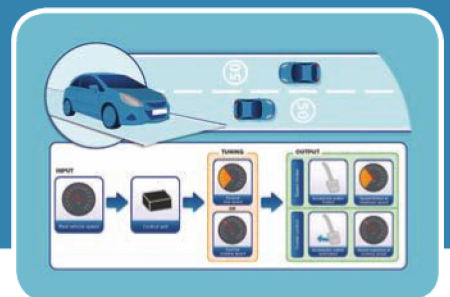
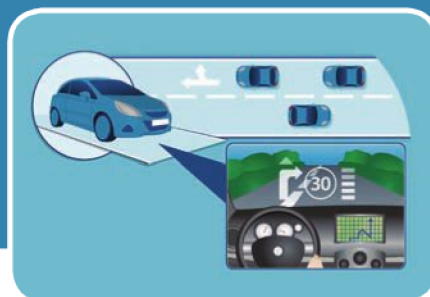
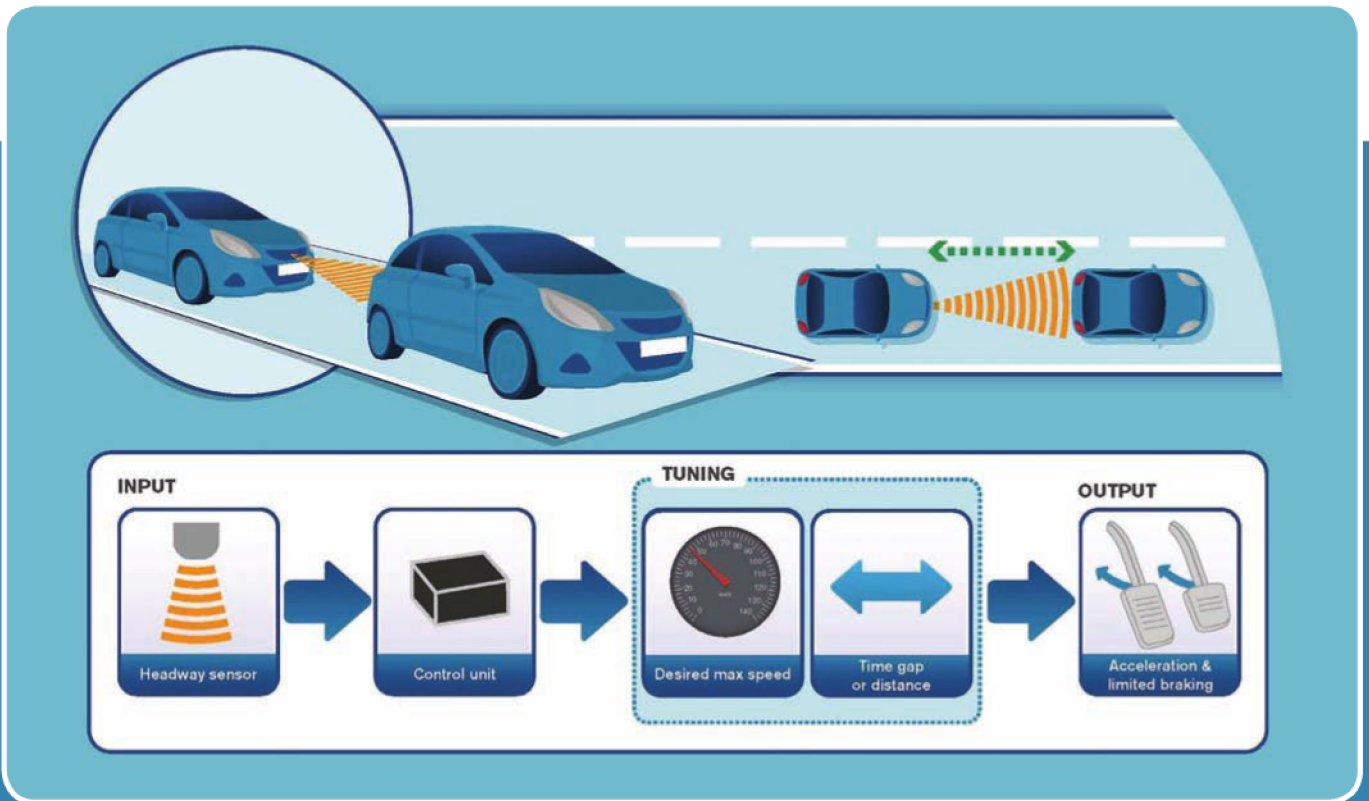


