Motorcycle
Approaching
Indication

DRIVE C2X

htc

120 140
100   160
80   180
60   200
40   220
20   240
0   260

partners

Automotive OEMs
Adam Opel · Audi · BMW Forschung und Technik* · Centro Ricerche Fiat · Daimler AG · Ford Forschungszentrum Aachen · Honda Research Institute Europe* · Peugeot Citroën Automobiles · Renault · Volvo Personenvagnar · Yamaha Motor*

Electronics and supplier industry
Continental* · Delphi Deutschland · Denso Automotive Deutschland* · Hitachi Europe · Neavia Technologies · NEC Europe · Renesas Electronics Europe · Robert Bosch*

Software developers
Testing Technologies* · Vector Informatik* · Ygomi Europe

Traffic engineers
PTV Planung Transport Verkehr

Research institutes
Bundesanstalt für Straßenwesen · Centro Tecnológico de Automoción de Galicia · Chalmers University · Deutsches Zentrum für Luft- und Raumfahrt · Facit Research · Fraunhofer Institute FOKUS · Hochschule für Technik und Wirtschaft Saarland* · Institut français des sciences et technologies des transports, de l'aménagement et des réseaux · Institut Nationale de Recherche en Informatique et en Automatique · Interuniversity Microelectronics Centre · Karlsruhe Institute of Technology · Technische Universität Graz · The Netherlands Organization for Applied Scientific Research · Universitatea Tehnica Cluj–Napoca · University of Surrey · VTT – Technical Research Centre of Finland

Road operators
Autostrada del Brennero · City of Tampere* · Hessen Mobil – Road and Traffic Management · Rijkswaterstaat, Dutch Ministry of Infrastructure and the Environment*

Others
EICT · ERTICO – ITS Europe · ETSI Centre for Testing and Interoperability* · Nokian Renkaat*

* support partner

project coordinator

Matthias Schulze
Senior Manager Driver Support, Daimler AG
Group Research & Advanced Engineering
HPC: 050 – G003
71059 Sindelfingen, Germany
matthias.m.schulze@daimler.com

funding

DRIVE C2X is co-funded by the
European Commission – DG CONNECT

European Commission

www.drive-c2x.eu

accelerate cooperative mobility

The DRIVE C2X reference system was implemented, tested and validated. It builds the foundation for a pan–European C2X field operational test and serves as the basis for the comprehensive evaluation of cooperative mobility carried out on seven European test sites.
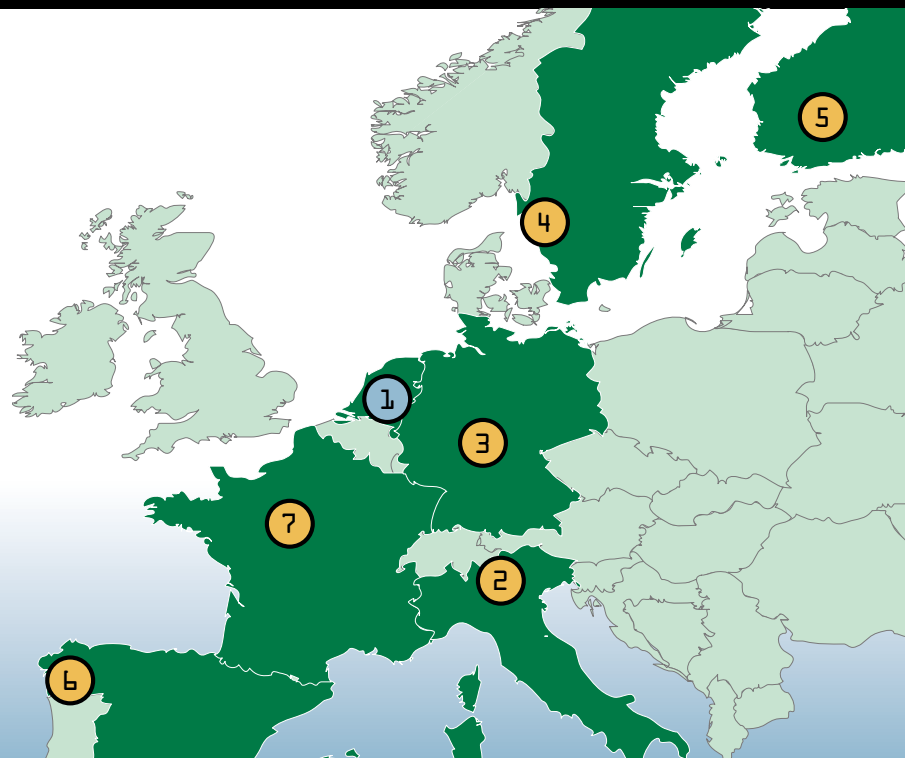A common European reference system for cooperative driv-ing yields several benefits for an optimal deployment of C2X technologies: It guarantees a comparable evaluation across borders, interoperability, and integration of regional systems into a connected large-scale testing platform.
The reference implementation provides software components for vehicle, roadside and central ITS stations ready for testing.

