# D3.3.1: Test communities overview (initial)

<table>
<thead>
<tr>
<th>Deliverable n.</th>
<th>3.3.1</th>
<th>Test communities overview (initial)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub Project</td>
<td>SP3</td>
<td>Field Operational Tests</td>
</tr>
<tr>
<td>Workpackage</td>
<td>WP3</td>
<td>Test sites set-up</td>
</tr>
<tr>
<td>Task n.</td>
<td>T3.3.1; T3.3.2; T3.3.3; T3.3.4; T3.3.5</td>
<td>Test Communities set up coordination; Southern Test Community: Greek, Italian and Spanish test sites; Central Test Community: German test site, UK and French test sites; Northern Test Community: Finnish and Swedish test sites; TeleFOT functions and services technical verification</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Alma Solar (ETRA) Lila Gaitanidou (CERTH) Katia Pagle (ICCS) Test Site leaders</td>
<td>File name TeleFOT_D3.3.1__ Test communities overview_v6.doc</td>
</tr>
<tr>
<td>Status</td>
<td>Final</td>
<td></td>
</tr>
<tr>
<td>Distribution</td>
<td>PU</td>
<td></td>
</tr>
<tr>
<td>Issue date</td>
<td>2010-05-3131</td>
<td>Creation date 2010-07-29</td>
</tr>
<tr>
<td>Project start and duration</td>
<td>1st of June, 2008 – 48 months</td>
<td>Project co-funded by the European Commission DG-Information Society and Media in the 7th Framework Programme</td>
</tr>
</tbody>
</table>
TABLE OF CONTENTS

TABLE OF CONTENTS ................................................................. 2
LIST OF FIGURES ........................................................................... 3
LIST OF TABLES .............................................................................. 4
LIST OF ABBREVIATIONS ............................................................. 5
REVISION CHART AND HISTORY LOG ........................................ 6
EXECUTIVE SUMMARY ............................................................... 7
1. INTRODUCTION ......................................................................... 9
2. TEST COMMUNITIES CONCEPTS ............................................. 11
   2.1. Large scale tests (L-FOT) .................................................... 11
   2.2. Detailed scale tests (D-FOT) .............................................. 11
3. TELEFOT FUNCTIONS ............................................................ 13
4. TEST SITES DESCRIPTIONS .................................................... 14
   4.1. Northern Test Community .................................................. 14
       4.1.1. Sweden ................................................................. 14
       4.1.2. Finland ............................................................... 14
   4.2. Central Test Community .................................................... 14
       4.2.1. UK .................................................................... 14
       4.2.2. Germany .......................................................... 14
       4.2.3. France .............................................................. 14
   4.3. Southern Test Community ................................................ 14
       4.3.1. Spain ................................................................. 14
       4.3.2. Italy ................................................................. 14
       4.3.3. Greece ............................................................. 14
CONCLUSION ............................................................................... 14
REFERENCES .............................................................................. 14
LIST OF FIGURES

Figure 1: Map of the area of the Swedish FOT1 tests ................................................ 14
Figure 2: Device to be used in the Swedish L-FOT1 (PDA) ........................................ 14
Figure 3: Map of the area of the Swedish FOT2 (and FOT3 & FOT4) tests ................. 14
Figure 4: Device to be used in the Swedish L-FOT2 (Garmin nüvi) ........................... 14
Figure 4: WisePilot by Apollo ................................................................................. 14
Figure 6: Map of the area of the Finnish LFOT ........................................................ 14
Figure 7: DESTIA Traffic Information. .................................................................... 14
Figure 8: DRIVECO OBD-II module and mobile phone application ............................. 14
Figure 10: Instrumented BMW 525dA E61 Touring from VTT ................................. 14
Figure 10: Geographical location of UK LFOT 1 ..................................................... 14
Figure 12: UK Large FOT 1: BLOM device .............................................................. 14
Figure 12: UK Large FOT 2: Green Driving Support (Nottingham/Leicester/Coventry) .. 14
Figure 13: UK Large FOT 2: Green Driving Support .............................................. 14
Figure 14: Geographical region UK for DFOT 1, BLOM ........................................... 14
Figure 15: BLOM N-Drive G800 ............................................................................. 14
Figure 16: Geographical region UK DFOT 2 Green driving support ............................ 14
Figure 17: Detailed FOT 2: Multi-function in-vehicle information system supported by back-office services ................................................................. 14
Figure 18: Geographical region UK DFOT 3 ............................................................. 14
Figure 19: UK DFOT 3: Mobileye ........................................................................... 14
Figure 20: Satellite picture of the test area for the detailed FOT in Germany (between Aachen and Cologne) ............................................................... 14
Figure 21: Map of the test area for the detailed FOT in Germany (between Aachen and Cologne) ........................................................................... 14
Figure 22: Bloom PND (NDrive G800) ..................................................................... 14
Figure 23: Equipped Vehicle DFOT Germany (Volkswagen Passat CC) ....................... 14
Figure 24: Sunrise, sunset, dawn and dusk times, graph [Gaisma.com] ...................... 14
Figure 25: Sun path diagram [Gaisma.com] .............................................................. 14
Figure 26: Climate diagram of Aachen, Germany [Wetterkontor.net] ......................... 14
Figure 27: Map of the area of the French FOT1 test site. ............................................ 14
Figure 28: DANEW device .................................................................................... 14
Figure 29: Map of the area of the Spanish LFOT (WV) .............................................. 14
Figure 30: The nomadic device to be used in the Spanish WV LFOT ......................... 14
Figure 31: The road network in the area of the tests of Spanish WV LFOT ................. 14
Figure 32: Traffic conditions in the area of the tests of the Spanish WV LFOT ......... 14
Figure 32: Average weather indicators of the area of the tests of Spanish WV LFOT . 14
Figure 34: Location of Madrid .............................................................................. 14
Figure 36: Vexia Econav ....................................................................................... 14
Figure 37: Average temperature per month in Madrid .............................................. 14
Figure 37: Average precipitation per month in Madrid ............................................. 14
Figure 40: Sun path diagram ................................................................................ 14
Figure 41: Reggio Emilia in Northern Italy where the Italian LFOTs will be conducted ... 14
Figure 42: Emilia Romagna ................................................................................... 14
Figure 43: Acer smart phone, model “beTouch E 101” ............................................. 14
Figure 44: Temperature and precipitations ................................................................ 14
Figure 45: Reggio Emilia Sun path diagram (ref: May 2009) .................................... 14
Figure 46: Reggio Emilia Sunrise, sunset, dawn and dusk times, graph ..................... 14
Figure 47: Turin ................................................................................................. 14
Figure 48: Turin weather averages ....................................................................... 14

2010/07/28
Figure 49: Turin Sunrise, sunset, dawn and dusk times, graph
Figure 50: Turin Sun path diagram (ref. May 2009)
Figure 49: Athens and the surrounding area (Attica prefecture) where the Greek LFOTs will be conducted.
Figure 52: The nomadic device provides a typical Windows mobile HMI. The pictures reflect from left to right the sequence that needs to be followed in order to initiate the TeleFOT application menu.
Figure 53: The interface of the TeleFOT application
Figure 54: User interface of the TeleFOT accelerometer calibration.
Figure 55: User interface of the TeleFOT navigation application.
Figure 56: Acceleration measurements in the three axes (x, y, z).
Figure 57: Monthly variation of absolute min (denoted with red line), max (denoted with blue line) and average (denoted with green line) temperatures in the Attica prefecture.
Figure 57: Monthly average humidity in the Attica prefecture.
Figure 58: Monthly Average Rainfall (and total days of rain indicated in the right axis).
Figure 59: Monthly average windspeed (the wind direction from July to March is to North, and from April to June is to the South).
Figure 61: Map of Thessaloniki and the surrounding area where the Greek DFOTs will be conducted.
Figure 62: The experimental vehicle of the Greek DFOT.
Figure 63: The frontal radar.
Figure 64: The Lane Departure Camera.
Figure 65: The industrial PC.
Figure 66: Monthly variation of absolute min (denoted with red line), max (denoted with blue line) and average (denoted with green line) temperatures in the prefecture of Thessaloniki.
Figure 67: Monthly Average Rainfall (and total days of rain indicated in the right axis).

LIST OF TABLES

Table 1: Functions definitions
Table 2: Functions to be tested and LFOTs planned in Finland
Table 2: Functions to be tested and DFOTs planned in Finland
Table 3: Combination of functions in the Italian LFOT
Table 5: Functions to be tested and LFOTs planned in Greece
Table 6: Order of presentation of the various conditions to the subjects.
Table 7: Functions to be tested in the Greek DFOTs
Table 7: Baseline cases for the Greek DFOTs
Table 8: Timing of the Greek DFOTs
## LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>ABBREVIATION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADAS</td>
<td>Advanced Driver Assistance System</td>
</tr>
<tr>
<td>CAA</td>
<td>Cockpit Activity Assessment Module</td>
</tr>
<tr>
<td>CAN</td>
<td>Controller Area Network</td>
</tr>
<tr>
<td>DFOT</td>
<td>Detailed Scale FOT</td>
</tr>
<tr>
<td>ECA</td>
<td>Environmental conditions assessment module</td>
</tr>
<tr>
<td>FLIR</td>
<td>Infra red camera</td>
</tr>
<tr>
<td>FOT</td>
<td>Field Operational Test</td>
</tr>
<tr>
<td>GPRS</td>
<td>General packet radio service</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning System</td>
</tr>
<tr>
<td>GSM</td>
<td>Global System for Mobile Communications</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
</tr>
<tr>
<td>IMU</td>
<td>Inertial measurement unit</td>
</tr>
<tr>
<td>LCD</td>
<td>Liquid Crystal Display</td>
</tr>
<tr>
<td>LFOT</td>
<td>Large Scale FOT</td>
</tr>
<tr>
<td>OBD-II</td>
<td>On-Board Diagnostics (interface)</td>
</tr>
<tr>
<td>PND</td>
<td>Personal Navigation Device</td>
</tr>
<tr>
<td>RAM</td>
<td>Random Access Memory</td>
</tr>
<tr>
<td>RDS</td>
<td>Radio Data System</td>
</tr>
<tr>
<td>SD</td>
<td>Secure Digital</td>
</tr>
<tr>
<td>SIM</td>
<td>Subscriber Identity Module</td>
</tr>
<tr>
<td>TeleFOT</td>
<td>Field Operational Tests of Aftermarket and Nomadic Devices in Vehicles</td>
</tr>
<tr>
<td>TMC</td>
<td>Traffic Message Channel</td>
</tr>
<tr>
<td>UTF-8</td>
<td>8-bit UCS/Unicode Transformation Format</td>
</tr>
</tbody>
</table>
# REVISION CHART AND HISTORY LOG

<table>
<thead>
<tr>
<th>REV</th>
<th>DATE</th>
<th>REASON</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>2009-11-27</td>
<td>First draft version of the deliverable</td>
</tr>
<tr>
<td>1.0</td>
<td>2010-02-13</td>
<td>Update of the deliverable</td>
</tr>
<tr>
<td>2.0</td>
<td>2010-04-21</td>
<td>Update of the deliverable</td>
</tr>
<tr>
<td>4.0</td>
<td>2010-06-02</td>
<td>Pre-Final version</td>
</tr>
<tr>
<td>5.0</td>
<td>2010-06-07</td>
<td>File size reduction</td>
</tr>
<tr>
<td>5.1</td>
<td>2010-06-09</td>
<td>Contributions on test sites set up evolution</td>
</tr>
<tr>
<td>5.2</td>
<td>2010-06-11</td>
<td>Contributions on test sites set up evolution</td>
</tr>
<tr>
<td>5.3</td>
<td>2010-06-15</td>
<td>Edition of the document</td>
</tr>
<tr>
<td>5.4</td>
<td>2010-07-28</td>
<td>Peer reviewed version</td>
</tr>
<tr>
<td>6.0</td>
<td>2010-07-29</td>
<td>Modifications according to the peer review</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY

The objective of this public document is to provide a description of each test site and the different FOTs its site is going to implement through the duration of TeleFOT project.

To perform the work planned in TeleFOT, several Field Operational Tests (FOTs) will be set up all around Europe. These FOTs will be focused on the impact of technically mature ICT systems, and will evaluate safety, user acceptance, efficiency and deployment aspects that will be evaluated and compared among the different FOTs. The project FOTs will be divided into three test communities: Northern Community (Sweden and Finland), the Central Community (U.K., France and Germany) and Southern Community (Spain, Italy and Greece).

The present deliverable will try to give an overview of the Test communities in the project and provide general view of the work to be performed in each of the different FOTs.

To do this the deliverable will be structured in four main chapters.

The first chapter will introduce TeleFOT and give the reader an idea on how and where this deliverable is placed in the overall project.

Chapter 2 and 3 will, respectively, explain some of the most relevant concepts of the project and give an overview of the different functions that will be implemented and tested in the several FOTs.

A general description of each FOT will be provided in chapter 4. More concretely, this chapter will try to give a wider view of the configuration of each Test community and test site, showing the following contents for each FOTs:

- Map of the area of the tests: the location that each test is planned to be performed is provided for all TeleFOT test communities;
- Functions tested: all functions are recalled and a mapping of functions tested and tests site is provided;
- Devices to be used: all nomadic devices to be used during the tests are recalled and a mapping of devices used and tests site is provided;
- Participants: the number and characteristics of the participants envisioned per test site and test are presented;
- Road type: the type of roads that will be addressed during the tests for each test site and test is presented
- Traffic conditions and interaction with other road users: the description of each test community and test site is concluded with the envisioned interaction of the driver with the other road users, taking into account the traffic conditions of the test area

In the current deliverable the different FOTs that are envisioned are presented per test community. In some FOTs the exact and final definition of each test site set up is to be detailed in future steps of the test and evaluation strategy and will be reported in deliverable D3.3.2 Test communities Final descriptions.
This deliverable will present an overall description of the different FOTs, for more detailed information on FOTs detailed plans please check deliverable 3.4.1 Field Operational Test plans.
1. INTRODUCTION

TeleFOT is a Large Scale Collaborative Project under the Seventh Framework Programme, co-funded by the European Commission DG Information Society and Media within the strategic objective "ICT for Cooperative Systems".

