



COOPERS Field Tests – First Results

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Autostrada del Brennero

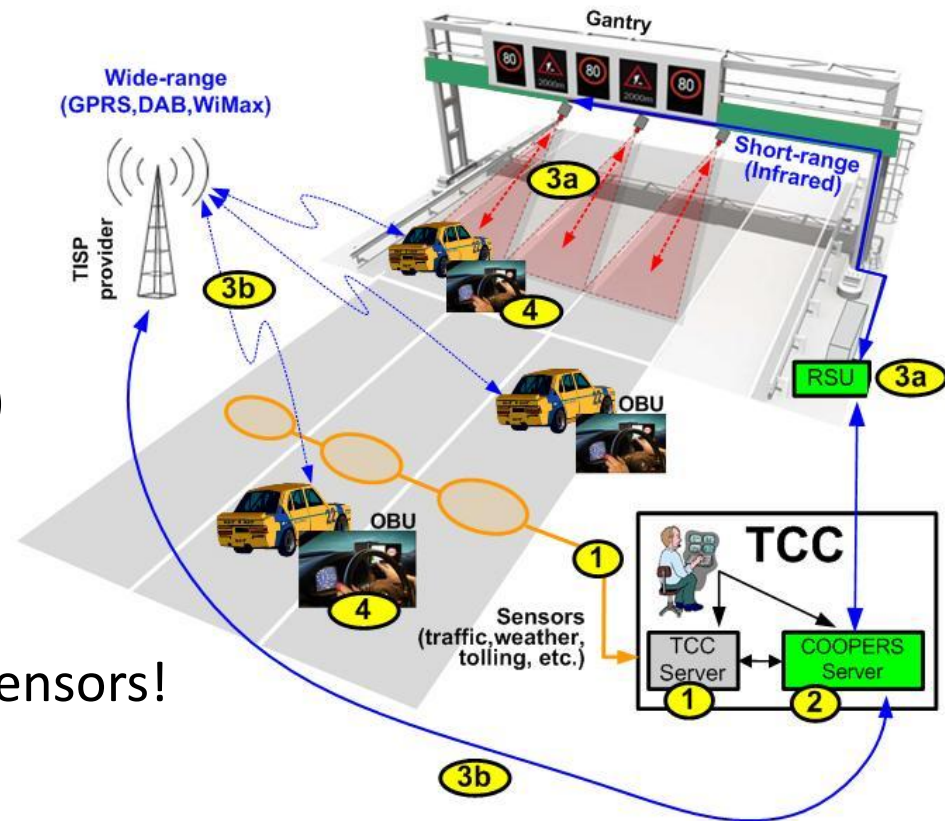


THE COOPERS PROJECT: OBJECTIVES

- ...as seen from the road operator: COOPERS is a co-operative ICT-system able to **warn drivers** in real time concerning events and **hazards** on the highway and to use the vehicle as **mobile sensor**.
- Why do we participate ?
 - Increased **safety**: compared to VMS and RDS-TMC, Coopers can provide information faster, more detailed, more accurate, and personalized.
 - Better **traffic management**: COOPERS allows vehicles and infrastructure to interface and exchange data, using the vehicles as mobile sensors, and permitting co-operative services.
 - **Financial** advantages: Coopers provides a “personalized VMS” inside the vehicle. With a sufficient penetration, the number of VMS along the highway might be reduced.