FIELD MARSHALLS

Tested with real drivers on real roads, eight intelligent vehicle systems will be the focus of intense scrutiny, assessed in terms of their impact on safety, efficiency and driver comfort. ERTICO's **Maxime Flament** and Ford's **Aria Etemad** explain the significance of the euroFOT project

All images courtesy of euroFOT



Car and truck fleets are currently getting ready for the first pan-European field operational tests (FOTs) of active in-vehicle safety systems. The euroFOT large-scale project – part of the EC program on Information and Communication Technologies (ICT) for mobility, aimed at improving traffic safety and efficiency – will see over 1,000 equipped vehicles on the roads of Europe in 2010 for a total of 18 million kilometers.

Car manufacturers including Ford, Mercedes-Benz, BMW, Renault, Volvo, Volkswagen, Audi and Fiat/Lancia, as well as truck manufacturers MAN and Volvo, have joined forces with automotive suppliers, universities and research institutes to test near-market advanced driver assistance systems in real traffic conditions.

The test vehicles are equipped with data acquisition systems (DAS), varying from simple CANbus readers to complex video recording units, monitoring drivers' behavior and their short- and long-term

adaptation to the tested technologies. In addition, vehicle and traffic dynamics are analyzed under all traffic conditions with the aim of contributing to future product development. Driver questionnaires and interviews will also feed the study with subjective information to obtain more personal feedback on the systems tested.

In addition to comprehensive technical assessments of active system performance and capability, the trial results will also provide a better understanding of how European drivers handle and interact with their vehicles. Moreover, it will also offer an important opportunity to raise consumer awareness for available safety technologies and their impact on our daily lives.

The eight systems tested include both longitudinal control functions, such as forward collision warning (FCW), adaptive cruise control (ACC) and speed regulation system (SRS), and lateral variants such as blind-spot monitoring (BLIS), lane departure warning (LDW) and impairment warning

(IW). euroFOT will also test more advanced applications, such as Head-up Display (HUD) interactions (safeHMI), fuel efficiency advice (FEA) and new-generation curve speed warning (CSW).

