Therefore, especially the pre-operation phase for open road testing can be more prolonged before all requirements are fulfilled. The approach of open road has also the benefit to have a naturalistic traffic environment and an interaction with all kind of road users, etc.

2.3.3 Virtual

As a third approach to collect data is a virtual environment, which means via simulations. The term simulation is broad and combines different approaches:

- Driver simulator (Human-in-the-Loop): In a driver simulator, the driver is in the focus of the investigation. In such a simulator, a driver is normally seated in a realistic vehicle and experiences driving scenarios with or without an ADF in simulated environment. The reaction of the driver and his/her handling of an ADF is measured and investigated in the driver simulator. Within Hi-Drive, data collection in driver simulators mainly takes place in sub-project “Users” SP6 as part of the user centred evaluation.
- Scenario simulator (System-in-the-Loop): A scenario simulation is used to create data of ADF behaviour for a large variation of driving scenarios. This method is used to
  - reduce the need for costly and time-consuming logging of driving data to gather information on AD behaviour in a large variety of driving scenarios, and
  - gain information on AD behaviour for rare and/or safety critical scenarios since it is challenging to experience such scenarios on open roads.

Therefore, the ADF is integrated in a simulation environment and the setup is used to systematically simulate a large number of driving scenarios with a systematic variation of conditions. Then, the data is used to analyse the behaviour of the ADF. Within Hi-Drive data collection with scenario simulation mainly takes place within sub-project "Effects" SP7 as part of the impact assessment.

- Simulations for enabler development: In that approach, logged real world data is used to test the enabler's performance. Due to the simulation approach, it is possible to implement changes for the enabler, re-run the simulation and investigate the impact of changes on enabler performance.

All three types of simulations are used in Hi-Drive to gain in depth information on ADF and use behaviour and the impact of ADF on overall traffic. Those experiments are not described in this deliverable.

2.4 Collection of information on operations

2.4.1 Overall Approach

To gather relevant information on the different operations (type of operation, enabler, etc.), a template was developed that collects this information in a defined and structured way.

For defining the template content, a small core work-package "Operations preparation" working team reviewed the L3Pilot operations preparation checklists and based its work on a) the SP3 ADF descriptions and Use Case catalogue with their associated ODDs and test scenarios (mapped to SP2 Enablers' I.D.s), b) the Hi-Drive methodology draft outcomes including the recommendations for experimental designs, expectations for evaluation focus areas split in user, technical and impact areas. The proposed template was then reviewed by SP4 leaders and was iteratively refined to its final format. More details not included currently in the template cards can and will be added later based on the needs of the experimental setup and following the guidelines of work-package "Experimental procedures".

The template was created and hosted on the project's common data sharing tool, namely Confluence, which a) allowed the creators to embody how-to-fill-in-the-template instructions and b) allows its use by each Operation team as a living document (confluence page can be updated constantly and notifications are sent to work-package "Operations preparation" core team when this occurs).

For each operation, the template starts with an identity card that describes the main focus of the operation and the synthesis of the operation team (as described in sec. 2.1 and following the L3Pilot history). Each operation owner (with let's assume a random id "X"), in collaboration with other members of the Operation team, decides how to split its operations

with all prototype vehicles in its fleet. Each operation is assigned a unique increasing number starting from "X.1". Each Operation leader reports its experimental setup for evaluating a specific ADF in a specific operational context (fleet in numbers, location, test scenarios, time plan) by filling in all the template fields.

A custom template was created for use in work-package "Operations preparation", Figure 2.2 (last item at the bottom, in red). Guidelines for filling the template were integrated in the same confluence template and are shown in Figure 2.3.

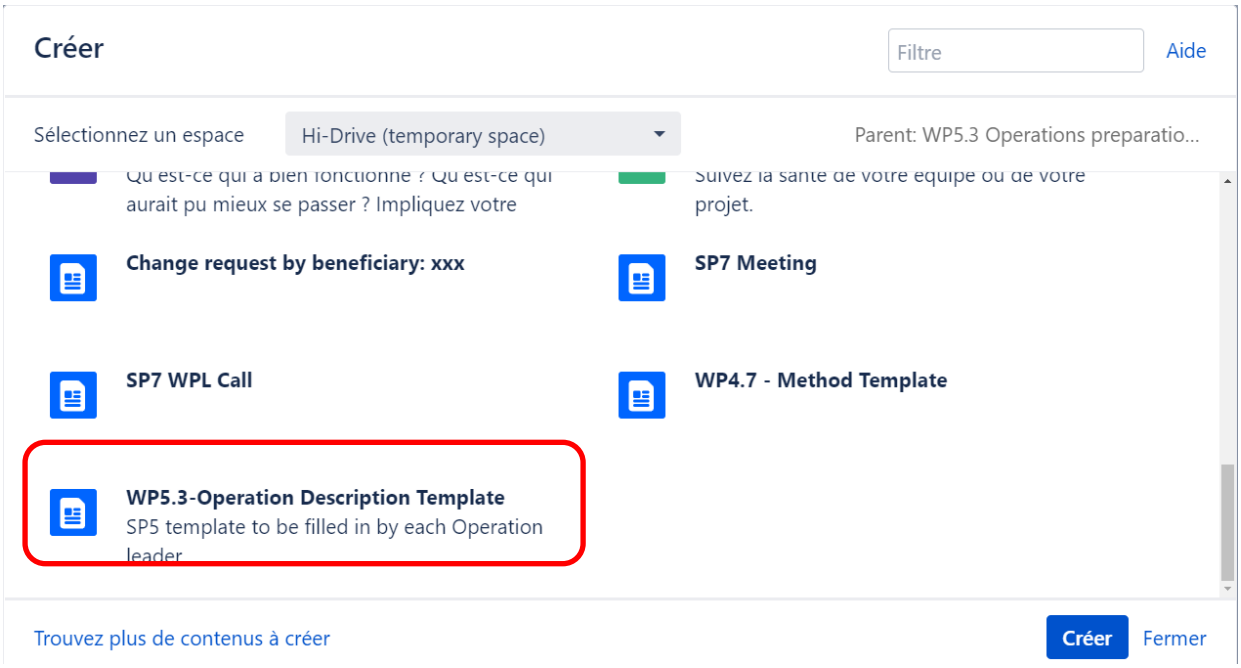


Figure 2.2: A custom template created for use in work-package "Operations preparation"

WP5.3 Operation Description Template

Info | Template backround info

Title: *Template for Operations Description. This is the Operation Description template that is created from the excel Operation Description found here: CORE team workshop.*

Scope: *Each operator owner (in collaboration with this operation's team) reports the experimental setup for evaluating one ADf integrating one or multiple Enablers and supporting one or multiple Hi-Drive UCs/Test scenarios .*

Links to previous SP work: *ADF ID and use cases/test scenarios IDs associated with specific Enablers IDs are to be retrieved from T3.3.1 list here: ADF(s) and Use Cases catalogue description (by each ADF owner)*

Responsible Hi-Drive Task*: T5.3.1*

Propriétés de la page | id = Instructions | hidden = true

Where-to-place: The confluence function "Create [title of the template]" can be used as many times as needed in order to create the descriptions of each partner's operations in their wp5.3 individual confluence pages under here: OPERATION description. Please rename the template to indicate your Operation ID number (Operation 1, Operation 2, Operation X: the number should coincide with Operation Number of the first table below) and place it correctly under/within your individual confluence page. Each partner will then be responsible for any changes or updates to these pages.

How-to-fill it in: All the grey framed boxes are explanatory to help/guide you on how to fill in each card. Once the template is published as a confluence page the boxes will disappear and only the dedicated needed information will remain as part of the card. (this is indicated at the bottom part of the box also). Please do not add any info or edit these boxes and follow these instructions:

1. Read the instructions/examples provided in the 'Page properties' boxes ("Page properties | hidden = true").
2. Cells with white background ask for your input. Cells in grey background are void cells, shall be ignored.
3. The bold font is part of the template and needs to remain as is.
4. The text indicated in italics is to be replaced by your info. In the end there should be no italics left.
5. When a 'tick' box appears as below, please tick it only if applicable, e.g.:

☐ Tick the box on the right only if applicable. (you may tick and untick many times)

Structure of the template:

- Operation identity card: This card assigns a unique Operation ID and describes the team behind this operation;
- Operation CARD I: Operation objectives per UC. This card includes info on:
  - **General info**
  - **Operation purpose /evaluation focus per UC**
  - **Evaluation area focus and mapping to test scenarios IDs (second row to be filled in only if first row is ticked)**
- Operation CARD II: Operation location and type of experimental environment
  - Operation Location vs. UC/test scenarios
- Operation CARD III: Operation planning

In case you have any question or trouble on the template please contact Jean-Louis, Anastasia or Christina.

⚠ ***Do not write in these boxes. They will be hidden when publishing the page and are only used for these instructions***

Figure 2.3: Operations description - Guidelines for filling the template

2.4.2 Template description

The template was created as a set of pre-structured information cards (realized as drop-down menu in confluence) that could be easily opened for editing or reading by the Operation owners as well as their data analysis partners, when planning and conducting the trials or when accessed by external sub-projects "Users" SP6 and "Effects" SP7 partners when analysing the collected data and outcomes.

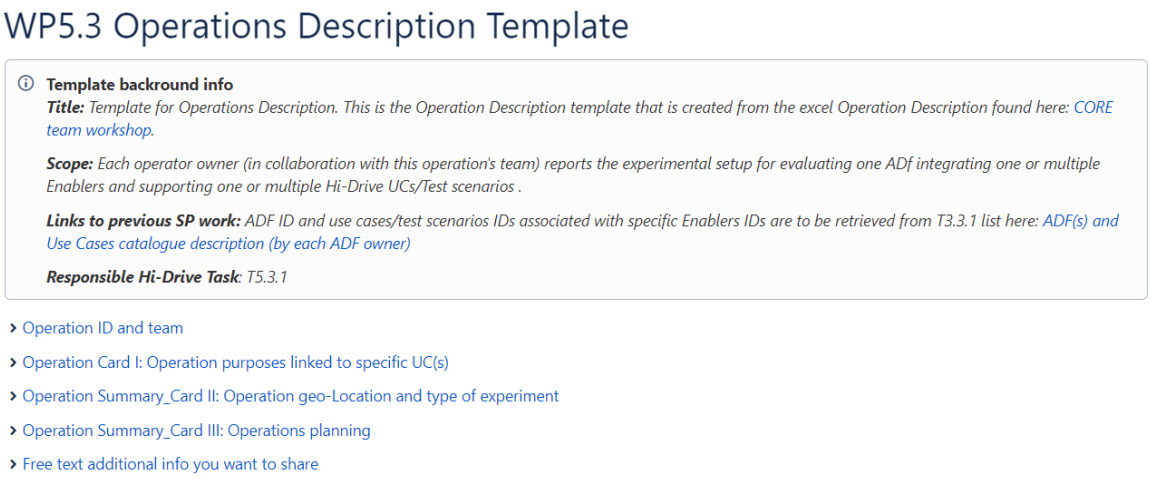


Figure 2.4: Operation Description Template

The Operation description cards include four main cards: one dedicated to the operation overview, one dedicated to the linkage to use cases, one dedicated to the type and location of the operation, and the last one dedicated to the technical checklist and corresponding time plan set for each experiment. More specifically, the structure is described hereafter:

- Operation Summary identity card: This card assigns a unique Operation I.D. and describes the team behind this operation (see "Operation ID and team" in Annex 1);
- Operation Summary CARD I: Operation objectives per UC. This card includes smaller cards which are:
  - General info
  - Operation purpose /evaluation focus per UC
  - Evaluation area focus and mapping to test scenarios IDs

    See "Operation Card I: Operation purposes linked to specific UC(s)" in Annex 1.
- Operation Summary CARD II: Operation location and type (note: operation type refers to test environment as described in sub-projects "Vehicles" SP3 and "Methodology" SP4 and

will be used in sub-projects "Users" SP6 and "Effects" SP7 also including virtual proving grounds, see previous section on type of Operations)

- Operation Location vs. UC/test scenarios

  See "Operation Summary_Card II: Operation geo-Location and type of experiment" inAnnex 1.

- Operation Summary CARD III: Operation planning

  Operation summary CARD III - Planning: this is split into three phases, i.e. preparation, pre-operation and operation. All phases include dedicated checklists covering requirements for the vehicles, the infrastructure, the test track and the logging devices. It contains three sub-tables containing the info listed hereafter: It contains three sub-tables as follows,

- Phase 0: preparation checklist; permits, technical, subject related
- Phase 1: pre-operation checklist; driving scenarios, data to be logged, data checks;
- Phase 2: operation checklist; number of vehicles, participants number and relevant information, trips driven distance and duration, driving/traffic scenario events, collected data description

  More details about this part in "Operation Summary_Card III: Operations planning" in Annex 1.

Note on overall monitoring process by work-package "Operations preparation": Operations monitoring process will continue after "Description of operations" deliverable submission until work-package "Operations preparation" ending and it is further split into two phases:

- Phase A: First Operations' planning as reported in this "Description of operations" deliverable.
- Phase B: Progress and final Operations' planning after this deliverable submission and as the project evolves when more details are added for the Operations based on sub-project "Methodology" SP4 requirements (e.g. user questionnaires by applicable questionnaire item per site, needs of simulation experiment details if applicable), bilateral data sharing agreements for extra data sharing between operation leader and analysis partner if required by sub-projects "Enablers" SP2 or "Effects" SP7 work, etc.

2.4.3 Operation Summary template

The template presented in chapter 2.4.2 was created to collect a maximum of information about each operation in the Hi-Drive project. This information is presented in the current deliverable for the 47 operations via a summary table presented in Table 2.1.

Table 2.1: Template for summary tables of all Hi-Drive operations

1- Operation Summary			
Operation Leader		**Operation ID**	
ID and title of the ADF under test		**Enabler(s) sub-group**	
Hi-Drive Data Analysis Partner		**Number of vehicles in the operation**	
UC classes treated			
2- Operation purpose /evaluation focus per UC			
X.X			
X.X			
3- Evaluation area focus & Location			
Evaluation area focus		**Open Road main Location**	
Evaluation area focus		**Controlled Track Location**	
4- Operation Environment/Content & Planning			
	Controlled (Test Track)	**Open Road**	**Virtual**
Brief description of the experiment			
Participants	**Number of total participants expected**		
	Information on the participants type		
Operations planning	**Starting month**	**Ending month**	
Preparation Phase			
Pre-operation Phase			
Operation			

3 Operation description

3.1 Operations overall description

Each operation in the Hi-Drive project is defined by operation I.D. & owner, enabler I.D. & owner and analysis partner.

For this public deliverable "Description of operations", all operations were anonymised. Then, for the operations information, "operation owner" is replaced by a number and "Analysis partner" are being presented as "defined" or "Pending" status.

Each operation is linked to one or more enablers which are organized into four categories and sub-groups:

1. CAD Connectivity based on direct communication or on cellular communication
   - GROUP E.2.3.1 Vehicle to Vehicle Communications
   - GROUP E.2.3.2 Vehicle to Infrastructure and Infrastructure to Vehicle Communications
   - GROUP E.2.3.3 Vehicle to Cloud (Edge and Core)
   - GROUP E.2.3.4 Vehicle Intention Communication
2. CAD High precision positioning techniques
   - GROUP E.2.4.1 Geo-referenced Cloud Services
   - GROUP E.2.4.2 Sensor Fusion for Localisation
   - GROUP E.2.4.3 Positioning relying on Ranging Signals
3. CAD Cybersecurity: shielding from V2X cyber-attacks
   - GROUP E.2.5.1 Threat Analysis and Risk Assessment
   - GROUP E.2.5.2 V2X Cyber-Risks Mitigation
4. CAD Machine Learning (ML) Techniques
   - GROUP E.2.6.1 CAD ML Toolkit for ML developers
   - GROUP E.2.6.2 CAD ML Perception, Object Detection and Classification
   - GROUP E.2.6.3 CAD ML Decision-Making
   - GROUP E.2.6.4 CAD ML Driver Monitoring

Hereafter a table with an overview of all Hi-Drive operations is provided:

Table 3.1: Overview of all Hi-Drive operations

N°	Op ID	Analysis partner	Vehicle (V) /Simulations (S)	Enabler description	Enabler Sub-group	Operation brief description
1	1.1	Defined	V & S	Front free area estimation	**E.2.6.2**	Motorway operation based on driving in a tunnel, a construction zone, passing under a bridge and in harsh weather conditions
2	2.1	Defined	V	Driver Intention Prediction	**E.2.6.2**	Symbol-based Communication: Feasibility of driver intention interpretation for manoeuvre prediction and communication with pedestrians
3	3.1	Defined	V	Conformal prediction in driver monitoring systems	**E.2.6.4**	On-road studies with, User interaction with AD, repeated use with safety-driver and L3Pilot vehicle
	3.2					On-road studies with, User interaction with AD, repeated use without safety-driver and new test vehicle on
4	4.1	Defined	V	Camera-based depth estimation	**E.2.6.2**	In Urban, integration of the enabler and test in proving grounds and real scenarios
				Camera-based motion estimation		
				Camera-based object detection		
5	5.1	On going	V	-V2I hazard warning and dynamic signage at junctions	**E.2.3.2**	Preventive take-over requests or ADF deactivation thanks to preventive knowledge of dynamic events.
				-V2N dynamic road information for ODD adaptation	**E.2.3.3**	
	5.2		V	-Positioning based information service	**E.2.4.1**	Lane level positioning in challenging areas of high-speed roads.
				-Sensor fusion for Localization	**E.2.4.2**	
	5.3		V	Driver Manoeuvre Intention Recognition (DMIR)	**E.2.6.3**	Tests on private test-track and/or real-roads.
	5.4		V & S	Driver's Distraction Detection	**E.2.6.4**	Integration on vehicle and tests in real-world / private test-track and virtual ones
6	6.1	On going	V	V2V for automated overtaking	**E.2.3.1**	Integration of the enabler and test in proving grounds and real scenarios
	6.2			-I2V for hazard warning	**E.2.6.2**	In motorway, managing risky situations
				-Driver´s level of attention monitoring	**E.2.3.2**	
	6.3			V2X for highway junctions	**E.2.3.2**	Integration of the enabler and test in proving grounds and real scenarios
	6.4			Sensor fusion for Localization	**E.2.4.2**	Use of HD maps, DGPS, IMUs, and cameras for localization
	6.5			Seamless positioning for slow speed manoeuvres in varying conditions	**E.2.4.2**	Use of Lidar and IMUs for localization
	6.6			-Cyber-security recommendations in V2X for highway entry	**E.2.5.2**	Design countermeasures techniques and their corresponding tests
				-Driver´s level of attention monitoring	**E.2.6.4**	

