D5.2
Test Operational Manual

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WP5 Tests and Evaluation

D5.2 Test Operation Manual

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Executive Summary

FitDrive (Monitoring devices for overall Fitness of Drivers) is implementing new toolkits and methodologies for monitoring and evaluating driving performance, cognitive load, physical or mental fatigue and reaction time, providing information to drivers, intelligent road systems, and police roadside controls.

The project is focused on professional drivers and their "fitness to drive" status. A new monitoring AI-based system will profile the driving behaviour of a specific user along one month of naturalistic driving; then it will be able to detect anomalous behaviour (with respect to the profiled one) and enable providing early warnings. Further research efforts will try to associate different kinds of anomalies to the most probable specific causes such as alcohol, drugs, or fatigue.

This manual has been prepared to provide guidelines for the four test cycles envisaged by the FitDrive project and contains indications on the safety of operations.

Some parameters, especially for the last two cycles, have only been preliminarily identified and will need to be refined based on the results of the first two cycles and studies that are still ongoing at the date of issue of this document.

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1.Contents

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2. Introduction

The objective of this Manual is to define how to conduct different types of tests in different time spots to gather data for the development of behavioural modes, as well as to test and validate them.

2.1. Organisation, roles and responsibilities

2.1.1. Organisation

The activities covered by this Manual are related to the following tasks of the FitDrive project:

- Definition and selection process of test participants (Task 5.1)
- Simulation tests for detection of driving behaviour and motivational rules (Cycle 1 - Task 2.4)
- Test in controlled environment (Cycle 2 - Task 5.2)
- Test in real scenario (Cycle 3 - Task 5.3)
- Demonstration test (Cycle 4 - Task 5.3)
- Test evaluation (Task 5.4)

2.1.2. Roles and Responsibilities

The partner leading the above-mentioned tasks are:

- Task 5.1 - EPDA
- Task 2.4 - ITCL/UNISAP
- Task 5.2 - AIPSS
- Task 5.3 - AIPSS
- Task 5.4 - UNISAP

They oversee defining and supervising the activities to be carried out together with the other concerned partners and affiliated entities: MDH, EFA, ROMATRE, ADSYS, XEE, SECURETEC and ASELSAN, according to the task descriptions defined in the Technical Annex of the FitDrive Grant Agreement.

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2.2. Definition of KPIs for the Tests' evaluation

The KPIs, described in the tables below define the rate of success of the tests in the different cycles from 1 to 4. Their values are also taken into account for the overall evaluation of the FitDrive system, in terms of: i) accuracy, ii) usefulness by professional staff; iii) level of satisfaction of the users; iv) usability described in section 6 of this document.

Table 1: FitDrive tests KPIs

Cycle 1	Cycle 2
$\frac{\text{N° of volunteers completing tests}}{Total\ N°\ of\ planned\ volunteers}$	$\frac{\text{N° of volunteers completing tests}}{Total\ N°\ of\ planned\ volunteers}$
Cycle 3	**Cycle 4**
$\frac{\text{N° of volunteers completing tests}}{Totl\ N°\ of\ planned\ volunteers}$	$\frac{\text{N° of anomalous behaviours detected in the tests}}{Total\ N°\ of testers}$
	$\frac{\text{N° of anomalous behaviours detected in the tests}}{Total\ N°\ of\ \boldsymbol{actual}\ anomalous\ behaviours}$

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3. Simulation tests

3.1. Objective

Several past research activities employing car simulators investigated the effects of mental impairments such as drowsiness, use of alcohol, drugs and medicine. FitDrive will take advantage in this sense from its predecessor, I.e. the H2020 project SimuSafe, that already compared the driving experience in real cars and simulators, and performed some exploratory studies with impairing conditions. The main objective of the first simulation tests, by taking advantage from the previous experience, is to collect a large, multimodal and consistent dataset to investigate drivers' behaviour under the effects of fatigue, even considering not only cars but also lorry vehicles. The tests will be done in two different locations (Spain and Italy) with the already existing SimuSafe car cockpit in Rome and a lorry cockpit in Burgos. The data will be used to build the knowledge, the methods, and the preliminary behavioural models to be employed in future experimental steps and to be adapted to real settings (C2).

3.2. Recruitment

A total of 32 professional drivers are aimed to be recruited: 16 in Spain and 16 in Italy. The selection process of the volunteers starts with a preliminary announcement on the web sites and social media of the concerned partners, as well as through targeted mails and/or phone calls to professional driver associations.
The announcement will explain the scope of the tests in clear and plain language, avoiding too specific terms, and will be made according to the scheme in Figure 1.
A compensation in form of reimbursement for the working time lost, will be clearly specified.
The applicants will be requested to fill in the Questionnaire attached as Annex 1 Participant Questionnaire.

