

FOT Execution

A Subjective FOT on Lane Departure Warning

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Final Event
26-27 June 2012
Autoworld, Brussels



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FOT

Bringing intelligent vehicles to the road

Lane Departure Warning

- ⌘ The Lane Departure Warning (LDW) is an equipment available on the Lancia Delta.
- ⌘ LDW provides the feedback to the driver through a torque applied on the steering wheel as soon as the driver is going close or overcome a lane border unintentionally.
- ⌘ The device also warns the driver, acoustically, when it detects that he/she has not the hands on the steering wheel.



Field Test

- ♂ Assessment of the impact of LDW function.
- ♂ Subjective large scale test through questionnaires.
- ♂ FOT execution: February 2010 – September 2011.
- ♂ Passenger cars - 570 drivers recruited (1761 contacted).
- ♂ LDW group (i.e. 280 drivers with the LDW installed) and Control group (i.e. 290 without LDW).
- ♂ 9 month test per each drivers.
- ♂ No data acquisition system on the vehicles.
- ♂ Data collected through different questionnaires. On-line and on paper.

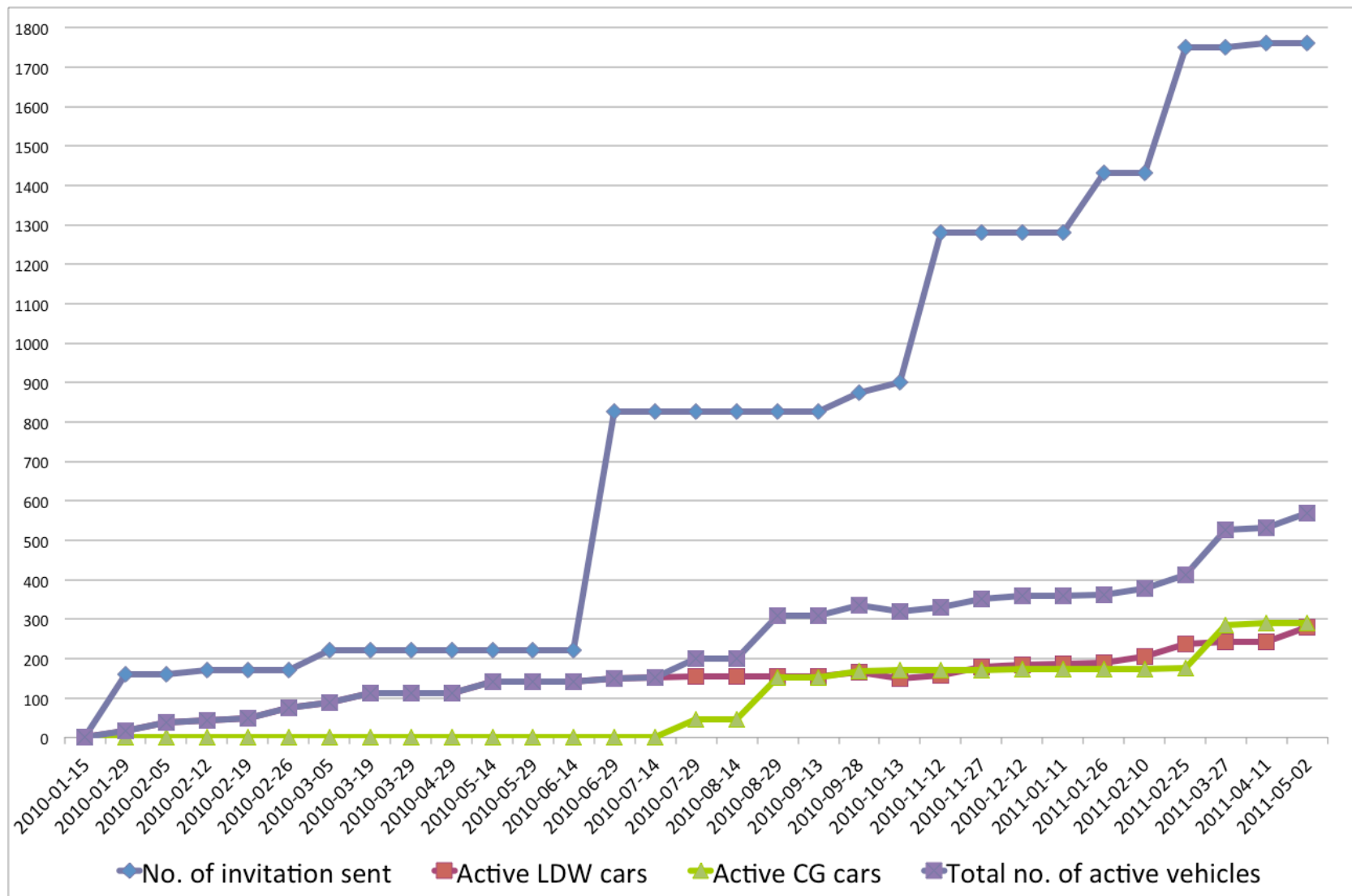
- ♂ **Assessment of the users' acceptance and perceived safety.**