Officially started on June 1st 2008, TeleFOT aims to test the impacts of driver support functions on the driving task with large fleets of test drivers in real-life driving conditions. In particular, TeleFOT assesses via Field operational Tests the impacts of functions provided by aftermarket and nomadic devices, including future interactive traffic services that will become part of driving environment systems within the next five years.

Field Operational Tests developed in TeleFOT aim at a comprehensive assessment of the efficiency, quality, robustness and user friendliness of in-vehicle systems, such as ICT, for smarter, safer and cleaner driving.

The present document is framed in SP3, and more specifically in WP3.3. The main objective of TeleFOT SP3 is to design, develop and validate tests communities for Field Operational Tests including both large scale and detailed trials and covering the North, the Central and the South Europe, for the assessment of the introduction of nomadic devices to the vehicle environment. In that course, the current deliverable was prepared in collaboration between SP3 and the project management and describes the TeleFOT test communities, as these are being developed and set up within TeleFOT SP3. Within SP, WP3.3 aims to carry out the technical and organisational arrangements both at conceptual and material levels, enabling the start of execution of the different FOTs in the project.

TeleFOT is divided into several Field Operational Tests (FOTs) which are wide and long-term road tests with a great number of subjects and huge amount of data. These long term tests will be addressing the impacts of different functions all around Europe. Twelve different functions – that will cover two main areas; safe driving and economic and fuel efficient driving- are going to be tested in the different FOTs.

- Traffic information
- Speed limit information
- Speed alert
- Navigation support (static)
- Navigation support (dynamic)
- Green driving support
- Parking support
- Speed camera alert
- eCall
- Forward Collision Warning
- Lane Departure Warning

In order to give a more detailed view in some of the most interesting aspects of the TeleFOT main addressed issues, several Detailed FOTs will be executed. The aim of the DFOTs is to focus on a limited number of test vehicles and subjects in order to be able to collect a wider variety and richer information. The DFOTs are also described and analysed in the present document the same way as LFOTs are.

Framed in SP3 and more specifically in WP33, the present deliverable will be highly relevant to the project and to the activities it covers, as it provides a wide overview of the descriptions and configurations of all the trials to be implemented in the project. However, we have to take into account that there are other deliverables that this deliverable does not contain the final descriptions of the test sites, which will be updated in D3.2.2
2. TEST COMMUNITIES CONCEPTS

The different FOTs to be implemented within the project can be split into large and detailed FOTs and will be implemented into eight different Test Sites across Europe. In order to coordinate all the activities in the different FOTs, TeleFOT has grouped the Test Sites into three different Test Communities:

- Northern Community
  - Finland
  - Sweden
- Central Community
  - France
  - Germany
  - UK
- Southern Community
  - Greece
  - Italy
  - Spain

The organization of the different FOTs and Test Sites in communities facilitates both the coordination and management of all the activities of the project and the comparison of the FOTs results per geographical areas.

The following subsections will try to define the difference between large-scale and detailed FOTs.

2.1. Large scale tests (L-FOT)

In large-scale test FOTs drivers will use their own vehicles in their daily travel. These vehicles will be equipped with testing (aftermarket/nomadic) and recording devices which will measure speed, position and in some cases acceleration and vehicle dynamics. These constitute the core of testing. In the current deliverable the large-scale FOTs that are envisioned per test community are presented, while the exact and final definition of each test site set up will be detailed in future steps of the test and evaluation strategy and will be reported in deliverable D3.3.2 Test communities Final description.

2.2. Detailed scale tests (D-FOT)

This type of testing complements the large-scale FOTs. These D-FOTs are much more detailed in terms of behavioural parameters measured. During the detailed FOTs it is intended that subjects will be using dedicated test vehicles or so-called instrumented
vehicles. Detailed FOTs will also generate plenty of data through detailed and repeated testing sessions over the FOT duration. The consortium found it necessary to carry out detailed tests across Europe, since cultural differences explaining driver behaviour and reactions have been identified to be significant by earlier European behavioural studies and accident statistics. Detailed testing provides a better possibility to give causal explanations to the differences between European drivers than large-scale tests. Large-scale tests measure and record differences but can explain them only to some extent. In the current deliverable the detailed FOTs that are envisioned per test community are described, while the exact and final definition of each test site set up will be detailed in future steps of the test and evaluation strategy and will be reported in deliverable D3.3.2 Test communities Final description.
3. TELEFOT FUNCTIONS

As explained before twelve different functions are going to be tested within the different FOTs in TeleFOT.

The following table shows in a concise manner the descriptions of the functions to be tested in TeleFOT, as these where defined in TeleFOT deliverable D2.5.1, entitled “Functions specification” [1].

Table 1: Functions definitions

<table>
<thead>
<tr>
<th>FUNCTION NAME</th>
<th>FUNCTION DESCRIPTION</th>
<th>SYSTEM/ FUNCTION IS DESIGNED TO?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic Information</td>
<td>The system provides drivers with real-time information about the status of the traffic system (including congestions, weather conditions, roadworks, crashes, etc.). The system draws on external databases and links to a traffic control centre.</td>
<td>Making the driver aware of the actual as well as potentially critical traffic conditions in the nearest road and street environment.</td>
</tr>
<tr>
<td>Speed limit information</td>
<td>Display current speed of the vehicle and the current speed limit of the road/street used</td>
<td>Make the driver aware of actual speed limits on the road/street used</td>
</tr>
<tr>
<td>Speed alert</td>
<td>Display current speed of the vehicle and the current speed limit of the road/street; A warning is issued when speed limit is exceeded</td>
<td>Make the driver aware of actual speed limits on the road/street used; Make the driver follow the current speed limit by providing a warning (visual and/or auditive) when the speed limit is exceeded</td>
</tr>
<tr>
<td>Navigation support (static)</td>
<td>Guide the user to a destination set beforehand, through locating the vehicle (using a positioning system) and calculating “best path” (in terms of travel time, distance or other preferences) by the use of relevant algorithms.</td>
<td>Provide navigation support to the driver to find the way towards a pre-defined destination</td>
</tr>
<tr>
<td>FUNCTION NAME</td>
<td>FUNCTION DESCRIPTION</td>
<td>SYSTEM/ FUNCTION IS DESIGNED TO?</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Navigation support</td>
<td>Guide the driver to a destination set beforehand, through locating the vehicle (using a positioning systems) and calculating &quot;best path&quot; (in terms of travel time, distance or other preferences) by the use of relevant algorithms. The algorithms also take into account the actual (and real time) status of the traffic system or other pre-selected topics.</td>
<td>Provide navigation support to the driver to find the way towards a pre-defined destination, the current traffic situation and other pre-selected conditions influencing the traffic process are also taken into account.</td>
</tr>
<tr>
<td>(dynamic)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green driving</td>
<td>This function has not been completely defined yet. But here are some possible definitions coming from the FOT that are going to implement it:</td>
<td>This function will:</td>
</tr>
<tr>
<td>support</td>
<td>Finland: Analysis of driving habits.</td>
<td>Improve driving habits and reduce fuel consumption and CO2 emissions.</td>
</tr>
<tr>
<td></td>
<td>The “Driveco” module collects information through a module which is connected to the OBD2-connector. The service reports on gasoline use and CO2 emissions. When connected to a GPS phone travel reports can be generated automatically.</td>
<td>Encourages green driving practice.</td>
</tr>
<tr>
<td></td>
<td>UK: Green Driving Advisor will provide:</td>
<td>Longer term mentoring about driving characteristics and performance.</td>
</tr>
<tr>
<td></td>
<td>Pre-trip advice on car set-up</td>
<td></td>
</tr>
<tr>
<td></td>
<td>On-trip performance monitoring</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Post-trip feedback</td>
<td></td>
</tr>
<tr>
<td>Parking support</td>
<td>This function will provide the user with information on the parking availability and, if possible, assignment and/or booking of the parking slot for the driver</td>
<td>Help the driver to find a parking slot easily and give him information of the parking availability in the area.</td>
</tr>
<tr>
<td>Speed camera alert</td>
<td>This function will display a warning when a vehicle is approaching a potential speed camera location.</td>
<td>Make the driver aware of the presence of a speed camera. Make the driver follow the current speed limit by informing the driver about.</td>
</tr>
</tbody>
</table>
## FUNCTION NAME | FUNCTION DESCRIPTION | SYSTEM/ FUNCTION IS DESIGNED TO?
---|---|---
### eCall
In the event of an emergency, the single European emergency number 112 can be called manually by the vehicle occupant, free of charge, by pressing a “panic button” realized on the nomadic device. A voice link will be set between the vehicle occupant and the 112 PSAP.
This function will be designed to provide the vehicle occupant with assistance (on demand) in the case of an emergency event.

### Forward Collision Warning
Warn the driver about a possible or imminent crash with the preceding vehicle, by calculating the time headway between the two vehicles and providing and visual and/or acoustical warning to the driver.
Provide forward collision warning to the driver in order for him/her to adjust the vehicle speed so as to avoid a possible crash with the preceding vehicle.

### Lane Departure Warning
Warn the driver about unintentional exit from the lane (no use of indicator) by detecting the lane markings with the use of a lane detection camera and providing an acoustical, optical and/or haptic warning to the driver.
Provide lane departure warning to the driver in order for him/her to adjust the steering of the vehicle so as to avoid an unintentional lane departure, which could lead to accident.

The following sections will show the test sites and FOTs descriptions; within these descriptions the functions tested in each FOT are indicated.
4. TEST SITES DESCRIPTIONS

This section presents the test communities of TeleFOT, through the presentation of the test sites that are part of each test community. In each TeleFOT test site a list of FOTs (either large-scale or detailed) is envisioned. For that reason, the FOTs that are planned for each test site are presented. First the Northern test community is presented, in which two test sites are build, namely the Swedish test site and the Finnish test site. In the Swedish test site a list of large-scale FOTs will be conducted, while the Finish test site will facilitate the execution of both large scale and detailed FOTs. Secondly, the Central test community is presented, in which three test sites are build, namely the British test site, the German test site and the French test site. The set up of the British test site will facilitate the execution of both large-scale and detailed FOTs, in the German test site detailed FOTs will be conducted, which will provide insight for the concurrent use of functions and services on the nomadic device while advanced driver assistance systems are in use, while in the French test site a large-scale FOT on the e-Call function is planned. Third, the Southern test community is presented, in which three test sites are build, namely the Italian, the Spanish and the Greek test sites. In all the Southern test sites, both large-scale and detailed FOTs will be conducted. The presentation of the test communities, decomposed in test sites and FOTs presentation is provided in the following sections.

4.1. Northern Test Community

4.1.1. Sweden

4.1.1.1 Large-scale FOT1: Stockholm City

- Map of the area of the tests

The test site will involve cars from different car fleets of City of Stockholm. The cars will mainly be used in Stockholm and the surrounding municipalities (refer to Figure 1). Stockholm is the biggest town in Sweden with a population of 829,417 in the municipality (2009), 1.25 million in the urban area (2005), and 2 million in the metropolitan area (2009). It can be expected that most driving will be conducted on city roads.
Functions tested

The functions to be tested will comprise real-time guidance on driving style and fuel efficiency with pre- and post-trip tutoring and feedback. The system will also provide Speed Alert and Speed limit information. In addition to the real time information given to the driver on the screen, aggregated data is uploaded on a web site so that it is possible to see how much the whole fleet is speeding, how good they are at driving green etc.

Devices to be used

The device will be an after-market device that is procured by the transportation authorities of City of Stockholm. The software is produced by the company Innova and is run on a PDA running Windows. The PDA is fixed to the car (see the following figure).
Figure 2: Device to be used in the Swedish L-FOT1 (PDA)

- **Participants (No, characteristics, etc.)**

  It is expected that at least 100 vehicles (the City of Stockholm have about 1000 vehicles and the goal is to have all equipped by the end of 2010) will be included. Presently 300 cars have been equipped and by the end of May 2010 a drive where the first 100 devices will be free of charge and the following will be sold for half the market price will start. It is expected that most participants will be recruited among these 100. Each vehicle will be driven by several users, so some method for determining which participant drives which car must be developed (probably some simple roadbook or by cross referring to drivers journals).

- **Road type**

  All road types will be included. The road types used will be determined by the participants. The character of the cars includes makes it probable that most driving will be in city traffic.

- **Traffic conditions and interaction with other road users**

  All traffic conditions will be encountered by the participants.
• **Weather conditions**

Data collection will take place over a 3 month baseline period and a 6 month treatment period and all weather conditions experienced in that time will be a factor in the study. In the Stockholm area it can be expected that most driving will be done in snow free conditions.

• **Time of day and seasonal effects.**

Exposure to time of day will be determined by the participants. Some cars it is expected to be used only during office hours, but others will be used 24/7 according to their function.

4.1.1.2 Large-scale FOT2: Stockholm public transport

• **Map of the area of the tests**

The test site will include all of Sweden, with participants recruited from the Gothenburg area. Most of the driving will therefore be conducted in the Gothenburg area.

![Figure 3: Map of the area of the Swedish FOT2 (and FOT3 & FOT4) tests](Map of Sweden)
• **Functions tested**

The functions to be tested will comprise Speed limit information, Green driving support and Navigation (static).

• **Devices to be used**

The device that will be used in the Swedish L-FOT2 is the Garmin Navigator in the Nûvi series with EcoRoute (Figure 4). EcoRoute is a new part of Garmin’s navigation software that gives indications on how “green” you drive based on GPS data (speed relative speed limits and rate of acceleration). EcoRoute also gives routing advice according to lowest fuel consumption and gives the user a possibility to compete in green driving.