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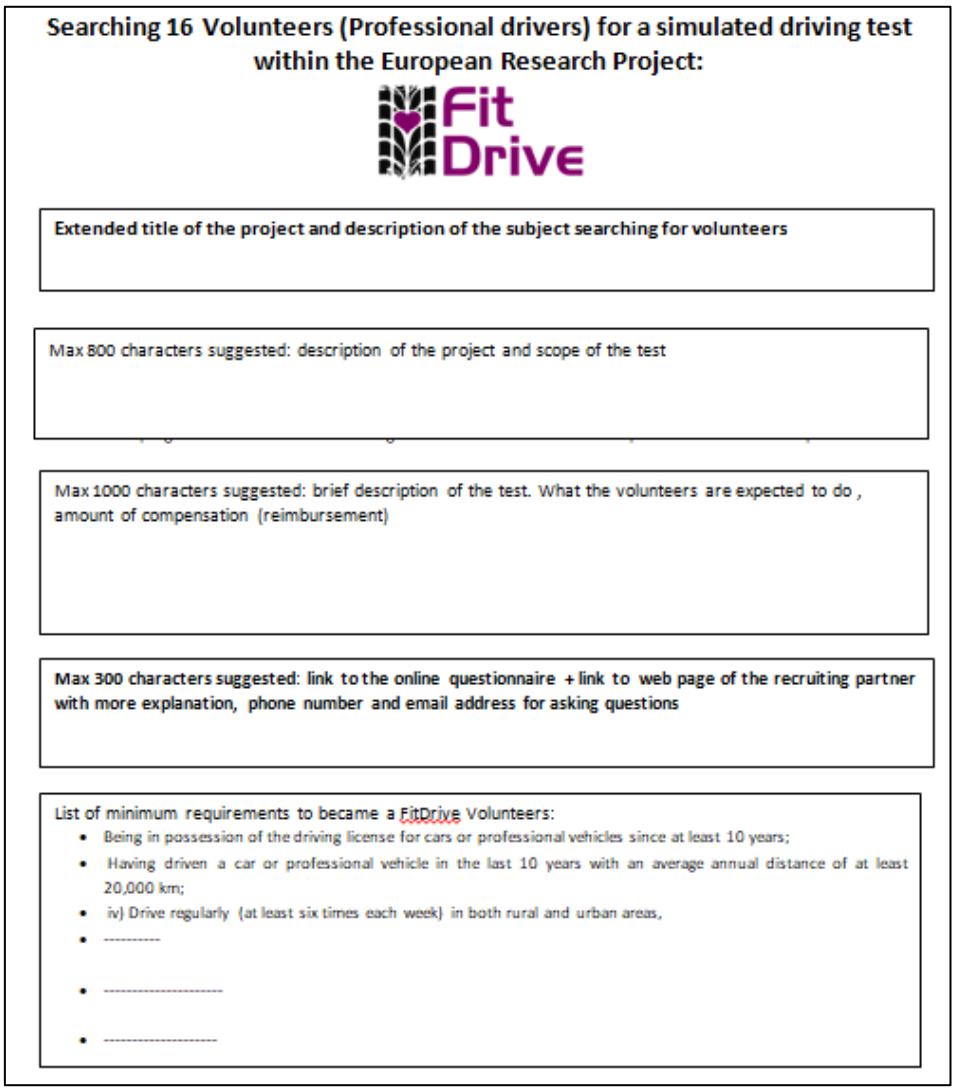

Searching 16 Volunteers (Professional drivers) for a simulated driving test within the European Research Project:

Fit Drive

Extended title of the project and description of the subject searching for volunteers

Max 800 characters suggested: description of the project and scope of the test

Max 1000 characters suggested: brief description of the test. What the volunteers are expected to do , amount of compensation (reimbursement)

Max 300 characters suggested: link to the online questionnaire + link to web page of the recruiting partner with more explanation, phone number and email address for asking questions

List of minimum requirements to became a FitDrive Volunteers:

- Being in possession of the driving license for cars or professional vehicles since at least 10 years;
- Having driven a car or professional vehicle in the last 10 years with an average annual distance of at least 20,000 km;
- iv) Drive regularly (at least six times each week) in both rural and urban areas,
- ----------
- ----------
- ----------

Figure 1: Scheme of the announcement for recruiting volunteers

3.3. Safety management

3.3.1. COVID-19

The following safety measures are intended as an integration of the ones required by the local and national laws; the test organizers should regularly check for requirements applicable during the test period.