Design of Experiment



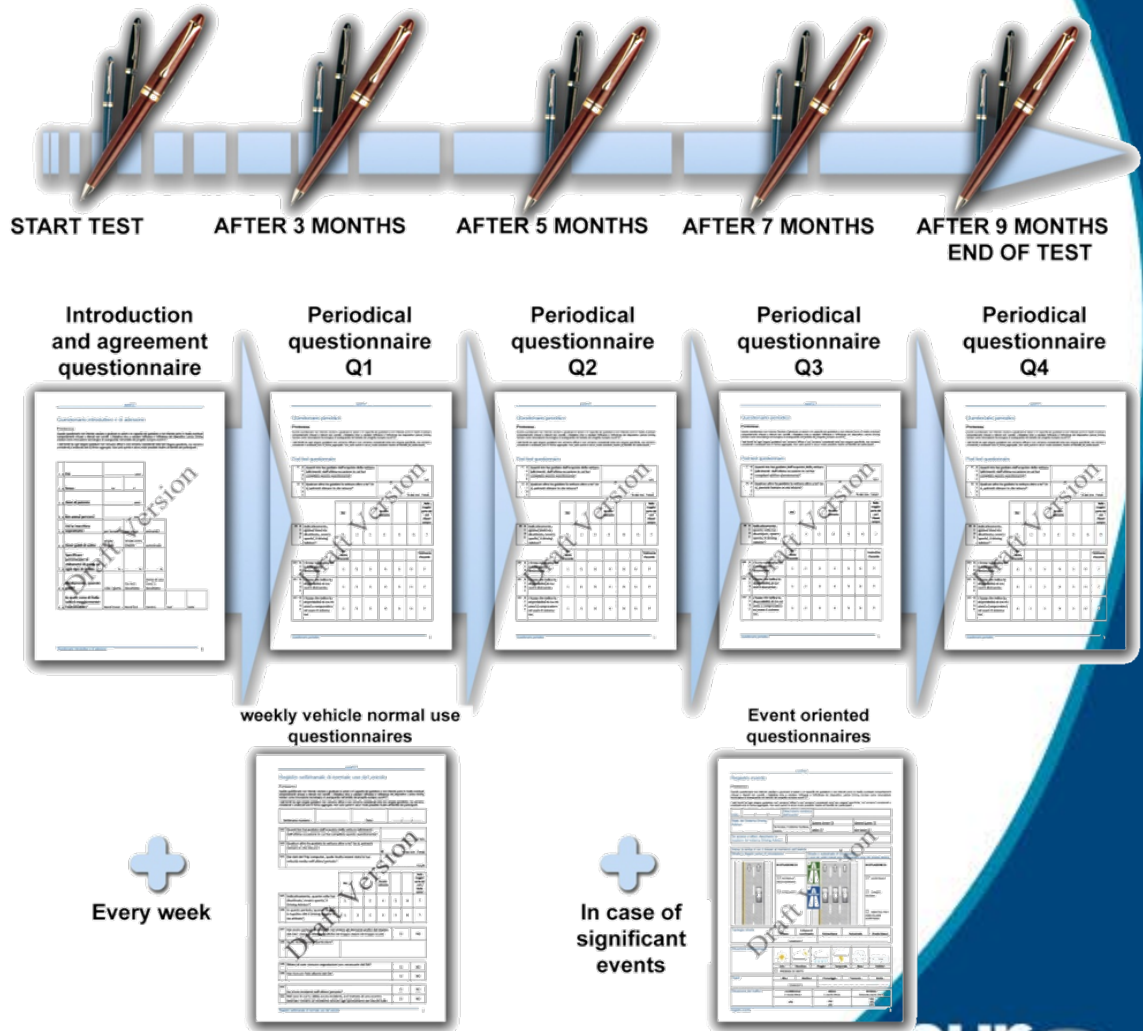
- ⌘ Five periodical questionnaires to test the users' perception about the system.
- ⌘ Users could also report specific events when the device has been useful to avoid dangerous situations.