![Image of Garmin nüvi device](image.png)

**Figure 4: Device to be used in the Swedish L-FOT2 (Garmin nüvi)**

• **Participants (No, characteristics, etc.)**

One hundred (100) users will participate in the Swedish LFOT2. The aim is to stratify the group according to the target group for the device. This means that we aim at slightly more men than women 60/40, between the ages of 25 to 65, with more than three years driving experience and driving more than 10000km/year.

• **Road type**

All road types will be included.

• **Traffic conditions and interaction with other road users**

All traffic conditions will be encountered by the participants.

• **Weather conditions**
Data collection will take place over nine months starting September 2010, and all weather conditions experienced in that time will be a factor in the study. One could expect most driving to be done in snow free conditions, but there will certainly be some snow and ice, quite a lot of rain, but also hot summer days.

- **Time of day and seasonal effects.**

  Exposure to time of day will be determined by the participants.

4.1.1.3 Large-scale FOT3: MOTION

This large-scale FOT has been concluded. The results of this Field Operational Test are provided in the MOTION final report [2].

- **Map of the area of the tests**

  The test site included all of Sweden. Participants in the study were recruited from drivers all over Sweden (Figure 3).

- **Functions tested**

  The functions tested comprised Speed Alert and Speed limit information coupled to an existing off board navigation system (WisePilot and Telia Navigator by Apello). The users could decide the amount of speeding allowed before the device alerts, and the type of alert (aural and/or visual).

- **Devices used**

  WisePilot and Telia Navigator runs in any Java or windows capable mobile phone (Figure 5).
Figure 5: WisePilot by Apello

- **Participants (No, characteristics, etc.)**
  Around 1000 participants were recruited among Wisepilot’s and Telia Navigator’s existing customers.

- **Road type**
  All road types were included.

- **Traffic conditions and interaction with other road users**
  All traffic conditions were encountered by the participants.

- **Weather conditions**
  Data collection took place for over five months starting February 2009. All weather conditions experienced in that time were a factor in the study. Sweden has a great variation in weather according to season and from north to south. In the south it is snow free all but a few days/year while the northern parts can expect snow from November until May.

- **Time of day and seasonal effects.**
  Exposure to time of day will be determined by the participants.
4.1.1.4 Large-scale FOT4: Traffic information through an Android app

- **Map of the area of the tests**
  The test site will include all of Sweden, and probably some parts of Norway (Figure 3).

- **Functions tested**
  The functions to be tested will comprise Green driving support, Speed Alert and Speed information coupled to an existing off board navigation system (WisePilot and Telia Navigator by Apelio).

- **Devices to be used**
  WisePilot and Telia Navigator is run in any Java or windows capable mobile phone.

- **Participants (No, characteristics, etc.)**
  The participants will be recruited among the participants in FOT 3 in order to be able to use FOT 3 as a Base-line for FOT 4. With some of the participants of FOT 3 falling out, an estimate of the number of participants are 500 people.

- **Road type**
  All road types will be included.

- **Traffic conditions and interaction with other road users**
  All traffic conditions will be encountered by the participants.

- **Weather conditions**
  Data collection will take place over six months starting late autumn/early winter 2009, and all weather conditions experienced in that time will be a factor in the study.

- **Time of day and seasonal effects.**
  Exposure to time of day will be determined by the participants.
• Differences between initial and current plans in the Swedish test site

The following paragraphs describe the main differences in the FOT between the initial plans – described in D1.4 – and the actual FOT plans:

- **LFOT1.** No changes from the description in D1.4

- **LFOT2.** Is changed quite a lot: The Swedish LFOT2 was supposed to be done on Stockholm city transport vehicles equipped with green driving support and speed alert. We spent quite a lot of time negotiating with Stockholm city transport, our contact there assuring that it would be possible for us to use the equipped buses for out LFOT. No formal agreement could, however, be negotiated. Finally we got the news that our contact at Stockholm city transport had quit his job for a new job in a completely unrelated business. Therefore there was no choice, but to discontinue the LFOT. Instead a new LFOT was initiated using on the shelf technology both for the tested equipment and the logging device.

- **LFOT3.** No changes from the description in D1.4

- **LFOT4.** Also in this LFOT there have been difficulties with third parties. The service provider that was involved in LFOT3 decided very late that they did not have the time to do the changes to their service needed for the intended LFOT4. The business of navigation support in mobile phones is moving very quickly at the moment and the service provider have negotiated big deals with phone companies necessitating putting all of their resources on fulfilling their obligations in that area. The Swedish National Transport Administration (former SNRA) have decided to instead testing the effects of a Traffic information application for Android phones in the LFOT4.
4.1.2. Finland

4.1.2.1 Large scale FOTs

- **Map of the area of the tests**

The functions and services tested in the Finnish Large-scale FOTs cover the whole country. However, the majority of the test users are likely to be recruited from Oulu, Tampere, Jyväskylä and Helsinki regions due to partner organisation locations and for customer support.

![Map of the area of the Finnish LFOT](image)

*Figure 6: Map of the area of the Finnish LFOT*

- **Functions to be tested**

Two Large-scale FOTs are prepared. A summary of the functions to be tested during the tests are included in the following table.
Table 2: Functions to be tested and LFOTs planned in Finland

<table>
<thead>
<tr>
<th>Functions</th>
<th>FOT</th>
<th>LFOT1</th>
<th>LFOT2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic information</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Speed limit information</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Speed alert</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Navigation support (static)</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Navigation support (dynamic)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green Driving Support</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

As can be seen from the above table, these functions will be tested in combinations in two Large-scale FOTs, in whole Finland, as detailed below:

i) LFOT1 will be performed in co-operation with a company operating a large fleet of vehicles. Negotiations with a first company failed, and an offer is being discussed with a second company. The scope of the FOT and the actual services are under discussion.

The nomadic device to be used during the trials is planned to be a personal navigation device (PND) compliant with DESTIA Traffic TMC service. The RDS-TMC (Radio Data System – Traffic message Channel) service broadcasts up-to-date information on incidents, accidents, congestion, major road works etc. Destia Traffic also reports dangerous road surface conditions like black ice or snowstorms. Messages are broadcasted through radio frequencies and they can be opened with TMC equipped navigation devices.

TMC makes it possible to receive local traffic information on the road in a selected language anywhere in Europe. These services include country specific map material and location tables. At the moment Destia is broadcasting the TMC messages in Finland, in Sweden and in Norway and is looking to expand the service to cover other Baltic Sea regions as well.

The functions to be tested in this LFOT are (under discussion):

a. **Traffic Information:** Destia Traffic provides the following information:
   - Accidents, major road works and other events that effect traffic flow and disturbances of ferries for national roads 1–999.
   - Congestion in the Helsinki Metropolitan Area and Oulu region.
- Road weather: unexpected changes in weather conditions, such as black ice or snowstorms.

During the first months of 2009 (1–15.4.2009) the amount of messages sent was: 200 000 road weather related messages, 140 000 traffic congestion messages, 1500 accident messages and several hundred road works messages. Road weather and congestion messages are only valid for a short time, so that e.g. an hour long road weather condition can cause 4 messages being sent. The messages are approximately equally distributed over Finland, except for congestion messages, which have a major concentration in the Helsinki Metropolitan Area.

![DESTIA Traffic Information](image)

**Figure 7: DESTIA Traffic Information.**

b. **Speed limit and speed alert:** These functions are standard in most of the PNDs, which are Destia Traffic compliant. Implementation depends on the PND manufacturer. Digiroad, a national road database, can also be used as a source for speed limit information.

c. **Static and dynamic navigation function:** These functions are standard in most of the PNDs that are Destia Traffic compliant.

d. **Green driving.** Additionally, fleet owners are interested in various fuel consumption and driving behaviour related indicators. During the test there are plans to prepare an Internet feedback system for drivers / the partner company. This service will be provided by Emtele and VTT.
ii) LFOT2 area is also the whole country, but the test users will be recruited from Oulu region due to Oulu city, collaborating in the recruitment and organisation of the FOT.

The nomadic device to be used during the trials will be a Series 60 smart phone compliant with Logica LATIS™ client. LATIS™ is a Location aware traffic information solution for drivers. It is based on Logica's Enterprise Mobility framework. Logica's location aware traffic information solution is meant for organizations aiming to provide location relevant and real time information for drivers on the road. Traffic and road weather information are provided by Destia. To achieve this and to comply with legislation, LATIS™ utilizes a built-in speech synthesizer to read aloud announcements of nearby incidents or other relevant info. On-line map service is used to display the user's position and the exact location of the incident. Current speed and speed limit are also displayed for users equipped with GPS. The current speed is read aloud, if it exceeds the speed limit. As the information exchange in LATIS™ works both ways by nature, all users produce also advanced FCD information. Manual "one button" reporting of traffic incidents enables even a limited number of users to effectively provide traffic information. LATIS™ mobile phone application works also on the background, enabling a simultaneous use of navigator software. It also reads aloud the incoming SMS messages.

The LATIS service is being integrated with DRIVECO service provided by a Finnish company EC-Tools. DRIVECO personal is a green driving advisor for smart phones and an automatic driving diary. DRIVECO collects information on fuel consumption from a separate module connected to OBD-II vehicle interface. The module sends data over Bluetooth to a smartphone running DRIVECO software. Journey summaries are further collected from the smartphone to a web service for reporting and feedback. GPS logs can be used for generating a diary. The development of DRIVECO Personal is based on experience with driving guides for freight transport. Potential savings with green driving are around 10% (www.driveco.fi). The device also allows monitoring and reporting of CO₂ emissions.

Figure 8: DRIVECO OBD-II module and mobile phone application.
The participants of this LFOT will be provided both with a DRIVECO module and LATIS application.

As a summary, the functions to be tested during this LFOT will be:

a. Traffic Information (information provided by Destia)

b. Speed limit info and speed alert

c. Green driving.

• Nomadic Devices to be used

Two different types of devices will be tested in Finland:

- **LFOT1**: PNDs (Personal Navigation Devices) with TMC receiver, capable of receiving Destia Traffic TMC messages. Destia has made agreements with the following PND manufacturers (status 02.10): Tomtom, Garmin, Mio and Navigon. Most likely a Garmin PND for professional use, which allows interfacing to an in-vehicle logger will be selected.

- **LFOT2**: Smartphones based on the S60 software platform, with built-in or external GPS receiver. In addition the Driveco module will be used in the vehicle.

The plan is to recruit users who already own a device compatible with the tested functions: Destia Traffic compliant PND or S60 with built-in/external GPS. Additionally, it is likely that VTT will purchase devices.

• Participants

The Finnish Large Scale FOTs aim to include 400–450 users, with in-vehicle logging. The target for LFOT1 and LFOT2 is 200 users for both. Additionally there have been plans for conducting an ISA test with 30–50 drivers together with the national funded TeleISA project on Intelligent Speed Adaptation.

The actual distribution of the participants will depend on the recruitment method:

- The city of Oulu will assist in the recruitment of users for FOT2. An announcement is placed in Kaleva, the major local newspaper from the Oulu region, referring to a registration form on the TeleFOT website. The announcement is put twice in Kaleva, one in a special automotive section.

- Discussions are ongoing with transport fleet companies to install loggers and nomadic devices in their vehicles. The companies have been generally interested in improving driving habits of the personnel and tracking fuel consumption.

- Discussions are starting with major non-technological organisations and companies, in order to promote being TeleFOT test user to their personnel.

- Use of test user databases or involvement of an external company for the recruitment of test users.

• Road type

The total length of Finnish road network is 454 000 km, including
Public Roads 78 000 km of which ~51 000 km is paved. This includes 13 300 km main roads (1–101, including 739 km of motorways) and 13 500 km regional roads.
- Streets 26 000 km
- Other roads (includes private roads, forest truck roads) 350 000 km.

The total amount of kilometres travelled is 53 billion in 2008, from which 67 % (35.6 billion km) on public roads.

Finns make an average of 3 trips a day and use 70 minutes to do so. The distance travelled per day is 42 kilometres per person (Tiehallinto, 2008). 76 % percent of the mobility is as driver of passenger of a passenger car, 15 % by public transport and 5 % on foot or bicycle. The average amount of km driven in 2008 with personal vehicles was 16 800 km, with trucks 31 100 km and bus 47 200 km.

93 % of passenger traffic and 67 % of goods transport takes place on the roadways. Personal transport (total amount of km) has increased 62 % in the years 1980–2008, personal car transport 82 %. Finland has 3.15 million automobiles which includes 2.7 million passenger cars (Tiehallinto, 2009).

The plan is to include all road types, i.e. urban, peri-urban and highway environments, in order to assess the functions under different road conditions. The road types used will be determined by the participants.

- **Traffic conditions and interaction with other road users**
  As mentioned above, different road types will be addressed in the tests. Consequently, the traffic conditions will vary according to the environment and also according to the time of day. Therefore, all traffic conditions will be encountered by the participants. The test planning will seek to include the most representative cases. The major congestions are during morning and afternoon rush hours in the Helsinki Metropolitan Area.

- **Weather conditions**
  The average temperature in Helsinki is -5.7 in February and 17.2 in July (average for 1900-2000, www.fmi.fi), in Sodankylä resp. -13,0 and +14,4. The average daily temperature is below zero on average (1900-2000) from end of November until the end of March in Turku and from mid October to the end of May in Sodankylä (www.fmi.fi).

  6000–7000 km highways are mainly kept free of ice and snow with the help of salt. The other roads are partly or completely covered with a layer of compacted snow. Some 10 % of the annual vehicle mileage is generated on roads with a snow or ice covered surface. High volume roads are ploughed first and within two hours after it begins snowing. Other public roads are ploughed within six hours after snowfall begins.

  During winter, from the beginning of December until the end of February, winter tyres are obligatory. Winter tyres can be used from the beginning of November until mid April. (www.tiehallinto.fi)
• **Time of day and seasonal effects**

The length of day varies largely depending on the season and the geographical position. During winter, from the beginning of November to the end of February, winter speed limits are in force. The limits can be lowered already in October and can remain in force through April due to exceptional road weather conditions.

The tests will start when summer speeds are in force, due to the better accuracy of the speed limit database, which is used by the speed limit info service.