N°	Op ID	Analysis partner	Vehicle (V) /Simulations (S)	Enabler description	Enabler Sub-group	Operation brief description
7	7.1	On going	V	V2V for cooperative manoeuvring (highway on-ramp merging)	**E.2.3.1**	Automated motorway on-ramp situation on test track with V2V support
8	8.1	Defined	V	Green light optimized speed advisory (GLOSA_F)	**E.2.3.2**	GLOSA in urban environment
	8.2		V	Navigation guided AD	**E.2.4.2**	Navigation guided AD
	8.3		V	-Seamless positioning for slow speed manoeuvres in varying conditions	**E.2.4.2**	Automated Valet Parking System
				-Navigation guided AD		
9	9.1	Defined	V	V2V for manoeuvre coordination (highway on-ramp merging)	**E.2.3.1**	Vehicle on test track (with AD on) & operational site (with AD off).
10	10.1	Defined	V	-I2V for road hazards notification and dynamic signage	**E.2.3.2**	Test track and real road validation of motorway chauffeur with support for road hazards and dynamic signage via connectivity enablers
				-N2V for road hazards notification and dynamic signage	**E.2.3.3**	
	10.2			V2N for cooperative sensing	**E.2.3.3**	Test track validation of urban chauffeur with support non-signalized intersections via connectivity enabler
	10.3			-V2V for cooperative manoeuvring	**E.2.3.1**	Test track validation of motorway chauffeur with support for merging sections via connectivity and robust positioning enablers
				-Sensor fusion for Localization	**E.2.4.2**	
11	11.1	Defined	V	No enabler	**No enabler**	No ADF, only simulated ADF via WoZ Impact of car sickness on (driving) performance.
12	12.1	Defined	V	V2I for ODD extension and defragmentation	**E.2.3.2**	GLOSA / GREEN WAVE TRAVELLER Use cases | Test in intern facilities, proving grounds, and real scenarios
	12.2			Sensor fusion for Localization	**E.2.4.2**	Use of HD maps, DGPS, IMUs, and cameras for localization
	12.3			Positioning for slow-speed manoeuvres	**E.2.4.2**	Use of Lidar and IMUs for localization
13	13.1	Defined	V	V2N Field monitoring	**E.2.3.3**	Safety is the main concern to develop a function and the dedicated safety concept for the automated vehicle is named SOTIF. From Level3 to level 5, a lot of safety concepts are relevant to develop an ADAS function. One concept is general for all "autonomous drives" and known as a "Field monitoring" activity.
	13.2			GNSS foresight reliability	**E.2.4.1**	Forecasting in advance GNSS signals quality in challenging environments
	13.3			V2N Localisation and objects detection	**E.2.4.2**	Localisation and objects detection in Urban Environment
14	14.1	Defined	V	V2V for cooperative awareness	**E.2.3.1**	Urban chauffeur with improved safety/comfort

N°	Op ID	Analysis partner	Vehicle (V) /Simulations (S)	Enabler description	Enabler Sub-group	Operation brief description
15	15.1	On going	V	-V2N for cooperative sensing	**E.2.3.3**	Automated driving through complex junctions with the support of infrastructure sensing
				-Object detection	**E.2.6.2**	
	15.2			Vehicle intention/trajectory prediction	**E.2.6.2**	Motorway shadow mode driving for data collection and enabler evaluation
16	16.1	Defined	V	Positioning in GNSS denied areas based on SLAM	**E.2.4.2**	Motorway chauffeur with support of GPS denied regions
					E.2.6.2	
	16.2			Geometry identification and location of Construction areas	**E.2.4.2**	Motorway chauffeur with support of construction areas
					E.2.6.2	
17	17.1	Defined	V	Communication by lighting - Display, (TBC) Projection	**E.2.3.4**	Test of communication to pedestrian crossing the road, on test track
	17.2			Communication by lighting - Display	**E.2.3.4**	Test of communication to following driver, on test track
	17.3			Communication by lighting -	**E.2.3.4**	Test of communication to pedestrian in parking scenario, on test track
				Display and Projection		
18	18.1	On going	V	V2V for Cooperative Maneuver	**E.2.3.1**	Test cooperative lane merge between passenger cars and trucks utilizing ITS-G5 based V2V communication.
	18.3			V2V for cooperative Sensing	**E.2.3.1**	Test safe overtake where a passenger car overtakes a truck utilizing ITS-G5 based V2V communication
	18.2			V2I for ODD extension and defragmentation	**E.2.3.2**	Test safe overtake where a passenger car overtakes a truck utilizing ITS-G5 based V2V communication
19	19.1	Defined	V	N2V use of external data sources for ODD prediction	**E.2.3.3**	using weather data
	19.2			V2N for cooperative sensing	**E.2.6.1**	Using HD maps data
	19.3			Positioning based information service	**E.2.4.1**	Landmark-based position accuracy in snowy conditions
20	20.1	On going	V	Green light optimized speed advisory (GLOSA_F)	**E.2.3.2**	Urban chauffeur with support for rural sections and cross-border
	20.2			Trajectory planning	**E.2.6.3**	
	20.3					

3.2 Detailed summaries of operations

This paragraph is presenting summary tables for all Hi-Drive operations based on the template presented in Table 2.1 in chapter 2.4.3. All operations are summarized following the same template and defined by the operation I.D.

Remark: Chapters 3.2 and 3.3 are an image of 8th of July 2022 for the information of each operation preparation. The provided information is subject to change in the future.

Operations planning is following the sub-project "Operations" SP5 timeline given in Annex 2.

Operation 1.1

Table 3.2: Summary table for operation 1.1

1- Operation Summary			
Operation Leader	1	**Operation ID**	1.1
ID and title of the ADF under test	*ACC in harsh weather conditions and in road works for automated motorway driving.*	**Enabler(s) sub-group**	E.2.6.2
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Motorway		
2- Operation purpose /evaluation focus per UC			
M.1	☑ *Challenging ODD conditions to be tested* • *Driving in a tunnel*		
M.2	☑ *Challenging ODD conditions to be tested* • *Driving in a construction zone*		
M.3	☑ *Challenging ODD conditions to be tested* • *Driving in a motorway and passing under a bridge.*		
M.4	☑ *Challenging ODD conditions to be tested* • *Driving in harsh weather conditions*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort* ☑ *Extended ODD*	**Open Road main Location**	*France* *Germany*
4- Operation Environment/Content & Planning			
	Virtual	**Open Road**	
Brief description of the experiment	*ACC scenarios in a virtual environment with a sensor model and the enabler in open loop to evaluate the performance* ☑ *Other: Software simulation (CarMaker)*	*AV prototype is driven on the motorway with the following conditions* *through a tunnel* *under a bridge* *through a construction zone with or without barriers* *in harsh weather conditions.* *The AD function is turned on before entering these conditions and data is logged from the enabler in an open-loop system to analyze the performance.* ☑ *AV prototype*	
Participants	**Number of total participants expected**	*10*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*June 2022*	*December 2022*	
Pre-operation Phase	*October 2022*	*February 2023*	
Operation	*March 2023*	*December 2024*	

Operation 2.1

Table 3.3: Summary table for operation 2.1

1- Operation Summary			
Operation Leader	2	**Operation ID**	2.1
ID and title of the ADF under test	*No ADF is used.*	**Enabler(s) sub-group**	E.2.6.2
Hi-Drive Data Analysis Partner	*Defined*	**Number of vehicles in the operation**	<50
UC classes treated	☑ Urban		
2- Operation purpose /evaluation focus per UC			
U.1/U.2	☑ *Challenging traffic interaction with other road user to be tested* *•This tasks aims to test the enabler 2.6.2.k that focuses on the vehice-pedestrian-communication using implicit communication*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *User-Interactions with other road users* ☑ *Nominal ODD*	**Open Road main Location**	*Germany*
4- Operation Environment/Content & Planning			
	Open Road		
Brief description of the experiment	*In the surronding of pedestrian crossings (recognized via traffic sign recognition), data is collected and evaluated. We use one route for test and one for training data of the Machine Learning model.* ☑ *non-automated Vehicle*		
Participants	**Number of total participants expected**	*< 100*	
	Information on the participants type	*Employees*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*July 2022*	*April 2023*	
Pre-operation Phase	*August 2022*	*September 2023*	
Operation	*July 2022*	*September 2023*	

Operation 3.1

Table 3.4: Summary table for operation 3.1

1- Operation Summary			
Operation Leader	3	**Operation ID**	3.1
ID and title of the ADF under test	ADF_1 : Motorway chauffeur ADF_2 : Urban motorway chauffeur	**Enabler(s) sub-group**	E.2.6.4
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	2
UC classes treated	☑ Motorway + "Urban motorway"		
2- Operation purpose /evaluation focus per UC			
M.1	☑ *Challenging system-driver interaction to be tested* *Testing repeated use effect of automated driving on driver's behavior, system usage, engagement in non-driving related tasks and attitude/acceptance towards ADF.* *This is tested on motorway and urban motorway to cover different speed limits and evaluate whether the road type has an effect on driver behavior. A safety-driver is present on the co-driver seat.*		
M.2	*•Driver's interaction with non-driving related tasks* *•System usage over time (repeated use)* *•Driver monitoring: attention towards road*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *User-ADf acceptance &comfort* ☑ *Nominal ODD → Motorway* ☑ *Extended ODD → Urban motorway*	**Open Road main Location**	*Germany*
	☑ *User-ADf usage* ☑ *Nominal ODD → Motorway* ☑ *Extended ODD → Urban motorway*		
4- Operation Environment/Content & Planning			
	Open Road		
Brief description of the experiment	*The research focus of these operations is rather on user-related evaluation, less on technical evaluation. However, the collected driving data will be made avialable to be included in technical evaluation.* *Operational trigger points defined by: activation ADF, deactivation ADF.* ☑ *Multiple AV prototypes*	*Repeated trips by participants:* *M.1: Automated driving on Motorway (4x on the same route) with safety-driver.* *U.1: Automated driving on Urban Motorway (4x on the same route) with safety-driver.* *Free choice of ADF usage, when ADF is active, NDRT are allowed.* ☑ *Multiple AV prototypes*	
Participants	**Number of total participants expected**	*•30 for Motorway (M.1)* *•30 for Urban Motorway (U.1)*	
	Information on the participants type	*Ordinary drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*October 2021*	*•U.1: September 2022* *•M.1: March 2023*	
Pre-operation Phase	*•U.1: July 2022* *•M.1: March 2022*	*•U.1: September 2022* *•M.1: May 2022*	
Operation	*•U.1: September 2022* *•M.1: May 2023*	*•U.1: November 2022* *•M.1: July 2023*	

Operation 3.2

Table 3.5: Summary table for operation 3.2

1- Operation Summary			
Operation Leader	3	**Operation ID**	3.2
ID and title of the ADF under test	ADF_2 : Urban motorway chauffeur	**Enabler(s) sub-group**	E.2.6.4
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Motorway = "Urban motorway"		
2- Operation purpose /evaluation focus per UC			
M.3	☑ *Challenging system-driver interaction to be tested* *Testing repeated use effect of automated driving on driver's behavior, system usage, engagement in non-driving related tasks and attitude/acceptance towards ADF.* *This is tested on motorway and urban motorway to cover different speed limits and evaluate whether the road type has an effect on driver behavior. A safety-driver is present on the co-driver seat.* *•Driver's interaction with non-driving related tasks without safety-driver present* *•System usage over time (repeated use) without safety-driver present* *•Driver monitoring: attention towards road without safety-driver present*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *User-ADf usage* ☑ *Extended ODD → Urban motorway* ☑ *User-ADf acceptance &comfort* ☑ *Extended ODD → Urban motorway*	**Open Road main Location**	*Germany*
4- Operation Environment/Content & Planning			
	Open Road		
Brief description of the experiment	*The research focus of these operations is rather on user-related evaluation, less on technical evaluation. However, the collected driving data will be made avialable to be included in technical evaluation. Operational trigger points defined by: activation ADF, deactivation ADF.* ☑ *AV prototype*	*Repeated trips by participants:* *Automated driving on Urban Motorway (4x on the same route) without safety-driver* *Free choice of ADF usage, when ADF is active, NDRT are allowed.* ☑ *AV prototype*	
Participants	**Number of total participants expected**	*n=30 for Urban Motorway (U.2)*	
	Information on the participants type	*Ordinary drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*October 2021*	*March 2024*	
Pre-operation Phase	*March 2022*	*April 2024*	
Operation	*April 2024*	*June 2024*	

Operation 4.1

Table 3.6: Summary table for operation 4.1

1- Operation Summary			
Operation Leader	4	**Operation ID**	4.1
ID and title of the ADF under test	*Automated driving without LIDAR on urban roads*	**Enabler(s) sub-group**	E.2.6.2, E.2.6.2, E.2.6.2
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	*1*
UC classes treated	☑ Urban		
2- Operation purpose /evaluation focus per UC			
U.1	☑ *Challenging ODD conditions to be tested* •*Far away objects* •*Small objects*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD* ☑ *Extended ODD* ☑ *ODD boundary*	**Controlled Track Location** **Open Road main Location**	*Germany*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)	**Open Road**	
Brief description of the experiment	*Testing the ADF with camera-based environment perception and recording data for offline comparison of lidar-based and camera-based perception system.* *One simple fixed route (with or without other traffic participants) will be used.* ☑ *AV prototype*	*Testing the ADF with camera-based environment perception and recording data for offline comparison of lidar-based and camera-based perception system.* *One fixed route and arbitrarily selected routes will be used. Typical traffic participants (cars, trucks, cyclists, pedestrians) are expected.* ☑ *AV prototype*	
Participants	**Number of total participants expected**	*3*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*January 2022*	*October 2022*	
Pre-operation Phase	*November 2022*	*June 2023*	
Operation	*June 2023*	*June 2024*	

Operation 5.1

Table 3.7: Summary table for operation 5.1

1- Operation Summary			
Operation Leader	5	**Operation ID**	5.1
ID and title of the ADF under test	*V2X_1 Highway chauffer extended ODD*	**Enabler(s) sub-group**	E.2.3.2 E.2.3.3
Hi-Drive Data Analysis Partner	Pending	**Number of vehicles in the operation**	1
UC classes treated	☑ Motorway		
2- Operation purpose /evaluation focus per UC			
M.1	☑ *Challenging ODD conditions to be tested* *devitations from normal driving operations: e.g. modified speed-limit, traffic-light phases.*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Extended ODD*	**Open Road main Location**	*Italy*
		Open Road optional Location	*Austria*
4- Operation Environment/Content & Planning			
	Open Road		
Brief description of the experiment	*High-speed roads.* *Triggers:* *M.1 Activation/deactivation of Highway Chauffeure ADF.* ☑ *AV prototype*		
Participants	**Number of total participants expected**	*2*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*October 2022*	*January 2023*	
Pre-operation Phase	*February 2023*	*May 2023*	
Operation	*May 2023*	*December 2023*	

Operation 5.2

Table 3.8: Summary table for operation 5.2

1- Operation Summary			
Operation Leader	5	**Operation ID**	5.2
ID and title of the ADF under test	*POS_1 Highway chauffer extended ODD*	**Enabler(s) sub-group**	E.2.4.1 E.2.4.2
Hi-Drive Data Analysis Partner	Pending	**Number of vehicles in the operation**	1
UC classes treated	☑ Motorway		
2- Operation purpose /evaluation focus per UC			
M.1	☑ *Challenging ODD conditions to be tested* *missing GNSS signals* *missing lane markings*		
M.2	☑ *Challenging ODD conditions to be tested* *continuity of lane-level position in tunnels.*		
M.3	☑ *Challenging ODD conditions to be tested* *continuity of lane-level position when: - lane markings are not available,* *- GNSS degraded areas.*		
3- Evaluation area focus & Location			
Test scenarios IDs: M.1	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD*	**Open Road main Location**	*Italy*
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Extended ODD*	**Open Road optional Location**	*Austria*
4- Operation Environment/Content & Planning			
	Open Road		
Brief description of the experiment	*Highway roads.* *Triggers:* *M.1 Activation/deactivation of Highway Chauffeure ADF.* *M.2 Need to drive toward a tunnel (geofenced area).* *M.3 Need to identify areas where lane-markings are not available or cannot be seen due to visibility/light problems (geofenced area).* ☑ *AV prototype*		
Participants	**Number of total participants expected**	*2*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*October 2022*	*January 2023*	
Pre-operation Phase	*February 2023*	*May 2023*	
Operation	*May 2023*	*December 2023*	

Operation 5.3

Table 3.9: Summary table for operation 5.3

1- Operation Summary			
Operation Leader	5	**Operation ID**	5.3
ID and title of the ADF under test	Motorway chauffeur with support of different enablers	**Enabler(s) sub-group**	E.2.6.3
Hi-Drive Data Analysis Partner	Pending	**Number of vehicles in the operation**	1
UC classes treated	☑ Motorway		
2- Operation purpose /evaluation focus per UC			
M.1	☑ *Minimum risk manoeuver (if applicable)* *In certain circumstances (e.g. due to reach ODD end, V2V signal error, positioning error) the ADF is able to perform a MRM (see ADF and UC Description).* *However, the objective of this use case is not to test its execution.*	☑ *Challenging system-driver interaction to be tested* *To adapt the strategies of ADAS applications (the lowest SAE levels of automation) to the driver's intention (for example, when approaching a vehicle ahead, a front collision warning can be delayed because the system "knows" that the driver intends to overtake).* *To reproduce more "human-like" strategies of ADF based on the preferences inferred by the system, as driver's intentions, during the manual mode driving sessions.*	
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD* ☑ *Extended ODD*	**Open Road main Location** **Controlled Track Location**	*Italy*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)	**Open Road**	
Brief description of the experiment	*The experiment will take place at the proving grounds.* *When the system detects and predict the driver's intention to overtake - for example - it supports him/her in executing the manoeuver (e.g. checking if the left lane is free, even if the driver forgets to use the turn indicator).* ☑ *AV prototype*	*The experiment on open road is not yet decided / defined at the moment.* *If possible, it should be carried with similar modalities to the experiment on the test-track.* ☑ *AV prototype*	
Participants	**Number of total participants expected**	*10*	
	Information on the participants type	*Employees*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*December 2021*	*March 2023*	
Pre-operation Phase	*December 2022*	*February 2023*	
Operation	*April 2023*	*December 2023*	