All the persons in the test area (volunteers, technicians, researchers etc.) should strive to:

- Have a valid COVID vaccination certificate or a certificate proving a negative result for a test done within the 48 hours.

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- maintain physical distancing. Physical distancing means maintaining a distance of at least 1,5 metres) between persons.
- wear a face mask, preferably FFP2.
- wash their hands before each simulator session.

Before and after each simulation session:

- an adequate air change in the simulator room should be ensured by opening doors and windows for at least 10 minutes.
- the simulator cockpit should be cleaned (steering wheel, gear shifter, dashboard, and all frequently touched areas) with disinfectant wipes.

3.3.2. Simulator sickness

The experience of the previous SimuSafe project (its D3.2) will be exploited by considering the following issues:

1. Participants should be briefed that symptoms are not abnormal, particularly for those not accustomed to simulation [this could be done via the Informed Consent process].
2. Persons who are experts at a task in the real environment, particularly those unaccustomed to simulation of that task, are most at risk. Such individuals have stronger expectations about sensory associations that may be foiled by simulation and may well have no adaptation to sensory associations within the simulated environment.
3. Driving scenarios requiring high rates of linear or rotational acceleration should be avoided or kept brief (< 5 minutes) until full habituation has been achieved. Such scenarios are most conducive to visual-vestibular conflicts.
4. Avoid freezing of the simulated scene during trials, unless preceded by the opportunity for the driver to achieve stable and straight control of the vehicle.
5. Use as narrow a field of view as required by task or as appropriate by mode. Reduce the field of view in simulations that are known to be particularly provocative.
6. Discourage unnecessary head movements, particularly when first demonstrating dynamic simulations.
7. Be aware that the initial session and certain types of scenarios (e.g., high scene complexity, accelerations/decelerations, cornering) require particular care.

Recommended mitigation measures

Recruitment will be strictly targeted to exclude potential participants who:

- Have a history of high blood pressure and/or epilepsy.
- Have any health conditions that may worsen under physical and/or mental stress.

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- Have any health conditions that may prevent adequately hearing or seeing the virtual environment.
- Have a history of severe motion sickness and/or simulator sickness.
- Airflow will be enhanced in the simulator rooms. Fans will be set up around the rooms so that air blows on the participants. The airflow will help decrease the onset of sim sickness as well as enhance the simulator experience.
- Water will be available at each cockpit as well as in the space dedicated for participant recovery.
- Medical assistance availability is recommended

3.4. Instruments and Equipment

Table 2: Devices to be used in the simulation tests

Device	Responsible	C1	Notes
Profile Questionnaire (online)	EPDA / AIPSS	Y	Attached as Annex1
NASA-TLX questionnaire	UNISAP	Y	Please refer to D2.2
VAS questionnaire	UNISAP	Y	Please refer to D2.2
EEG Mindtooth	UNISAP	Y	Please refer to D2.2
Empatica E4 (EDA/HR)	UNISAP	Y	Please refer to D2.2
Smartband (FitBit or similar)	UNISAP	N	Please refer to D2.2
Tobii Pro2 Eye-Tracker glasses	UNISAP / ITCL	Y	Please refer to D2.2
Face camera	ITCL (Neurologica)	Y	Please refer to D2.2
EnviroSensor	ITCL	Y	Please refer to D2.2

3.5. Instructions to the testers

A "*Project information sheet-cycles 1-2*" (Annex 2) will be provided to each participant during the selection phase and at least 1 week before starting the simulation test. It must contain names and contacts (phone and email) of at least one researcher involved in the test.

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Before the test day, the testers will receive the "*Participant consent form*" (Annex 2) to be filled in and signed. The name of the contact person should be the same (or one of the names) indicated in the *Project information sheet-cycles 1-2*.

Then, the testers will be prepared for the simulation test with all the neurorecording and monitoring devices, receiving specific oral information about each device, its scope and use and will perform the simulation according to the safety measures described in the previous section and to the following operation elements.

3.6. Operations elements

The actual simulation will last for no more than one hour, including an adaptation period (10 minutes) of free driving to allow the tester to become confident with the cockpit and the simulator environment and a pause (10 minutes) between two simulation sessions. The driving instructions to the tester will consider the geometries of the location chosen for the controlled environment test, in order to make the simulation path as much consistent as possible with the future driving in controlled environment.