• **Differences between initial and current plans**

The main differences between the initial plans, described in D1.4, and the actual plans are explained in the following paragraphs:

- **LFOT1** negotiations with the first fleet operator failed and the FOT is currently (May 2010) being redesigned. The concept remains the same but emphasis on different functions will be decided in negotiations with a new fleet operator. At the moment Green Driving and Internet-based feedback about driving style seem promising.

- **LFOT2** recruitment was expanded to cover also Tampere region to attract more users. The FOT aims at 200 users and currently there are more than 230 registered candidates, still most from Oulu region.

4.1.2.2 Detailed FOT

For detailed FOTs requiring driver and environmental monitoring, VTT has been preparing to use a specially instrumented BMW 525dA E61 Touring, model 2008 (Figure 9.). The vehicle is dedicated for testing latest ADAS technology and acquiring research data. It has been instrumented in close co-operation with companies, but TeleFOT has been mentioned in necessary agreements to ensure full use of the data.

The vehicle contains driver assistance systems such as Lane Departure Warning (Mobileye), ACC Stop & Go, HUD and navigation. It holds 3 PCs collecting data from various sensors and systems:

- Two Ibeo LUX laser scanners
- FLIR PathFindIR thermal camera
- Omron high dynamic range colour camera
- CAA module monitoring and interpreting the driver’s eye movement
- Friction estimation (and detection of ice and water) based on a light polarization camera (VTT prototype called IcOR) and vehicle dynamics
- IMU for acceleration and orientation
- Differential GPS
- RDS/TMC interface
- Vehicle CAN
The data collection system is undergoing some development and is expected to be tailored for TeleFOT purposes near the end of 2009. This includes more complete integration of the camera systems and the TeleFOT Cockpit Activity Assessment (CAA) module.

In addition to the BMW, other vehicles will be equipped with the CAA module. If possible, some 5–10 vehicles used in the large scale FOTs will be equipped with the CAA module to provide more detailed measurements.

- **Functions to be tested**

The main purpose of the detailed FOTs in Finland is to assist the LFOTs. The functions under test are therefore almost the same. During the detailed FOTs, the performance indicators which cannot be measured during the large scale FOT, plus a separate case study on nomadic device based eCall will be addressed. The summary of the functions to be tested during the tests are included in the following table.

**Table 3: Functions to be tested and DFOTs planned in Finland**

<table>
<thead>
<tr>
<th>Functions</th>
<th>FOT</th>
<th>DFOT1</th>
<th>DFOT2</th>
<th>BENCHMARKING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic information</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Speed limit information</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Speed alert</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
As can be seen in the table above, and in coordination through the overall test site plans, these functions will be tested in combinations within two Detailed FOTs, in whole Finland, as detailed below:

i) **DFOT1** will include the following functions:

   i) **Traffic information**
   
   ii) **Speed limit information**

   iii) **Speed alert**

   iv) **Navigation support (static)**

   v) **Navigation support (dynamic)**

   vi) **Green Driving Support**

   The test is likely to concentrate on driver monitoring with CAA devices to support LFOT1.

ii) **DFOT2** will include the following functions:

   a. **Nomadic device based eCall**

   The main scope of the eCall FOT in Finland is to evaluate retrofitted eCall in vehicles. The FOT is concentrated on the following issues:

   a) measure users (emergency centres) experiences. eCall-MDS messages will be simulated for different accident scenarios, which will be sent to the emergency call training centre. The impact on the risk assessment work of the emergency call centre personnel is evaluated.

   b) the use of the sensors at the nomadic devices for automatic eCall messages is assessed. Accelerometers have been attached to the nomadic devices in the crash tests by ADAC (task 4.8.3) in order to assess the acceleration imposed to nomadic devices during impact. Based on the results of the crash tests, and on assessment of possible false alarms (e.g. drop on floor) an assessment of the possible use of nomadic device for automatic eCall is performed.
iii) **WP4.8 benchmarking tests** included usability tests of three devices. Both expert testing and field tests with 10 users have been carried out during 2009. The devices were: TomTom GO 630 Traffic, Nokia 6210 Navigator and NDrive G800R.

- None of the users have navigator of their own (three of them have tried friend’s or relative’s navigator). All of the users drive more than 10 000 km/year.
- The tests with the users started with various usability tests in a VTT car. Then the users continued to use the devices for 3 weeks as part of their normal life. Data was gathered through usage diaries, web questionnaires and interviews.

- **Devices to be used**
  During the Detailed FOT, the same devices as during the Large-scale FOTs will be used.

- **Area and test conditions**
  The detailed FOTs address the same environment (participant profile, road type, traffic conditions, weather conditions...) as the large scale FOT.

- **Participants**
  The actual test plan for the detailed FOTs are under discussion and depend on the vehicles available and the final evaluation and assessment objectives. The test users will be likely selected from the LFOT users.
4.2. Central Test Community

4.2.1. UK

4.2.1.1 Large scale FOT 1: BLOM

- **Map of the area of the tests**
  The large scale test site will involve drivers based in the East Midlands area (Nottingham/Leicester/Coventry).

![Map of the area of the tests](image)

*Figure 10: Geographical location of UK LFOT 1*

- **Functions to be tested**
  LFOT 1 will test the following functions provided by the BLOM system;
  
  - b. Speed Alert information
  - c. Speed limit information
  - d. Navigation support (Static)

- **Devices to be used**
  The BLOM N-Drive G800 will be used during the FOT.
• **Participants (No, characteristics, etc.)**
  It is anticipated that 80 logging devices will be purchased and hence a sample of 80 drivers representative of the driving population will be recruited for LFOT 1.

• **Road type**
  All road types will be included in the large FOTs. The road types used in the large FOT will be determined by the participants since the tests will operate in a naturalistic manner.

• **Traffic conditions and interaction with other road users**
  All traffic conditions will be encountered by the participants in the large scale FOT.

• **Weather conditions**
  The weather conditions experienced in the large scale FOT will be determined by the participants. No restrictions will be made since the tests will operate in a naturalistic manner.

• **Time of day and seasonal effects**
  Exposure to time of day and seasonal effects will be determined by the participants in the large FOT. No restrictions will be made on the time of day or season since the tests will operate in a naturalistic manner.
4.2.1.2 Large scale FOT 2: Green Driving Support

- **Map of the area of the tests**
  The large scale test site will involve drivers based in the East Midlands area (Nottingham/Leicester/Coventry).

![Map of the area of the tests](Nottingham/Leicester/Coventry)

**Figure 12: UK Large FOT 2: Green Driving Support (Nottingham/Leicester/Coventry)**

- **Functions to be tested**
  The functions to be tested in the large will comprise real-time guidance on driving style and fuel efficiency with pre- and post-trip tutoring and feedback. The system may also provide navigation advice and hazard warning.

- **Devices to be used**
  The device will be a nomadic system (HTC smart-phone/PDA) running a bespoke application – the SMART Driving Advisor.
• **Participants (No, characteristics, etc.)**
It is expected that 30 vehicles and units will be equipped with each vehicle being allocated to a single participant for a 3 month period. This will be repeated either 2 or three times to give in the regions of 60-90 participants for LFOT2.

• **Road type**
All road types will be included in the large FOTs. The road types used in the large FOT will be determined by the participants, No restrictions will be made since the tests will operate in a naturalistic manner.

• **Traffic conditions and interaction with other road users**
All traffic conditions will be encountered by the participants in the large scale FOT. No restrictions will be made on traffic conditions.

• **Weather conditions**
The weather conditions experienced in the large scale FOT will be determined by the participants. No restrictions will be made since the tests will operate in a naturalistic manner.

• **Time of day and seasonal effects**
Exposure to time of day will be determined by the participants in the large FOT. Seasonal effects will not be managed in the large scale FOT. It is likely that time of day effects will be controlled actively (i.e. day and night data collection if considered a significant factor in system usability). No restrictions will be made since the tests will operate in a naturalistic manner.
Differences between initial and current plans

There have been some changes between the initial UK FOT plans – described in D1.4 - and the actual plans; the plans were changed to focus LFOT1 on the Blom system for the following reasons;

- Data logging capability of the system
- Functionality
- Compatibility with other FOTs in TeleFOT – notably the Valladolid test-site in Spain and the Italian test-site – and hence comparability of results

The Blom FOT will now be LFOT1 (as opposed to LFOT2) and LFOT2 will be testing the Footlite system

4.2.1.3 Detailed FOT 1: BLOM

Map of the area of the tests

The detailed test site will involve drivers based in the East Midlands area (Nottingham/Leicester/Coventry).

![Map of the area of the tests](image)

Figure 14: Geographical region UK for DFOT 1, BLOM

Functions to be tested

DFOT 1 will test the following functions provided by the BLOM system;

a. Speed Alert information
b. Speed limit information
c. Navigation support (Static)

- **Devices to be used**
  DFOT1 in the UK will use the BLOM N-Drive G800

![BLOM N-Drive G800](image)

*Figure 15: BLOM N-Drive G800*

- **Participants (No, characteristics, etc.)**
  It is hoped to recruit all of the LFOT participants from LFOT1 to also undertake a series of DFOTS. These will be undertaken in the control phase of the LFOT study and key phases during the test part of the LFOT. This will enable learning effects associated with the device use to be analysed.

- **Road type**
  The DFOT will use a structured route that will include key points of interest to the analysis, in particular those where the device is expected to provide information and cause distractions. These will include roundabouts, intersections and traffic merging.

- **Traffic conditions and interaction with other road users**
  Traffic conditions will be actively sampled in the detailed FOT in an attempt to ensure a range of conditions is included and that the trials are able to keep to a reasonably efficient schedule. This may mean limiting exposure to particularly congested traffic.

- **Weather conditions**
  The detailed FOT is likely to take place in a wide range of conditions but with limited exposure to very extreme conditions to reduce participant exposure to unnecessary risk.
• **Time of day and seasonal effects**

Exposure to time of day and seasonal effects will be managed in the detailed FOT. It is likely that seasonal effects will be managed by selecting a ‘neutral’ time for data collection in the detailed FOT. Time of day will be controlled actively (i.e. day and night data collection if considered a significant factor in system usability).

4.2.1.4 Detailed FOT 2: Green driving support

• **Map of the area of the tests**

The detailed test site will involve drivers based in the East Midlands area (Nottingham/Leicester/Coventry).

![Geographical region UK DFOT 2 Green driving support](image)

**Figure 16: Geographical region UK DFOT 2 Green driving support**

• **Functions to be tested**

The functions to be tested in the detailed FOTs will comprise real-time guidance on driving style and fuel efficiency with pre- and post-trip tutoring and feedback. The system may also provide navigation advice and hazard warning.
• **Devices to be used**

The device will be a nomadic system (HTC smart-phone/PDA) running a bespoke application – the SMART Driving Advisor.

![Image](image.jpg)

**Figure 17: Detailed FOT 2: Multi-function in-vehicle information system supported by back-office services.**

• **Participants (No, characteristics, etc.)**

Data capture equipment will be allocated to a vehicle to support the detailed FOTs which will focus on system interface, safety, usability and acceptability issues. It is the intention that all LFOT participants for this function will also undertake a series of DFOTs during the course of their trial. These will be undertaken in the control phase of the LFOT study and key phases during the test part of the LFOT. This will enable learning effects associated with the device use to be analysed.

• **Road type**

The DFOT will use a structured route that will include key points of interest to the analysis, in particular those where the device is expected to provide information and cause distractions. These will include roundabouts, intersections and traffic merging.

• **Traffic conditions and interaction with other road users**

Traffic conditions will be actively sampled in the detailed FOT in an attempt to ensure a range of conditions is included and that the trials are able to keep to a reasonably efficient schedule. This may mean limiting exposure to particularly congested traffic.

• **Weather conditions**

The detailed FOT is planned to run in parallel to the large FOT, with 4 DFOTS per participant being conducted during their undertaking of the LFOT. This is likely to occur...
during spring when extreme adverse conditions are unlikely. Extreme conditions will be actively avoided to ensure participant safety.

- **Time of day and seasonal effects**

  Exposure to time of day will be managed in the detailed FOT. It is likely that time of day effects will be controlled actively (i.e. day and night data collection if considered a significant factor in system usability).

4.2.1.5 Detailed FOT 3: Mobileye

- **Map of the area of the tests**

  The DFOT 3 test site will comprise drivers living, and driving within, the East Midlands area (Nottingham/Leicester/Coventry).

![Map of the area of the tests](image)

*Figure 18: Geographical region UK DFOT 3*

- **Functions to be tested**

  The functions to be tested in DFOT 3 are
  
  - Forward collision warning
  - Lane departure warning
- **Devices to be used**
  
  The Mobileye aftermarket device will be used in this D-FOT

![Figure 19: UK DFOT 3: Mobileye](image)

- **Participants (No, characteristics, etc.)**
  
  It is anticipated that the DFOT will comprise 40 participants sampled representatively from the driving population.

- **Road type**
  
  The DFOT will use a structured route that will include key points of interest to the analysis, in particular those where the device is expected to provide information and cause distractions. These will include roundabouts, intersections and traffic merging.

- **Traffic conditions and interaction with other road users**
  
  Traffic conditions will be actively sampled in the detailed FOT in an attempt to ensure a range of conditions is included and that the trials are able to keep to a reasonably efficient schedule. This may mean limiting exposure to particularly congested traffic.

- **Weather conditions**
  
  The detailed FOT is likely to take place in a wide range of conditions but with limited exposure to very extreme conditions to reduce participant exposure to unnecessary risk.

- **Time of day and seasonal effects**
  
  Exposure to time of day will be managed in the detailed FOT. It is likely that time of day effects will be controlled actively (i.e. day and night data collection if considered a significant factor in system usability).

- **Differences between initial and current plans**
For the DFOTs, we will be testing the Blom system (DFOT1), the Footlite system (DFOT2) and the MobilEye (DFOT3).

All of these plans have evolved, from the initial plans – described in D1.4- to reflect

1. Data logging capabilities
2. Availability of the system(s) within the project
3. Compatibility with the other FOTs
4. Compatibility with the Objectives of TeleFOT in general in terms of research questions and data analysis.