THE COOPERS SYSTEM: SETUP

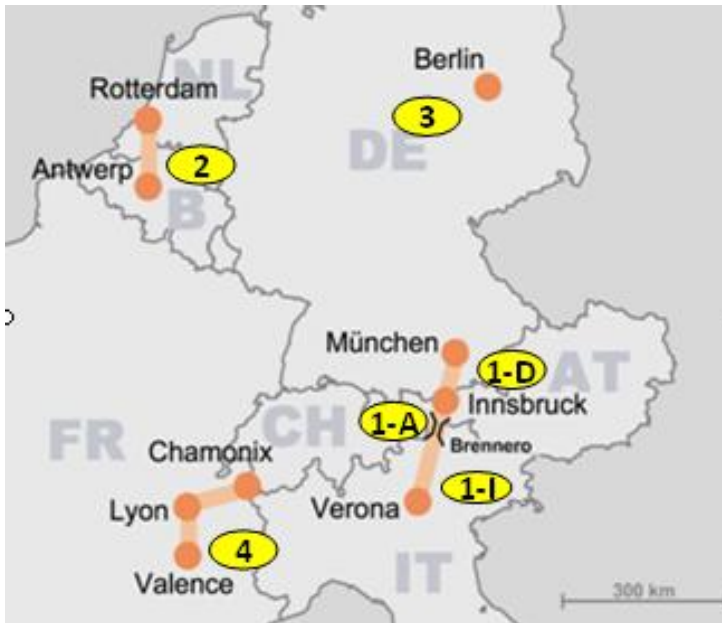
- Adaptation of **highway infrastructure** to support COOPERS
 - **CSC** (Coopers Service Center)
 - Task: generation of messages
 - Link to TCC servers (detect events; access to sensors)
 - Link to RSU / CSP
 - **RSU** (Roadside Unit) or CSP (Communication Service Provider)
 - relay messages between CSC and OBU (OnBoard-Unit)
 - Precision of Coopers messages depends highly on availability of sensors!



COOPERS FIELD TESTS

- User acceptance and driver behaviour measured in real field tests:
 - 4 test sites with approx. 50 drivers each
 - Tests carried out with standardized procedure to get comparable results from the various test sites
 - **User acceptance** measured with standardized questionnaires, before the drive (expectations) and after the drive (confirmation)
 - **Drive behaviour** measured with car telemetry (speed, headway, lane changes, etc.), driver biometry (gaze direction, heart rate, etc.) and direct observation
 - Logfiles generated by CSC, RSU, APC and HMI
 - Technical evaluation (system performance) and safety-related evaluation (safety indicators)

COOPERS FIELD TESTS



Test procedure

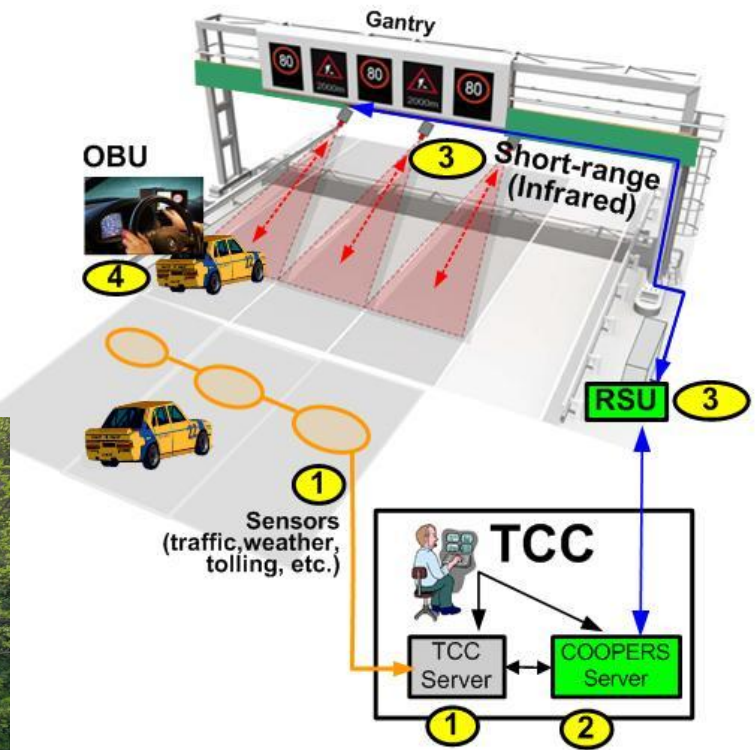
- Pre-questionnaire (expectations)
- Fitting biometric equipment
- 2 comparative drives along test track
 - with Coopers messages
 - without Coopers messages
 - car telemetry, driver biometry, logfiles
- Post-questionnaire (confirmation)