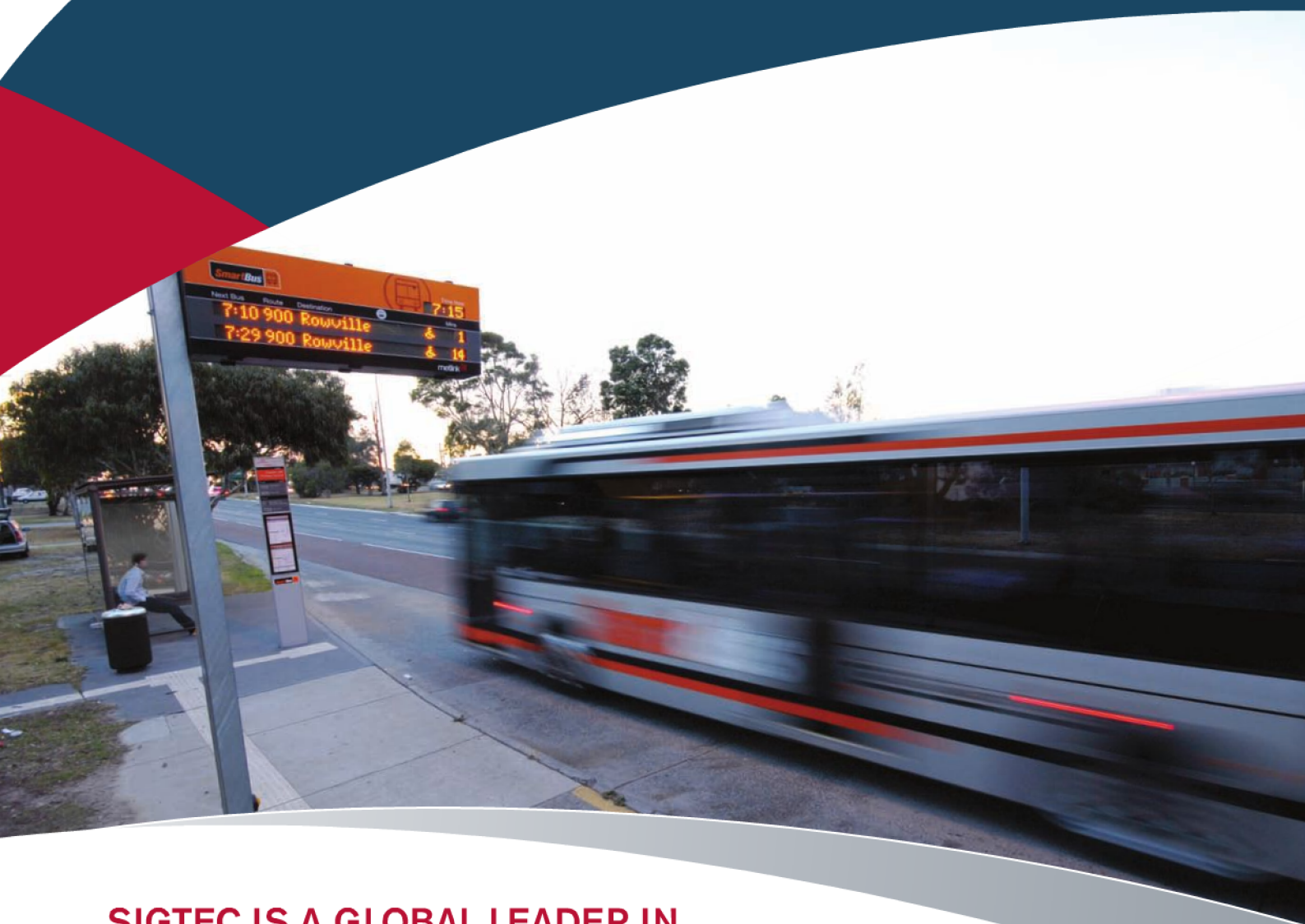
The project was officially launched in May 2008. Since then, preparatory steps have been undertaken, such as setting up data acquisition systems (DAS) and data management centers, specifying further the research questions and their hypotheses for each of the functions, and dealing with the acquisition of the drivers and the vehicles.

EXPERIMENTAL PROCEDURES

As set out in the FOT handbook proposed by FESTA (Field Operational teSt support Action), the development of a common methodology is key to the success of euroFOT and is a crucial step for any such test. The first major FOT methodology challenge was the identification, selection and specification of performance indicators describing driving behavior, driver workload