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4. Tests in controlled environment

4.1. Objective

The rational of the test is to gather data with driving conditions similar as much as possible to the previously simulated ones. This test session involves 16 subjects, 8 from Spain and 8 from Italy, selected from the 32 ones that have performed the previous test. The selection criteria will be based on the results of the previous cycle, by choosing those testers that demonstrated a behaviour "of interest" (i.e. clear differences between normal and fatigued driving) during the simulation test (C1). The main objective is to evaluate whether the findings, in terms of correlations between fatigue onset and effects on neurophysiological signals and overt behaviour, obtained in simulated conditions are still valid and to what extent in real conditions. Thanks to the previous experience in SIMUSAFE, as well as documented even in scientific literature, FitDrive consortium is already aware of the bias due to the use of simulators, therefore the final aim is to adapt and optimized the models developed from data collected in simulated conditions to be effective and reliable even in real driving conditions.

4.2. Safety and risk management

Tests must be conducted in an area closed to the ordinary traffic; test organizers must ensure a control to any access, to avoid other vehicles entering in the test area. The path of the test should be clearly defined with appropriate indications able to avoid any uncertainty in the driver.

The test vehicle must be covered by a full insurance including damages to the driver, the vehicle, and other persons or goods.

The researcher in charge of the test operations (hereafter, "*Instructor*") must check again immediately before the test that the tester has a valid driving license.

The testers will be informed in advance about the following safety rules:

<u>It is mandatory to:</u>

- communicate to the Instructor any situation that may reduce the level of attention, such as assumption of alcohol, medicines, drugs or health issues;
- respect the speed limits communicated by the instructor and avoid any behaviour that could create a danger for one's own safety and that of others.

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It is forbidden to:

- use sandals and / or open shoes.
- smoke and consume alcoholic beverages.
- use the mobile phone.
- use any device on the car in a way that differs from the ones indicated by the instructor.

4.2.1. COVID-19

The following measures will be adopted *in addition to the measures described in the previous section 3.3.1:*

- The test vehicle must be cleaned regularly, at least after each session; ensuring a thorough cleaning of the steering wheel, gear shifter, dashboard, all gauges, windows, door handles and all other frequently touched areas.
- Most areas can be cleaned with detergent and water and then followed with disinfectant wipes and a dry washcloth or towel. Once the cleaning is complete, cleaning gloves and other reusable material should be properly cleaned.

4.3. Instructions to the testers

Testers will be requested to drive for 1 hour in the late afternoon or in the evening, because the end of a working day is assumed as a standard baseline condition of fatigue and/or stress; another period of the day can be chosen, provided that the testers' conditions can be supposed like the assumed baseline.
The testers will be requested to drive for 1 hour while wearing/using again the advanced neuro-devices and other equipment as defined in section 4.4.

A "*Project information sheet-cycle 1-2*" (Annex 3) will be provided to each participant at least 1 week before starting the simulation test. It must contain detailed instructions of the driving session, including a map of the path of the driving test.
The sheet must also contain names and contacts (phone and email) of at least one researcher involved in the test.

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Before the test day, the testers will receive the "*Participant consent form*" (Annex 2) to be filled in and signed. The name of the contact person should be the same (or one of the names) indicated in the *Project information sheet-cycle2*.

Testers will be asked to repeat the driving instructions before starting the test and to describe the map of the path they received in advance: only after checked they have fully understood the instructions the test can start. In case of doubts, the instructor will explain again the rules and the map to the tester.
Then the testers will be prepared for the driving test with all the neurometrics and monitoring devices, receiving specific oral information about each device, its scope and use and will perform the simulation according to the safety measures described in the previous section and to the following operation elements.

4.4. Instruments and Equipment

Table 3: Devices to be used in the controlled environment tests

Device	Responsible	C2
Profile Questionnaire (online)	EPDA / AIPSS	Done in C1
NASA-TLX questionnaire	UNISAP	Y
VAS questionnaire	UNISAP	Y
EEG Mindtooth	UNISAP	Y
Empatica E4 (EDA/HR)	UNISAP	Y
Smartband (FitBit or similar)	UNISAP	N
Tobii Pro2 Eye-Tracker glasses	UNISAP / ITCL	Y
Face camera	ITCL (Neurologyca)	Y
EnviroSensor	ITCL	Y

4.5. Test time limitations and repetitions

Each driving session should be completed within 90 minutes and, as general indication, no more than 2 sessions with two different testers should be performed in the same

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afternoon/evening. An ordinary session should last for a maximum of 60 minutes; in case of problems of driver's adaptation to the test, if they happen in the first 20 minutes, the test can be stopped and re-started. In case of issues that cannot be solved in the first 30 minutes, the session with the concerned tester should be postponed to another date.