> 200 field test drives performed
> 80 full test days
> 20.000 km driven on test drives

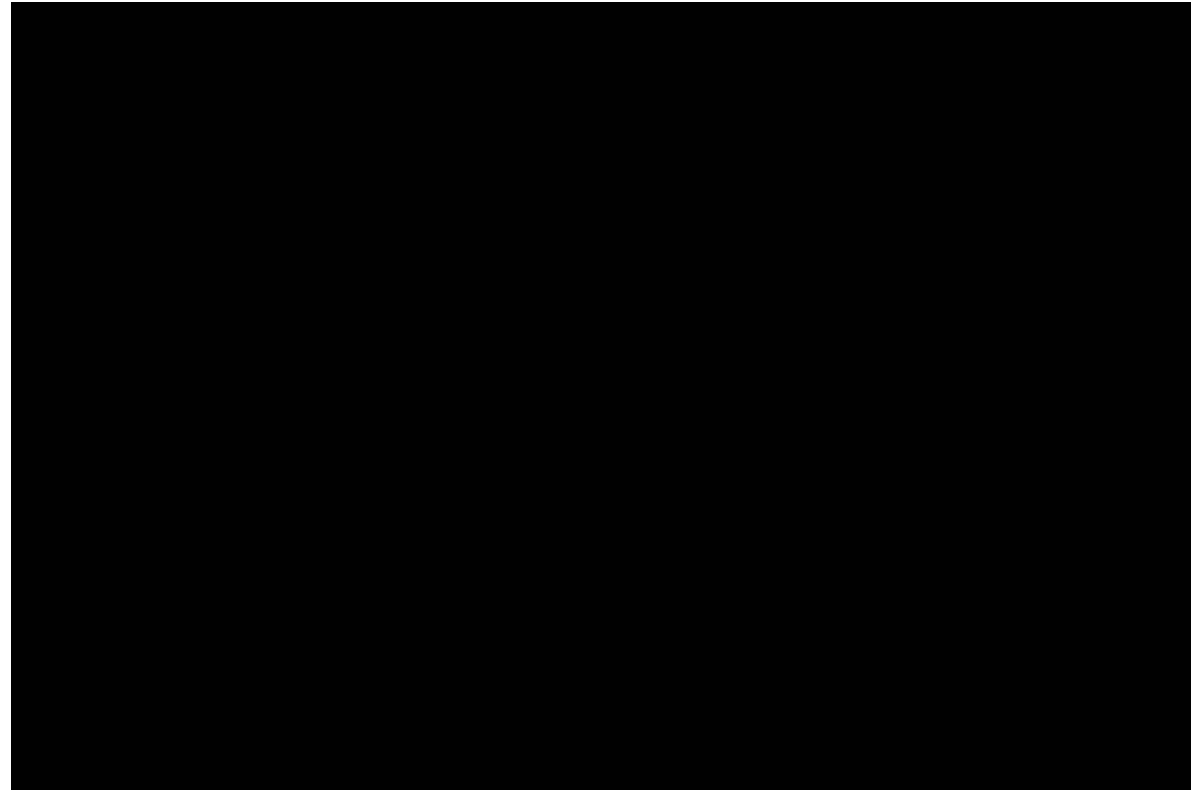
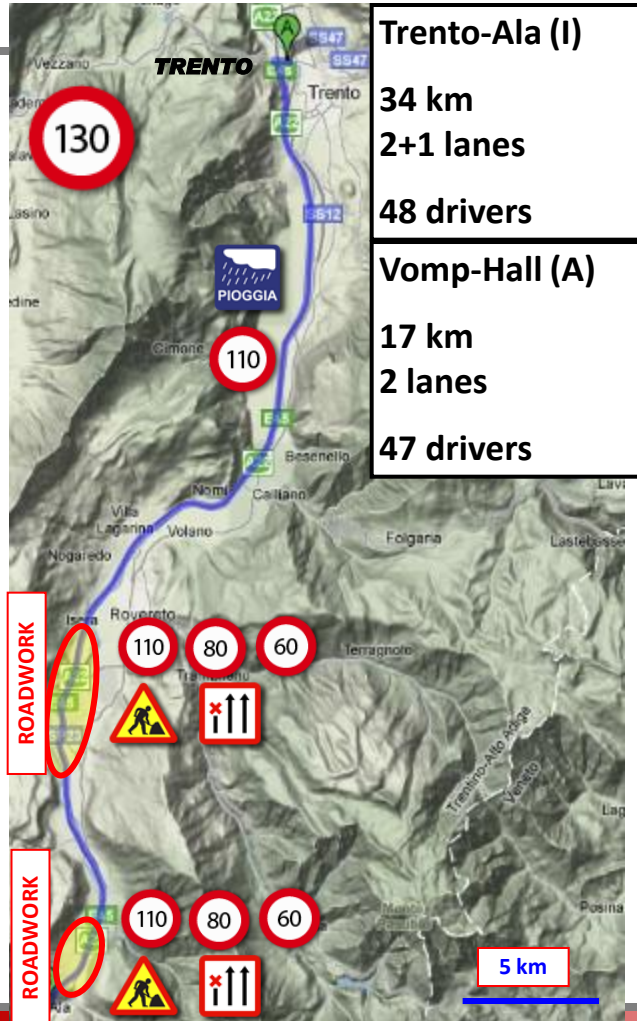
700 messages aired per day
20.000 messages aired per month