*Technology
that moves people*



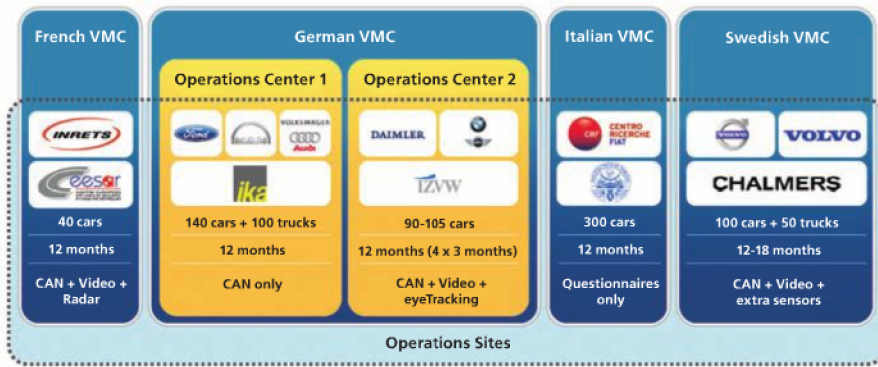
SIGTEC IS A GLOBAL LEADER IN INTELLIGENT TRANSPORT SYSTEMS

Sigtec improves people's everyday lives through the application of our innovative technology to public transport and public safety operations, so that these services are provided more efficiently and more reliably, to the benefit of our customers, and the environment.

Public Transport Public Safety Taxi Solutions

- Automatic Vehicle Monitoring
- Computer Aided Dispatch
- Fare & Payment Systems
- Real Time Information
- Mobile Data Systems
- Traffic Signal Priority
- Fleet Management

www.sigtec.com



← 28 organizations have committed to scientifically test and assess the impact of eight ADAS systems

↓ The participating Volvo trucks will collect data for a year. Each truck will be equipped with a central computer unit and four video cameras

and acceptability, traffic safety, traffic efficiency, and impact on the environment.

The specification of experimental procedures to be applied represented the second challenge for the methodology. Experts have developed a set of detailed procedures explaining in detail how to investigate the different systems tested. These include a list of measurements, performance indicators, events, and situational variables. All these procedures should help researchers of euroFOT to find comparable answers to the hypotheses that were defined at the inception of the project – the ‘research questions’.

THE NEXT STEPS

The first test vehicles – able to collect field test data and to perform the pilot tests – have now been prepared following a similar method across vehicle brands. This is to ensure comparable data collection. Spread out in at least 11 operation sites around Europe, these test vehicles are currently hitting the roads in small fleets. Researchers have conducted a four-month pilot experiment and the ‘real’ euroFOT data collection began in January 2010. The pilot tests will ensure that data acquisition systems are properly installed, and that



the logged data and management centers run smoothly and gather the essential data needed to answer the research questions. During these pilot tests, euroFOT researchers will also test early data mining techniques, to guarantee the identification of relevant safety incidents among the hundreds of thousands of kilometers driven.

To ensure a proper data analysis for euroFOT, robust and flexible data management solutions are needed. For such a wide scale of field operational tests, the whole chain of data management needs to be established, from data collection and storage to analysis tools. Experts from the consortium carefully defined and developed the best-suited data acquisition

systems (DAS) and data storage solutions for euroFOT. Along with these data management solutions, they also ensure that common analysis tools are used and that the quality of this data is assured.

To provide the right solutions and to determine DAS components, data management partners looked at performance indicators as well as technical and practical constraints due to the differences between all the vehicles to be tested. Indeed, the availability of measurements as well as their accuracy and frequency can vary greatly between car manufacturers.

All of these specifications, procedures, hardware and software implementation were delivered in a common approach. However, each vehicle center tests a different set of safety functions and hypotheses, so there is also a need for different data management solutions. As a whole, data management partners of the project provide a common core, as well as specific solutions for each Vehicle Management Centre (VMC).

All data acquisition systems in euroFOT are connected to the in-vehicle CANbus, providing extensive information about vehicle state. Also, several vehicle centers are using video cameras and extra sensors such as radars, microphones, and others to enable better data mining and analysis.

All the DAS are connected wirelessly using GPRS and UMTS to transmit status reports and CANbus data. On the other hand, full video data will be stored on hard drives and picked up manually by the vehicle center’s crews whenever necessary.