Operation 5.4

Table 3.10: Summary table for operation 5.4

1- Operation Summary			
Operation Leader	5	**Operation ID**	5.4
ID and title of the ADF under test	Motorway Chauffeur (MC) with support of different enablers	**Enabler(s) sub-group**	E2.6.4
Hi-Drive Data Analysis Partner	Pending	**Number of vehicles in the operation**	1
UC classes treated	☑ Motorway		
2- Operation purpose /evaluation focus per UC			
M.2	☑ *Minimum risk manoeuver (if applicable)* *In certain circumstances (i.e. due to reach ODD end,) the ADF is able to perform a MRM.* *However, the objective of this use case is not to test its execution.*	☑ *Challenging system-driver interaction to be tested* *This classifier will be developed real-time and online, with a threefold goal:* *•To adapt on-board technologies, in order to mitigate the effects of distraction.* *•To adapt the strategies of the AD (through the different SAE Levels of Automation), in order to minimize the effects of distraction on the driving task or on the Take-over Request (TOR).* *•To optimize the sharing and control strategies between the automated system and the human driver.* *Under this point of view, the expected impacts are related to safety (both for occupants and for other traffic participants) and to user's experience (towards more acceptance of AVs, because the system is really able to "understand my situation").*	
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD* ☑ *Extended ODD*	**Open Road main Location**	*Italy*
	☑ *User-ADF usage* ☑ *Nominal ODD*	**Controlled Track Location**	
4- Operation Environment/Content & Planning			
	Controlled (Test Track)	**Open Road**	**Virtual**
Brief description of the experiment	*The experiment will take place at the proving grounds of operation leader site.* *When the system detects the driver distraction, it modifies accordingly the "Take Over Request" (TOR) strategies (e.g. the ADF waits the right time to provide a TOR - if possible - or a MRM is actuated, instead a "simple" function disengagement).* ☑ *AV prototype*	*The experiment on open road is not yet decided / defined at the moment.* *If possible, it should be carried with similar modalities to the experiment on the test-track.* ☑ *AV prototype*	*Data collection for the development of the enabler, in which the user is distracted by means a series of secondary tasks and data are collected.* *Driving simulator can be used also for testing the enabler + ADF.* ☑ *Driver Simulator (Human-In-The-Loop)*
Participants	**Number of total participants expected**	*10*	
	Information on the participants type	*Employees*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*Ferbuary 2023*	*April 2023*	
Pre-operation Phase	*April 2023*	*September 2023*	
Operation	*September 2023*	*March 2024*	

Operation 6.1

Table 3.11: Summary table for operation 6.1

1- Operation Summary			
Operation Leader	*6*	**Operation ID**	6.1
ID and title of the ADF under test	*Motorway chauffeur with support of different enablers*	**Enabler(s) sub-group**	E.2.3.1
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	2
UC classes treated	☑ Motorway		
2- Operation purpose /evaluation focus per UC			
M.1	☑ *Challenging ODD conditions to be tested* *•Motorway*	☑ *Challenging traffic interaction with other road user to be tested* *Interaction with a vehicle driving ahead slower than ego vehicle.* *Interaction with a vehicle on the left lane coming from the rear at high speed.* *Interaction with a vehicle driving behind the ego vehicle, that occludes the field of view of the onboard rear sensors.*	
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD* ☑ *Extended ODD*	**Open Road main Location** **Controlled Track Location**	*Spain*
4- Operation Environment/Content & Planning			
	Open Road	**Controlled (Test Track)**	
Brief description of the experiment	*The experiment will take place on a real motorway where lanes are straight. There are two lanes on the motorway where the experiment will be tested.* *During the experiment the three vehicles (leading legacy vehicle, ego vehicle and connected vehicle) will drive within the same lane and keeping a safe distance and when they arrive to the test location and the conditions are met the overtaking manoeuver will be triggered.* *In case the left lane is not available due to the presence of a legacy vehicle the ego vehicle will decelerate while it keeps driving within the current lane.* *There is just one fixed route.* *The route is inside a geofenced area.* ☑ *Multiple AV prototypes*	*The experiment will take place at the proving grounds.* *The ego vehicle, which is equipped with the ADF, will be preceding by a legacy vehicle and also a connected vehicle (L2) will be driving behind the ego.* *The leading vehicle speed has to be lower than vehicle ones and the connected vehicle will send its radar information to the ego vehicle.* *The leading vehicle speed and the absence of another vehicle driving within the left lane will trigger the overtaking manoeuver performance. The manoeuver will finish once the ego vehicle comes back to the origin lane ahead the slow legacy vehicle.* *Also, the experiment will be tested in case another legacy vehicle is detected by the connected vehicle approaching from the left lane.* *The scenario will be set up with at least 3 vehicles apart from the ego vehicle:* *•a leading vehicle that the ego vehicle will try to overtake* *•a connected vehicle behind the ego that will block rear visibility of the ego sensors, and that will share the information from its sensors with the ego vehicle* *•a legacy i.e. non-connected vehicle, approaching from the left lane.* ☑ *Multiple AV prototypes*	
Participants	**Number of total participants expected**	*10*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*April 2022*	*December 2022*	
Pre-operation Phase	*November 2022*	*August 2023*	
Operation	*May 2023*	*July 2024*	

Operation 6.2

Table 3.12: Summary table for operation 6.2

1- Operation Summary			
Operation Leader	6	**Operation ID**	6.2
ID and title of the ADF under test	*Motorway chauffeur with support of different enablers*	**Enabler(s) sub-group**	E.2.3.2, E.2.6.4
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Motorway		
2- Operation purpose /evaluation focus per UC			
M.2	☑ *Challenging system-driver interaction to be tested* *•Driver monitoring*	☑ *Challenging ODD conditions to be tested* *•Motorway* *•Roadworks area* *•Risky weather situations (fog, heavy rain)*	
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD* ☑ *Extended ODD*	**Open Road main Location** **Controlled Track Location**	*Spain*
4- Operation Environment/Content & Planning			
	Open Road	**Controlled (Test Track)**	
Brief description of the experiment	*The experiment will be located at a motorway. The lanes are straights and the motorway has two lanes at that location.* *A roadworks or weather warning will be sent by a simulated Traffic Management Center to the ego vehicle warning about the hazard event triggering a reaction from the ADF.* *There is just one fixed route.* *The route is inside a geofenced area.* ☑ *AV prototype*	*The experiment will take place at the proving grounds.* *One of the scenarios consists on: when the ego vehicle is approaching to a roadworks area installed on the proving ground, a simulated Traffic Management Center sends a roadworks warning to the vehicle. Then, the driver monitoring checks and informs to the driver to be aware of the road while the ego vehicle manage the risky situation by its own.* *On the other scenario the ego vehicle receives simulated weather conditions warning so that it manages the situation adapting the vehicle speed if necessary.* *The scenario will be set up with:* *the ego vehicle* *sensors installed at the edge of the road* *a RSU (Roadside Unit)* *a simulated ITS-Center or Traffic Management Center* ☑ *AV prototype*	
Participants	**Number of total participants expected**	*10*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*April 2022*	*December 2022*	
Pre-operation Phase	*January 2023*	*September 2023*	
Operation	*April 2023*	*May 2024*	

Operation 6.3

Table 3.13: Summary table for operation 6.3

1- Operation Summary			
Operation Leader	6	**Operation ID**	6.3
ID and title of the ADF under test	*Motorway chauffeur with support of different enablers*	**Enabler(s) sub-group**	E.2.3.2
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Motorway		
2- Operation purpose /evaluation focus per UC			
M.3	☑ *Challenging traffic interaction with other road user to be tested* *•Interaction with a vehicle approaching from the on-ramp.*	☑ *Challenging ODD conditions to be tested* *•Motorway off-ramp*	
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD* ☑ *Extended ODD*	**Open Road main Location** **Controlled Track Location**	*Spain*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)	**Open Road**	
Brief description of the experiment	*The experiment will take place at the proving grounds.* *The ego vehicle route continues taking an exit and the simulated infrastructure sends I2V messages with information about the objects approaching from the right.* *If the lane is available the ego vehicle will take the exit, if not the vehicle has to adapt the speed.* *The scenario will be set up with:* *the ego vehicle* *sensors installed at the edge of the road* *a RSU (Roadside Unit)* *a simulated ITS-Center TBC* ☑ *AV prototype*	*The experiment on open road will be located on a motorway.* *The off-ramp and the on-ramp involved are both curved.* *While the number of motorway lanes are 3 the on-ramp and off-ramp have just one.* *When the ego vehicle is arriving at the exit it needs to take, it receives an I2V message with the information of the objects approaching from the on-ramp.* *The first scenario consists of the lane being available so that the ego vehicle will take the exit. The experiment is considered as finished when the ego vehicle is driving within the off-ramp.* *The second scenario consists of the lane being unavailable so that the ego vehicle has to adapt its speed.* *There is just one fixed route.* *The route is inside a geofenced area.* ☑ *AV prototype*	
Participants	**Number of total participants expected**	*10*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*April 2022*	*December 2022*	
Pre-operation Phase	*December 2022*	*August 2023*	
Operation	*March 2023*	*May 2024*	

Operation 6.4

Table 3.14: Summary table for operation 6.4

1- Operation Summary			
Operation Leader	6	**Operation ID**	6.4
ID and title of the ADF under test	*Motorway chauffeur with support of different enablers*	**Enabler(s) sub-group**	E.2.4.2
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Motorway		
2- Operation purpose /evaluation focus per UC			
M.4	☑ *Challenging ODD conditions to be tested* *•Bridge over the motorway*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD* ☑ *Extended ODD*	**Open Road main Location** **Controlled Track Location**	*Spain*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)	**Open Road**	
Brief description of the experiment	*The experiment will take place at the proving grounds of operation leader site.* *As there is no bridge built at the operation leader facilites the DGPS signal lost will be simulated to be able to test the enabler influence.* *The lane markers have good quality so that the ego vehicle will be able to use the sensor fusion to keep driving within the current lane when the GPS signal lost is simulated.* *The scenario will be set up with:* *the ego vehicle* ☑ *AV prototype*	*The experiment location will be on a motorway. There is a bridge over the motorway and the lanes are straight at that location.* *Also, there are two lanes per direction.* *The GPS signal lost due to the bridge will trigger the experiment.* *The ego vehicle, thanks to the sensor fusion (Camera, LiDAR, Radar) and its mapmatching with the internal HD-Map, is able to keep driving within the current lane improving the AD function.* *There is just one fixed route.* *The route is inside a geofenced area.* ☑ *AV prototype*	
Participants	**Number of total participants expected**	*10*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*April 2022*	*December 2022*	
Pre-operation Phase	*January 2023*	*August 2023*	
Operation	*February 2023*	*May 2024*	

Operation 6.5

Table 3.15: Summary table for operation 6.5

1- Operation Summary			
Operation Leader	6	**Operation ID**	6.5
ID and title of the ADF under test	*Parking chauffeur with support of seamless positioning enabler.*	**Enabler(s) sub-group**	E.2.4.2
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Parking		
2- Operation purpose /evaluation focus per UC			
P.1	☑ *Challenging traffic interaction with other road user to be tested* *•Interaction with a crossing pedestrian*	☑ *Challenging ODD conditions to be tested* *Transition between outdoors and indoors.*	
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD* ☑ *Extended ODD* ☑ *ODD boundary*	**Controlled Track Location**	*Spain*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)		
Brief description of the experiment	*The vehicle will start driving from outdoors when the driver sends it a parking manoeuver request via a smartphone app. Then, the ego vehicle will drive itself indoors and park correctly and aligned with the parking spot.* *During the experiment a pedestrian will cross ahead.* *Once the ego is stopped in the parking spot and the engine is off the experiment will be considered as finished.* *The scenario will be set up with:* *•the ego vehicle* *•a smartphone app* ☑ *AV prototype*		
Participants	**Number of total participants expected**	*10*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*April 2022*	*September 2022*	
Pre-operation Phase	*December 2022*	*July 2023*	
Operation	*January 2023*	*March 2024*	

Operation 6.6

Table 3.16: Summary table for operation 6.6

1- Operation Summary			
Operation Leader	6	**Operation ID**	6.6
ID and title of the ADF under test	*Motorway chauffeur with support of different enablers*	**Enabler(s) sub-group**	E.2.5.2, E.2.6.4
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Motorway		
2- Operation purpose /evaluation focus per UC			
M.5	☑ *Challenging traffic interaction with other road user to be tested* *•Interaction with vehicle approaching driving on the motorway.*	☑ *Challenging system-driver interaction to be tested* *•Driver monitoring* *•Take-over request (TOR)*	☑ *Challenging ODD conditions to be tested* *•Motorway on-ramp*
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD* ☑ *Extended ODD*	**Open Road main Location** **Controlled Track Location**	*Spain*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)	**Open Road**	
Brief description of the experiment	*The experiment will take place at the proving grounds.* *The ego vehicle, which is equipped with the ADF, is trying to perform a lane merge and a cyber-attack will be simulated. Therefore, the I2V information received will not be reliable.* *The suitable countermeasures should avoid the attack so that the ADF will keep activated with no errors.* *Other test scenario will imitate a situation where the countermeasures are not effective. Then, the driver monitoring system checks that the driver is not attentive so that the ADF will decide to trigger a MRM.* *Another test scenario will imitate a situation where the countermeasures are not effective. Then, the driver monitoring system checks that the driver is attentive so that the ADF will trigger a TOR.* *The scenario will be set up with:* *•the ego vehicle* *sensors installed at the edge of the road* *•a RSU (Roadside Unit)* *•a simulated ITS-Center or Traffic Management* ☑ *AV prototype*	*The experiment will be located on a motorway at O Porriño. The on-ramp, which will be used by the ego vehicle to merge into the motorway lane, is lightly curved and there is just one lane.* *A cyber-attack to the ego vehicle will be simulated so that the I2V information received from the infrastructure is no reliable. Then, the countermeasures designed by the cyber-security system will avoid the attack keeping the ADF activated (this is a test scenario)* *If the countermeasures have not the capability to avoid the attack keeping the ADF activated and the driver monitoring system checks that the driver is not attentive, a MRM will be executed. This will set another scenario.* *If the countermeasures do not have the capability to avoid the attack keeping the ADF activated and the driver monitoring system checks that the driver is attentive, a TOR will be executed. This will set the last scenario.* *There is just one fixed route* *The route is inside a geofenced area* ☑ *AV prototype*	
Participants	**Number of total participants expected**	*10*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*April 2022*	*February 2023*	
Pre-operation Phase	*February 2023*	*November 2023*	
Operation	*April 2023*	*June 2024*	

Operation 7.1

Table 3.17: Summary table for operation 7.1

1- Operation Summary			
Operation Leader	7	**Operation ID**	7.1
ID and title of the ADF under test	*Motorway chauffeur with support of negotiation for on-ramp sections*	**Enabler(s) sub-group**	E.2.3.1
Hi-Drive Data Analysis Partner	Pending	**Number of vehicles in the operation**	*3*
UC classes treated	☑ Motorway		
2- Operation purpose /evaluation focus per UC			
M.1	☑ *Challenging ODD conditions to be tested* *The ego vehicle drives on the on-ramp with the intention of entering the highway, while the other vehicle approaches the merging section on the highway. The intended manoeuvres of the two vehicles are in conflict and must therefore be coordinated.*		
M.2	☑ *Challenging ODD conditions to be tested* *The ego vehicle approaches the merging section on the highway, while the other vehicle drives on the on-ramp with the intention of entering the highway. The intended manoeuvres of the two vehicles are in conflict and must therefore be coordinated.*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Extended ODD* ☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD* ☑ *Extended ODD*	**Controlled Track Location**	*Germany*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)		
Brief description of the experiment	*One vehicle driving on the ramp wants to merge into the highway, where another vehicle drives on the right lane next to the ramp. The colliding situation will be solved by a collaborative approach between both vehicles. Either the vehicle on the highway gives space to the merging one or the merging vehicle must slow down or stop until the highway vehicle has passed by and there is no longer a conflict.* ☑ *Multiple AV prototypes*		
Participants	**Number of total participants expected**	*4-6*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*October 2022*	*January 2023*	
Pre-operation Phase	*January 2023*	*April 2023*	
Operation	*April 2023*	*December 2024*	

Operation 8.1

Table 3.18: Summary table for operation 8.1

1- Operation Summary			
Operation Leader	8	**Operation ID**	8.1
ID and title of the ADF under test	GLOSA in urban environment	**Enabler(s) sub-group**	E.2.3.2
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Urban		
2- Operation purpose /evaluation focus per UC			
U.1	☑ Challenging ODD conditions to be tested Traffic light interaction Reacting on external information Trust signal phase and timing		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Extended ODD*	**Open Road main Location**	*Germany*
		Open Road optional Location	*Netherland*
4- Operation Environment/Content & Planning			
	Open Road		
Brief description of the experiment	*Driving on open road, reading Traffic light information, acting on signal phase and timing to get a smooth drive through green or stop at red* ☑ *AV prototype*		
Participants	**Number of total participants expected**	*2*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*April 2022*	*January 2023*	
Pre-operation Phase	*December 2022*	*April 2023*	
Operation	*May 2023*	*December 2023*	

Operation 8.2

Table 3.19: Summary table for operation 8.2

1- Operation Summary			
Operation Leader	*8*	**Operation ID**	*8.2*
ID and title of the ADF under test	*Navigation guided AD*	**Enabler(s) sub-group**	*E.2.4.2*
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	*1*
UC classes treated	☑ Motorway		
2- Operation purpose /evaluation focus per UC			
M.1	☑ *Challenging ODD conditions to be tested* *interchange on motorway* *leaving the straight path* *entering & merging into new motorway*		
M.2	☑ *Challenging ODD conditions to be tested* *interchange on motorway* *leaving the interchange and enter the motorway via enabler.*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Extended ODD*	**Open Road main Location**	*Belgium,Germany, France*
4- Operation Environment/Content & Planning			
	Open Road		
Brief description of the experiment	*Inside viable zone (as in geofenced but applicable to more roads, predetermined roads only are selected).* *Conditions are* *M.1 Navigation systems sends: Interchange ahead* *1.1 Vehicle in correct lane* *1.2 Vehicle not in correct lane* *1.3 Speed not adapted to lane change* *M.2 Navigation systems sends: End of interchange ahead* *2.1 End of interchange detected; Start of new motorway.* ☑ *AV prototype*		
Participants	**Number of total participants expected**	*5*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*October 2022*	*January 2023*	
Pre-operation Phase	*February 2023*	*May 2023*	
Operation	*May 2023*	*December 2023*	