Recruitment history



Questionnaires

- ⌘ **Time 1.** After the order: driver characteristics and preliminary risk assessment.
- ⌘ **Time 2.** After few weeks of vehicle use, initial feedback.
- ⌘ **Time 3a and 3b.** After periods of use of the vehicle, two months.
- ⌘ **Time 4.** Final questionnaire, new risk assessment.



Filled-in questionnaires - examples

Participant ID: L10.58435.032010 euroFOT

Compili cortesemente il questionario sottostante riportando le informazioni richieste.

Dati demografici

RD_yem_1_1 Sesso M F

RD_yem_2_1 Anno di nascita 1964

RD_yem_3_1 Qual è il suo stato lavorativo?

Occupazione a tempo pieno Occupazione a tempo parziale Pensionato

Occupazioni temporanee Studente Attualmente non occupato

Altro Specificare

Esperienza di guida

RD_dex_2_1 In quale anno ha ottenuto la patente di guida? 1968

RD_dex_3_1 Media dei km annui percorsi 15.000 km/anno

RD_dex_5_1 Indichi la frequenza con cui le capita di guidare nelle situazioni sotto indicate:

	Mal	1	2	3	4	5	Spesso
RD_dex_5a_1 - In autostrada	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
RD_dex_5b_1 - Su strade rurali	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
RD_dex_5c_1 - In città o su strade urbane	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
RD_dex_5d_1 - Su strade e percorsi a lei famigliari	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
RD_dex_5e_1 - Su strade e percorsi a lei non famigliari	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

RD_dex_6_1 In una normale settimana di guida, quale percentuale del suo tempo di guida trascorre: (Totale 100%)

RD_dex_6a_1 per raggiungere il posto di lavoro%

RD_dex_6b_1 per attività lavorative%

RD_dex_6c_1 nel tempo libero 40 %

RD_dex_6d_1 per altro 30 %

LDW Group Questionario A 1

Participant ID: L10.58435.032010 euroFOT

Da compilare

BAS_mis_12_1
Scenario 1:
Curvare a sinistra a un incrocio in un momento di traffico intenso.
(Si veda figura a sinistra)

150
140
130
120
110 AFFATICAMENTO ESTREMO
100 AFFATICAMENTO MOLTO ELEVATO
90 GROSSO AFFATICAMENTO
80 AFFATICAMENTO CONSIDEREBILE
70 AFFATICAMENTO PIUTTOSTO PERCIBILE
60 50
40 QUALCHE AFFATICAMENTO
30 PICCOLO AFFATICAMENTO
20 QUASI NESSUN AFFATICAMENTO
10
0 ASSOLUTAMENTE NESSUN AFFATICAMENTO


BAS_mis_13_1
Scenario 2:
Nella guida di tutti i giorni

150
140
130
120
110 AFFATICAMENTO ESTREMO
100 AFFATICAMENTO MOLTO ELEVATO
90 GROSSO AFFATICAMENTO
80 AFFATICAMENTO CONSIDEREBILE
70 AFFATICAMENTO PIUTTOSTO PERCIBILE
60 50
40 QUALCHE AFFATICAMENTO
30 PICCOLO AFFATICAMENTO
20 QUASI NESSUN AFFATICAMENTO
10
0 ASSOLUTAMENTE NESSUN AFFATICAMENTO

LDW Group Questionario A 15

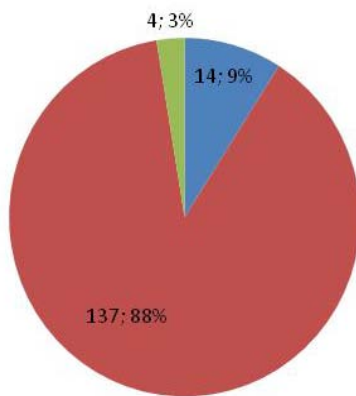
Event register

- Used to allow subjects to easily inform about important “events” happened during the use (or not) of the LDW.
- It is asked to keep this module (a small book with several copies of them) in the car, and to compile the module as soon as possible after the event.
- The module is very simple and could be filled in less than a minute.