4.2.2. Germany

4.2.2.1 Detailed FOT

- **Map of the area of the tests**

The detailed field operational test in Germany will be conducted in the region between Cologne (Köln) and Aachen. The test area in which the DFOT will be conducted is shown as a satellite image and as a map section (see the following figures)

![Figure 20: Satellite picture of the test area for the detailed FOT in Germany (between Aachen and Cologne)]
Functions to be tested

In the German DFOT several nomadic device functions are to be tested. These functions are static navigation and speed limit information/speed limit alert. Furthermore, the interaction between ADAS functions based on nomadic devices and ADAS functions integrated into the vehicle infrastructure will be assessed. Therefore, the in-vehicle functions Forward Collision Warning (FCW), Adaptive Cruise Control (ACC) and Lane Keeping Assist (LKA) are tested additionally to the nomadic device functions named above.

Devices to be used

The German test site is using a Personal Navigation Device (PND) by Blom as nomadic device (shown in Figure 22), on which a customised navigation tool provided by a Blom subcontractor, is installed. The device offers the possibility to log the information provided by the PND (GPS position, notifications to the driver etc.) and the interaction between user (driver) and device by logging the operation of the device.
In the German detailed Field Operational Tests an equipped vehicle is used for the test runs. This means that additional hardware is installed inside the serial vehicle, which is monitoring the environment, the vehicle and the driver during the test runs. This equipped vehicle is a modified Volkswagen Passat CC shown in Figure 23.

The vehicle contains a 3.6 l engine with 224 kW, an all-wheel drive and a double clutch automatic transmission. For the test of the interaction between in-vehicle ADAS functions and ADAS functions based upon nomadic devices, the vehicle is equipped with Adaptive
Cruise Control (ACC), Lane Keeping ("Lane Assist"), Forward Collision Warning ("Front Assist") and Xenon Cornering Lights.

To get access to as many information as possible, the vehicle was modified by the Volkswagen research workshop. Inside the vehicle a gateway has been installed, providing access to most of the vehicle sensors, offering information like wheel speed, velocity, acceleration in longitudinal and lateral direction, yaw rate, steering angle and steering angle velocity. Additional to the vehicle data Object data of the ACC-sensor (e.g. preceding vehicles) and the “Lane Assist” (e.g. position of lane markings) are provided by the ADAS systems. Beneath these parameters other information like brake pedal and throttle status can be assessed as well as outer influences, e.g. by windscreen wiper status, ABS and ESP action are accessible. For surveillance of the area in front of the car an additional camera has been mounted to the A-pillar on the passenger side of the car, so that incidents in front of the car can be recorded throughout the test runs.

After the car has been modified by VW ika added the data logging hard- and software into the trunk. For the conduction of the test runs other modules like the Cockpit Activity Assessment module (CAA) provided by VTT and the Environmental Conditions Assessment module (ECA) provided by ICCS as well as the PND by Blom will be integrated into the vehicle.

For the conduction of the German DFOT a number of 10 participants has been determined. The test subjects should be of different gender, age, background and driving experience, so that a representative and comparable image of the road users can be provided. The test subjects will be chosen from the ika-test-subject pool.

- Conduction of the tests

At the beginning all test subjects have to fill in the Background questionnaires and the “before” questionnaires regarding e.g. user uptake.

In advance to the actual test runs the test vehicle and the installed test systems will be introduced to the test subjects. The introduction is based on driving scenarios in which the driver can experience the working system on the ika test track near to the Institut.

The actual test runs will be conducted as accompanied tests, in which the test subjects are driving along a given route. During the test run the supervisor is taking notes describing specific incidents on the road or behaviour of the test subject. Further surveillance, e.g. by using the “Wiener Fahrprobe”, are not planned during the test runs. Each test subject will be passing the test run several times with an offset of about 2 weeks. During and after these tests the subjects will fill in the questionnaires, so that the development e.g. of the user uptake can be evaluated.

- Road type

Because of the focus on the interaction between internal ADAS functionalities and nomadic devices, a route on which as many ADAS functions as possible can be tested has to be chosen. Due to the fact that functions like ACC and Lane Keeping are designed to
be used on well developed roads, like highways or main roads, the tests will be mainly conducted on these types of roads.

- **Traffic conditions and interaction with other road users**

  To ensure that systems, like ACC, become active during the comparatively short test runs, a route on which the traffic density allows to use the tested systems will be defined. The conditions in the chosen test area between Cologne and Aachen should be suitable for these tests.

- **Time of day and seasonal effects**

  The test period shall range over a time span of 6 month, so that the tests will be conducted under changing weather conditions and in different seasons. Due to the length of the test period and the number of conducted tests seasonal effect, like icy conditions, and other effects of weather conditions should be levelled over the period of testing. To avoid assessing short term effects all drivers are travelling the test routes several times in all of the three modes (with all systems, only with integrated systems, only with systems based upon the nomadic device).

  In the following figures the sunrise, sunset, dawn and dusk times are shown (see Figure 24). The second figure shows the sun-path diagram for the city of Aachen (Figure 25).
**Weather conditions**

In the following diagrams the average temperature and precipitation is listed in a monthly overview (Figure 26) for the region of Aachen. Aachen is situated in the temperate zone with an oceanic climate. The weather is humid with mild winters and relatively balanced temperatures. Due to the location north of two low mountain ranges (Eifel and Hohes Venn) the precipitation in Aachen is slightly higher than in its surrounding area. Another effect of this location is the appearance of Föhn, a warm and dry down slope wind, with air flows from the south.
Figure 26: Climate diagram of Aachen, Germany [Wetterkontor.net]

- Differences between initial and current plans

The initial plans have been described in document D1.4 and have not changed for the German Test Site Set Up.
4.2.3. France

4.2.3.1 Large-scale FOT 1: The region of Franch Comté

- **Map of the area of the tests**
  The test site will involve cars from different test participants of the region. The cars will mainly be used in the region Alsace-Franche Comté and the surrounding municipalities (See map below).

![Map of the area of the French FOT1 test site.](image)

- **Functions to be tested**
  The function tested at the French test site is the e-Call function.

- **Devices to be used**
  PND DANEW will be used to setup e-Call within vehicle [4]. It has the following main characteristics:
  - Large 4,3" LCD touch screen
  - GPRS connectivity for WEB services (internet) and FTP
  - SIM card (data) and micro SD card slot
  - SiRF Atlas III dual-core processor
  - 64MB RAM and a 1GB flash memory
  - Weights about 180 grams
Participants (No, characteristics, etc.)
It is expected that at least 400 vehicles (equipped with the DANEW device) will be used. Each vehicle will be registered to a particular participant of the test. A sophisticated classification method of drivers based on, for example profession, age, will be used to establish more diversified drivers’ community.

Road type
All road types will be included. The road types selection are based on participants preferences.

Traffic conditions and interaction with other road users
All traffic conditions will be encountered by the participants.

Weather conditions
Data collection will take place over a 6 months (from January till July) period and all weather conditions experienced in that time will be a factor in the study. The trial is scheduled to take place the beginning of 2011.

Time of day and seasonal effects.
The test time will not be explicitly specified, there will be 24/24 hrs service during the testing period.
• **Differences between initial and current plans**

The French L-FOT has not suffered from any significant changes between the initial plans, and the actual plans described in this deliverable.

### 4.3. Southern Test Community

#### 4.3.1. Spain

#### 4.3.1.1 Large scale FOT1 – WV test site

• **Map of the area of the tests**

The west test site in Spain (WV) will be located in the area of Valladolid, a mid size city, located in Castilla y León region, in the North-West of Spain.

![Figure 29: Map of the area of the Spanish LFOT (WV)](image)

The province of Valladolid has a population of 495,000 distributed in an area of 8,202 km². It is characterised by the uniformity of its orography, mainly plain areas with small hills. The capital is Valladolid (city) with more than 319,000 inhabitants and located at 691 m of altitude.

• **Functions to be tested**

The Spanish-Valladolid test site will be focused on the following functions:

- **a.** Navigation support (static), including real image
- **b.** Speed limit information
- **c.** Speed alert
• **Devices to be used**

The nomadic device that will be used in the L-FOT Spanish Valladolid test site is a navigation device from NDrive.

This device is a personal navigation solution based on GPS technology. It provides navigation through visual and voice instructions, which includes names of roads and locations, door-to-door navigation and detailed information about points of interest in several languages. As an added value, the NDrive device uses real photos in perspective to show another way to navigate in its screen.

![Figure 30: The nomadic device to be used in the Spanish WV LFOT](image)

• **The test vehicle(s) and type of instrumentation**

The vehicle(s) that will be used during the trials will be the users’ own vehicles.

Regarding the data acquisition, it will be done through the nomadic device itself thanks to a specific logging software that has been developed within TeleFOT project in order to register the needed information. Data logged will be:

- General purpose variable (Date, timestamp)
- Route/Journey data (GPS coordinates, number of satellites, speed, speed limit, road type, heading)
- Functions (on-off, warning messages, navigation mode)
- Assisted mode (route type, re-calculations)
- User interaction

• **Participants (No, characteristics, etc.)**

Taking into account the most appropriate study design according to the project objectives and the test site research approach, a final set of 120 users is targeted.

Specifically, aspects such as age (25-65 years old), gender (male and female) and driving experience (>3 years driving experience and >10,000kms/year) will be considered in order to achieve a suitable representation of the driving population.
Road type

Valladolid area is composed by different types of roads:

- Highway, motorway (speed limits: 100 and mainly 120 km/h)
- Single carriageway roads (speed limits: 70, 80 and mainly 100 km/h)
- Extra-urban roads (speed limits: 40, 60 and mainly 80 km/h)
- Urban roads (speed limits: 20, 30, 40, 70 and mainly 50 km/h)

Traffic conditions and interaction with other road users

Valladolid is a mid-size city and therefore, urban areas have a medium level of traffic except for some specific stretches and hours where isolated traffic jams can be encountered. Moreover, several extra-urban areas are located around the city with different speed limits and in some stretches regulated by traffic lights.

Additionally, several highways/motorways connect the city with other important locations/cities such as Madrid, Salamanca or Burgos.

The following picture shows the traffic densities of some of the most important road sections around Valladolid. These figures (mean daily traffic) are based on official traffic density indexes provided by local and national authorities.
Weather conditions

The climate can be considered as continental (attenuated) with a comfortable average temperature along the year. The average annual precipitations range between 400 and 600 mm, distributed along the year with an extreme decrease in summer.

Next table shows average figures provided by the National Institute of Meteorology regarding weather conditions such as average temperatures (maximum and minimum), precipitations, humidity, sunshine hours, etc.
### D3.3.1 Test communities overview (initial)

**Table 1: Average weather indicators of the area of the tests of Spanish WV LFOT**

<table>
<thead>
<tr>
<th>Month</th>
<th>Average Temp.(ºC)</th>
<th>Average Max. Temp. (ºC)</th>
<th>Average Min. Temp. (ºC)</th>
<th>Precipitation (mm)</th>
<th>Relative Humidity (%)</th>
<th>Average nº of days with precipitation (&gt;1mm)</th>
<th>Average nº of days with snow</th>
<th>Average nº of days with storm</th>
<th>Average nº of days with fog</th>
<th>Average nº of days with frost</th>
<th>Average nº of clear days</th>
<th>Average nº of sunshine hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>4.0</td>
<td>8.3</td>
<td>0.0</td>
<td>40</td>
<td>83</td>
<td>7</td>
<td>3</td>
<td>0</td>
<td>11</td>
<td>17</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>February</td>
<td>6.1</td>
<td>11.4</td>
<td>0.9</td>
<td>32</td>
<td>72</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>12</td>
<td>4</td>
<td>141</td>
</tr>
<tr>
<td>March</td>
<td>8.4</td>
<td>15.0</td>
<td>2.3</td>
<td>23</td>
<td>62</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>8</td>
<td>6</td>
<td>209</td>
</tr>
<tr>
<td>April</td>
<td>10.1</td>
<td>16.3</td>
<td>4.0</td>
<td>44</td>
<td>62</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>222</td>
</tr>
<tr>
<td>May</td>
<td>13.8</td>
<td>20.5</td>
<td>7.2</td>
<td>47</td>
<td>61</td>
<td>9</td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>260</td>
</tr>
<tr>
<td>June</td>
<td>18.1</td>
<td>25.9</td>
<td>10.7</td>
<td>33</td>
<td>54</td>
<td>5</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>7</td>
<td>310</td>
</tr>
<tr>
<td>July</td>
<td>21.7</td>
<td>30.4</td>
<td>13.3</td>
<td>16</td>
<td>47</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>August</td>
<td>21.6</td>
<td>29.8</td>
<td>13.6</td>
<td>18</td>
<td>49</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>September</td>
<td>18.1</td>
<td>25.7</td>
<td>10.9</td>
<td>31</td>
<td>56</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>8</td>
<td>244</td>
</tr>
<tr>
<td>October</td>
<td>12.8</td>
<td>18.8</td>
<td>6.9</td>
<td>42</td>
<td>69</td>
<td>7</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>176</td>
</tr>
<tr>
<td>November</td>
<td>7.7</td>
<td>12.6</td>
<td>2.9</td>
<td>51</td>
<td>78</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>8</td>
<td>5</td>
<td>114</td>
</tr>
<tr>
<td>December</td>
<td>5.0</td>
<td>8.8</td>
<td>1.3</td>
<td>56</td>
<td>84</td>
<td>8</td>
<td>1</td>
<td>0</td>
<td>10</td>
<td>13</td>
<td>3</td>
<td>81</td>
</tr>
<tr>
<td>TOTAL</td>
<td>12.3</td>
<td>18.6</td>
<td>6.2</td>
<td>435</td>
<td>65</td>
<td>71</td>
<td>8</td>
<td>17</td>
<td>42</td>
<td>61</td>
<td>76</td>
<td>2534</td>
</tr>
</tbody>
</table>

**Figure 33: Average weather indicators of the area of the tests of Spanish WV LFOT**

- **Time of day and seasonal effects**
  
  Taking into account the duration of the test period for the large scale tests (around 6 months), seasonal effects can be avoided since drivers will use the systems under different weather conditions. Regarding the time of the day, this could have an effect in the results due to the subjects’ habits and therefore, a varied sample should be considered in order to minimise these effects.