In all, the size of the data storage planned will approach 140TB, which will require rigorous data mining and analysis tools using state-of-the-art database engines. In addition to the collected data, an enrichment

FOTs: a common approach

In order to ensure a common approach and comparable results, the euroFOT project is following a common methodology promoted by the European Commission and by numerous European stakeholders – the FESTA methodology. The European network of field operational tests called FOT-Net is making sure this methodology is applied and gathers further recommendations to improve it.

The best way to learn about the FESTA methodology is to read its FOT handbook containing guidelines on how to conduct a field operational test. This handbook was intended to guide the work of field operational test organizers on a general level; each FOT would need to

adapt to its special needs. The handbook walks the reader through the whole process of planning, preparing, executing, analyzing and reporting a field operational test, giving information about aspects that are especially relevant for a study of this magnitude (administrative, logistics, etc).

The FOT-Net project gathers European and international stakeholders in a strategic networking platform to present results of FOTs, identify and discuss common working items and promote a common approach for FOTs. The FOT networking platform aims not only to spread this methodology, but also to further explore the FESTA recommendations, and debate about issues that will need further attention.



tool will add specific environmental and road feature information such as traffic density information, roadworks, legal speed limits and other ADAS horizon features from digital maps (next intersection, road curvature, slope, etc).

At the moment, the use of hardware and software components is limited to the euroFOT partners. However, the knowledge built in this project (the specifications and procedures of the requirements) will be shared with the whole FOT community.

A COMPLEX STRUCTURE

Ensuring that around 1,000 vehicles hit the European roads across 10 vehicle brands grouped in four vehicle management centers, five operation centers, and at least 11 operation sites, is a real challenge. The euroFOT operations are organized in four vehicle management centers in Germany, Sweden, France and Italy. The VMCs play a key role in collecting the data from the vehicles. They provide an operational platform for the entire project where practical details are treated in line with the methodological recommendations



“Ensuring that around 1,000 vehicles hit European roads across 10 vehicle brands grouped in four vehicle management centers, five operation centers, and at least 11 operation sites, is a real challenge”

during FOT preparation and piloting. These VMCs are divided into five operation centers and a series of operation sites. The operations centers are responsible for the acquisition of the vehicles, the purchase and installation of the data acquisition systems, the relations with the drivers and the data quality monitoring. The operation sites address the practical details such as vehicle handling, installation of the DAS, driver interaction, and pick-up of the data. In total, there will be 11 operation sites across Europe.



⬆ About 100 Volvo V70 and XC70 cars, equipped with cameras and computers, will be involved in the field test in Sweden

⬅ The driver's behavior will be monitored in order to gain more knowledge about how we react as human beings in complex traffic situations

⬆ Showing the functions under test within the euroFOT study, ultimately evaluating the overall effectiveness and feasibility of intelligent vehicle systems

EVALUATION AND ASSESSMENT

The positive effects of ADAS have been shown in various paper studies. The task here is to confirm this with hard facts. Three main results are expected for the data analysis. First, the defined hypotheses will be verified on the effects of the functions. Then the global impacts on safety, traffic efficiency and environment will be analyzed. Finally, the socio-economic costs and benefits of the functions will be compared.

This means that the collected data needs to be carefully analyzed and studied to evaluate the real impact of the functions under test. During the test itself, the incoming data quality will be monitored to provide early warnings if it seems erroneous. As a result of this quality check, researchers will be able to judge if field intervention is needed by the operation site crews.

All user-related aspects concerning driver behavior and performance will be studied such as workload and user acceptance and how these behaviors develop through the tests. The impacts of the selected functions on traffic and driving safety, traffic efficiency and environment will also be identified.

The final results of this field test are expected for 2011. With so many countries, functions, brands and interests combined into this unique project, this is quite possibly one of the most challenging European-wide field operational tests that has been conducted for some time. ■

¹¹ For more information about the FESTA and FOT-Net project, log on to www.fot-net.eu. Alternatively, you can contribute to the FOT Wiki: <http://wiki.fot-net.eu>