DRIVE C2X prepares the Europe–wide implementation of a commonly agreed C2X communication system based on the ETSI TC ITS standardisation. It involves all major European players in this area and has the support of national authorities and road operators. The project develops deploy-ment strategies and describes business models based on the commercial value of the data generated by C2X systems. The project carries out a cost/benefit analysis that weighs the effects of a large-scale deployment. A detailed micro-economic analysis provides stakeholders with a clear view on the costs and potential revenue streams through system implementation.

supported by
CAR 2 CAR
COMMUNICATION CONSORTIUM

EUCAR

collaboration partner of
EasyWay ★ ★ ★

system test site
1 Helmand, Netherlands

functional test sites
2 Brennero, Italy
3 Frankfurt, Germany
4 Gothenburg, Sweden
5 Tampere, Finland
6 Vigo, Spain
7 Yvelines, France

I'm important, let me through

hit the bricks! braking hard here

no driving for me today no more...

boring jam here, better use elma road

five, four, three, two, one, greeeeen

can you see me in your mirror?

construction site building road

...drive 100, drive 100, drive 100...

pouring down, watch out it's slippery

someone dropped an exhaust pipe!?!

sustainable

efficient

E F

safe

economic

convenient

accepted

profitable

DRIVE C2X selected seven national test sites and equipped them with 802.11p based ETSI G5 technologies and a test management centre. It consolidates the results from these test sites and integrates the findings into a Europe-wide analysis. The project established a cooperative infrastructure to ensure interoperability between vendors and across national borders.

Each test site deployed common functions provided by the reference system as well as selected individual functions. With its campaign of test site events, DRIVE C2X gives the opportunity to experience the benefits of cooperative driving in various settings. It promotes cooperative mobility to generate user awareness and acceptance – in Europe and beyond.
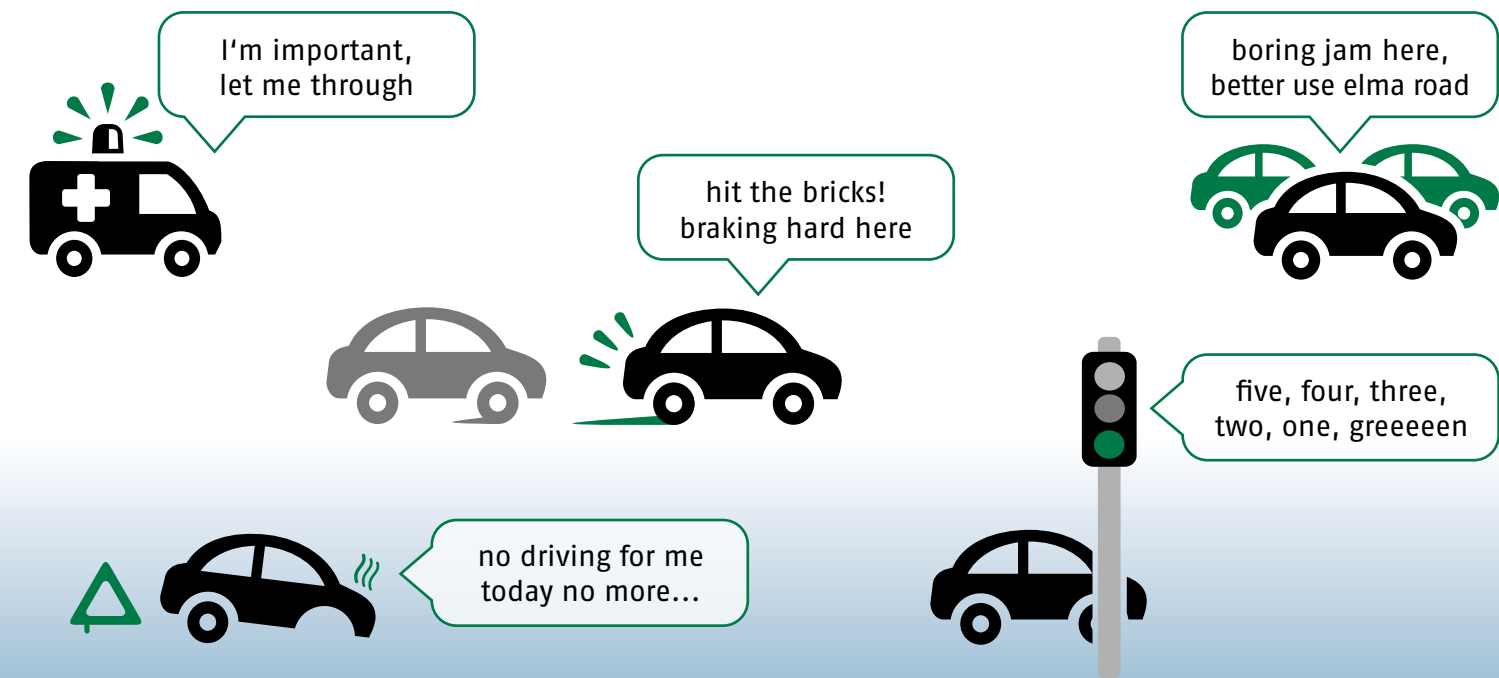
DRIVE C2X offers a set of attractive cooperative driving functions. After interoperability testing on the system test site, those were implemented on the six functional test sites. The project now measures their effectiveness and benefits on a national and European level. These 13 functions address multiple areas: Safety functions