Operation 8.3

Table 3.20: Summary table for operation 8.3

1- Operation Summary			
Operation Leader	8	**Operation ID**	8.3
ID and title of the ADF under test	*Automated Valet Parking System (AVPS)*	**Enabler(s) sub-group**	E2.4.2
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	*1*
UC classes treated	☑ Parking		
2- Operation purpose /evaluation focus per UC			
P.1	☑ *Challenging traffic interaction with other road user to be tested* *•VRU walking across the parking lot* *•VRU walking in trajectory*	☑ *Challenging ODD conditions to be tested* *•map details (few or many)* *•changes between map generation and test* *•how much extra space is needed in parking lot*	
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Extended ODD*	**Controlled Track Location**	*Germany*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)		
Brief description of the experiment	*When the ego vehicle is driving autonomously on an urban environment, it receives an user request to park in a selected parking. Then, the ego vehicle will perform a parking manoeuver safely and stop correctly and aligned within the parking spot. The transition between both zones, which have different conditions of GNSS coverage, will be seamless and unnoticeable* *Trigger points* *Trigger: EGO vehicle receives a parking request.* *1.1 The transition between areas is optimal, so the parking manoeuver will be performed successfully* *Needed Equipment: Parking garage or multistory car park* ☑ *AV prototype*		
Participants	**Number of total participants expected**	*2*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*October 2022*	*January 2023*	
Pre-operation Phase	*February 2023*	*April 2023*	
Operation	*May 2023*	*December 2023*	

Operation 9.1

Table 3.21: Summary table for operation 9.1

1- Operation Summary			
Operation Leader	9	**Operation ID**	9.1
ID and title of the ADF under test	*Motorway chauffeur with support of negotiation for on-ramp sections*	**Enabler(s) sub-group**	E.2.3.1
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	2
UC classes treated	☑ Motorway		
2- Operation purpose /evaluation focus per UC			
M.1	☑ *Challenging ODD conditions to be tested* *The ego vehicle drives on the on-ramp with the intention of entering the highway, while the other vehicle approaches the merging section on the highway. The intended manoeuvers of the two vehicles are in conflict and must therefore be coordinated.*		
M.2	☑ *Challenging ODD conditions to be tested* *The ego vehicle approaches the merging section on the highway, while the other vehicle drives on the on-ramp with the intention of entering the highway. The intended manoeuvers of the two vehicles are in conflict and must therefore be coordinated.*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Extended ODD*	**Controlled Track Location**	*Germany*
	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD* ☑ *Extended ODD*		
4- Operation Environment/Content & Planning			
	Controlled (Test Track)		**Virtual**
Brief description of the experiment	*One vehicle drives on the on-ramp with the intention of entering the highway, while the other vehicle approaches the merging section on the highway. The intended manoeuvers of the two vehicles are in conflict and must therefore be coordinated. Result of coordination is either that the "highway vehicle" adapts its speed or that the "ramp vehicle" has to give way to the "highway vehicle".* ☑ *Multiple AV prototypes*		*A variety of merging situations at highway on-ramps is simulated as preparation for test track tests. The test track merging section will also be modeled in simulation.*
Participants	**Number of total participants expected**	*4-6*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*October 2021*	*January 2023*	
Pre-operation Phase	*January 2023*	*April 2023*	
Operation	*April 2023*	*December 2024*	

Operation 10.1

Table 3.22: Summary table for operation 10.1

1- Operation Summary			
Operation Leader	10	**Operation ID**	10.1
ID and title of the ADF under test	*Motorway chauffeur with support of merging sections, road hazards and signage, and robust positioning system*	**Enabler(s) sub-group**	E.2.3.2, E.2.3.3
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Motorway		
2- Operation purpose /evaluation focus per UC			
M.4	☑ *Challenging ODD conditions to be tested* *Approaching a motorway section affected by hazardous situations. Here, without explicit and unambiguous I2V notifications, the ego vehicle might not timely detect and adequately react to the hazard (this challenging ODD condition is going to be addressed by the I2V enabler, with a resulting extension and improvement of the overall ODD).*		
M.5	☑ *Challenging ODD conditions to be tested* *Approaching a motorway section where dynamic road signage is provided. Here, without explicit and unambiguous I2V signage, the ego vehicle might not timely detect and adequately react to the signage (this challenging ODD condition is going to be addressed by the I2V enabler, with a resulting improvement of the overall ODD).*		
M.6	☑ *Challenging ODD conditions to be tested* *Approaching a motorway section affected by hazardous situations. Here, without explicit and unambiguous N2V notifications, the ego vehicle might not timely detect and adequately react to the hazard (this challenging ODD condition is going to be addressed by the N2V enabler, with a resulting extension and improvement of the overall ODD).*		
M.7	☑ *Challenging ODD conditions to be tested* *Approaching a motorway section where dynamic road signage is provided. Here, without explicit and unambiguous N2V signage, the ego vehicle might not timely detect and adequately react to the signage (this challenging ODD condition is going to be addressed by the N2V enabler, with a resulting improvement of the overall ODD).*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD* ☑ *Extended ODD*	**Open Road optional Location**	*Germany, Austria, Spain*
		Controlled Track Location	*Germany*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)	**Open Road**	
Brief description of the experiment	*In the planned tests, AV prototypes are prepared to reproduce the conditions (trigger points) needed to evaluate the effectiveness of the ADF in the respective UCs with and without the enablers.* *For the early reactions to road hazards notifications and dynamic signage UCs, Test scenarios will start with AV prototypes receiving the hazards notifications/signage information, and will end with AV prototypes reacting (successfully or unsuccessfully) according to the specific situation (e.g. keep automation and change to the lanes that are not affected by the hazard, resp. adapt to the speed limit communicated in the signage information)* ☑ *AV prototype*	*In the planned tests, AV prototypes are prepared to reproduce the conditions (trigger points) needed to evaluate the effectiveness of the ADF in the respective UCs with and without the enablers.* *For the early reactions to road hazards notifications and dynamic signage UCs, Test scenarios will start with AV prototypes receiving the hazards notifications/signage information, and will end with AV prototypes reacting (successfully or unsuccessfully) according to the specific situation (e.g. keep automation and change to the lanes that are not affected by the hazard, resp. adapt to the speed limit communicated in the signage information)* *In these tests the ADF will be decoupled by vehicle control/actuators.* ☑ *AV prototype*	
Participants	**Number of total participants expected**	*4-6*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*October 2021*	*June 2023*	
Pre-operation Phase	*October 2022*	*October 2023*	
Operation	*February 2023*	*at least till Jul 2024*	

Operation 10.2

Table 3.23: Summary table for operation 10.2

1- Operation Summary			
Operation Leader	10	**Operation ID**	10.2
ID and title of the ADF under test	*Urban chauffeur with support for non-signalized intersections*	**Enabler(s) sub-group**	E.2.3.3
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Urban		
2- Operation purpose /evaluation focus per UC			
U.1	☑ *Challenging ODD conditions to be tested* *Approaching a non signalized intersection occupied by road users and obstacles that are not initially visible to the ADF on-board sensors . Here, without V2N cooperative sensing information, the ego vehicle might not timely detect and adequately react to the presence of those road users and obstacles (this challenging ODD condition is going to be addressed by the V2N enabler, with a resulting improvement of the overall ODD).*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD*	**Controlled Track Location**	*Germany*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)		
Brief description of the experiment	*In the planned tests, AV prototypes are prepared to reproduce the conditions (trigger points) needed to evaluate the effectiveness of the ADF in the respective UCs with and without the enablers.* *For the non-signalized intersection transit use case with early AD reaction, Test scenarios will start with AV prototypes receiving to cooperative sensing information, and will end with AV prototypes reacting (successfully or unsuccessfully) according to the specific situation (e.g. slow down and possibly stop without occupying the conflict area of the intersection)* ☑ *AV prototype*		
Participants	**Number of total participants expected**	*4-6*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*June 2022*	*June 2023*	
Pre-operation Phase	*July 2023*	*October 2023*	
Operation	*November 2023*	*July 2024*	

Operation 10.3

Table 3.24: Summary table for operation 10.3

1- Operation Summary			
Operation Leader	10	**Operation ID**	10.3
ID and title of the ADF under test	*Motorway chauffeur with support of merging sections, road hazards and signage, and and robust positioning system*	**Enabler(s) sub-group**	E2.3.1, E.2.4.2
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	3
UC classes treated	☑ Motorway		
2- Operation purpose /evaluation focus per UC			
M.1	☑ *Challenging ODD conditions to be tested* *For the on-ramp vehicle, approaching a merging section from the ramp. Here, without explicit V2V coordination, the ramp vehicle could not timely detect fast vehicles arriving on the motorway (this challenging ODD condition is going to be addressed by the V2V for cooperative manoeuvering, with a resulting extension of the overall ODD).*		
M.2	☑ *Challenging ODD conditions to be tested* *For the motorway vehicle, approaching a merging section on the motorway, where other vehicles merge from the on-ramp (this challenging ODD condition is going to be addressed by the V2V for cooperative manoeuvering, with a resulting improvement of the overall ODD)*		
M.3	☑ *Challenging ODD conditions to be tested* *For for the on-ramp vehicle, approaching a merging section from the ramp. Here, unprecise positioning and wrong road/lane matching can fragment the ODD (this challenging ODD condition is going to be addressed by the sensor fusion-based localization with a resulting improvement of the overall ODD*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD* ☑ *Extended ODD*	**Controlled Track Location**	*Germany*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)		
Brief description of the experiment	*In the planned tests, AV prototypes are configured to reproduce the conditions (trigger points) needed to evaluate the effectiveness of the ADF in the respective UCs with and without the enablers.* *For the Cooperative motorway merging UCs, Test scenarios will start with AV prototypes being configured to create a conflict between the trajectory of the merging on ramp vehicle and that of the motorway vehicle. Test scenarios will end with AV prototypes addressing (successfully or unsuccessfully) the conflict by a specific type of manoeuver coordination (e.g. allow merging by adapting speed, allow merging by changing lane, deny merging)* ☑ *Multiple AV prototypes*		
Participants	**Number of total participants expected**	*4-6*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*October 2021*	*December 2022*	
Pre-operation Phase	*January 2023*	*March 2023*	
Operation	*April 2023*	*July 2024*	

Operation 11.1

Table 3.25: Summary table for operation 11.1

1- Operation Summary			
Operation Leader	11	**Operation ID**	11.1
ID and title of the ADF under test	*No ADF, only simulated ADF via WoZ*	**Enabler(s) sub-group**	no enabler
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Urban		
2- Operation purpose /evaluation focus per UC			
U.1	☑ *Challenging system-driver interaction to be tested* *Takeover of vehicle control by drivers who are feeling car sick.* *Impact of car sickness on (driving) performance.*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *User-ADf acceptance &comfort* ☑ *Nominal ODD* ☑ *no ADF*	**Open Road main Location**	*Germany*
4- Operation Environment/Content & Planning			
	Open Road	**Controlled (Test Track)**	
Brief description of the experiment	*User Evaluation:The participants will be passengers. They will experience situations that tend to induce motion sickness. It will be tested how motion sickness can be incuded reliable (e.g. which driving tasks, which side tasks).* *Select type of experiment:* *WoZ* ☑	*The participants will be on the drivers seat. The vehicle is a WoZ vehicle. The experiment will simulate driving wih ADF. The participants will experience situations that tend to induce motion sickness. It will be tested how motion sickness can be incuded reliable (e.g. which driving tasks, which side tasks).* *In a second phase, a WoZ vehicle will be used to simulate AD. Then, take-over situations will be included in the setup. Drivers will be asked to take over control and handle defined situations while feeling car sick.* *Select type of experiment:* ☑ *WoZ*	
Participants	**Number of total participants expected**	*50*	
	Information on the participants type	*Employees*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*April 2022*	*September 2022*	
Pre-operation Phase	*September 2022*	*December 2023*	
Operation	*September 2022*	*December 2023*	

Operation 12.1

Table 3.26: Summary table for operation 12.1

1- Operation Summary			
Operation Leader	12	**Operation ID**	12.1
ID and title of the ADF under test	*Urban Chauffeur with GLOSA support and handling of low GNSS sections*	**Enabler(s) sub-group**	E.2.3.2
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Urban		
2- Operation purpose /evaluation focus per UC			
U.1	☑ *Challenging traffic interaction with other road user to be tested* • *Interaction with a leading vehicle that does not allow to meet the ideal target speed generated by the GLOSA algorithm*	☑ *Challenging ODD conditions to be tested* • *The car must avoid stopping in prohibited or dangerous areas*	
U.2			
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Extended ODD*	**Open Road main & optional Location**	*Spain*
		Controlled Track Location	*Spain*
4- Operation Environment/Content & Planning			
	Open Road	**Controlled (Test Track)**	
Brief description of the experiment	*Use cases U.1.x and U.2.x will be tested in open road with the AV, handling with existing random leading vehicles on the same road.* ☑ *AV prototype*	*In Controlled Scenario, U.1.x and U.2.x use cases will be configured to handle one or multiple consecutive traffic lights, using operational triggers, in order to compare the improvement of the ADF thanks to the I2V / N2V Enabler with respect to manual driving.* *In some tests, a series leading vehicle will be used to evaluate the impact of unforeseen traffic jams in the GLOSA algorithm. Some operational triggers will be used.* *For both operations connected traffic lights are needed (maybe portable).* ☑ *AV prototype*	
Participants	**Number of total participants expected**	*10*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*April 2022*	*December 2022*	
Pre-operation Phase	*November 2022*	*August 2023*	
Operation	*April 2023*	*July 2024*	

Operation 12.2

Table 3.27: Summary table for operation 12.2

1- Operation Summary			
Operation Leader	12	**Operation ID**	12.2
ID and title of the ADF under test	*Urban Chauffeur with GLOSA support and handling of low GNSS sections*	**Enabler(s) sub-group**	E.2.4.2
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Urban		
2- Operation purpose /evaluation focus per UC			
U.3	☑ *Challenging ODD conditions to be tested* • *ADF will be tested in low GNSS areas*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Extended ODD*	**Controlled Track Location**	*Spain*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)		
Brief description of the experiment	*In controlled Scenario, U.3.1. use case will be configured for the AV to drive from a well covered GNSS area to a low coverage area (area previously detected), in order to measure the current capability of the vehicle to localize itself in the current/proper lane thanks to this localization enabler, keeping AD Mode active.* *Horizontal accuracy and percentage of time without lane-level positioning output will be evaluated.* ☑ *AV prototype*		
Participants	**Number of total participants expected**	*10*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*April 2022*	*December 2022*	
Pre-operation Phase	*November 2022*	*August 2023*	
Operation	*April 2023*	*July 2024*	

Operation 12.3

Table 3.28: Summary table for operation 12.3

1- Operation Summary			
Operation Leader	12	**Operation ID**	12.3
ID and title of the ADF under test	*Urban Chauffeur with GLOSA support and handling of low GNSS sections*	**Enabler(s) sub-group**	E.2.4.2
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Urban		
2- Operation purpose /evaluation focus per UC			
U.4	☑ *Challenging ODD conditions to be tested* • *ADF will be tested in low GNSS areas*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Extended ODD*	**Controlled Track Location**	*Spain*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)		
Brief description of the experiment	*In controlled Scenario, U.4.1. use case will be configured for the AV to drive from a well covered GNSS area to a low coverage area (area previously detected), in order to measure the current capability of the vehicle to localize itself in the current/proper lane thanks to this localization enabler, keeping AD Mode active.* *Deviation of the position provided by the system from a reference, and measuring a percentage of time where the deviation is higher than a threshold will be evaluated.* ☑ *AV prototype*		
Participants	**Number of total participants expected**	*10*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*April 2022*	*December 2022*	
Pre-operation Phase	*November 2022*	*August 2023*	
Operation	*April 2023*	*July 2024*	

Operation 13.1

Table 3.29: Summary table for operation 13.1

1- Operation Summary			
Operation Leader	13	**Operation ID**	13.1
ID and title of the ADF under test	*Field monitoring*	**Enabler(s) sub-group**	E.2.3.3
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Motorway		
2- Operation purpose /evaluation focus per UC			
M.1	☑ *Challenging ODD conditions to be tested* *•Motorway entry* *•Motroway exit*		☑ *Challenging system-driver interaction to be tested* *•Give back*
M.2	☑ *Challenging traffic interaction with other road user to be tested* *•Hard Cut In*		
M.3	☑ *Challenging ODD conditions to be tested* *•bad line perception for ADF*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *ODD boundary*	**Open Road main Location**	*France*
		Open Road optional Location	*Germany*
		Controlled Track Location	*France*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)	**Open Road**	
Brief description of the experiment	*We will first control our Field Monitoring system on a private test track. No specifc use case will be evaluated. To register a specifc event (e.g. we cross another vehicle) we will check that the registration is effective with good timeslots.* ☑ *AV prototype*	*Open roads are already validated by the operation leader and the French governement.* *We will have specific triggers to explicitly register a situation according to M1 (trigger is a cut-in) M2 (trigger is exit of the ODD) M3 (trigger will be to loose the line marking)* ☑ *AV prototype*	
Participants	**Number of total participants expected**	*4-6*	
	Information on the participants type	*Professional Safety Drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*January 2022*	*December 2022*	
Pre-operation Phase	*January 2023*	*June 2023*	
Operation	*January 2023*	*June 2024*	