COOPERS FIELD TESTS AT SITE 1

- Tests from 18.1.10-14.3.10 (Asfinag and Autostrada del Brennero)
- Transmission of messages via CALM-IR



COOPERS FIELD TEST AT SITE 1



RESULTS: USER ACCEPTANCE

PERCEIVED USEFULNESS

I expect/found the system useful during driving

I expect/found the system increases my driving safety

I expect/found using the system i can better conform to traffic rules

I expect/found using the system i have improved information about road conditions

ATTITUDE TOWARDS THE SYSTEM

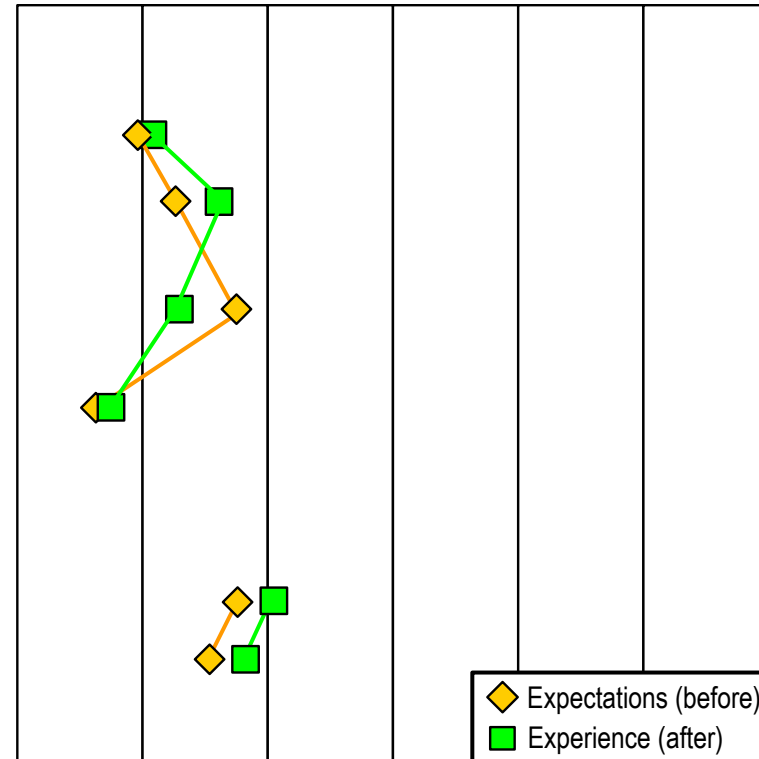
I expect/found driving with the system will be fun

