

DRIVE



Accelerate cooperative mobility

## Deliverable D11.3

# Report on FOT Operations

Version number	Version 1.0
Dissemination level	PU
Lead contractor	ERT
Due date	31/10/2013
Last update	12/06/2014



**Authors**

Davide Brizzolara, ERTICO – ITS Europe  
François Fischer, ERTICO – ITS Europe  
Harri Koskinen, VTT  
Sami Koskinen, VTT  
Ines Heinig, Chalmers University  
Peter Follin, Lindholmen Science Park AB (LSP)  
Cécile Barbier, Renault  
Luciano Ojeda, PSA Peugeot Citroën  
Filippo Visintainer, Centro Ricerche Fiat  
José Fernandez, CTAG  
Pirkko Rama, VTT  
Helge Rosé, Fraunhofer  
Matthias Schulze, Daimler AG

## Project funding

7th Framework programme  
INFORMATION AND COMMUNICATION TECHNOLOGIES  
Objective ICT-2009.6.2: ICT for Mobility of the Future  
Large-scale integrating project  
Grant agreement no.: 270410

## Project co-ordinator

Matthias Schulze  
Daimler AG  
HPC 050 – G003  
71059 Sindelfingen  
Germany

Phone +49 7031 4389 603  
Mobile +49 160 86 33 30 8  
Fax +49 7031 4389 218  
E-mail [matthias.m.schulze@daimler.com](mailto:matthias.m.schulze@daimler.com)

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## Executive summary

DRIVE C2X aims at delivering a comprehensive assessment of cooperative systems functions, providing for instance: warnings about road hazards (road works, weather, traffic jam...) or information to optimise driving through traffic light, increasing thus traffic efficiency. The assessment will use log data resulting from Field Operational Tests carried out on several test sites located in different EU countries. To achieve this goal, DRIVE C2X will address four major technical objectives:

1. Create and harmonise a European wide testing environment for cooperative systems
2. Coordinate the tests carried out in parallel throughout the DRIVE C2X community
3. Evaluate cooperative systems
4. Promote cooperative driving

This deliverable reports the activities carried out as part of the DRIVE C2X sub-project 3: FOT operations. It reports the FOT operations documenting the activities for the collection of consistent and high quality data for technical and impact assessment as well as user acceptance.

The project builds strongly on previous and on-going work on cooperative systems and the FOT operations have been carried out by a Europe-wide testing community including seven test sites in Finland, France, Germany, Italy, the Netherlands, Spain, and Sweden.

The coordination of the FOT operations was left under the responsibility of the test site leaders. However the FOT organisation has followed a common and harmonised methodology, in order to preserve the conditions for combining data from all test sites for the common analyses. This was a challenging part of the FOT operation because the methodology principles needed also to be adapted to the local circumstances. Therefore: each functional test site, having a particular road infrastructure, has adapted the implementation of the cooperative system applications to its specific context.

According to the topology of the cooperative systems infrastructure, FOT were executed in a specific way, for instance running naturalistic or controlled and scenario based tests. In the controlled approach, the drivers were called into the test and had to follow the driving instructions provided by the on board unit, allowing thus to meet specific test situations, like for instance a traffic jam involving several DRIVE- C2X equipped vehicles. In the naturalistic approach, the test drivers' behaviour were monitored in their daily driving, and the routes and driving times are based on drivers' needs. The tested scenarios comprise both V2I and V2V.

A wide set of functions were implemented in the DRIVE C2X reference system: Road works warning (RWW), Traffic jam ahead warning (TJAW), Car breakdown warning (CBW), Weather warning (WW), Approaching emergency vehicle warning (AEVW), In-vehicle signage (IVS), Green-light optimal speed advisory (GLOSA).

The testing process on each test sites was supported by a test management centre which plaid the threefold role of active element of cooperative applications in controlled tests, of data collector for the test sites and of monitoring system of the on-going trial.

The FOT operations have been carried out in four phases:

1. FOT system integration and validation: testing and validating of the general FOT framework defined in DRIVE C2X in practice on a dedicated and fully DRIVE C2X compliant test site.
2. DRIVE C2X test site preparation and adaptation: preparation of the test sites both from organisational and technical points of view in order to implement the common guidelines provided by the developers of the FOT Framework.
3. Piloting: each test site to pilot the adapted DRIVE C2X FOT tools and procedures to ensure that the test sites are ready for the collection of FOT data.
4. FOT management: coordination of the functional tests across all test sites in terms of Test Data Management, Fleet and User Management, and Service/Application Management.

Test data management was an essential part of the FOT operations. It supported not only the storing of the test results on specified files and databases, keeping track of the location of the different information but also verified that data collection with logging tools matched project requirements. Specific procedures for collecting log files manually or automatically and for monitoring data collection and validating stored data, both manually and with the help of dedicated software have been implemented.

A wide range of data was collected and stored: the logs describing the internal states of the vehicle and generally information available on the CAN bus; the basic GPS data (latitude, longitude, speed, heading, altitude and position fix modem, indicating the availability and roughly the quality of positioning); all the information sent to the vehicle's HMI devices, mainly to the display, complemented with logs of what was finally displayed on the screen and user settings, such as mute; the content of the DENM messages; and, finally, log function-related data especially for technical evaluation purposes.

For Fleet and User Management, specific documents have been created with the aim to achieve an optimum harmonisation across the test sites concerning the procedures to manage the users during the test runs.

Application Management supported the harmonisation of the DRIVE C2X functions on the different test sites. Differences in the implementation of the DRIVE C2X functions, needed to take into account test site specificities should not have created the provision of inconsistent data concerning the analysis requirements. Therefore the application management has also collected and documented the differences between test sites, relating to the parameterisation of the functions.

In this deliverable the execution of FOT operations is carefully detailed for the different test sites.

The FOT results have shown that the sites have been able to collect and store compliant data, according to the DRIVE C2X guidelines and analysis requirements for the FOT evaluation.

The challenge of collecting data from different test sites for a common technical and impact assessment has been successfully supported by the use of a common methodology applied by all test sites during the different phases of the FOT operations.