Operation 13.2

Table 3.30: Summary table for operation 13.2

1- Operation Summary			
Operation Leader	13	**Operation ID**	13.2
ID and title of the ADF under test	*Forecasting in advance GNSS signals quality in challenging environments*	**Enabler(s) sub-group**	E.2.4.1
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Urban		
2- Operation purpose /evaluation focus per UC			
U.1	☑ *Challenging ODD conditions to be tested* *- Real-time navigation and fusion engine optimization in order to improve performance and reliability* *- Real-time GNSS optimized route planning in order extend and confirm the ODD* *- Real-time GNSS coverage calculation for system automated integrity monitoring*		
	☑ *Challenging ODD conditions to be tested* *- Forecasting the GNSS signal quality up to 3 days in the future.*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Extended ODD*	**Open Road main Location**	*Belgium, France*
		Open Road optional Location	*Germany*
4- Operation Environment/Content & Planning			
	Open Road		
Brief description of the experiment	*Experiment will take place in urban and peri-urban area.* ☑ *AV prototype*		
Participants	**Number of total participants expected**	*4-5*	
	Information on the participants type	*Professional Safety Drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*January 2022*	*December 2022*	
Pre-operation Phase	*September 2022*	*December 2022*	
Operation	*September 2022*	*December 2023*	

Operation 13.3

Table 3.31: Summary table for operation 13.3

1- Operation Summary			
Operation Leader	13	**Operation ID**	13.3
ID and title of the ADF under test	*Localisation and objects detection in Urban Environment*	**Enabler(s) sub-group**	E2.4.2
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Urban		
2- Operation purpose /evaluation focus per UC			
U.2	☑ *Challenging traffic interaction with other road user to be tested*	☑ *Challenging ODD conditions to be tested*	
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD* ☑ *ODD boundary*	**Open Road main Location**	*France*
		Open Road optional Location	*Germany*
		Controlled Track Location	*France*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)	**Open Road**	
Brief description of the experiment	*To drive in challenging and non challenging environment and to compare the data of our set of sensors with the data of an AD function.* ☑ *AV prototype*	*To drive in challenging and non challenging environment, especially through specific roundabout, and to compare the data (objects detection ; localization...) between our serial sensors and our Ground truth system which has a specific set of sensors.* ☑ *AV prototype*	
Participants	**Number of total participants expected**	*2-3*	
	Information on the participants type	*Professional Safety Drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*January 2022*	*December 2022*	
Pre-operation Phase	*January 2023*	*June 2023*	
Operation	*January 2023*	*June 2024*	

Operation 14.1

Table 3.32: Summary table for operation 14.1

1- Operation Summary			
Operation Leader	14	**Operation ID**	14.1
ID and title of the ADF under test	*Urban chauffeur with improved safety/comfort*	**Enabler(s) sub-group**	E.2.3.1
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	2
UC classes treated	☑ Urban		
2- Operation purpose /evaluation focus per UC			
U.1	☑ *Challenging traffic interaction with other road user to be tested* *In a stop and go situation, it is sometime scary to see a vehicle in front with the brake light on and the ego car not reacting (assuming speed is the same). It is not comfortable for driver/passenger to see no reactions from the AD system.*		
U.2	☑ *Challenging traffic interaction with other road user to be tested* *For every traffic lights, stop signs or other situations where there are stopped vehicles, the onboard sensors might detect stopped cars in front quite late therefore the AD vehicle might brake hard to stop behind. The goal is to improve the safety/comfort by braking in advance thanks to the enabler*		
U.3	☑ *Challenging traffic interaction with other road user to be tested* *When a vehicle is stopped behind a curved road, it is difficult to avoid an hard braking scenario. The goal is to improve the safety/comfort of on-board driver/passengers by applying a smooth braking in advance*		
U.4	☑ *Challenging ODD conditions to be tested* *•Ice on the road* *When, at a specific location, some ice cover the road it is better to change the AD behaviour to avoid any risks.*		
3- Evaluation area focus & Location			
Evaluation area focus	*Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD*	**Open Road main Location**	*Belgium*
	Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour) ☑ *Extended ODD*	**Controlled Track Location**	
4- Operation Environment/Content & Planning			
	Controlled (Test Track)	**Open Road**	
Brief description of the experiment	*The front vehicle is driving between 10-50kph and send information of slippery road. The AD vehicle driving at the back change its behaviour while approaching the location.* ☑ *AV prototype*	*A route will be selected to cover U.1, U.2, U.3. We will always have 2 vehicles. The vehicle in front (not necessary right in front) will send information via V2V to the AD vehicle at the back.* ☑ *AV prototype*	
Participants	**Number of total participants expected**	*5-9*	
	Information on the participants type	*Professional Safety Drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*April 2022*	*January 2023*	
Pre-operation Phase	*January 2023*	*April 2023*	
Operation	*April 2023*	*July 2024*	

Operation 15.1

Table 3.33: Summary table for operation 15.1

1- Operation Summary			
Operation Leader	15	**Operation ID**	15.1
ID and title of the ADF under test	*Automated driving through complex junctions with the support of infrastructure sensing*	**Enabler(s) sub-group**	E.2.3.3 E2.6.2
Hi-Drive Data Analysis Partner	Pending	**Number of vehicles in the operation**	1
UC classes treated	☑ Urban		
2- Operation purpose /evaluation focus per UC			
U.1	☑ *Challenging ODD conditions to be tested* *Without co-operative sensing the vehicle would not have the required information to navigate the junction in specific challenging ODD conditions.*		
U.2	☑ *Challenging ODD conditions to be tested* *Without the use of infrastructure sensing at the roundabout, the ego vehicle would continue on its planned path and be affected by the congestion.*		
U.3	☑ *Challenging ODD conditions to be tested* *To enter a roundabout, the ego vehicle must wait for the roundabout to be clear on its right-hand side traffic. In the case when the ego vehicle's view is obscured by other road users, it will not be able to make a safe decision to enter the roundabout.*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD* ☑ *Extended ODD*	**Open Road main Location**	*United Kingdom*
4- Operation Environment/Content & Planning			
	Open Road		
Brief description of the experiment	*Making use of cooperative sensing and V2N the ADF will control the ego vehicle (with a safety driver) and drive through a complex junction with different traffic conditions and scenarios.* ☑ *AV prototype*		
Participants	**Number of total participants expected**	*3-6*	
	Information on the participants type	*Professional Safety Drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*October 2021*	*December 2022*	
Pre-operation Phase	*October 2022*	*June 2023*	
Operation	*June 2023*	*June 2024*	

Operation 15.2

Table 3.34: Summary table for operation 15.2

1- Operation Summary			
Operation Leader	15	**Operation ID**	15.2
ID and title of the ADF under test	*Motorway shadow mode driving for data collection and enabler evaluation*	**Enabler(s) sub-group**	E2.6.2
Hi-Drive Data Analysis Partner	Pending	**Number of vehicles in the operation**	1
UC classes treated	☑ Motorway		
2- Operation purpose /evaluation focus per UC			
M.1	☑ *Challenging traffic interaction with other road user to be tested* *Interaction between merging vehicle and vehicles driving on the main motorway.*		☑ *Challenging ODD conditions to be tested* *Challenging road*
M.2			
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD* ☑ *Extended ODD*	**Open Road main Location**	*United Kingdom*
4- Operation Environment/Content & Planning			
	Open Road		**Virtual**
Brief description of the experiment	*Collecting data and demo of associated enabler in several driving runs through merging scenarios.* ☑ *AV prototype*		*with ADF in simulation environment*
Participants	**Number of total participants expected**	*3-6*	
	Information on the participants type	*Professional Safety Drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*October 2021*	*December 2022*	
Pre-operation Phase	*January 2023*	*June 2023*	
Operation	*June 2023*	*June 2024*	

Operation 16.1

Table 3.35: Summary table for operation 16.1

1- Operation Summary			
Operation Leader	16	**Operation ID**	16.1
ID and title of the ADF under test	*Motorway chauffeur with support of GPS denied regions*	**Enabler(s) sub-group**	E2.4.2 E2.6.2
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	*1*
UC classes treated	☑ Motorway		
2- Operation purpose /evaluation focus per UC			
M.1	☑ *Challenging ODD conditions to be tested* *•GNSS signal will be lost during AD function*		
M.2	☑ *Challenging ODD conditions to be tested* *•GNSS signal not available during AD function* *•Localisation in Tunnel environment*		
M.3	☑ *Challenging ODD conditions to be tested* *•GNSS signal will recover during AD function* *•Maintain AD function after tunnel exit*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD* ☑ *Extended ODD*	**Open Road main Location**	Germany
4- Operation Environment/Content & Planning			
	Open Road		
Brief description of the experiment	*Maintain the ADF by driving through a highway tunnel, where GNNS signal will be interrupted for a long time (> 1 Minute).* ☑ *AV prototype*		
Participants	**Number of total participants expected**	*3*	
	Information on the participants type	*Professional Safety Drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*June 2022*	*December 2022*	
Pre-operation Phase	*January 2023*	*August 2023*	
Operation	*March 2023*	*June 2024*	

Operation 16.2

Table 3.36: Summary table for operation 16.2

1- Operation Summary			
Operation Leader	16	**Operation ID**	16.2
ID and title of the ADF under test	*Motorway chauffeur with support of construction areas*	**Enabler(s) sub-group**	E2.4.2; E2.6.2
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	*1*
UC classes treated	☑ Motorway		
2- Operation purpose /evaluation focus per UC			
M.1	☑ *Challenging ODD conditions to be tested* *•Identification of c-area* *•Vehicle will leave mapped traffice lanes*		
M.2	☑ *Challenging ODD conditions to be tested* *•Vehicle will be in ADF mode on unmapped traffice lane*		
M.3	☑ *Challenging ODD conditions to be tested* *•Identification of c-area exit* *•Vehicle will leave unmapped traffic lanes*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD* ☑ *Extended ODD*	**Open Road main Location** **Open Road optional Location**	*Germany*
4- Operation Environment/Content & Planning			
	Open Road		
Brief description of the experiment	*Maintain the ADF by driving through a construction area on motorway.* ☑ *AV prototype*		
Participants	**Number of total participants expected**	*3*	
	Information on the participants type	*Professional Safety Drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*June 2022*	*December 2022*	
Pre-operation Phase	*April 2023*	*October 2023*	
Operation	*June 2023*	*June 2024*	

Operation 17.1

Table 3.37: Summary table for operation 17.1

1- Operation Summary			
Operation Leader	17	**Operation ID**	17.1
ID and title of the ADF under test	*Urban chauffeur with communication by lighting to crossing pedestrian*	**Enabler(s) sub-group**	E.2.3.4, E.2.3.4
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Urban		
2- Operation purpose /evaluation focus per UC			
U.1	☑ *Challenging traffic interaction with other road user to be tested* *•Interaction with a pedestrian crossing the road*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *User-Interactions with other road users* ☑ *Nominal ODD*	**Controlled Track Location**	*France*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)		
Brief description of the experiment	*Test performed in a controlled track with a straight portion to verify the impact of the enabler. The AV prototype will be used as host vehicle. It will drive in autonomous mode towards a predefined point where a pedestrian will be crossing. The lighting enabler (eHMI) will be activated when the pedestrian is detected and characterized. The test scenario will stop after the interaction with the pedestrian.* *Data will be logged to monitor vehicle behavior and pedestrian behavior during the test scenario.* ☑ *AV prototype*		
Participants	**Number of total participants expected**	*21*	
	Information on the participants type	*1 Professional Safety drivers In AV + 20 Pedestrians*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*July 2022*	*December 2022*	
Pre-operation Phase	*January 2023*	*February 2023*	
Operation	*March 2023*	*March 2023*	

Operation 17.2

Table 3.38: Summary table for operation 17.2

1- Operation Summary			
Operation Leader	17	**Operation ID**	17.2
ID and title of the ADF under test	*Urban chauffeur with communication by lighting to following driver*	**Enabler(s) sub-group**	E.2.3.4
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	2
UC classes treated	☑ Urban		
2- Operation purpose /evaluation focus per UC			
U.2	☑ *Challenging traffic interaction with other road user to be tested* *•interaction with a following driver*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *User-Interactions with other road users* ☑ *Nominal ODD*	**Controlled Track Location**	*France*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)		
Brief description of the experiment	*Test performed on a controlled track. The driver under test will drive the non-autonomous car towards the AV about to stop or already at a stop to let off passengers. The lighting enabler, a rear display, will be activated when the approaching vehicle is detected. The test scenario will stop after the driver under test performs the overtaking manoeuver.* *Data will be logged to monitor AV behavior and following driver behavior during the test scenario.* ☑ *AV prototype* ☑ *Ordinary car*		
Participants	**Number of total participants expected**	*21*	
	Information on the participants type	*1 Professional Safety drivers In AV + 20 Ordinary drivers In normal car*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*July 2022*	*July 2023*	
Pre-operation Phase	*August 2023*	*September 2023*	
Operation	*September 2023*	*September 2023*	

Operation 17.3

Table 3.39: Summary table for operation 17.3

1- Operation Summary			
Operation Leader	17	**Operation ID**	17.3
ID and title of the ADF under test	*Parking chauffeur with communication by lighting*	**Enabler(s) sub-group**	E.2.3.4 E.2.3.4
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Parking		
2- Operation purpose /evaluation focus per UC			
P.1	☑ *Challenging traffic interaction with other road user to be tested* *•interaction with a pedestrian in a parking*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *User-Interactions with other road users* ☑ *Nominal ODD*	**Controlled Track Location**	*France*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)		
Brief description of the experiment	*Test performed in a controlled track with typical parking environment to verify the integration and deployment of the enabler. The AV prototype will be used as host vehicle in parking situation. The ADF function is turned with this following conditions :* *ADF function is activated* *Pedestrian is detected and characterized (Pedestrian Position & Dynamics, intention, risk of collision, etc) via vehicle sensor* *Road conditions fulfilled (curve is not too steep, no construction site)* *The ADF function is turned on before entering these conditions and data is logged to analyze and evaluate the performance and some KPI.* ☑ *AV prototype*		
Participants	**Number of total participants expected**	*21*	
	Information on the participants type	*1 Professional Safety drivers In AV + 20 Pedestrians*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*July 2022*	*April 2023*	
Pre-operation Phase	*May 2023*	*May 2023*	
Operation	*June 2023*	*June 2023*	

Operation 18.1

Table 3.40: Summary table for operation 18.1

1- Operation Summary			
Operation Leader	18	**Operation ID**	18.1
ID and title of the ADF under test	*Motorway Chauffeur*	**Enabler(s) sub-group**	E2.3.1
Hi-Drive Data Analysis Partner	Pending	**Number of vehicles in the operation**	2-4
UC classes treated	☑ Motorway		
2- Operation purpose /evaluation focus per UC			
M.1	☑ *Challenging traffic interaction with other road user to be tested* *(please add your bullet list only if the above statement is ticked)* *•Interaction between trailing vehicle during the ramp merge - different speeds* *•Cooperation between vehicles having different automation levels (Truck and Car)*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Extended ODD*	**Controlled Track Location**	*Sweden*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)		
Brief description of the experiment	*Test cooperative lane merge between passenger cars and trucks utilizing ITS-G5 based V2V communication.* ☑ *AV prototype*		
Participants	**Number of total participants expected**	*For ADf enabled Vehicles: 2-3* *For trucks : 1-2*	
	Information on the participants type	*For ADf enabled Vehicles: Professional Safety Drivers, employees* *For trucks: Professional Safety Drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*February 2022*	*November 2022*	
Pre-operation Phase	*November 2022*	*February 2023*	
Operation	*February 2023*	*September 2023*	

Operation 18.2

Table 3.41: Summary table for operation 18.2

1- Operation Summary			
Operation Leader	18	**Operation ID**	18.2
ID and title of the ADF under test	*Motorway Chauffeur*	**Enabler(s) sub-group**	E.2.3.2
Hi-Drive Data Analysis Partner	Pending	**Number of vehicles in the operation**	2-3
UC classes treated	☑ Urban		
2- Operation purpose /evaluation focus per UC			
U.3	☑ *Challenging ODD conditions to be tested* *•Presence of roadworks and/or traffic jams*	☑ *Challenging traffic interaction with other road user to be tested* *•Cooperation between vehicles having different automation levels (Truck and Car)*	
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Extended ODD*	**Controlled Track Location**	*Sweden*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)		
Brief description of the experiment	*Test safe overtake where a passenger car overtakes a truck utilizing ITS-G5 based V2V communication* ☑ *AV prototype*		
Participants	**Number of total participants expected**	*For ADf enabled Vehicles 2-3* *For trucks: 1*	
	Information on the participants type	*For ADf enabled Vehicles : Professional Safety Drivers, Ordinary drivers* *For trucks: Professional Safety Drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*February 2022*	*November 2022*	
Pre-operation Phase	*November 2022*	*February 2023*	
Operation	*February 2023*	*September 2023*	

Operation 18.3

Table 3.42: Summary table for operation 18.3

1- Operation Summary			
Operation Leader	18	**Operation ID**	18.3
ID and title of the ADF under test	*Motorway Chauffeur*	**Enabler(s) sub-group**	E2.3.1
Hi-Drive Data Analysis Partner	Pending	**Number of vehicles in the operation**	2-3
UC classes treated	☑ Rural		
2- Operation purpose /evaluation focus per UC			
R.2	☑ *Challenging ODD conditions to be tested* *•Autonomous sensing blocked by other road users (truck)*	☑ *Challenging traffic interaction with other road user to be tested* *•Cooperation between vehicles having different automation levels (Truck and Car)*	
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Extended ODD*	**Controlled Track Location**	*Sweden*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)		
Brief description of the experiment	*Test safe overtake where a passenger car overtakes a truck utilizing ITS-G5 based V2V communication* ☑ *AV prototype*		
Participants	**Number of total participants expected**	*For ADf enabled Vehicles: 2-3* *For trucks: 1*	
	Information on the participants type	*For ADf enabled Vehicles : Professional Safety Drivers, employees* *For trucks: Professional Safety Drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*February 2022*	*November 2022*	
Pre-operation Phase	*November 2022*	*February 2023*	
Operation	*February 2023*	*September 2023*	

3.2.42 Operation 19.1

Table 3.43: Summary table for operation 19.1

1- Operation Summary			
Operation Leader	19	**Operation ID**	19.1
ID and title of the ADF under test	*Landmark based position accuracy improvements in snowy conditions, cross-border FI-NO*	**Enabler(s) sub-group**	E.2.3.3
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Cross-border ☑ Rural		
2- Operation purpose /evaluation focus per UC			
R/CB.1	☑ *Challenging traffic interaction with other road user to be tested cross-border testing challenge when having handover between two networks. Cross-border testing for having stable positioning error correction even thought that handover in mobile network is induced.*	☑ *Challenging ODD conditions to be tested* *Freezing temperature (less than -15 C deg) and having snow on a road.* *The landscape and driving trajectory has been changed from baseline due to snow banks.*	
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical-ODD runtime monitoring for scenario extraction* ☑ *Extended ODD*	**Open Road main Location**	*Finland*
		Open Road optional Location	*Norway*
4- Operation Environment/Content & Planning			
	Open Road		
Brief description of the experiment	*Open road test experiments includes reference landmark data collection in clear weather and adverse weather visibility test. Cross border test concentrates on 5G handover with real time sensor data from vehicle* ☑ *AV prototype*		
Participants	**Number of total participants expected**	*1*	
	Information on the participants type	*Employees*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*June 2022*	*November 2022*	
Pre-operation Phase	*November 2022*	*February 2023*	
Operation	*March 2023*	*February 2024*	