4.6. Operations Elements

Before the actual test session there will be a pre-test driving session where the tester, after having passed the check from the instructor described in the previous section 4.2, will drive for a minimum of ten minutes in the test path to become confident with the vehicle and the neurorecording devices. If no issues are detected the actual test can start, otherwise the rules described in the previous section 4.5 are applied.

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5. Tests in real scenario

5.1. Objective

This round of tests involves 10 new testers in Spain, Italy, and Ireland (total 30), with the objective of:

1. profiling the driving behaviour of each tester during one month of normal driving during their usual working days;
2. detecting anomalous behaviour with respect to their normal profile;
3. assigning a likelihood to the specific cause of the detected anomalous behaviour based on the characteristics of the anomalies.

5.2. Recruitment

The recruitment will be made in the same way described in the previous section 3.2, clearly specifying that the testers will use their own vehicle, duly equipped by the FitDrive researchers and a compensation will be provided in terms of reimbursement for the working time lost during the test operations such as mounting the devices in the vehicles, periodic check. The specific questionnaire will be based on the one used for the previous recruitment, integrated by further information not yet available at the date of emission of this document, because they are mainly based on the result of the previous tests cycles. An updated version of this manual will contain specific information.

5.3. Safety and risk management

An additional insurance will integrate the existing one in the testers' vehicle, if needed.

Since the test foresees one month of "*driving as usual*", the safety measures in this case will be:

- Check of the valid driving licence of the driver.
- Check of a proper valid insurance of the tester's vehicle.

5.3.1. COVID-19

Each time before and after the installation, maintenance and de-installation of the devices in the tester's vehicle, the following operations must be conducted:

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- The test vehicle must be cleaned, ensuring a thorough cleaning of the steering wheel, gear shifter, dashboard, all gauges, windows, door handles and all other frequently touched areas.
- Most areas can be cleaned with detergent and water and then followed with disinfectant wipes and a dry washcloth or towel. Once the cleaning is complete, cleaning gloves and other reusable material should be properly cleaned.

5.4. Instruction to the testers for one month of naturalistic driving

The final FitDrive devices will be mounted on users' vehicles and the drivers will be requested to wear only a smart band device (no other neuro-devices) during their ordinary life for 1 month.
Testers will be requested just to drive "as usual", to allow the system to profile their driving style; the only specific task will consist in switching off the device if their vehicle is driven by another person during a certain period promptly inform the researcher in charge for the tests.
Once all the testers have been profiled, the demonstration phase will take place.

5.4.1. Instruments and equipment

Table 4: Devices to be used during the naturalistic driving tests

Device	Responsible	C3	Notes
Profile Questionnaire (online)	EPDA / AIPSS	Y	
NASA-TLX questionnaire	UNISAP	Y	
VAS questionnaire	UNISAP	Y	
EEG Mindtooth	UNISAP	N	
Empatica E4 (EDA/HR)	UNISAP	N	
Smartband (FitBit or similar)	UNISAP	Y	

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Tobii Pro2 Eye-Tracker glasses	UNISAP / ITCL	N	
Face camera	ITCL (Neurologyca)	TBD	If used, must be moved in vehicle to 'legal' location
EnviroSensor	ITCL	TBD	

5.5. Demonstration phase

5.5.1. Instruction to the testers for the demonstration phase

This phase involves the same 10 testers previously profiled by the FitDrive system. Seven of them will be randomly selected to simulate an Altered Driving Condition.
They will be instructed in detail on how to modify driving behaviour in a realistic way (e.g., increase the steering oscillations, or decrease the fluidity of accelerations/brakes, etc.). according to the data in Table 5.

The seven selected testers will be requested to give their saliva samples, then they will receive the samples back in a sealed envelope containing the instructions to be opened only before starting their trip; the saliva samples will be the same given by the testers, except for only one, that will be mixed with the drugs of interest. The tester with the altered saliva sample will drive according to the instructions simulating the driving under altered conditions related to the drug that has been mixed with the saliva. The method of driving will be defined based on the previously mentioned FitDrive
cycle 3 tests. The seven testers will drive according to the instruction of simulating one of these impairments:

- Fatigue (3 drivers)
- Alcohol (2 drivers)
- Drugs or psychoactive substances (1 driver)
- Use of medicines for chronic pathologies (e.g. Early Alzheimer) (1driver)
-

The remaining 3 testers will drive normally. In this way, we will have the same number of participants driving in normal (3) and fatigue-altered (3) conditions (fatigue detection is one of the main objectives of FitDrive), while the other 4 testers will consider other impairing causes, in particular alcohol and drugs abuse (being the

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development of screening devices another main objective of FitDrive) and even assumption of medicines.