I expect/found to like driving with the system

Strongly agree

Neither agree nor disagree

Strongly disagree



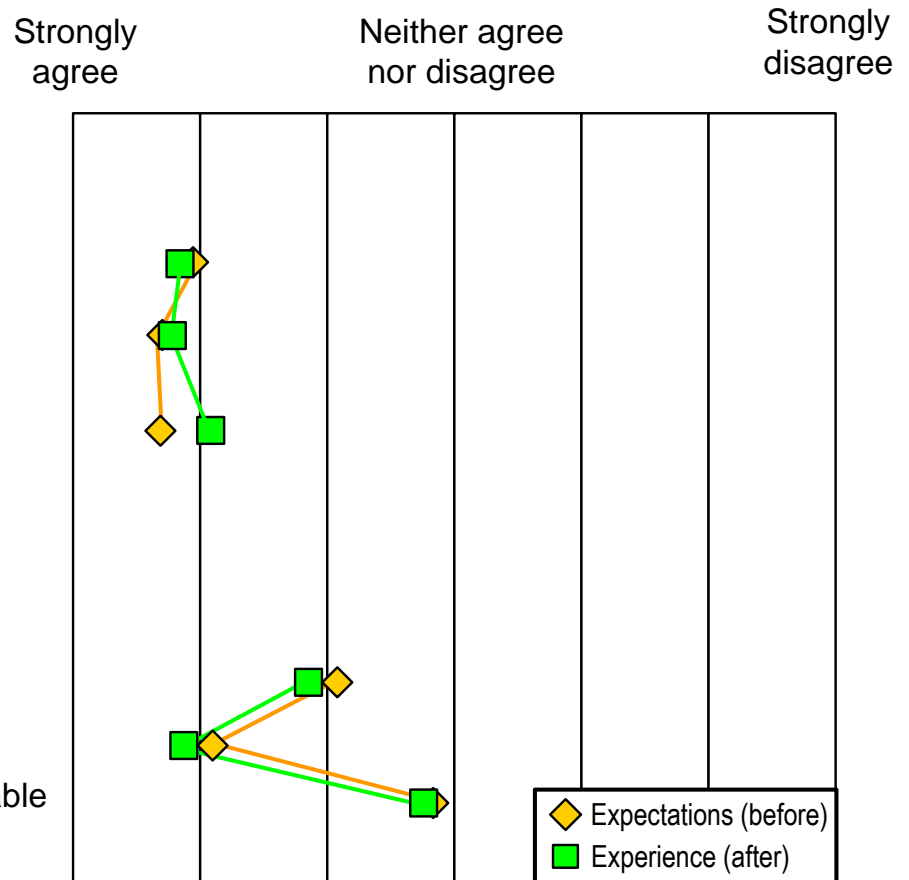
RESULTS: USER ACCEPTANCE

PERCEIVED EASE OF USE

- I expect/found I will find the system easy to use
- I expect/found the sings on the screen to be easily comprehensible
- I expect/found the sings on the screen to be easily readable

INTENTION TO USE THE SYSTEM

- I would recommend my friends to use the system
- If I had a system I would use it
- I would buy the system when commercially available