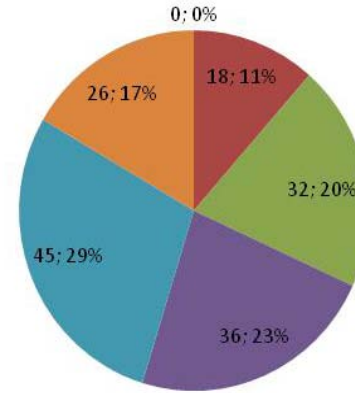
Date / / -
Briefly event description <small>(use the rear for a more detailed description)</small>
Driving Advisor system status at the event	<input type="checkbox"/> Switched ON <input type="checkbox"/> Switched OFF
IF SWITCHED ON Referring to the event, the Driving Advisor system	If switched ON: <input type="checkbox"/> Active <input type="checkbox"/> Not active <input type="checkbox"/> I don't know
IF SWITCHED ON Referring to the event, the Driving Advisor system	<input type="checkbox"/> solved the situation providing the right warning <input type="checkbox"/> did not solve the situation
Please describe the Driving Advisor reaction and the warning provided
IF SWITCHED OFF You think that the Driving Advisor	<input type="checkbox"/> could solve the situation <input type="checkbox"/> could not solve the situation
Which type of road were you driving on?	<input type="checkbox"/> Urban <input type="checkbox"/> Extra urban <input type="checkbox"/> Highway
Event described happened	<input type="checkbox"/> in back straight <input type="checkbox"/> in a bend <input type="checkbox"/> in an intersection <input type="checkbox"/> in proximity of road works
Manoeuvre performed at the event	<input type="checkbox"/> Normal driving <input type="checkbox"/> Lane change <input type="checkbox"/> Going in or out in a junction
Weather condition	 <small>Please tick in case of windy condition</small>
Lighting condition	<input type="checkbox"/> Dawn <input type="checkbox"/> Daytime <input type="checkbox"/> Sunset <input type="checkbox"/> Night with artificial lighting <input type="checkbox"/> Night without artificial lighting
Traffic situation	<input type="checkbox"/> Light <input type="checkbox"/> Normal <input type="checkbox"/> Heavy
Speed at the event (km/h)	0 10 30 50 70 90 110 130
Your distraction level at the event was	very low <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> very high
Your tiredness level at the event was	very low <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> very high
Your trip started since	<input type="checkbox"/> less than an hour <input type="checkbox"/> Between 1 and 3 hours <input type="checkbox"/> More than 3 hours
Were you using something at the event?	<input type="checkbox"/> Nothing <input type="checkbox"/> Phone <input type="checkbox"/> Radio/CD <input type="checkbox"/> Air conditioning <input type="checkbox"/> Other