- **Differences between initial and current plans**

  The initial plans have been in general maintained although some slight modifications have been included. Regarding the device to be used during the trials, the hardware has evolved to the corresponding new model according to market evolution. On the other hand, the system's software has been modified in order to include the logging software developed specifically for TeleFOT. Finally, in relation to the number of subjects, the Valladolid test site is planning a target number of 120, thus increasing the initial plan in 20 drivers.

4.3.1.2 Detailed FOT – WV test site

- **Map of the area of the tests**

  The detailed FOT (WV test site) will be conducted in the province of Valladolid, located in the North-West of Spain (see L-FOT map).
• **Functions per site**

Detailed tests are planned to be carried out as a complement to the large-scale tests performed in Valladolid (within the Spanish test site) with the aim of exploring in-depth drivers’ behaviour when making use of particular driving functions. Thus, the same functions will be considered within the D-FOT:

- Navigation support (static), including real image
- Speed limit information
- Speed alert

• **Devices to be used**

As said before, the detailed test will be a complement of the L-FOT and therefore, the same nomadic device (navigator) will be used, namely NDrive.

• **The test vehicle(s) and type of instrumentation**

The vehicle to be used during the D-FOT trials will be a specific equipped vehicle with the corresponding data acquisition system. The system will include:

- Vehicle dynamics (speed, acceleration, GPS position, driven distance, use of pedals and controls, etc.)
- Driver status (CAA variables, micro-cameras including video and audio)
- Environment (weather conditions and lighting through video)

Furthermore, an additional logging will be done through the nomadic device using the same specific logging software as in L-FOT. As previously explained, data logged will be:

- General purpose variable (Date, timestamp)
- Route/Journey data (GPS coordinates, number of satellites, speed, speed limit, road type, heading)
- Functions (on-off, warning messages, navigation mode)
- Assisted mode (route type, re-calculations)
- User interaction

• **Participants (No, characteristics, etc.)**

The overall number of participants will depend on the final decision about the experimental design to be considered within the detailed FOT. This test design will define the experimental conditions and as a consequence, the number of groups and the needed number of participants in each of them. Nevertheless, the expected number of participants would be around 20 drivers.

• **Road type**

The detailed FOT will be conducted in Valladolid area and as far as possible, different types of roads will be covered within the trials (urban, extra-urban, rural and motorway) in order to consider several road features such as number of lanes, level of road curvature, speed limits, traffic densities, etc.
• **Traffic conditions and interaction with other road users**

The area of the D-FOT trials will be selected according to different layouts and features (traffic conditions and environmental aspects such as signs, road markings, speed limits, etc.) in order to include different conditions in the subsequent analysis. For that, traffic information (previously mentioned in the L-FOT description) will be used in order to select the most suitable routes.

• **Weather conditions**

As it was explained before (L-FOT description), Valladolid has a varying weather conditions along the year. According to the established timeplan, the D-FOT trials will be conducted in the first half of the year, thus involving winter and spring periods.

• **Time of day and seasonal effects**

In this case, the duration of the test trials will be limited and therefore the seasonal effects will be taken into account: similar weather conditions will be ensured by selecting the appropriate days and modifying the calendar schedule. A similar procedure will be followed for the selection of the time of the day to carry out the D-FOT trials.

• **Differences between initial and current plans**

Currently the plans are maintained, although considering the same comments regarding the device to be used (evolved hardware and dedicated software). Nevertheless, these DFOTs are still under definition and therefore, they could be subject to changes.
4.3.1.3 Large scale FOT – M test site

- **Map of the area of the tests**

The Spanish Large Scale FOT will be based in the city of Madrid. Madrid is the capital of Spain and the largest city of the country, with a population of more than 3.200.000 inhabitants, Madrid is one of the most populous municipalities in the European Union. Madrid is located in the centre of Spain.

![Location of Madrid](image)

The Madrid large FOT will take place in the metropolitan area of the city which has an extension of approximately 5300km². The FOT participants will be provided with real time traffic information of the main road arterials of the city, as well as information on maximum speed and incidences.
• **Functions per site**

The functions to be tested in Madrid FOT are as follows:

a. Real time traffic information
b. Speed limit information
c. Green driving support

• **Devices to be used**

The nomadic device to be used during the field tests in Madrid will be an enhanced version of the new Vexia Econav, a navigation device which, apart from the normal navigation support, includes the green driving support functionalities that provides the user with information on which gear to use and when to change gears in order to reduce fuel consumptions. These devices will be properly modified in order to able to receive the real time traffic information provided by ETRA.
Participants (No, characteristics, etc.)

The drivers to participate in Madrid LFOT will be recruited among the users of Vexia devices. These drivers will be provided with the enhanced Vexia devices which would have been modified in order to be able to provide the functionalities required for this LFOT. The drivers participating in Madrid FOT will presumably need to go through a training process to learn to use the new functionalities and to be introduced to the LFOT in particular and to TeleFOT in general. The target of the Madrid Large FOT is to reach around 100 participants.

The test vehicle (s) and type of instrumentation

The vehicles to be used in Madrid FOT will be equipped with the above mentioned device properly modified in order to include the new functionalities to be tested in Madrid. The type of instrumentation needed inside the vehicle to perform the FOT will be the Vexia Econav navigator device, no data logger will be needed as the data will be sent to a central data logger and will be logged remotely.

Road type

Madrid FOT will take place within the most important road arterials and streets of the Madrid city centre and metropolitan area.

Traffic conditions and interaction with other road users

The Madrid FOT participants will interact directly with other road users, as they will not run on segregated routes.

Being a big city as it is, Madrid suffers from high density traffic, having regular peaks at rush hours (morning 7-9; evening 17-19, at working days) which cause usual congestions at the main city entrances and main roads of the city.
- **FOT execution**

Madrid FOT is expected to start during the second half of 2010. By this time the test drivers will have been provided with the enhanced Vexia devices properly modified to provide the new functionalities to be tested.

- **Weather conditions**

Madrid is located about 600 metres above the sea level at 40°24N 3°41W and has a Continental Mediterranean climate with cool winters due to its altitude, including sporadic snowfalls and minimum temperatures often below 0 °C in Winter time. Summer tends to be hot with temperatures over 30 °C in July and August. Due to Madrid's altitude and dry climate, nightly temperatures tend to be cooler, leading to a lower average temperature in the summer months.

### Figure 37: Average temperature per month in Madrid

<table>
<thead>
<tr>
<th>Month</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average high °C (°F)</td>
<td>9.7 (49)</td>
<td>12.0 (54)</td>
<td>15.7 (60)</td>
<td>17.5 (64)</td>
<td>21.4 (70)</td>
<td>20.6 (69)</td>
<td>21.1 (70)</td>
<td>31.2 (88)</td>
<td>30.0 (86)</td>
<td>25.0 (77)</td>
<td>19.0 (66)</td>
<td>13.4 (56)</td>
<td>10.1 (50)</td>
</tr>
<tr>
<td>Average low °C (°F)</td>
<td>2.8 (37)</td>
<td>3.7 (39)</td>
<td>5.6 (42)</td>
<td>7.2 (46)</td>
<td>10.7 (51)</td>
<td>15.1 (59)</td>
<td>13.4 (55)</td>
<td>18.2 (65)</td>
<td>15.0 (59)</td>
<td>10.2 (50)</td>
<td>8.0 (43)</td>
<td>3.8 (39)</td>
<td>3.7 (40)</td>
</tr>
<tr>
<td>Precipitation cm (inches)</td>
<td>1.5 (0.6)</td>
<td>3.5 (1.4)</td>
<td>2.6 (1.0)</td>
<td>4.7 (1.8)</td>
<td>5.2 (2.0)</td>
<td>2.5 (1.0)</td>
<td>1.5 (0.6)</td>
<td>2.8 (1.1)</td>
<td>1.0 (0.4)</td>
<td>5.6 (2.2)</td>
<td>8.5 (3.3)</td>
<td>47.8 (18.8)</td>
<td></td>
</tr>
<tr>
<td>Avg. precipitation days</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td>11</td>
<td>12</td>
<td>7</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>11</td>
</tr>
</tbody>
</table>

Precipitation levels are low, but rainfall (sometimes snowfall in wintertime) can be occurred all throughout the year. Summer and winter are the driest seasons, with most rainfall occurring in the autumn and spring.

In the following graph we can see the average precipitation per month in Madrid together with the average, maximum and minimum temperature.
Time of day and seasonal effects

In the following figures the Sunrise, sunset, dawn and dusk times graph and the Sun path diagram are depicted for Madrid.

Figure 38: Average precipitation per month in Madrid

Figure 39: Madrid Sunrise, sunset, dawn and dusk times, graph
• **Differences between initial and current plans**

The Madrid FOT has not suffered from any significant changes between the initial plans, detailed in D1.4 and the actual plans described in the present deliverable.
4.3.2. Italy

4.3.2.1 Large scale FOT

- **Map of the area of the tests**

The large scale FOT will be based in Reggio Emilia, province of the Emilia Romagna region, in Northern Italy.

![Figure 41: Reggio Emilia in Northern Italy where the Italian LFOTs will be conducted](image)

The region of Emilia-Romagna consists of nine provinces and covers an area of 22,124 km². Nearly half of the region (50%) consists of plains while 25% is hilly and 25% mountainous. The mountains stretch for more than 300 km from the north to the south-east, with only three peaks above 2,000 m.

About a half of the region is constituted by Padan Plain, an extremely fertile alluvial plain crossed by the river Po.

Via Aemilia divides the region into two almost equal parts: the Northern one (47.8% of the total) consists of plains, while hills (27.1% of the total) and mountains (25.1% of the total) are in the Southern part of the region.
Functions per site

The following functions are planned to be tested in the Italian Large Scale FOT:

a. Speed limit information
b. Speed alert
c. Navigation support (static)

The Italian LFOT will test an Acer smart phone, model “beTouch E 101“ [5], using a software to be provided by Blom.

The Acer smart phone “beTouch E 101“ has the following specifications:

- Windows mobile 6.5 Professional
- Qualcomm ESM 7225, 528 MHz; EDGE/GPRS/GSM (850/900/1800/1900 MHz)
- 512 MB ROM, 256 MB RAM
- Touchscreen LCD TFT 3,2” WQVGA (400 x 240)
- Bluetooth 2.0 + EDR
- Integrated GPS, AGPS supported
- Memory slot MicroSD
- Rechargeable battery Li - Ion, 1140 mAh
- Dimensions: 113 x 56 x 12,85 mm
- Weight: 118 g (battery included)
All the vehicles will be equipped with MetaSystem’s Clear Box, which will mainly be used for data logging purposes.

Even though the sample will be mainly composed by private car drivers, public or private fleet drivers may be included in the sample. Contacts are underway to recruit drivers from public and corporate fleets, as well as from private transportation companies.

- **Participants (No, characteristics, etc.)**

A sample of 150 drivers was set as target for the LFOT, to be possibly flanked by a control group of 150 drivers.

Recruitment will take into account driving experience (i.e. average Km. driven per year), age, gender, profession: participants will be recruited among drivers who comply with a minimum 10000 Km./year experience and who have received their driving license from at least three years; a pre-screening will also attempt to define which part of the yearly distance driven belongs to "usual roads" (criteria for "usual" are to be defined).

- **FOT execution**

The Italian Large Scale FOT will test combination of functions. Different cases will be determined on the base of the use (i.e. if the tester activates Navigation).

Possible combinations can be as showed in the following table.
Table 4: Combination of functions in the Italian LFOT

<table>
<thead>
<tr>
<th></th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
<th>Case 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Navigation (Static)</td>
<td>V</td>
<td>-</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Speed Alert</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>-</td>
</tr>
<tr>
<td>Speed Info</td>
<td>V</td>
<td>V</td>
<td>-</td>
<td>V</td>
</tr>
</tbody>
</table>

Vehicles for pilot tests are planned to be equipped with a smart phone and a MetaSystem ClearBox. A Software to be provided by Blom will be installed on the smartphones in order to enable the test functions as well as data logging.

Pilot tests are planned to be executed before carrying out the trials. During the pilot tests also questionnaires and travel diaries provided by SP2 will be tested, so to treat them as mini-FOTs, as decided at IP level.

Pilot testing is in fact conceived as a trial run of procedures and instruments that are to be used in the tests. The pilot testing will verify that the questionnaires/travel diary "work" in terms of questions, answer alternatives, terminology and translation, so that people understand them, and that they provide the data necessary in order to test the different hypotheses.

4-5 persons are to be involved in the pilot testing, representing the participants in the test.

- **Road type**

The plan is to include different road types, in order to assess the functions under different road conditions. Extra-urban, urban, residential and rural scenarios will be addressed, as well as access to the A1 Motorway (backbone of road transports).

Restricted Access Areas in downtown: in Reggio Emilia traffic restrictions are applied to Euro 0 and Euro 1 vehicles on specific periods; special access permissions for commercial vehicles (e.g.: goods delivery). Most of the urban and motorway road network relies on flat terrain; in the town's nearing, hills and mountains are present (up to 15% slopes) with tunnels (with possible lack of satellite connection).

Limitations for the test site can also be related to Telecom Network coverage for online applications.

The urban morphology does not present particular problems, since the city is in prevalence in plain and buildings, in particular in the historical centre, are not very high (mainly three floors).
Traffic conditions and interaction with other road users

Traffic in Reggio Emilia presents regular peaks of density during working days (morning 7-9; evening 17-19), with possible congestions as a consequence of roadworks and accidents on the A1 Motorway: when it is closed or overcongestioned, the traffic is deviated onto Reggio Emilia road network.