The simulation of altered conditions will be based on a defined combination of the parameters shown in the first row of Table 5 that will be defined by choosing the adequate range for each specific conditions at least two months before the expected starting date of the demonstration, based on the studies conducted during the FitDrive Project. This table has to be intended as a mere example of what will be defined. It will be filled by employing outcomes from C1 and C2 experimental phases (especially for fatigue-related anomalous behaviours) and evidence already reported in scientific literature (for the other impairing causes).

Table 5: Parameters to be defined for the simulation of anomalous behaviour

Cause/Driving parameters	Speed during the anomalous behaviour	Amplitude of "waves" (Steer oscillations)	Frequency of braking acceleration	Position in the lane
Range to be chosen	30/40/50 Km/h	1/2/3 meters	Every 30/45/60 seconds	Left/centre/right
Drugs	*To be defined after cycle 2*	*To be defined after cycle 2*	*To be defined after cycle 2*	*To be defined after cycle 2*
Alcohol	*To be defined after cycle 2*	*To be defined after cycle 2*	*To be defined after cycle 2*	*To be defined after cycle 2*
Depression medicines	*To be defined after cycle 2*	*To be defined after cycle 2*	*To be defined after cycle 2*	*To be defined after cycle 2*
Early Alzheimer	*To be defined after cycle 2*	*To be defined after cycle 2*	*To be defined after cycle 2*	*To be defined after cycle 2*
Fatigue	*To be defined after cycle 2*	*To be defined after cycle 2*	*To be defined after cycle 2*	*To be defined after cycle 2*
Drugs	*To be defined after cycle 2*	*To be defined after cycle 2*	*To be defined after cycle 2*	*To be defined after cycle 2*

5.5.2. Instruments and equipment

Table 6: Devices to be used during the demonstration phase

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Device	Responsible	C4	Notes
Profile Questionnaire (online)	EPDA / AIPSS	Done in C3	
NASA-TLX questionnaire	UNISAP	Y	
VAS questionnaire	UNISAP	Y	
EEG Mindtooth	UNISAP	N	
Empatica E4 (EDA/HR)	UNISAP	N	
Smartband (FitBit or similar)	UNISAP	Y	
Tobii Pro 2 Eye-Tracker glasses	UNISAP / ITCL	N	
Face camera	ITCL (Neurologyca)	TBD	If used, must be moved in vehicle to 'legal' location
EnviroSensor	ITCL	TBD	
Drug screening devices	SECURETEC	Y	To be used in the check point

5.1. Test time limitations and repetitions

The test will be repeated for 2 times in each location by mixing the role of the drivers (altered and normal conditions) during the different repetitions.

5.2. Operations Elements

The demonstration tests will take place on closed roads to ensure no traffic hazard is created. Drivers are requested to drive a path of around 5Km, converging to a check point where the FitDrive devices will be interrogated, and the drug screening device will be applied on all the 6 samples. The system is expected to individuate the 5 drivers with the altered conditions and the drug screening device is expected to give positive results only for the of the driver indicated by the device as having altered conditions

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with the higher likelihood of drug use; each result is expected to be given in less than 2 minutes.

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6. Tests Evaluation

6.1. Definition of the evaluation criteria

The following KPIs have been chosen for the overall evaluation of the FitDrive system in terms of:

- accuracy
- usefulness
- level of satisfaction of professional users
- usability

the last three terms will be defined through specific questionnaires submitted to the tester in two times:

1. At the end of the naturalistic driving
2. At the end of the demonstration phase

Table 7: KPIs for the overall FitDrive System

Accuracy	Usefulness
% of false positive results	To be defined based on the tester's questionnaire
% of false negative results	
Level of satisfaction of professional users	**Usability**
To be defined based on the tester's questionnaire	To be defined based on the tester's questionnaire

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6.2. Reporting

Intermediate reports should be produced at the end of each test cycle;
The naturalistic driving tests should also have an inception report describing all the phases of test launch and an intermediate report after 15 days from the launch.

6.3. Reporting templates

Each cycle of tests must generate a specific report, according to the following template which represent the minimum amount of the information requested; each report should be customized according to the characteristics of each cycle.