Operation 19.2

Table 3.44: Summary table for operation 19.2

1- Operation Summary			
Operation Leader	19	**Operation ID**	19.2
ID and title of the ADF under test	*Sensor fusion for localization*	**Enabler(s) sub-group**	E2.6.1
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Cross-border ☑ Rural		
2- Operation purpose /evaluation focus per UC			
R.2	☑ *Challenging traffic interaction with other road user to be tested* *cross-border testing challenge when having handover between two networks. Cross-border testing for having stable positioning error correction even thought that handover in mobile network is induced.*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical-ODD runtime monitoring for scenario extraction* ☑ *Extended ODD*	**Open Road main Location**	*Finland*
		Open Road optional Location	*Norway*
4- Operation Environment/Content & Planning			
	Open Road		
Brief description of the experiment	*Open road test experiments includes reference landmark data collection in clear weather and adverse weather visibility test. Cross border test concentrates on 5G handover with real time sensor data from vehicle* ☑ *AV prototype*		
Participants	**Number of total participants expected**	*1*	
	Information on the participants type	*Professional Safety Drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*June 2022*	*November 2022*	
Pre-operation Phase	*December 2022*	*February 2023*	
Operation	*March 2023*	*February 2024*	

Operation 19.3

Table 3.45: Summary table for operation 19.3

1- Operation Summary			
Operation Leader	19	**Operation ID**	19.3
ID and title of the ADF under test	*Object detection*	**Enabler(s) sub-group**	E2.4.1
Hi-Drive Data Analysis Partner	Defined	**Number of vehicles in the operation**	1
UC classes treated	☑ Cross-border ☑ Rural		
2- Operation purpose /evaluation focus per UC			
R.2	☑ *Challenging ODD conditions to be tested* *Freezing temperature (less than -15 C deg) and having snow on a road. Having turbulent snow which is degraded sensing range of LiDARs. Having different shapes and road borders due to high snow banks.*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical-ODD runtime monitoring for scenario extraction* ☑ *Extended ODD*	**Open Road main Location**	*Finland*
		Open Road optional Location	*Norway*
4- Operation Environment/Content & Planning			
	Open Road		
Brief description of the experiment	*Driving during the winter time in North Europe in snowy and icy conditions. The roads and landmarks are partly covered by snow and visibility range is degraded due to turbulent snow. The aim is to use aggregated map data to compensate object detection performance drop.* ☑ *AV prototype*		
Participants	**Number of total participants expected**	*1*	
	Information on the participants type	*Professional Safety Drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*June 2022*	*November 2022*	
Pre-operation Phase	*December 2022*	*March 2023*	
Operation	*March 2023*	*February 2024*	

3.2.45 Operation 20.1

Table 3.46: Summary table for operation 20.1

1- Operation Summary			
Operation Leader	20	**Operation ID**	20.1
ID and title of the ADF under test	*Urban chauffer with support for rural sections and cross-border*	**Enabler(s) sub-group**	E.2.3.2
Hi-Drive Data Analysis Partner	Pending	**Number of vehicles in the operation**	*1*
UC classes treated	☑ Urban ☑ Rural		
2- Operation purpose /evaluation focus per UC			
U.4	☑ *Challenging ODD conditions to be tested* *areas with signalized urban intersections*		
U.5	☑ *Challenging traffic interaction with other road user to be tested* *Interaction with urban vehicles and VRU with right of way* *Interaction with urban vehicles and VRU when VuT has right of way*		
U.6	☑ *Challenging ODD conditions to be tested* *areas without or with limited lane markings*		
R.7	☑ *Challenging ODD conditions to be tested* *new road type: rural roads*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD*	**Controlled Track Location** **Open Road main Location**	*Germany*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)	**Open Road**	
Brief description of the experiment	*Tests on test track are used for development of ADF and testing scenarios before releasing on open road.* ☑ *AV prototype*	*Testing the ADF with V2X communication and digital map to compare against natural driving. Operation includes one short rural section, which is similar to urban roads.* *Section includes interaction with: cars, trucks, PTW, pedestrians and bicycles.* ☑ *AV prototype*	
Participants	**Number of total participants expected**	*4*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*July 2022*	*January 2023*	
Pre-operation Phase	*January 2023*	*March 2023*	
Operation	*March 2023*	*July 2023*	

Operation 20.2

Table 3.47: Summary table for operation 20.2

1- Operation Summary			
Operation Leader	20	**Operation ID**	20.2
ID and title of the ADF under test	*Urban chauffer with support for rural sections and cross-border*	**Enabler(s) sub-group**	E.2.6.3
Hi-Drive Data Analysis Partner	Pending	**Number of vehicles in the operation**	*1*
UC classes treated	☑ Cross-border		
2- Operation purpose /evaluation focus per UC			
C.B	☑ *Challenging ODD conditions to be tested* *Cross-border: Driving in multiple countries (in urban areas)*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD* ☑ *Extended ODD*	**Controlled Track Location**	*Germany & Netherlands*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)	**Open Road**	
Brief description of the experiment	*Tests on test track are used for development of ADF and testing scenarios before releasing on open road.* ☑ *AV prototype*	*Testing the ADF with digital map to compare against natural driving. ADF passes border and has to apply to changing traffic rules. Cross border driving will be performed in an urban area. Section includes interaction with: cars, trucks, PTW, pedestrians and bicycles.* ☑ *AV prototype*	
Participants	**Number of total participants expected**	*4*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*July 2022*	*January 2023*	
Pre-operation Phase	*January 2023*	*March 2023*	
Operation	*March 2023*	*July 2023*	

Operation 20.3

Table 3.48: Summary table for operation 20.3

1- Operation Summary			
Operation Leader	20	**Operation ID**	20.3
ID and title of the ADF under test	*Urban chauffer with support for rural sections and cross-border*	**Enabler(s) sub-group**	E.2.6.3
Hi-Drive Data Analysis Partner	Pending	**Number of vehicles in the operation**	*1*
UC classes treated	☑ Motorway ☑ Motorway trans. to urban		
2- Operation purpose /evaluation focus per UC			
MtU.1	☑ *Challenging traffic interaction with other road user to be tested* *Interaction with motorway vehicle coming from behind during merging*		
M.2	☑ *Challenging traffic interaction with other road user to be tested* *Interaction with motorway vehicle coming from behind during lane change*		
MtU.3	☑ *Challenging traffic interaction with other road user to be tested* *Interaction with motorway with slower vehicle in front*		
3- Evaluation area focus & Location			
Evaluation area focus	☑ *Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)* ☑ *Nominal ODD* ☑ *Extended ODD*	**Controlled Track Location** **Open Road main Location**	*Germany*
4- Operation Environment/Content & Planning			
	Controlled (Test Track)	**Open Road**	
Brief description of the experiment	*Tests on test track are used for development of ADF and testing scenarios before releasing on open road.* ☑ *AV prototype*	*Testing the ADF with digital map to compare against natural driving.* *Open Road focuses on entering and exiting motorway* *Section includes interaction with: cars, trucks, PTW.* ☑ *AV prototype*	
Participants	**Number of total participants expected**	*4*	
	Information on the participants type	*Professional safety drivers*	
Operations planning	**Starting month**	**Ending month**	
Preparation Phase	*July 2022*	*January 2023*	
Pre-operation Phase	*January 2023*	*March 2023*	
Operation	*March 2023*	*July 2023*	

3.3 Overview of operation description

The operation description, which is the aim of this deliverable, resulted in some information linked to the tests/operations performed by each operation owner.

As presented over the different chapters of the documents, Hi-Drive is a project with the contribution of different actors, objectives, participants, vehicles and data systems. Hereafter Figure 3.1 shows an overview of key statistics that represent the Hi-Drive operations (status of July 2022).

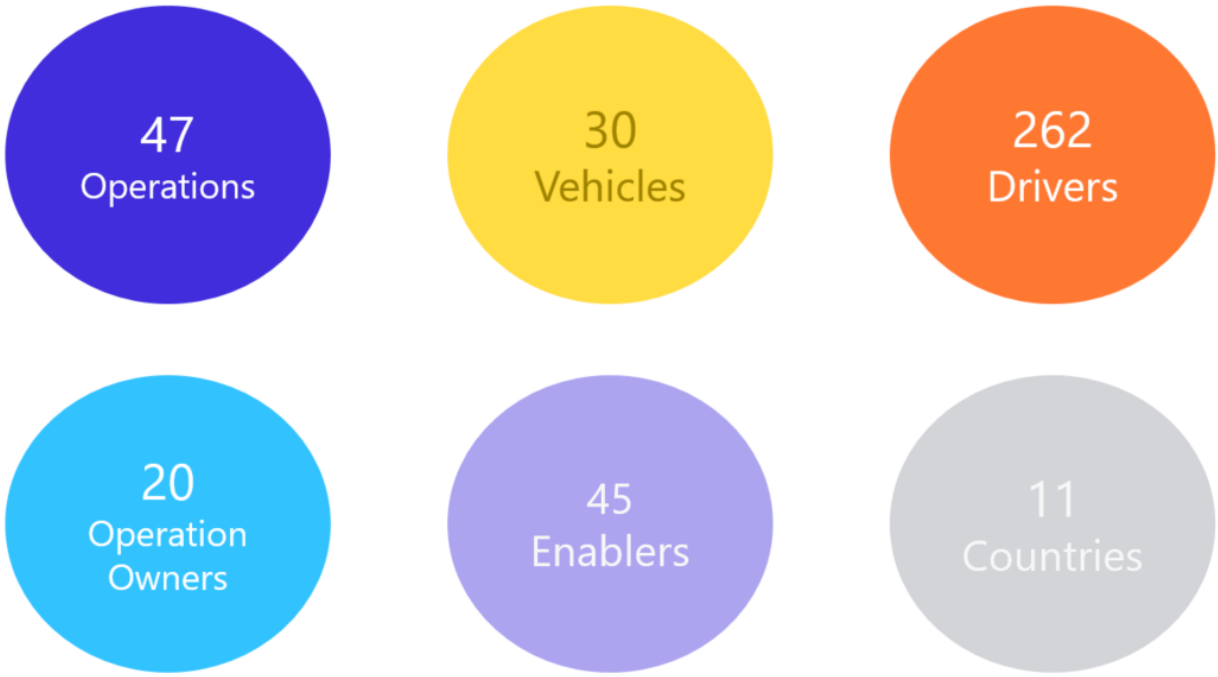


Figure 3.1: Overview of planned Hi-Drive operations according to status July 2022.

Organized in a wide variety of locations and cities, Hi-Drive operations will take place in various countries across Europe. Each participant country hosts between 2 and 22 operations as shown in Figure 3.2.

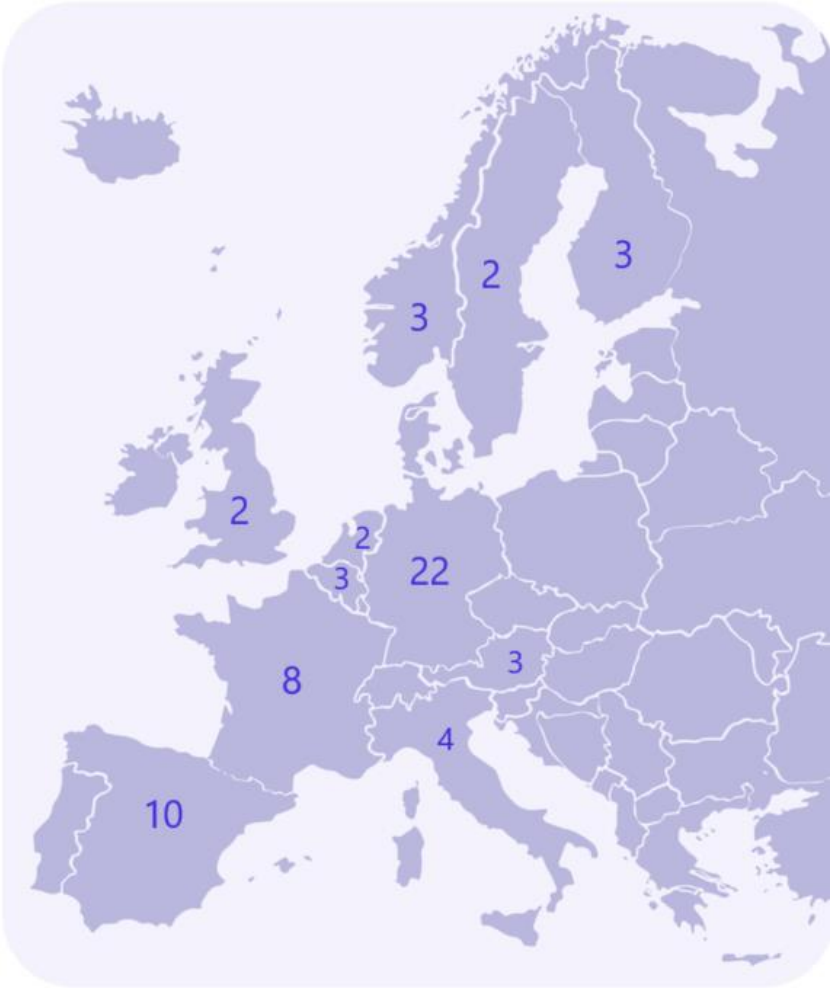


Figure 3.2: Number of operations per country

Hi-Drive operations will take place in different environments and locations in Europe. For motorway operations V2I equipped motorway roads, a number of urban nodes and in few cases also cross-border including TEN-T corridors where possible, as well as for example sections of road with a specific speed limit, roundabouts, challenging environments for GPS localization, tunnels, etc., will be selected according to the operation objectives, use cases and test scenarios involved.

Operations will be performed across several countries in Europe (Figure 3.2) and in three different test environments (Figure 3.3):

- Controlled (Test Track)
- Open Road
- Virtual

Please be aware, that especially data collection in virtual environments is also planned in other sub-projects (especially on "Users" SP6 and "Effects" SP7). Some operations are collecting data in more than one test environment. Also, due to cross-border testing, some operations are accounted for more than one country.

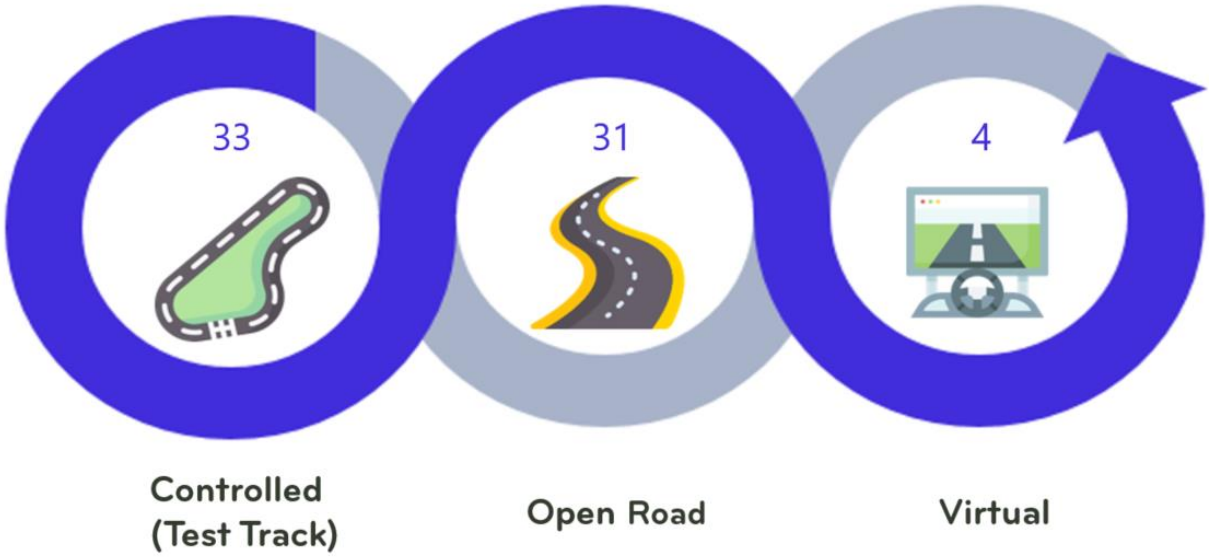


Figure 3.3: *Number of operations per test environment conducted within sub-project "Operation" SP5*

For each test environment and its corresponding operation, a number of tested use cases is defined according to the operation objectives and scenarios. Use cases are classified into six classes as presented in different paragraphs of the document:

- Motorway
- Urban
- Rural
- Parking
- Motorway trans. to urban

Please note that some operations include testing in multiple environments and therefore the sum for the total number of operations is higher than the 47 operations presented in Figure 3.1.

Figure 3.4 represents the repartition of test environment per each use case class. For this figure, one operation may include multiple use cases.