strive to support drivers and passengers in dangerous situations. Traffic efficiency functions aim to balance traffic load and reduce emissions. In addition, DRIVE C2X investigates infotainment and fleet management functions as potential revenue sources. Both vehicle-to-vehicle and vehicle-to-infrastructure communication technologies are applied.
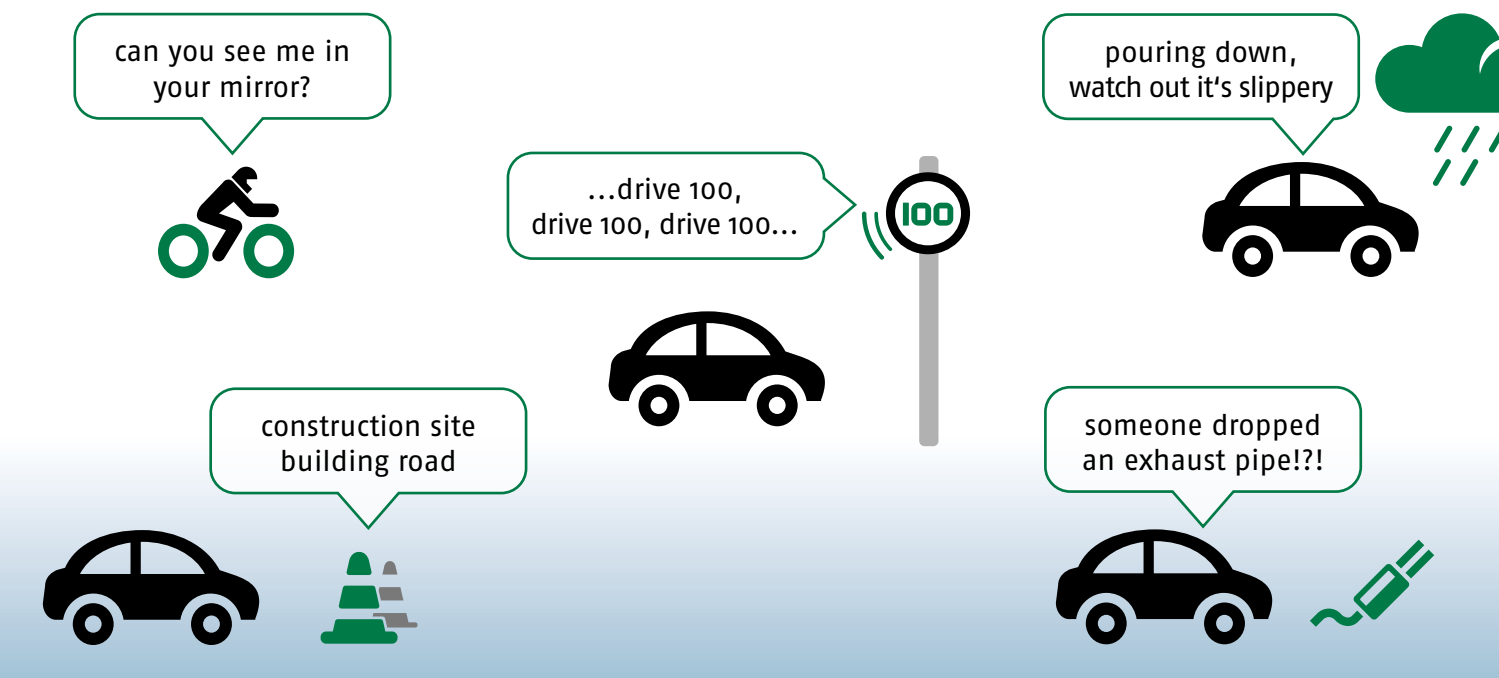
DRIVE C2X tackles the complexity of different test sites and test scenarios with a comprehensive evaluation framework. The project combines state-of-the-art FESTA methods with experience gained in the predecessor project and several FOTs. The evaluation framework specifies the collection of subjective and objective data, the identification of research questions,