- FitDrive basic info: few lines summarizing the project and the different cycle
- Test Objective (description of the data to be collected)
- Test Summary
- The total number of the executed test cases
- The number of the test cases performed without any issue
- The number of the test cases completed, but with some issues with short descriptions
- The number of the test cases not completed and postponed, together with the description of the causes
- Comments and description of the data collected

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Annex 1 Participant Questionnaire

Thank you for expressing interest in taking part in the FitDrive driving simulator experiments. Please refer to the attached sheet which describes what will take place during the experiment and what you should expect. Further information about the trial and the FitDrive project is available in the project data sheet and at www.fitdrive.eu.

Please complete the following questionnaire. Your answers are confidential, and no data will be shared outside of the FitDrive consortium. For full details of our data protection policy, please visit www.fitdrive.eu/dataprotection.

About you

1. *Name:
2. *Surname:
3. Address:
4. Town:
5. City:
6. *Country:
7. *E-mail:
8. *Phone number:
9. *Date of Birth:
10. *Gender: Male / Female / Other

Driving

11. *What category of driving licence do you hold?

B / BE / C / CE / C1 / C1E / D / DE / D1 / D1E / No driving licence

/// checkboxes for licence categories – more than one can apply ///

/// if no driving licence selected, questionnaire ends ///

12. *What average annual distance would you drive, inclusive of both driving for work and for leisure?

< 6,000km / Between 6001km and 16,000km / Between 16,001km and 32,000km / Between 32,001km and 64,000km / Between 64,000km and 120,000km

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13. *Do you have any endorsements on your driving licence? Yes / No

14. *Which of the following areas do you drive in? Rural areas / Urban areas / Both

Employment

15. *Are you currently employed? Yes / No ///if yes, go to 16. If no, go to 25 ///

16. *How many hours per week do you work on average?

17. *How long is your average work shift?

18. *Do you commute to work? Yes / No ///if yes, go to 19. If no, go to 22 ///

19. What transport method do you primarily use for your commute to work?

Car / Motorbike / Public Transport / Cycle / Walk / Other

20. *How long is your commute to work at the start of your shift?

21. *How long is your commute home at the end of your shift?

22. *Other than your commute, do you drive for work?

Yes – I drive a car / Yes – I drive a van or light goods vehicle / Yes – I drive a heavy goods vehicle / Yes – I drive a bus / No – do not drive for work

///if yes, go to 23. If no, go to 24///

23. *How many hours per day do you spend driving for work?

24. *What city is your primary place of employment?

<u>Lifestyle</u>

25. *How many hours do you sleep per night?

26. *Do you wake during your sleep?

27. Do you have any disabilities or medical condition that could affect driving?

None / Spinal cord injury / Muscle paralysis and/or atrophy / Muscular dystrophy / Total or partial anatomical loss of at least one extremity / Deafness (total or partial) / Sleep Apnoea / Narcolepsy / Epilepsy / Cardiovascular Condition

28. Do you have any sleep disorder and/or take any medication to sleep?

29. Have you ever visited a psychologist?

30. Do you suffer (or have been diagnosed) any of the following disorders?

No / ADHD / ADD / Anxiety disorders / Depression / Psychosis / Addiction / Bipolar disorder

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31. Do you take any kind of medicine on a regular basis? Yes / Mo

32. If yes, what medication and how often?

33. Regarding caffeine consume… how often do you drink a coffee?

I've never had a coffee / I used to drink, but now I do not / Less than 2 coffees a day / Between 3 and 5 coffees a day / Between 6 and 10 coffees a day / More than 10 coffees a day

34. Regarding alcohol consume… how often do you drink alcohol?

I've never had a drink / I used to drink, but now I do not / I only drink at weekends / I drink occasionally during the week / Other:

35. Regarding cannabis or marijuana use, how often do you smoke?

I've never smoked / I used to, but now I do not / I only smoke at weekends / I smoke occasionally during the week / Other:

Other

36. *Have you ever played in a driving simulator?

37. *Have you ever used a 3D simulator or device (for example, virtual reality goggles)? Yes / No

38. *Have you ever experienced dizziness?

Yes, and they were related to a 3D simulator / Yes, but it was not related to a 3D simulator / No

39. *Do you have migraines or headaches in a regular basis?

40. Have you ever been hospitalized?

41. If yes, what was the cause?

42. *Are you available to participate in a follow up test, driving in a vehicle for one hour at some point between April to September next year? Yes / No

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Annex 2 Participant Information Sheet C1-C2

Title of Research: FitDrive Behavioural Studies

Name and Contact Details of Researcher: *[Please identify the researcher responsible for the study]*

EXPLANATION OF THE FITDRIVE PROJECT

FitDrive (Monitoring devices for overall Fitness of Drivers) is implementing new toolkits and methodologies for monitoring and evaluating driving performance, cognitive load, physical or mental fatigue and reaction time, providing information to drivers, intelligent road systems, and police roadside controls.