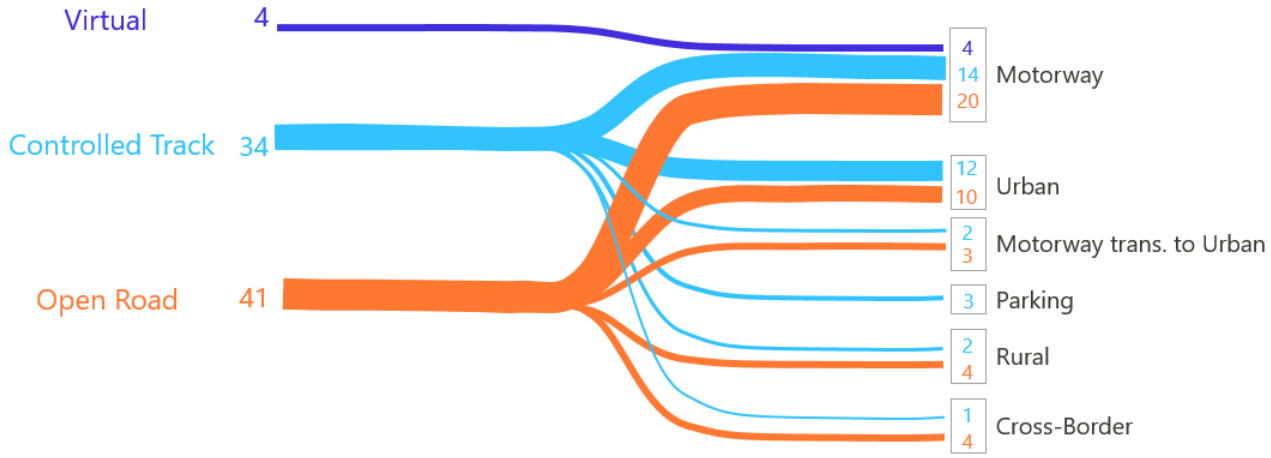


Figure 3.4: Repartition of test environments per use case classes

The focus of an evaluation for which the operation provides data for can be either technical or user (Figure 3.5). Technical focus is present on 40 operations and can correspond to:

- Technical: AD safety, efficiency, comfort (e.g. better overtaking behaviour)
- Technical: ODD runtime monitoring for scenario extraction

User focus is present on 8 operations and can correspond to:

- User: Interactions with other road users
- User: ADF usage
- User: ADF acceptance & comfort

For the Hi-Drive project, both technical and user evaluation area focus are present in operation 5.4 (see section 3.2). Some operations could have secondary focus such as collecting data for enabler development.

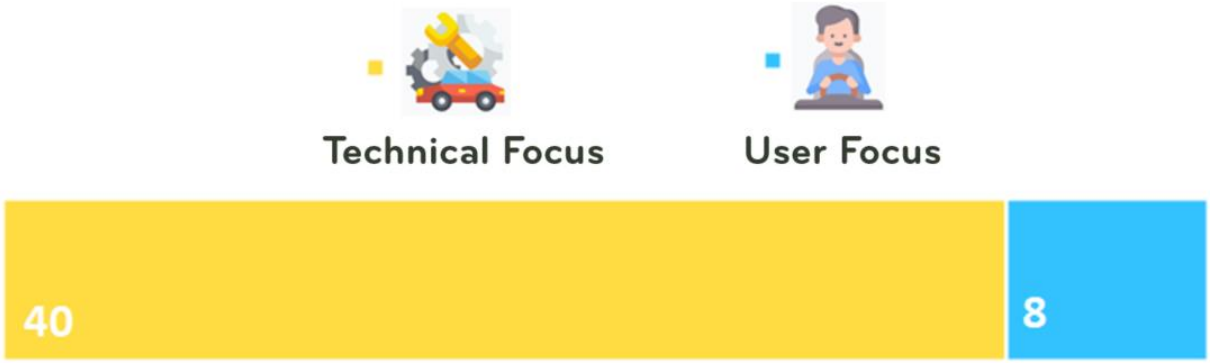


Figure 3.5: Operation number per main evaluation area focus

Each operation owner has decided on a planned number of vehicles that will be involved in Hi-Drive operations. Indeed, the 20 operation owners can be classified by operation vehicle number: operation owners with 1 vehicle, 2-3 vehicles, 4-5 vehicles and more than 5 vehicles as shown in Figure 3.6.

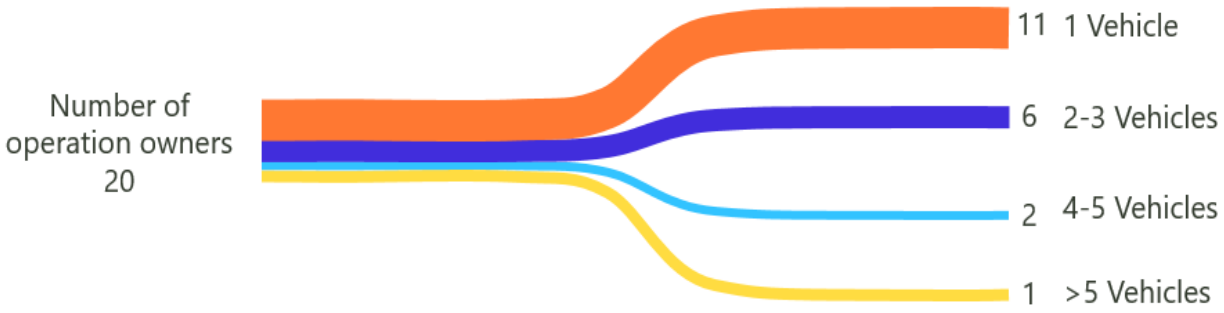


Figure 3.6: Repartition of fleet size for the 20 operation owners

For all the Hi-Drive operations, 262 drivers will participate. They can be even professional safety drivers, employees of the operation owners or ordinary drivers according to the operation objectives and conditions. Figure 3.7 is showing the repartition of the 262 drivers in the 3 different types.

Figure 3.7: Repartition of different types of drivers involved in Hi-Drive operations

Other participants may be involved in Hi-Drive operations in addition to drivers such as pedestrians and they are not counted as drivers.

Operations in the Hi-Drive project can be linked to one or more use cases. A representation of these use case classes and their repartition in the Hi-Drive project is shown in Figure 3.8.

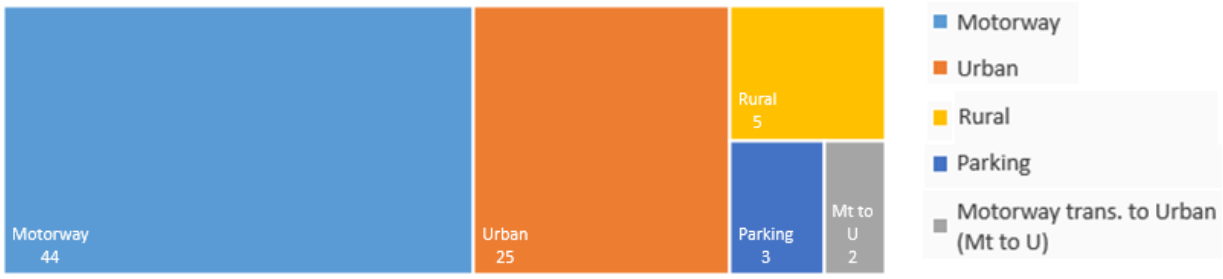


Figure 3.8: Use case classes repartition in Hi-Drive operations

As presented in different paragraphs and summary tables in this document, operations can be linked to one or more enablers. Operations are then defined by enablers which are classified into four categories (cf. chapter 3.1). These categories and their repartition in Hi-Drive operations are given in Figure 4.9.

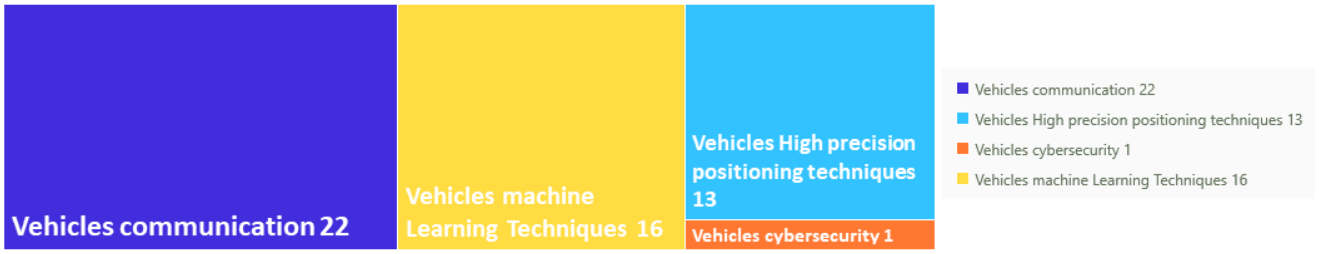


Figure 3.9: Repartition of operations per enable types

Figure 3.8 and Figure 3.9 are presenting respectively the repartition of use case classes and enabler categories in Hi-Drive operations. Since use cases and enablers are both defining operations, Figure 3.10 shows the current plan of how enablers are distributed for each use case class.

	1- Vehicles communication	2- Vehicles High precision positioning techniques	3 - Vehicles cybersecurity	4- Vehicles machine Learning Techniques
Motorway	15	15	1	20
Urban	12	4		4
Motorway trans. to Urban				2
Cross-border				1
Rural	3	1		1
Parking	1	2		
Urban to Urban Motorway				2
Total	31	22	1	30

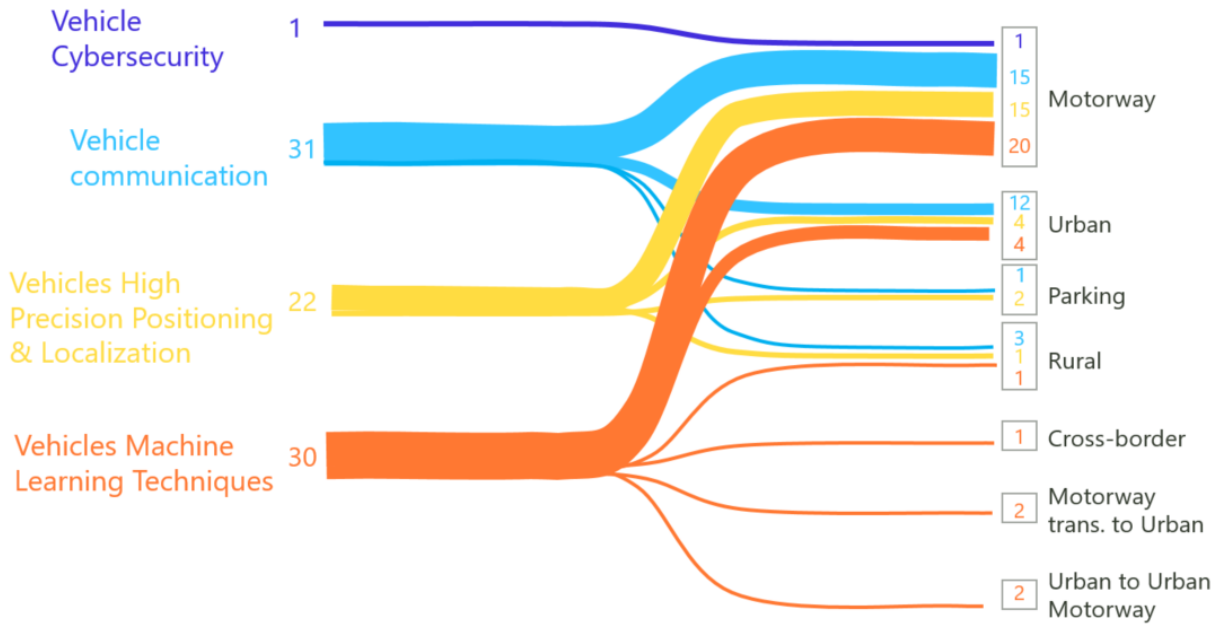


Figure 3.10: Repartition of enabler categories per use cases classes

4 Conclusions and outlook

Hi-Drive advances the European state-of-the-art of driving automation from SAE L3 'Conditional Automation' further up towards 'High Automation' by leading operations involving AD functions and technology enablers. They will demonstrate, all over Europe, in challenging conditions, with complex interactions with other road users, how the enablers can manage and extend the operational design domain (ODD) of AD functions and enhance AD performance.

According to the status of planning in July 2022, Hi-Drive will have 47 operations, led by 20 operation owners, taking place within sub-project Operations. Most of them are related to technical aspects. Some of them are more focused on user perspective complementing to the user experiments taking place within sub-project Users. These 47 operations are spread over 11 European countries, and are either on test tracks, mostly on open road or sometimes made in a virtual environment. More user related experiments will take place in sub-project "Users" SP6 Users, and are not included in this deliverable.

More than 262 drivers, either ordinary, employees or professional safety drivers will have the chance to be in the driver seat of 30 prototype vehicles. A majority of operations will be executed in a motorway environment, but a significant part of operations are deployed in urban environment. Various use cases of highly automated driving will be studied, from harsh environments to specific infrastructure, with other participants, pedestrians or connected vehicles. Hi-Drive project expects data from many relevant and challenging driving scenarios to be collected and analysed. On Motorway, or in urban environment, AD function will operate for longer periods than earlier, without the technology enablers. The interoperability will be assured across borders and brands.

A lot of data will be collected during these operations. Further studies in Hi-Drive will confirm the relevance of each enabler tested during these operations with AD function, regarding its impact to extend the operational design domain of AD functions or to enhance AD performance.

Glossary of Terms

Terms	Origin	Definition
anonymisation	UDRIVE	Anonymisation of a dataset is in principle the process of removing all possibility to link data back to a data subject (those about whom the data is collected). This process is by definition irreversible.
automated driving function	Hi-Drive	A common feature addressed by a group of automated driving systems Example: Motorway ADF, Urban ADF
automated driving system	SAE (2021)	The hardware and software that are collectively capable of performing the entire DDT on a sustained basis, regardless of whether it is limited to a specific operational design domain (ODD); this term is used specifically to describe a Level 3, 4, or 5 driving automation system. Example: ADS by vehicle owner XY (incl. sensor, processing hardware and software)
automated driving system feature	SAE (2021)	A Level automated driving system's design-specific functionality at a given level of driving automation within a particular ODD, if applicable. Example: motorway chauffeur as feature of the ADS by vehicle owner XY
baseline	P.E.A.R.S.	Set of data to which the performance and the effects of the technology under study are compared
conventional vehicle	SAE (2021)	[Motor] vehicle is a machine designed to provide conveyance on public streets, roads, and highways. Conventional vehicle is a vehicle designed to be operated by an in-vehicle driver during a part or all of every trip. Types of [motor] vehicles include ADS-equipped vehicles, ADS-dedicated vehicles, dual-mode vehicles, and conventional vehicles. ADS-dedicated vehicles and dual-mode vehicles are always ADS-equipped vehicles. Conventional vehicles may or may not be ADS-equipped vehicles.
data acquisition	FESTA	The process of sampling or recording data (real world data) for computer processing. It includes acquisition of pure sensor data, as well as acquisition of data from real-time and off-line services, and self-reported data.
driver	SAE (2021)	A user who performs in real-time part or all of the DDT and/or DDT fallback for a particular vehicle. This definition of "driver" does not include a robotic test device designed to exercise steering, braking, and acceleration during certain dynamic test manoeuvres.

Terms	Origin	Definition
driving scenario	L3Pilot	Driving scenarios describe the development of a situation within a traffic context in which at least one actor performs a (pre-) defined action and/or the driving scenario is triggered by a (predefined) event. The action or event is specified without the definition of concrete parameters. The influenced actor may either be the ego vehicle (e.g. performing a lane change or a minimum risk manoeuvre) or another traffic participant (e.g. a lane change in front of the ego vehicle). The event triggering the driving scenario can be a change in road infrastructure (e.g. an end of lane or a change in speed limit) or an external obstruction (e.g. an obstacle on the road).
driving situation	L3Pilot	A driving situation is a specific instance of a driving scenario (e.g. a lane change) but with specific parameters. Thus, a driving situation describes in detail a situation that can be simulated and analysed. An example: a lane change at 60.8 km/h with a second vehicle driving at a distance of 10 m behind the ego vehicle in the adjacent lane and with a velocity of 65.0 km/h.
enabler	Hi-Drive	Technological tools (SW, HW, Methodology) that have the potential to enable new vehicle automated function/s and/or upgrade existing vehicle automated function/s Examples: SW to be installed into vehicles to acquire data received from other vehicles, HW board to be installed into vehicles to connect to the 5G core network, Methodology: Threat Analysis and Risk Assessment
event	Hi-Drive	Events are either single time-points for which one or several criteria (change of an actor state, actors' relations or an environmental attribute) are fulfilled. Example: pedestrian starts crossing the street, falling below TTC threshold, lane ending
experiment	Hi-Drive	Experiment consists of a series of test runs / trips to investigate a common aspect (ADF, Enabler, User) and is conducted under comparable circumstances. It is made up of several test runs / trips. Experiment types include open road, test track, driving simulator, simulation models, etc.
FOT	FESTA	A study was undertaken to evaluate a function, or functions, under normal operating conditions in environments typically encountered by the host vehicle(s) using quasi-experimental methods.
human in the loop simulation		Any study that requires human interaction within a virtual reality environment (includes all types of driving simulators, pedestrians simulators, head-mounted displays etc.)
in-vehicle driver	SAE (2021)	A driver who manually exercises in-vehicle braking, accelerating, steering, and transmission gear selection input devices in order to operate a vehicle.

Terms	Origin	Definition
measure	FESTA	The magnitude of a quantity such as length or mass relative to a unit of measurement, such as a meter or a kilogram.
minimal risk condition	SAE (2021)	A stable, stopped condition to which a user or an ADS may bring a vehicle after performing the DDT fallback in order to reduce the risk of a crash when a given trip cannot or should not be continued.
mixed traffic environment	L3Pilot	Traffic in which participate VRUs, conventional vehicles with SAE Levels below 3 and SAE level 3 and upwards
motorway	Glossary for Transport Statistics	Road, specially designed and built for motor traffic, which does not serve properties bordering on it, and which: (a) is provided, except at special points or temporarily, with separate carriageways for the two directions of traffic, separated from each other, either by a dividing strip not intended for traffic, or exceptionally by other means; (b) does not cross at level with any road, railway or tramway track, or footpath; (c) is specially sign-posted as a motorway and is reserved for specific categories of road motor vehicles. Entry and exit lanes of motorways are included irrespectively of the location of the sign-posts. Urban motorways are also included.
naive subject	L3Pilot	Test person not having prior experience of the testable thing.
naturalistic driving study	FESTA	The opposite to controlled testing is the Naturalistic Driving Study (NDS) or observation, a research method using advanced technology for in-vehicle unobtrusive recording of driver (or rider) behaviour during ordinary driving in everyday traffic situations.
near crash	FESTA	A conflict situation requiring a rapid, severe evasive manoeuvre to avoid a crash.
operation	Hi-Drive	Operation is the execution of experiment(s) in a defined place and time.
operational design domain	SAE (2021)	Operating conditions under which a given driving automation system or feature thereof is specifically designed to function, including, but not limited to, environmental, geographical, and time-of-day restrictions, and/or the requisite presence or absence of certain traffic or roadway characteristics
ordinary driver	L3Pilot	Individual who holds a licence granting them permission to drive on public roads, but does not have any additional driving qualifications or permits, such as racing licences, and does not drive or test vehicles as part of his/her work
passenger	SAE (2021)	A user in a vehicle who has no role in the operation of that vehicle.
personal data	GDPR	All data related to an identified or identifiable person are personal data.