RESULTS: USER ACCEPTANCE

CONFIRMATION

My experience with the system was better than I expected

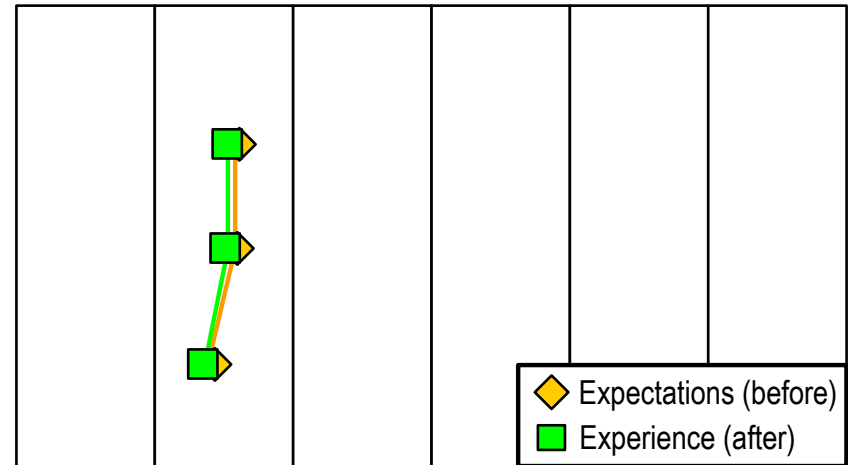
The service level provided by the system was better than I expected