The project is focused on professional drivers and their "fitness to drive" status. A new monitoring AI-based system will profile the driving behaviour of a specific user after one month of driving; then it will be able to detect anomalous behaviour (with respect to the profiled one) and to provide early warnings. Further research efforts will try to associate different kind of anomalies to the most probable specific causes such as alcohol, drugs or fatigue. The toolkit will be completed by a drug screening device based on saliva samples capable of giving reliable results in less than 2 minutes.

The system can be used by road patrols to speed up and increase efficiency of roadside controls through a device able to read in contactless mode the "warnings" issued by the system and select those drivers having shown a recent anomalous behaviour.

METHODOLOGY

Should you decide to participate in the study, you will drive in a simulator and could be later selected for a test drive in a controlled environment in a commercial vehicle provided by the project. we will install the necessary pieces of data collection equipment in the vehicle

There will be video recording of your face, and other biometric parameters such as: heart rate; respiration; eye tracking. During these tests sensors will be mounted on you to record the data signals. These sensors do not have any side effects and may not harm your integrity.

ARE THERE ANY RISKS INVOLVED?

In case you are driving vehicles equipped with sensors, such sensors will not affect passive and active safety instruments of your vehicle and would be installed in such a way not to deviate your attention from your primary task which is driving the vehicle safely. The risks while driving your car during tests will be the same as the risks of driving it when not participating in the study.

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DATA USAGE AND PRIVACY

The FitDrive Project treats all participants' data anonymously, preserves their identity and users no personal information for the sake of analysis; data collected within the project is used solely for the sake of the studies proposed in the project, and no personal data passed to third parties.

QUITTING WITHOUT PREJUDICE

Participation in this study is voluntary. Refusal to participate will involve no penalty. You are free to withdraw your consent and discontinue your participation in this project at any time.

You do not have to answer any question you do not want to answer. If at any time and for any reason, you would prefer not to participate in this study, please feel free not to. If at any time you would like to stop participating, please tell us. We can take a break, stop and continue at a later date, or stop altogether. You may withdraw from this study at any time, and you will not be penalized in any way for deciding to stop participation. If you decide to withdraw from this study, the researchers will ask you if the information already collected from you can be used.

Volunteer participants lying about their drug use or medical history to get into the trials, will be removed from the tests, and their respective data will be deleted.

COSTS AND/OR PAYMENTS FOR PARTICIPATION IN THIS STUDY

There will be no costs for participating in this research. In addition, you may be paid to participate in some of the studies of the FitDrive Project.

DATA USE WITHIN AND AFTER THE RESEARCH

Data obtained from the sensors and questionnaires will be anonymized and processed to create new simulation actors that behave in a more realistic way in simulated and virtual environments; this data will be included in a simulation platform as part of the results expected and planned for the FitDrive Project.

WHERE CAN I FIND MORE INFORMATION ABOUT THE FITDRIVE PROJECT?

Further information can also be consulted on the FitDrive Project's official Website, which will be updated regularly, at http://fitdrive.eu/.

QUESTIONS AND FURTHER INQUIRIES

If you have any questions concerning the research project and/or your participation in the tests, you are free to ask now.

Researcher name: *[please provide]* **Address**: *[please provide]* **E-mail**: *[please provide]* **Telephone/Mobile**: *[please provide]*

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Annex 3 Participant Consent Form

Title of Research: FitDrive Behavioural study targeted to professional drivers

Name and Contact Details of Researcher: [*Please identify the researcher responsible for the study]*

This Participant Consent Form refers to the 'FitDrive' (Monitoring devices for overall Fitness of Drivers) Project, funded by the European Commission under the H2020 Programme, Grant Number 953432.

1. I confirm that I have read and understood the Participant Information Sheet of for the study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

••

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason.

••

3. I understand that data collected during this study could be requested and looked at by regulatory authorities. I give my permission for any authority, with a legal right of access, to view data which might identify me. Any promises of confidentiality provided by the researcher will be respected.

••

4. I understand that the results of this study may be published and/or presented at meetings or academic conferences, and may be provided to research commissioners or funders (e.g. the European Commission). I give my permission for my anonymous data, which does not identify me, to be disseminated in this way.

••

5. I agree to the data I contribute being retained for any future research that has been approved by a Research Ethics Committee.

••

Place and date _____

Signature_____

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