In particular, the Reggio/Modena nord area is characterized by high levels of heavy transport and in case of accidents or overcongestion the interregional traffic impacts on the local road network, in particular on Via Aemilia.

A second road with a heavy goods and persons transport is the Brennero motorway, with a high impact on the urban mobility.

The vehicles circulation is not allowed in some areas of the cities (ZTL).

Weather conditions

Reggio Emilia’s territory consists almost entirely of plains: it is placed in the southern part of the Emilia Romagna region.

Reggio Emilia’s climate presents in prevalence severe winters, with frequent fog also during the day and sultry and hot summers. In winter time snow can fall from mountains to plains.

Autumn is very wet, cool and foggy until mid November, when climate starts to assume winter characteristics. Spring is quite mild.

<table>
<thead>
<tr>
<th>Month</th>
<th>T min (°C)</th>
<th>T max (°C)</th>
<th>Precipit (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>-2</td>
<td>4</td>
<td>55</td>
</tr>
<tr>
<td>Feb</td>
<td>0</td>
<td>8</td>
<td>53</td>
</tr>
<tr>
<td>Mar</td>
<td>4</td>
<td>13</td>
<td>63</td>
</tr>
<tr>
<td>Apr</td>
<td>8</td>
<td>18</td>
<td>73</td>
</tr>
<tr>
<td>May</td>
<td>13</td>
<td>23</td>
<td>71</td>
</tr>
<tr>
<td>June</td>
<td>16</td>
<td>27</td>
<td>54</td>
</tr>
<tr>
<td>July</td>
<td>19</td>
<td>30</td>
<td>36</td>
</tr>
<tr>
<td>Aug</td>
<td>18</td>
<td>29</td>
<td>48</td>
</tr>
<tr>
<td>Sep</td>
<td>15</td>
<td>25</td>
<td>64</td>
</tr>
<tr>
<td>Oct</td>
<td>10</td>
<td>18</td>
<td>91</td>
</tr>
<tr>
<td>Nov</td>
<td>5</td>
<td>10</td>
<td>81</td>
</tr>
<tr>
<td>Dec</td>
<td>1</td>
<td>5</td>
<td>61</td>
</tr>
</tbody>
</table>

Figure 44: Temperature and precipitations
• **Time of day and seasonal effects**

In the following figures the Sunrise, sunset, dawn and dusk times graph and the Sun path diagram are depicted for Reggio Emilia:

![Sun path diagram](image)

*Figure 45: Reggio Emilia Sun path diagram (ref: May 2009)*
Figure 46: Reggio Emilia Sunrise, sunset, dawn and dusk times, graph

- Differences between initial and current plans

The main modification consists of removing Traffic Information and Dynamic Navigation from the list of functions to be investigated in the Italian LFOT. This reason for this change is twofold: on the one hand, the initially selected device had to be replaced because of technical reasons, so that the functions set had to be rearranged accordingly with the current device’s features; on the other hand, the quantity and quality of information provided via Traffic Message Channel (TMC) service in the test area is limited to highways, and therefore will not allow for a sufficient amount of use cases for Traffic Information and Dynamic Navigation functions.
4.3.2.2 Detailed FOT

- **Map of the area of the tests**

The Detailed FOT will be based in Turin, in northwest Italy, capital of the Piedmont region.

Turin is a major city as well as a business and cultural centre in northern Italy, capital of the Piedmont region, located mainly on the left bank of the Po River surrounded by the Alpine arch.

The Geography of Piedmont is that of a territory predominantly mountainous, 43.3%, but with extensive areas of hills which represent 30.3% of the territory, and of plains (26.4%). Turin is surrounded on the western and northern front by the Alps and on the eastern front by a high hill. The centre of the city is mainly in plain.

![Turin Map](image)

**Figure 47: Turin**

- **Functions to be tested**
  
  a. Static and Dynamic Navigation
  
  b. Traffic Information
  
  c. Speed Camera Alert
  
  d. Green Navigation

Traffic information provided by national databases, delivered via TMC.
Test vehicles and type of instrumentation  The Magneti-Marelli EasyRoad, version without SIM/ TTS. Will be used on the two vehicles planned to be used for tests. The logging will be performed through dedicated PCs.

- **Participants (No, characteristics, etc.)**

Two vehicles will be used for tests, with around 50 drivers (within subject design). Participants will be recruited among drivers who comply with a minimum 10000 Km/year experience; a pre-screening will also attempt to define which part of the yearly distance driven belongs to "usual roads" (criteria for "usual" are to be defined). A differentiation will be made between professional and private drivers.

- **FOT execution**

In the Italian Test site, only one detailed field operational test will be set-up. With respect to previous plans, the Green Navigation function has been added, being both a core functionality and a major selling point of the Magneti-Marelli device.

During the detailed FOT, the performance indicators, which cannot be measured during the large scale FOT, will be addressed.

The tests will be carried on with trips beginning and ending in Orbassano (CRF) and Venaria Reale (Magneti-Marelli).

A within subject design is planned to be adopted.

- **Road type**

Scenario: mostly highway and urban roads.

Turin urban network is very thick and capillary. Roads are predominantly urban in the city centre, but Turin has a lot of high flow roads.

The Turin ring road connects different highways. It distributes the city accesses in all the cardinal points and allows getting to the most important cities of northern Italy. A21 to Piacenza, A4 to Milan and Trieste, A6 to Savona, A5 to Ivrea and Aosta and also A32 to French borders are the highways linking Turin to main cities and to the European and Italian road network.

A lot of high-level flow roads connect Turin outskirts to the city centre.

The urban morphology does not present particular problems, since the city is in prevalence in plain. So, most of the urban and highway road network lies on flat terrain. There are some hills and some rising roads are near the city, mainly on the right bank of the Po River.

There are restricted Access Areas in the city centre (named ZTL): in Turin traffic restrictions are applied to Euro 0, Euro 1 and Euro 2 vehicles on specific periods and within a specific “environmental zone”. Special access permissions for commercial
vehicles (e.g.: goods delivery), residents and disabled persons are available. Restricted access is also applied in the pedestrian only area, named “central zone ZTL”, in which just public transport or allowed vehicles can pass through.

Extra-urban, urban, residential and rural scenarios will be addressed, as well as access to highway.

Since Turin is a big city, urban territory is characterized by high buildings forming a sort of “urban canyons” which may represent difficulties for signal detection.

The tests will be carried on with trips beginning and ending in Orbassano (CRF) and Venaria Reale (Magneti-Marelli).

- **Traffic conditions and interaction with other road users**
  As a city of over 900,000 citizens, traffic in Turin presents regular peaks of density during working days (morning 7-9; evening 17-19), with possible congestions as a consequence of road works and accidents on the high level of flow roads. Sometimes particular traffic congestions happen along the ring road highway due to the presence of a lot of factories in the city outskirts and to the movement of a lot of workers during the daytime.

  In Turin critical points for traffic conditions are also some roads called Corso (C.so) Regina Margherita, C.so Giulio Cesare, C.so Francia, C.so Unione Sovietica, connecting the city centre to highways and outskirts.

- **Weather conditions**
  Turin has a continental climate. Winters are cold but dry, summers are mild in the hills and quite hot in the plains. Rain falls mostly during Spring and Autumn; during the hottest months, otherwise, rains are less usual but more strong (thunderstorms are usual). During Winter and Autumn banks of fog, which are sometimes very thick, form in the plains.

![Figure 48: Turin weather averages](image)

- **Time of day and seasonal effects**
  In the following figures the Sunrise, sunset, dawn and dusk times graph and the Sun path diagram are depicted for Turin:
**Figure 49: Turin Sunrise, sunset, dawn and dusk times, graph**

**Figure 50: Turin Sun path diagram (ref. May 2009)**
4.3.3. Greece

4.3.3.1 Large scale FOTs

- **Map of the area of the tests**
  The tests are going to be performed in the city of Athens and the surrounding area (Attica prefecture).

![Map of Athens and surrounding area](image)

**Figure 51:** Athens and the surrounding area (Attica prefecture) where the Greek LFOTs will be conducted.

- **Functions to be tested**
  In Greece 4 LFOTs are planned, as follows:
LFOT1: Navigation support (NAV)
LFOT2: Navigation support + Speed Limit information (NAV+SL)
LFOT3: Navigation support + Traffic information (NAV+TI)
LFOT4: Navigation support + Speed Alert (NAV+SA)

Table 5: Functions to be tested and LFOTs planned in Greece

<table>
<thead>
<tr>
<th>Functions</th>
<th>LFOT1</th>
<th>LFOT2</th>
<th>LFOT3</th>
<th>LFOT4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic information</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed limit information</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed alert</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Navigation support (static)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

In order to guarantee comparability of results, we will employ a within subjects design, in which the same subjects will participate in all the above LFOTs, thus we will have four experimental conditions plus a baseline, which will be the same for all the LFOTs. The order of the presentations of the various conditions to the subjects will be rotated, so as to counter-balance for learning effects among Baseline and LFOT 1 and between LFOTs 2, 3 and 4, as follows:

Table 6: Order of presentation of the various conditions to the subjects.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>25 subjects</td>
<td>Baseline</td>
<td>LFOT 1</td>
<td>LFOT 2</td>
<td>LFOT 3</td>
</tr>
<tr>
<td>25 subjects</td>
<td>Baseline</td>
<td>LFOT 1</td>
<td>LFOT 2</td>
<td>LFOT 4</td>
</tr>
<tr>
<td>25 subjects</td>
<td>Baseline</td>
<td>LFOT 1</td>
<td>LFOT 3</td>
<td>LFOT 2</td>
</tr>
<tr>
<td>25 subjects</td>
<td>LFOT 1</td>
<td>Baseline</td>
<td>LFOT 3</td>
<td>LFOT 4</td>
</tr>
<tr>
<td>25 subjects</td>
<td>LFOT 1</td>
<td>Baseline</td>
<td>LFOT 4</td>
<td>LFOT 2</td>
</tr>
<tr>
<td>25 subjects</td>
<td>LFOT 1</td>
<td>Baseline</td>
<td>LFOT 4</td>
<td>LFOT 3</td>
</tr>
</tbody>
</table>
In this way it will be possible to study the effects of the Navigation support compared to baseline, as well as the additional effects of Traffic Information, Speed Limit Information and Speed Alert plus Navigation Support, compared to Navigation only and compared to Baseline.

- **Devices to be used**

All Greek LFOTs will run in the Attiki region, which includes the Athens metropolitan area. This includes a network with urban, peri-urban roads, highways and rural roads.

Voice guided gps navigation software adequate for nomadic devices and for in-vehicle use will be acquired through a call for tender. The navigation software will present to the driver the navigation interface, namely route selection screen plus route guidance screen and vocal output (in LFOT1) plus one of the following: the speed limit information (in LFOT2), the speed alert warning (in LFOT4) and traffic information as received by the Traffic Management Centre of Athens (in LFOT3).

More specifically, in LFOT 1 the navigation software will be used. It will present to the driver the navigation interface, namely route selection screen plus route guidance screen and vocal output. In LFOT2 the navigation s/w will present (together with the navigation support) the speed limit information to the driver, through a visual speed limit traffic sign on the screen of the nomadic device. In LFOT3 the navigation s/w will present (together with the navigation support) the traffic information to the driver, through visual icons and text on the screen of the nomadic device. Some acoustic tones may be also used. In LFOT 4 the navigation s/w will provide (together with the navigation support) a warning to the driver, when he/she is driving with a speed greater than the speed limit in the current road segment. The warning will be visual on the screen of the nomadic device and acoustic.

The navigation system will be always on in the experimental conditions and always off in the baseline condition.

The software will run on nomadic devices, to be purchased for the scope of TELEFOT, which should have the following characteristics: 528 MHz processor, 288 MB RAM, touch screen with 480x800 WVGA resolution, Windows Mobile 6.1 Professional, internal GPS antenna, G-sensor, Bluetooth and Wi-Fi connectivity, battery up to 6 hours, possibility to insert a memory card, software developer kit.

The speed and acceleration of the driven vehicle will be measured with the sensors of the nomadic device. Therefore, the nomadic device will be firmly positioned on a fixing device (attached to the vehicle dashboard), at a location adequate for presentation of visual output to the driver. The orientation of the device will be such, that the three-axis measurements by the sensors of the mobile phone can easily be used to calculate the 3-axis acceleration of the vehicle, as indicated in Figure 56.

The following figures present the User interface of the navigation system on the nomadic device.
Figure 52: The nomadic device provides a typical Windows mobile HMI. The pictures reflect from left to right the sequence that needs to be followed in order to initiate the TeleFOT application menu.

The software data logger starts automatically upon initialization of the TeleFOT application.

Figure 53: The interface of the TeleFOT application.

The user is provided with a set of possibilities (from top to bottom): (a) Navigation support (static) – for FOT1, (b) Navigation support with Speed limit information – for FOT 2, (c) Navigation support with Traffic Information – for FOT3, (d) Navigation support with Speed alert – for FOT 4, (e) Calibration of the accelerometer – for the baseline condition and all FOTs.
Figure 54: User interface of the TeleFOT accelerometer calibration.

The user will be instructed to move the device in a way that the three lines are aligned (left side figure).

Figure 55: User interface of the TeleFOT navigation application.

The user is able to use a list of options provided by the application.
Data collection

- **Objective data**

Objective data will be collected through the GPS and G sensor of the nomadic device, which will be firmly positioned at the vehicle dashboard.

Objective data will be continuously collected via the sensors of the nomadic device, both in the baseline and in the experimental condition.

Messages with the position, speed, acceleration and event data will be generated approximately every 200 ms. Messages will be locally stored in real time (after each trip) and will be available to be uploaded to the central database every day.

Data checks will be performed periodically, to ensure completeness of data and provide for corrective measures, in case of problems.