Sample characteristics

LDW Group

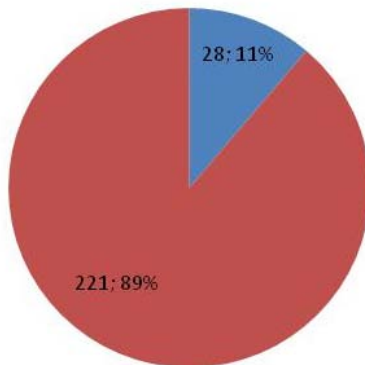


■ female
■ male
■ no answer

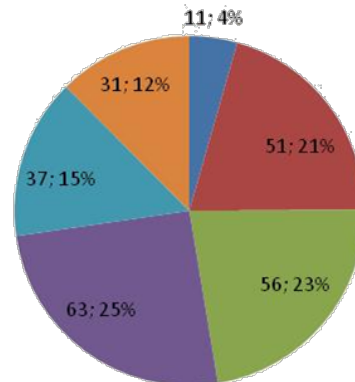


■ 18-25
■ 26-35
■ 36-45
■ 46-55
■ 56-65
■ > 65

Control Group

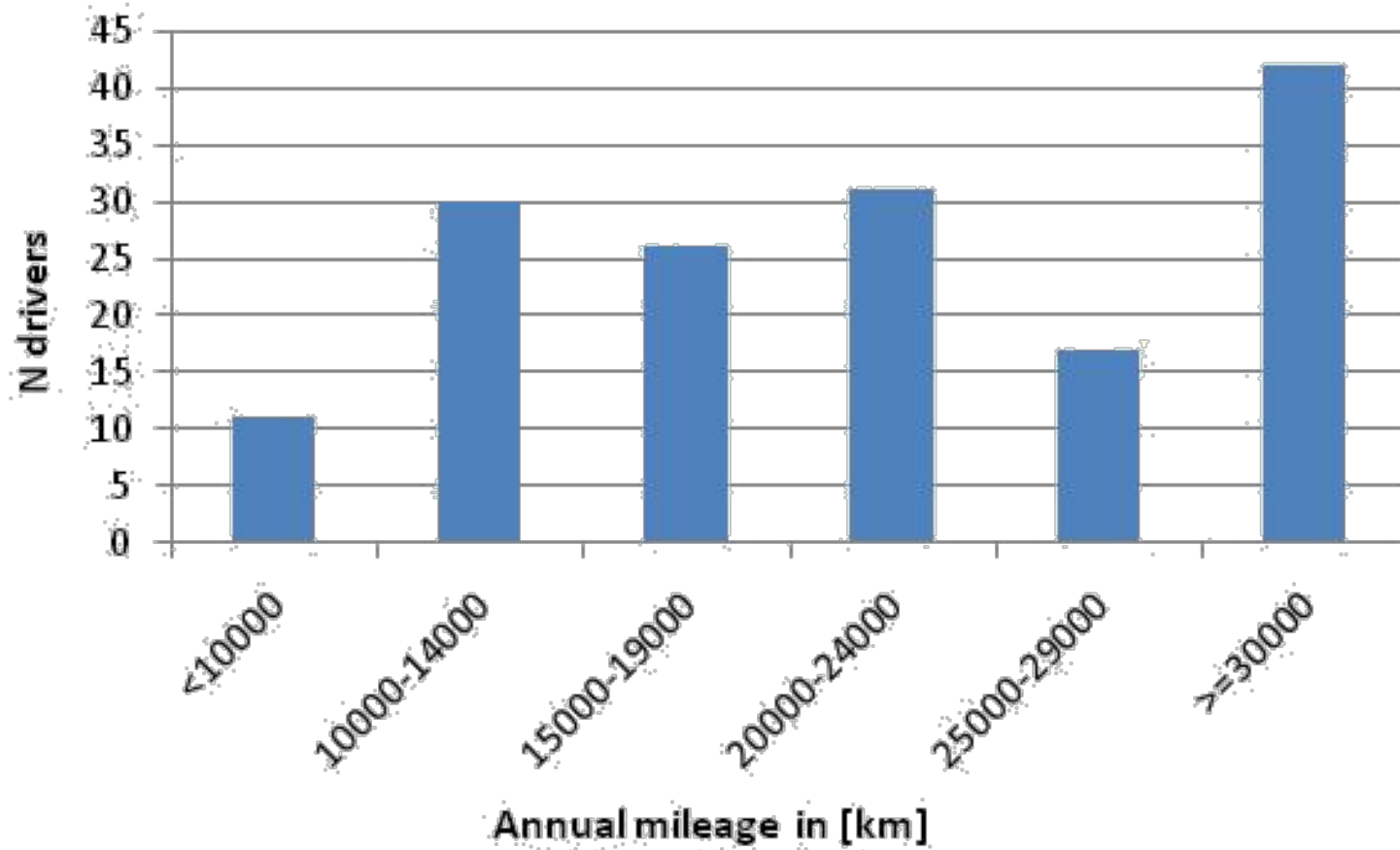


■ female
■ male



■ 18-25
■ 26-35
■ 36-45
■ 46-55
■ 56-65
■ > 65

Mileage – LDW group



Lessons learned

- ♂ Questionnaire design and planning for a large-scale test. Response rate issue.
- ♂ Driver recruitment and pre-screening.
- ♂ Driver liaison centre.
- ♂ Day-by-day activity for a large-scale test.
- ♂ Data management tools.
- ♂ Piloting test phases.
- ♂ Hypotheses specifications and tuning of them during the FOT.

8 Functionalities, 28 Partners, 1000 Vehicles

1 Field Operational Test, 8 Functionalities

28 Partners, 1000 Vehicles, 1 Field Operational Test

8 Functionalities, 28 Partners, 1000 Vehicles

1 Field Operational Test, 8 Functionalities

28 Partners, 1000 Vehicles, 1 Field Operational Test

8 Functionalities, 28 Partners, 1000 Vehicles

1 Field Operational Test