Overall, most of my expectations from the system were confirmed

Strongly agree

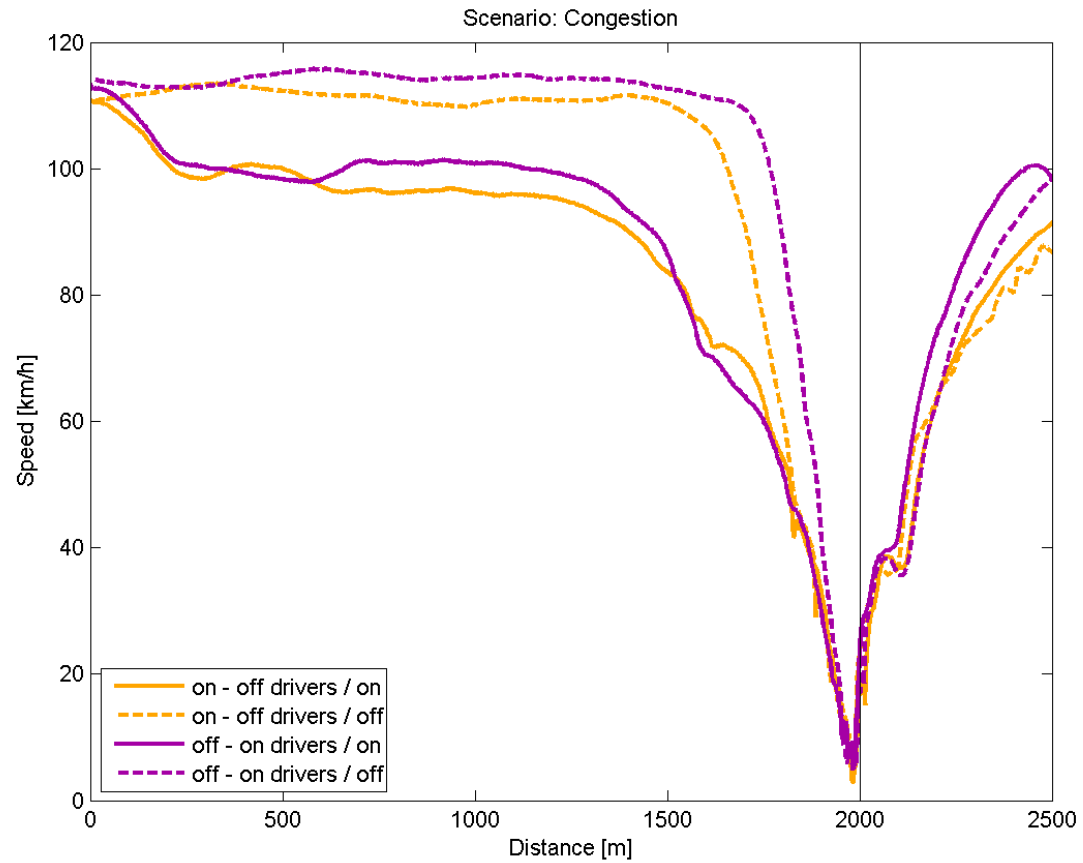
Neither agree nor disagree

Strongly disagree



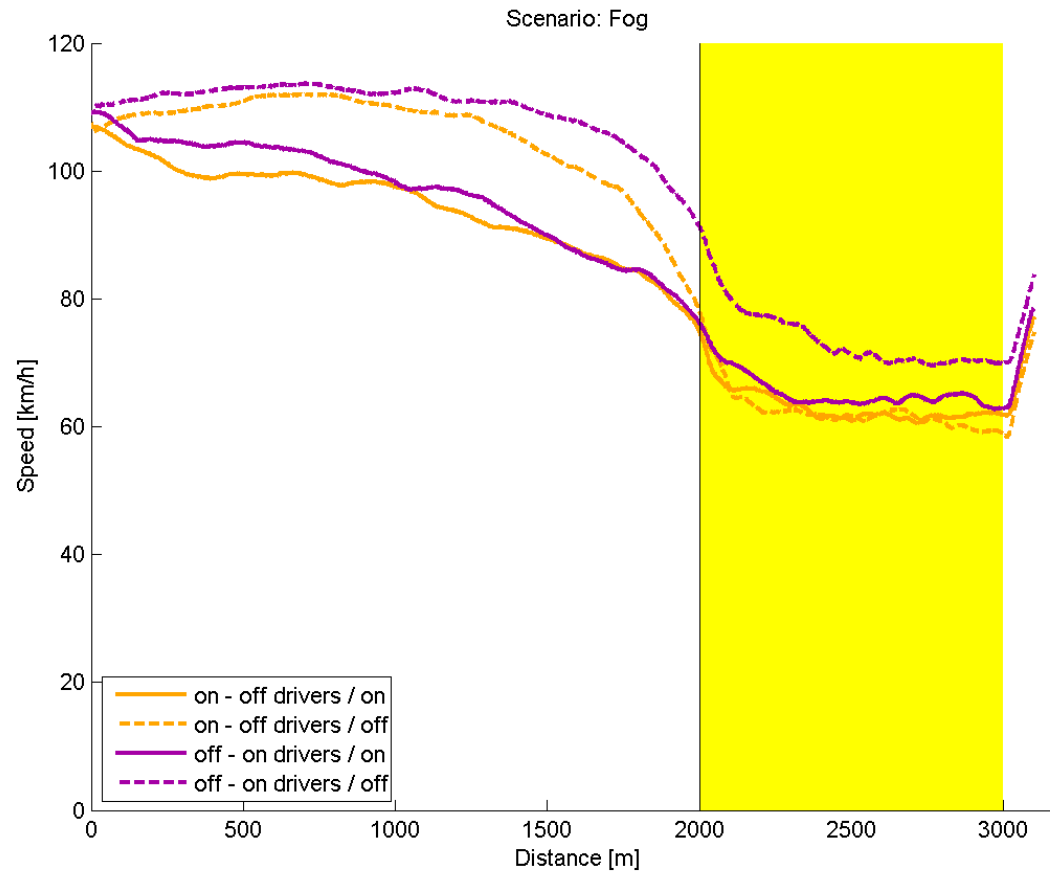
RESULTS: DRIVER BEHAVIOUR

Speed
behaviour
at a
congestion
event



RESULTS: DRIVER BEHAVIOUR

Speed
behaviour
at a
fog
event



SUMMARY

- More than 200 test drives (> 20.000km) have already been successfully carried out under real-life conditions:



COOPERS proved to be working!