- **Subjective data**

Subjective data will be collected by dedicated survey tools. The background questionnaire will be completed in the beginning and will support the screening and selection of participants. Uptake questionnaires and travel diaries, as proposed by SP2 (D2.2.1 “Testing and evaluation strategy” [6]) will be translated for the Greek LFOTs, and will be completed at selected intervals during the experiment, i.e. once a month. The pre-test
and a post-test uptake questionnaire will be completed too. The uptake questionnaire will survey the driver’s attitude towards the system, perceived influence on driving behaviour and driving style, user acceptance, and willingness to invest, as proposed by SP2 (in D2.2.1). Travel diaries will collect data about all trips in one week, start-end time, origin-destination, use of support system and perceived impact of support system on the trip. Previews of the survey tools to be used in the Greek test site are depicted in the following figures.

Each LFOT condition lasts for approximately 3.5 months.

For each LFOT, the travel diary will be completed after the end of month 1, after the end of month 2 and after the end of month 3 of the baseline and experimental conditions. The during-test uptake questionnaire will be completed after the end of month 1, after the end of month 2 and after the end of month 3 of the experimental condition. The background questionnaire a will be completed before the start of the experiment. The pre-test uptake questionnaire will be completed before the start of the experimental condition. The post-test uptake questionnaire will be completed at the end of the experimental condition.

Participants will be asked to hand in the questionnaires immediately after their completion. If these questionnaires are not handed-in in time, the participants will be reminded to complete them.

- **Participants (No, characteristics, etc.)**

A sample of 150 drivers will participate in each FOT. They will drive in two conditions, the baseline condition, where no support will be provided, and the experimental condition, in which they will receive support through the navigation system.

Male and female drivers will be equally represented in the sample. Participants should be experienced drivers, i.e. having a driving license for more than 3 years and driving annually at least 10,000 km. Elderly drivers, over 65 years old, will not participate in the sample.

The navigation systems are currently being introduced in the Greek market. The sample will be equally composed by people with a previous experience in support systems and by people without such an experience.

The sample will be equally composed by people who drive more in highways, people who drive more in urban roads and people who drive more in rural roads, so that the final pool of data possibly includes equally trips in all traffic environments.

A search for possible participants has been initiated via the AUTOMOBILE AND TOURING CLUB OF GREECE (ELPA), via personal contacts of the personnel in ICCS and via advertisements in relevant web sites and magazines. Possible participants will complete the background questionnaire. The selection of final participants will be done so that all the above conditions are true, namely they are experienced drivers, not elderly, half are male and the other half are female, they represent equally all levels of experience with driver’s support systems and of frequency of driving in various road environments.
• **Road type**

The participants will be instructed to behave and drive normally in a free way, as they would if they would not participate in the experiment. Therefore the drivers participating in the LFOTs will drive in the roads of the Attica prefecture. The Attica prefecture includes different road types, i.e. urban, peri-urban and highway environments, which means that it will be possible to assess the functions under study in the LFOTs in different road conditions.

• **Traffic conditions and interaction with other road users**

As mentioned above, different road types will be addressed in the tests. Consequently, the traffic conditions will vary according to the environment and also according the time of day.

• **Weather conditions**

The climate in Greece is typical of the Mediterranean climate: mild and rainy winters, relatively warm and dry summers and, generally, extended periods of sunshine throughout most of the year. A great variety of climate subtypes, always in the Mediterranean climate frame, are encountered in several regions of Greece. This is due to the influence of topography (great mountain chains along the central part and other mountainous bodies) on the air coming from the moisture sources of the central Mediterranean Sea.

In terms of climatology, the year can be broadly divided mainly into two seasons. The cold and rainy period, lasting from the mid of October until the end of March, and the warm and non-rain season lasting from April until September.

During the first period the coldest months are January and February, with, on average, mean minimum temperature ranging between 5 -10 degrees of Celsius near the coasts and 0 - 5 over mainland areas, with lower values (generally below freezing) over the northern part of the country.

Rainfall in Greece even in the winter, does not last a lot of days and the sky does not remain cloudy for several consecutive days, as it happens in other regions of the world. Winter bad weather days are often interrupted, during January and the first fortnight of February, with sunny days, well known as ‘Alkion days’ in ancient times.

During the warm and non-rain period the weather is almost stable, the sky is clear, the sun is bright and generally does not rain. However there are scarce intervals with rapid rain or thunderstorms of small duration mainly in mainland areas.

The warmest period is the last ten-day period of July and the first one of August, when the mean maximum temperature lies in the range of 29.0 and 35.0 degrees of Celsius. During the warm period the high temperatures are dampened from the fresh sea breezes in the coastal areas of the country and from the north winds blowing mainly in Aegean, well known as ‘Etesian’.
The following figures present graphically the variation of temperature, humidity, rain and wind speed in the Attica prefecture.

**Figure 57:** Monthly variation of absolute min (denoted with red line), max (denoted with blue line) and average (denoted with green line) temperatures in the Attica prefecture.

**Figure 58:** Monthly average humidity in the Attica prefecture.
Time of day and seasonal effects

Taking into account the duration of the test period for the large scale tests, seasonal effects can be avoided since drivers will use the systems under different weather conditions.
Regarding the time of the day, this could have an effect in the results due to the subjects’ habits and therefore, a varied sample should be considered (e.g. different age groups, people with different working hours, etc.)

- **Differences between initial and current plans**

  In Greece the planned test site set-up hasn't changed comparing to the original plan reported in TeleFOT Deliverable 1.4 “Test communities description.” Rather, the test site set-up has evolved in this period, and this has been reported in the previous sections. It’s worth to note however, that due to the short life-cycle of the nomadic devices industry, several models have been considered for selection/purchase for the Greek test site set-up. For this reason and in order to avoid selecting/favouring specific brands, the operators of the Greek test site resulted to base the selection on technology rather than specific models. Following this approach the call for equipment was issued (specifying that the nomadic device needed by the Greek test site should have a list of characteristics, as presented in the previous sections),
4.3.3.2 Detailed FOTs

- **Map of the area of the tests**

The tests for the Greek Detailed FOT will be taking place in the area of Thessaloniki, the second biggest Greek city. This area can be seen in the map below.

![Map of Thessaloniki and the surrounding area where the Greek DFOTs will be conducted](image)

*Figure 61: Map of Thessaloniki and the surrounding area where the Greek DFOTs will be conducted*
• Functions to be tested
The Greek detailed tests are divided into four DFOTs, in each of which different functions are being tested, namely:

- DFOT1: Navigation support + ADAS (CAS, LDW)
- DFOT2: Navigation support + Speed Limit information + ADAS (CAS, LDW)
- DFOT3: Navigation support + Traffic information + ADAS (CAS, LDW)
- DFOT4: Navigation support + Speed Alert + ADAS (CAS, LDW)

Table 7: Functions to be tested in the Greek DFOTs

<table>
<thead>
<tr>
<th>Functions</th>
<th>DFOT1</th>
<th>DFOT2</th>
<th>DFOT3</th>
<th>DFOT4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic information</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed limit information</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed alert</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Navigation support (static)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>ADAS (CAS, LDW)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

• Devices to be used
In terms of nomadic devices the Greek DFOT will use the same device and software that will be used also for the Greek LFOT (see section 4.3.4.1).

Moreover, an instrumented vehicle will be used which is equipped with a series of systems. The vehicle is a Lancia Thesis Emblema.
The research vehicle has been instrumented by many peripheral sensors. The signals of these sensors are transmitted via the CAN bus protocol.

Two peripheral sensors are used for the DFOT test pilot; the Frontal Radar and the Lane Departure Camera.

The Frontal Radar is located in the frontal bumper as it shown in the figure below.

![The frontal radar](image)

**Figure 63: The frontal radar**

The Frontal radar acquires signals related to the leading obstacles such as vehicles, vans, pedestrians etc. The model of the radar is FUJITSU TEN and it includes two scan zones. The data of this sensor are transferred via the CAN bus protocol.

The Lane Departure Camera is located in the middle of the frontal window. The main components of the system are: a CCD camera and a processing unit.
The CCD camera understands the driver’s departures within the white lanes in highways. Besides, many other CAN signals such as brake, cylinder pressure, steering wheel, OEM’s OBD-II signals and many other are also stored (they will be mentioned analytically in section 3.5).

Finally, all the above signals from the sensors are collected and stored in an industrial computer which resides at the trunk of the vehicle. This unit stores and uses all data with a specific applications developed by CERTH/HIT.

Additionally, two more systems will be operating on the vehicle: the CAA module which will detect the driver distraction and the ECA module which assesses different types of traffic risk.

- **Participants (No, characteristics, etc.)**

Due to the nature of the tests, aiming to assess the interaction of nomadic devices with ADAS in a small scale experiment, a feasibility compromisation led us to an a priori analysis for the computation of the required sample size, which resulted to 24 participants. These participants will all go through all the Baseline cases and DFOTs, according to the tests’ schedule below.
In order to achieve a better understanding of the driver behaviour and the effect of each of the tested nomadic devices, it is anticipated to have four different baseline cases, following the LFOT design. During these baselines, the nomadic devices will run normally, while the ADAS functions will operate in the instrumented vehicle, registering all relevant parameters (headway, TTC, TLC, etc.) without however providing warnings to the driver.

### Table 8: Baseline cases for the Greek DFOTs

<table>
<thead>
<tr>
<th>Baseline</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline 1</td>
<td>Navigation</td>
</tr>
<tr>
<td>Baseline 2</td>
<td>Navigation, Speed limit info</td>
</tr>
<tr>
<td>Baseline 3</td>
<td>Navigation, Traffic info</td>
</tr>
<tr>
<td>Baseline 4</td>
<td>Navigation, Speed alert</td>
</tr>
</tbody>
</table>

In order to guarantee comparability of results, we will employ a within subjects design, in which the same subjects will participate in all the above DFOTs and baselines, thus we will have four experimental conditions plus a 4-stage baseline, as described above.

In this way it will be possible to study the effects of the Navigation support combined with ADAS, as well as Traffic Information, Speed Limit Information and Speed Alert plus Navigation Support combined with ADAS, compared to each of the nomadic applications (baseline), while also in the baselines the parameters that are affected by the use of ADAS will be registered by the equipped vehicle. Comparisons may also be drawn between the Navigation support combined with ADAS and the Traffic Information, Speed Limit Information and Speed Alert information plus Navigation, combined with ADAS.

Thus, the testing schedule is planned as follows:

### Table 9: Timing of the Greek DFOTs

<table>
<thead>
<tr>
<th>Timing</th>
<th>Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 2010</td>
<td>Baseline 1</td>
</tr>
<tr>
<td>November 2010</td>
<td>Baseline 2</td>
</tr>
<tr>
<td>February 2011</td>
<td>Baseline 3</td>
</tr>
<tr>
<td>May 2011</td>
<td>Baseline 4</td>
</tr>
</tbody>
</table>
NOTE: The timing of the DFOTs will follow the timing of the corresponding LFOTs, with each DFOT starting towards the end of the relevant LFOT. This was decided in order to take into account any relevant findings and/or shortcomings of the LFOTs and try to accommodate accordingly the DFOTs (to the possible extend). The timing stated here may be subject of changes depending on the availability of the instrumented vehicle and/or participants.

- **Road type**
The DFOTs will be conducted mostly in highway and urban highway road environments, mainly due to the restriction of the lane departure system, for which the lane markings should be very clearly drawn in order to be recognised. Moreover, the Collision Avoidance System is operative for speeds over 30 Km/h, which is the case for extra-urban road environments.

- **Traffic conditions and interaction with other road users**
In the Greek DFOTs all the participants will have to drive on a pre-defined route. This implies that the traffic conditions will at all instances be more or less the same. Moreover, the timing of the day when the route will be driven will be nearly the same at all cases so as to avoid the influence daily traffic variation. The interaction with other road users will be free, meaning that the test subjects will drive as usual and will not be separated from the rest of the existing traffic.

- **Weather conditions**
For the weather conditions in Greece please refer to the Greek LFOT relevant section. Especially for the Prefecture of Thessaloniki, the following figures illustrate the average annual weather features.

![Figure 66: Monthly variation of absolute min (denoted with red line), max (denoted with blue line) and average (denoted with green line) temperatures in the prefecture of Thessaloniki.](image)
Figure 67: Monthly Average Rainfall (and total days of rain indicated in the right axis).

- **Differences between initial and current plans**

The main difference between the initial plans, described in D1.4 and the actual plans is as follows: DFOT 5 was abandoned as it was actually serving as a baseline. Currently, a more sophisticated baseline approach has been decided, with the aim of a better assessment and an optimal study design.
CONCLUSION

The main objective of this deliverable is to present the different FOTs – both detailed and large FOTs - that are being built within TeleFOT project. These FOTs are presented per Test community and the deliverable aims to show the objectives of the testing, the functions to be tested and the overall set up of each test site, both for Large and Detailed FOTs.

An overall description of the envisioned FOTs is presented in the present deliverable - for more extended information on FOTs detailed plans please check deliverable 3.4.1 Field Operational Test plans-, although in many cases this is not a completely final description:

Although some FOTs are ready to start or have already started, FOTs can still be subject to some changes. The exact and final definition of each FOT and test site set up is to be detailed in future steps of the test and evaluation strategy and will be reported in deliverable D3.3.2 entitled “Test communities Final description”.

The need for updates is more evident in the case of Detailed FOTs, where the exact configuration of the FOT, the main topics to be addressed or the data to be collected is – in some cases- yet to be decided. The exact definition of the DFOTs will be done in cooperation of SP4 – regarding data collection issues - and taking into account the results from the Large scaled FOTs.

D3.3.1 can be therefore seen as a working document, which information will be completely updated in D 3.3.2.

D3.3.1 also presents the main differences between the initial FOT plans – described in D1.4 – and the actual plans defined in this document, explaining why these changes have been applied. So the reader can observe how the test sites have been evolving through the time.

With all this, the actual deliverable is aiming to serve as a general guide for those who want to have a general overview of the descriptions of each of the test sites and FOTs implemented in TeleFOT. Therefore it will serve as a basis for the following steps in the process of developing the FOTs themselves and do the afterwards evaluation of the collected data.
REFERENCES


[10] Vexia device website: http://www.vexia.co.uk/


[13]