Terms	Origin	Definition
		In other words, data that can be used to identify a person directly or indirectly, such as by combining an individual data item with some other piece of data that enables identification, are personal data. Persons can be identified by their name, personal identity code or some other specific factor.
pilot (test)	L3Pilot	Field test of applications and functions not as mature as in FOTs. The testing methodology may need some adaptation from FOT methodology due to lower TRL of tested technology.
professional (test) driver	L3Pilot	Individual who drives vehicles as a profession, or as part of his/her day-to-day work, for remuneration, and has typically extensive driving experience. As part of his/her training, he/she has been trained to, for example, handle cars in critical situations. These drivers can be deployed to operate prototype vehicles undergoing road tests.
remote driver	SAE (2021)	A driver who is not seated in a position to manually exercise in-vehicle braking, accelerating, steering, and transmission gear selection input devices (if any), but is able to operate the vehicle.
sensor	FESTA	A device that responds to a physical stimulus (as heat, light, sound, pressure, magnetism, or a particular motion) and transmits a resulting impulse which can be interpreted as a measure by an instrument/observer.
system	FESTA	A combination of hardware and software enabling one or more functions
system under test	Hi-Drive	Automated driving system (incl. implemented technology enablers) that is tested with test scenarios
take over controllability	L3Pilot	The take over controllability describes to which extent the driver-vehicle system is able to continue its way smoothly and safely in take over situations.
test run	Hi-Drive	Test run is a test instance that includes at least one test or driving scenario. It can be repeated within one experiment several times – also with slightly changing the setting (parameter, test person etc.). It is comparable to trip, but typically more commonly used in the context of test track, simulation or simulator test. In contrast, trip is often used in the context of pilot or NDS / FOT and typically includes more driving scenarios.
test scenario	Hi-Drive	Description of sequence of triggers, events and actions among UC entities (ego-vehicle, other traffic participants, etc.) in order to reach a UC goal.
traffic scenario	L3Pilot	Traffic scenarios describe a larger traffic context by covering a longer period of time and longer road sections with certain traffic characteristics. One traffic scenario may include different (not predefined) driving scenarios.

Terms	Origin	Definition
		An example: a 3-lane motorway section of length 10 km with 2 motorway entrances and exits, a speed limit of 130 km/h, traffic volume of 4 000 vehicles/h/direction, 10% of heavy vehicles and a time period of 1 hour
trip	FESTA	Includes the sequence from the vehicle ignition key being turned on until it is turned off (even if the vehicle is not moving during this time frame).
use case	Hi-Drive	Abstract description of the interaction between an ADF and its environment in order to reach a particular goal.
user	SAE J3016	A general term referencing the human role in driving automation.
user-based simulator		A facility or range of equipment for creating a virtual reality environment that can be used for human-in-the-loop studies
validation	Hi-Drive	Validation in Hi-Drive context is checking whether you have build the right enabler/ADF/tool/method for a specific purpose. IEEE-STD-610: "An activity that ensures that an end product stakeholder's true needs and expectations are met."
verification	Hi-Drive	Verification in Hi-Drive context is checking whether you have build the enabler/ ADF/tool/method in the right way. It is mainly to check against (internal) requirements. IEEE-STD-610: "A test of a system to prove that it meets all its specified requirements at a particular stage of its development."

List of abbreviations and acronyms

Abbreviation	Meaning
ACC	Adaptive Cruise Control
ADAS	Advanced Driver Assistance Systems
ADF	Automated Driving Function
AEB	Autonomous Emergency Braking
AI	Artificial Intelligence
CAM	Cooperative Awareness Message
CAN	Controller Area Network (CAN bus)
CAV	Connected and Automated Vehicle
DB	Data base
DDT	Dynamic Driving Task
DOW	Description of work
EC	European Commission
FOT	Field Operational Test
GIDAS	German In-Depth Accident Study
GLOSA	Green Light Optimal Speed Advisory
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
HAD	Highly Automated Driving
HMI	Human-Machine Interaction
ID	Identifier
ITS	Intelligent Transport System
NDS	Naturalistic driving study
ODD	Operational Design Domain
OEDR	Object and Event Detection Responsibility
OEM	Original Equipment Manufacture
RHW	Road Hazard Warning
RLVW	Red Light Violation Warning
RSU	Roadside Unit
SAE	Society of Automotive Engineers
SP	Sub-project

Abbreviation	Meaning
SuT	System under test
THW	Time Headway
TMC	Traffic Management Centre
TOC	Take-over controllability
TOR	Take-over Request
TS	Test Site
V2I	Vehicle-to-Infrastructure communication
V2V	Vehicle-to-Vehicle communication
V2X	Vehicle-to-X communication
VRU	Vulnerable Road User
WoZ	Wizard-of-Oz (method)
WP	Work-Package

Annex 1 **Operation description template**

Template background info
Title: *Template for Operations Description. This is the Operation Description template that is created from the excel Operation Description found here: CORE team workshop.*
Scope: *Each operator owner (in collaboration with this operation's team) reports the experimental setup for evaluating one ADF integrating one or multiple Enablers and supporting one or multiple Hi-Drive UCs/Test scenarios.*
Links to previous SP work: *ADF ID and use cases/test scenarios IDs associated with specific Enablers IDs are to be retrieved from T3.3.1 list here: ADF(s) and Use Cases catalogue description (by each ADF owner)*
Responsible Hi-Drive Task*: T5.3.1*

Operation ID and team

Table A - Operation Identity			
Operation Leader	*Please fill in partner name*	**Operation ID**	*Please fill in your operation ID number as assigned in here. (or ask WP5.3. leader for a new number assignment)*
ID and title of the ADF under test	*Please fill in ADF ID and title (see example above) and provide the link to your sp3 ADF description page.*	**Enabler(s) ID (s)**	*Please fill in enablers ID (s) and owner(s) and hyperlink to the corresponding sp2 page that hosts the enabler's card description.*
Team members' Names/IDs involved in running the Operation	*Please fill in partners' names belonging to the operation team (Vehicle owner, Test site operator, Others)*		
Hi-Drive Data Analysis Partner	*Please fill in partners' names assigned by SP5-SP7 for handling the data of this particular operation for fulfilling Hi-Drive evaluation purposes (SP6, SP7)*		
IDs of any associated ADFs by other vehicle owners (if applicable)	*Please fill in ADF IDs implemented by different vehicle owners sharing the same experimental setup or directly collaborating.*		
Version	*Please fill in the current version of the confluence document, in the scale of 0.1 to 1.0*	***Last* update**	*Please fill in the date of last official update*

Operation Card I: Operation purposes linked to specific UC(s)

<table>
<tr><th colspan="10">Table B - General info</th></tr>
<tr><td>ADF users</td><td colspan="3">Please describe instructions given to the ADF test users before the operation (if any). Please also describe if in-cabin HMI is used for communicating with the driver during ADf active. Are you willing to administer user questionnaires?</td><td colspan="2">ADF under test pre-requisites/ limitations</td><td colspan="2"><u>Pre-requisites</u>
☐ lead vehicle presence is mandatory
☐ good weather is mandatory
☐ driver eyes on the road
Others (free text):
• Please insert here
• Please insert here
• ...</td><td colspan="2"><u>Limitations:</u>
☐ road works parts are excluded
☐ toll sections are excluded
☐ VRUs are not recognized/handled
Others (free text):
• Please insert here
• Please insert here
• ...</td></tr>
<tr><td>UC classes treated</td><td>☐ Motorway</td><td>☐ Urban</td><td>☐ Motorway trans. to urban</td><td>☐ Cross border</td><td>☐ Rural</td><td>☐ Parking</td><td>If more than one UCs and/or UC classes, do you treat these UCs in the same drive and in which sequence</td><td colspan="2">Please provide details using free text</td></tr>
</table>

Table C - Operation purpose /evaluation focus per UC					
UC ID	**Operation Purpose summary**	**Highlight challenging conditions handled/to be encountered**			
M.1	*Please describe using free text the main purpose of the operation its limitations and the evaluation goals*	☐ **Challenging traffic interaction with other road user to be tested** *(please add your bullet list only if the above statement is ticked)*	☐ **Challenging ODD conditions to be tested** *(please add your bullet list only if the above statement is ticked)*	☐ **Challenging system-driver interaction to be tested** *(please add your bullet list only if the above statement is ticked)*	☐ **Minimum risk maneuver (if applicable)** *(please describe the conditions which if detected lead to an MRM manoeuvre and also describe how this MRM is realized)*
M.2	*Example:* Testing Motorway AD function dealing with cooperative overtaking in low traffic flow using V2V as an enabler. *Total number of traffic participants in this UC will be two. Interaction with only one connected vehicle road user will be studied. The main evaluation goal is to measure overtaking manoeuvre efficiency with respect to manual driving.*	☐ **Challenging traffic interaction with other road user to be tested** *(please add your bullet list only if the above statement is ticked)*	☐ **Challenging ODD conditions to be tested** *(please add your bullet list only if the above statement is ticked)*	☐ **Challenging system-driver interaction to be tested** *(please add your bullet list only if the above statement is ticked)*	☐ **Minimum risk manoeuvre (if applicable)** *(please describe the conditions which if detected lead to an MRM manoeuvre and also describe how this MRM is realized)*
. . .					

Table D - Evaluation area focus and mapping to test scenarios IDs (second row to be filled in only if first row is ticked)					
☐ **Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)** **...If above statement selected then, evaluation shall take place during:** ☐ Nominal ODD ☐ Extended ODD ☐ ODD boundary	☐ **Technical- AD safety, efficiency, comfort (e.g. better overtaking behaviour)** **...If above statement selected then, evaluation shall take place during:** ☐ Nominal ODD ☐ Extended ODD ☐ ODD boundary	☐ **Technical**-ODD runtime monitoring for scenario extraction **...If above statement selected then, evaluation shall take place during:** ☐ Nominal ODD ☐ Extended ODD ☐ ODD boundary	☐ **User-Interactions with other road users** **...If above statement selected then, evaluation shall take place during:** ☐ Nominal ODD ☐ Extended ODD ☐ ODD boundary	☐ **User-ADf usage** **...If above statement selected then, evaluation shall take place during:** ☐ Nominal ODD ☐ Extended ODD ☐ ODD boundary	☐ **User-ADf acceptance &comfort** **...If above statement selected then, evaluation shall take place during:** ☐ Nominal ODD ☐ Extended ODD ☐ ODD boundary

Operation Summary_Card II: Operation geo-Location and type of experiment

Table E - Operation Location vs. UC/test scenarios			
	Open Road main Location	**Open Road optional Location**	**Controlled Track Location**
Country	*Insert HERE*	*Insert HERE*	*Insert HERE*
Site Location	*Insert HERE*	*Insert HERE*	*Insert HERE*
Mapping to UC/Test scenarios	Test scenarios IDs: *please insert*	Test scenarios IDs: *please insert*	Test scenarios IDs: *please insert*

Table F - Operation Environment/Content						
	Test Environment and type of studies					
	Controlled (Test Track)		**Open Road**		**Virtual**	
	Technical evaluation	**User evaluation**	**Technical evaluation**	**User evaluation**	**Technical evaluation**	**User evaluation**
Brief description of the experiment	*Insert HERE* Select type of experiment: ☐ **AV prototype** ☐ **Multiple AV prototypes**	*Insert HERE* Select type of experiment: ☐ **AV prototype** ☐ **Multiple AV prototypes** ☐ **WoZ**	*Insert HERE* Select type of experiment: ☐ **AV prototype** ☐ **Multiple AV prototypes**	*Insert HERE* Select type of experiment: ☐ **AV prototype** ☐ **Multiple AV prototypes** ☐ **WoZ**	*Insert HERE*	*Insert HERE* Select type of experiment: ☐ **Driver Simulator (Human-In-The-Loop)** ☐ **Survey** ☐ **Other: *Insert here***
Info on staged scenarios (if applicable)	*Insert HERE*	*Insert HERE*	*Insert HERE*	*Insert HERE*		
Info on external recording option (for capturing AV interaction with other road users)	*Insert HERE*		*Insert HERE*	*Insert HERE*		

Operation Summary_Card III: Operations planning

Table G - Phase 0: Preparation			**starting month:** *Insert HERE* ***ending month:*** *Insert HERE*
Checklists			**Timeline**
Permits checklist	**Approval of trials by authorities, insurance, etc.**	*Insert HERE your checklist (bullet list)*	*Insert HERE your timeline indicating months (bullet list)*
Technical Checklist	**Vehicle/Fleet set up**	*Insert HERE your checklist*	*Insert HERE your timeline indicating months (bullet list)*
	Track set up		*Insert HERE your timeline indicating months (bullet list)*
	Other Equipment ready	*Insert HERE your checklist (bullet list)*	*Insert HERE your timeline indicating months (bullet list)*
Subjects checklist	**Recruitment**	*Insert HERE your checklist (bullet list)*	*Insert HERE your timeline indicating months (bullet list)*
	Surveys preparation	*Insert HERE your checklist (bullet list)*	*Insert HERE your timeline indicating months (bullet list)*

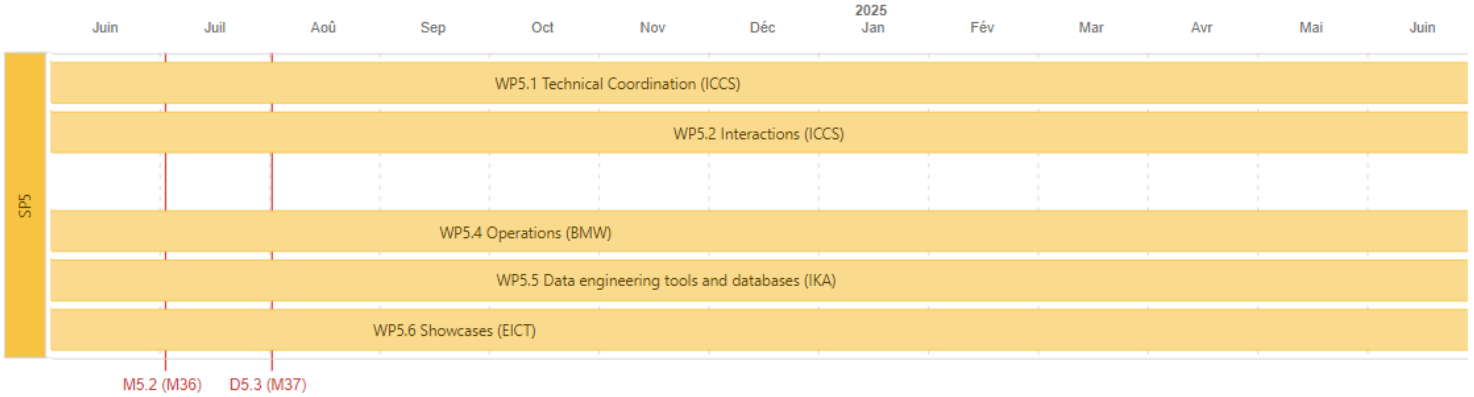
Table G - Phase 1: Pre-operation			**starting month:** *Insert HERE* ***ending month:*** *Insert HERE*
Checklists			**Timeline**
What does the pre-testing include? **Driving scenarios/events the testing includes**	**on track:** *Insert HERE if applicable*		*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*
	on open roads: *Insert HERE if applicable*		*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*
	on simulation: *Insert HERE if applicable*		*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*
Data to be logged	**Vehicle data**	*Short description of type of data logged*	*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*
	External data sources	*Short description of type of data logged*	*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*
	User survey data	*Short description of type of data logged*	*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*
Data checks	☐ **Data has been logged** ☐ **Data has been converted to project format** ☐ **Data quality checks have been performed (ready for handing over to the analysis partner)**		*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*

Table H - Phase 2: Operation			**starting month:** *Insert HERE* ***ending month:*** *Insert HERE*
Checklists			**Timeline**
Number and type of prototype vehicles participating in the operation	*Insert HERE*	***Month when first available logged data are expected (from testing)***	*Insert HERE the month*
Participants	**When do you expect the participant to be defined?**		*Insert HERE the month*
	Number of total participants expected	*Insert HERE*	*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*
	Info on drives	*Insert HERE*	*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*
	Safety driver seat	*Insert HERE*	*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*
	Information on the participants type	*Insert HERE*	*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*
Trips driven distance/duration **(baseline driving also included)**	**Number of kms and hours driven with:**	*Insert HERE* ***Total*** *Number of kms and hours driven (please add the rows filled in below)*	*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*
	☐ **ADF OFF / Enabler OFF**	*Insert HERE Number of kms and hours driven*	*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*
	☐ **ADF ON / Enabler OFF**	*Insert HERE Number of kms and hours driven*	*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*

Table H - Phase 2: Operation			**starting month:** *Insert HERE* ***ending month:*** *Insert HERE*
	☐ **ADF OFF / Enabler ON**	*Insert HERE Number of kms and hours driven*	*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*
	☐ **ADF ON / Enabler ON:**	*Insert HERE Number of kms and hours driven*	*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*
Driving/traffic scenarios or events the testing includes	☐ **on open roads**	*Insert HERE only if ticked the column on the left*	*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*
	☐ **on track**	*Insert HERE only if ticked the column on the left*	*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*
	☐ **on simulation**	*Insert HERE only if ticked the column on the left*	*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*
Data logged	**Vehicle data**	*Short description of type of data logged*	*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*
	External data sources	*Short description of type of data logged*	*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*
	User survey	*Short description of type of data logged*	*Insert HERE your timeline indicating months for the tasks on the left (bullet list)*

Free text additional info you want to share

Annex 2 **Sub-project "Operations" SP5 – Timeline and Milestones**


Juin
Juil
Aoû
Sep
Oct
Nov
Déc
2025
Jan
Fév
Mar
Avr
Mai
Juin
SP5
WP5.1 Technical Coordination (ICCS)
WP5.2 Interactions (ICCS)
WP5.4 Operations (BMW)
WP5.5 Data engineering tools and databases (IKA)
WP5.6 Showcases (EICT)
M5.2 (M36)
D5.3 (M37)