testable hypotheses and performance indicators. The project utilises both controlled and unsupervised testing. The experimental procedure is designed to ensure consistency across the seven test sites. The comprehensive methodical framework allows for the test results to be transferred to roads and road users – across Europe.
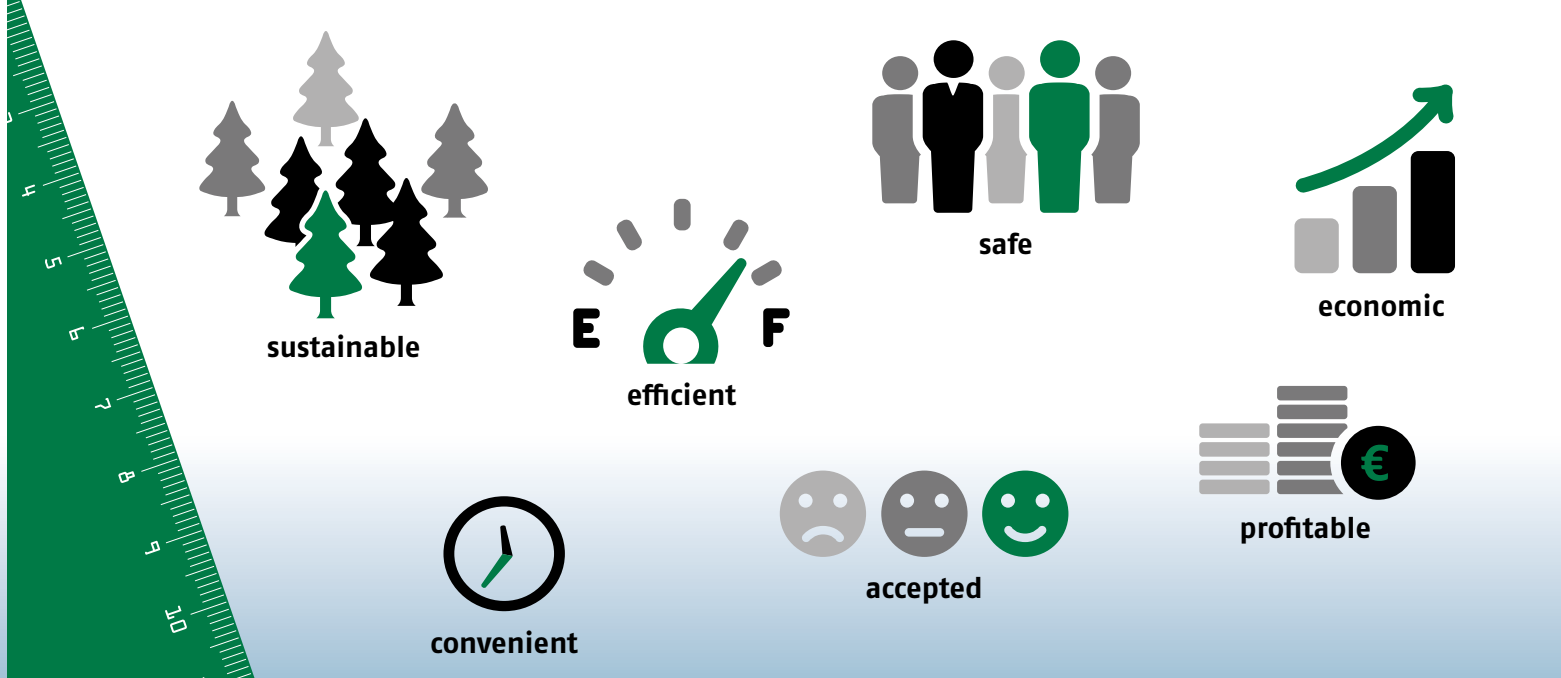
There is consensus that cooperative mobility has many benefits. The project quantifies these benefits in terms of safety, efficiency, convenience and sustainability. C2X deployment will be a major step towards improved traffic safety and efficiency. Ad-hoc networks instantly notify drivers about potentially dangerous situations, so

that drivers can react accordingly. Cooperative systems are also instrumental in reducing traffic-related emissions by improving traffic information and enabling efficient traffic management. Last but not least, C2X facilitates intelligent convenience functions for drivers. These functions open up new business opportunities – for all stakeholders involved.