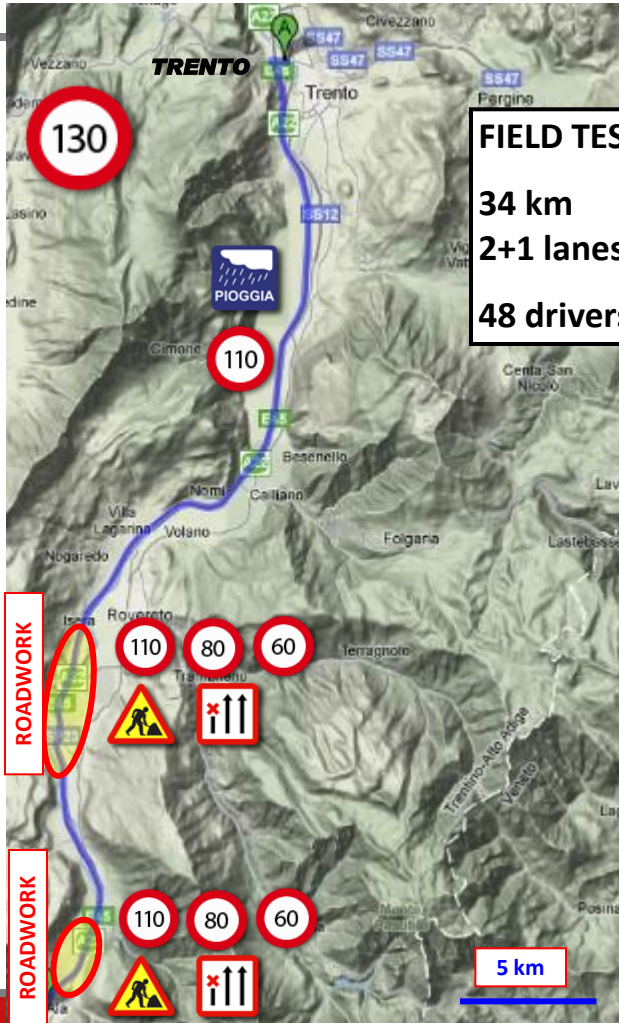
- The test drives have a **thoroughly positive attitude** towards the system; users perceived it to be **useful** and **easy to use**
- The messages given are **easily understandable**
- The timing of the messages was perceived as good
- The Coopers System **fulfilled the expectations** (pre- vs. post-questionnaire)!

cooperative

Conference 2010

mobility

COOPERS FIELD TESTS AT SITE 1

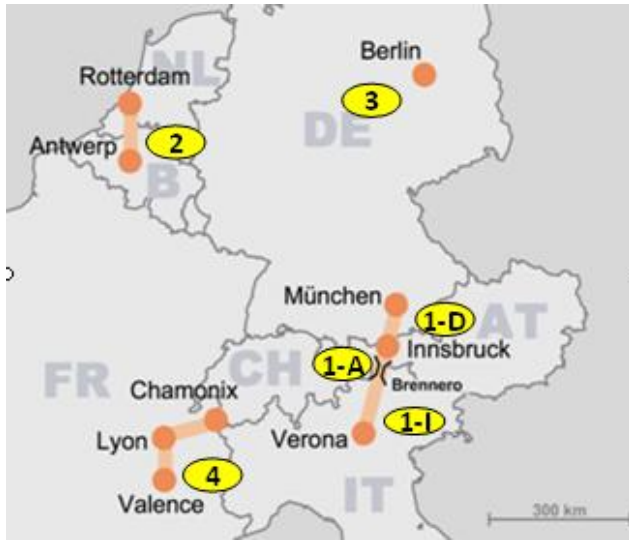


FIELD TESTS: Trento-Ala
 34 km
 2+1 lanes
 48 drivers

FIELD TESTS: Vomp-Hall
 17 km
 2 lanes + hardshoulder
 47 drivers



COOPERS FIELD TESTS



Test procedure

- Pre-questionnaire (expectations)
- Fitting biometric equipment
- 2 comparative drives along test track
 - with Coopers messages
 - without Coopers messages
 - car telemetry, driver biometry, logfiles
- Post-questionnaire (confirmation)
- 6 field tests, ~ 50 drivers each

FIELD TESTS				
	Status 19.3.10	Nr. drives	Days	Km driven
Site 1	ongoing			
Site 1 - I	finished	48	22	8600
Site 1 - A	finished	47	17	4700
Site 1 - D	imminent			
Site 2	ongoing			
Site 3	finishing	35+	21	5000
Site 4	imminent			
		130	60	18300

700 messages aired per day
20.000 messages aired per month