Safe and Intelligent Mobility
Test Field Germany

**simTD:** motivation. »With commitment, clear goals and a network of competent partners and supporters, we are going to develop trendsetting solutions for the future of road safety and mobility. Connecting vehicles, traffic management and all peripheral communication instances in an intelligent way opens up new potential for efficient traffic processes. The extensive experiments on car-to-x technologies at the test field Germany pave the way for a new era of safe and intelligent mobility."

Dr. Christian Weiß
Daimler AG
Group Research and Advanced Engineering

www.simTD.de
simTD is a joint project by leading German vehicle manufacturers, components suppliers, telecommunication companies and research institutions. The project is funded and supported by the Federal Ministry of Economics and Technology (BMWi), the Federal Ministry of Education and Research (BMBF), the Federal Ministry of Transport, Building and Urban Affairs (BMVBS) as well as the state of Hesse and the city of Frankfurt.

In addition to that simTD is supported by the Car 2 Car Communication Consortium.

Responsibility for the content of this flyer lies entirely by the simTD consortium. The consortium is formed by the following members:

Audi AG | BMW AG · BMW Forschung und Technik GmbH | Daimler AG | Ford Forschungszentrum Aachen GmbH | Adam Opel GmbH | Volkswagen AG | Robert Bosch GmbH |
Continental Teves AG & Co. oHG | Deutsche Telekom AG | Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. | German Research Center for Artificial Intelligence (DFKI) | Berlin Technical University | Technische Universität München | Saarbruecken University of Applied Sciences (HTW) | Wuerzburg University |
Hessian State Office for Road and Traffic Affairs | City of Frankfurt am Main — simTD funding and support: Federal Ministry for Economics and Technology | Federal Ministry for Education and Research | Federal Ministry for Transport, Building and Urban Affairs | German Automobile Industry Association
The sim\textsuperscript{TD} research project is shaping tomorrow’s safe and intelligent mobility through researching and testing car-to-x communication and its applications.

The project started in September 2008 and will run for four years.

sim\textsuperscript{TD} will put the results of previous research projects into practice. For this purpose realistic traffic scenarios will be addressed in a large-scale test field infrastructure around the Hessian city of Frankfurt am Main. The project will also pave the way for the political, economic and technological framework to successfully set up car-to-car and car-to-infrastructure communication.

To achieve those objectives, numerous automotive and telecommunication companies, the Hessian state government and renowned universities and research institutions have partnered up. The Federal Ministry for Economics and Technology, the Ministry for Education and Research as well as the Ministry for Transport, Building and Urban Affairs are funding and supporting the project.

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The simTD project is characterised by the highly diverse and in-depth integration of many individual solutions. The technically well-equipped experimental region and the fact that functions with high customer benefit will be implemented in vehicles are key factors for achieving the project goals. The expected unprecedented results and which are planned to be put into operation at a designated point in time, are a highly complex research, development and integration challenge. It requires strongly interconnected partners and professional workflow. A consistent request process ensures that the sub-projects are efficiently interconnected.

**simTD objectives.**

**The project conception.**

**Traffic**
- Monitoring of traffic situation and complementary information/basic functions
  - Data collection in the infrastructure side
  - Data collection by the the vehicle
  - Identification of road weather
  - Identification of traffic situation
  - Identification of traffic events/incidents
- Traffic (flow) information and navigation
  - Foresighted road/traffic information
  - Road works information system
  - Advanced route guidance and navigation

**Driving and safety**
- Local danger alert
  - Obstacle warning
  - Congestion warning
  - Road weather warning
  - Emergency vehicle warning
- Driving assistance
  - In-vehicle signage/traffic rule violation warning
  - Traffic light phase assistant / Traffic light violation warning
  - Extended electronic brake light
  - Intersection and cross traffic assistance

**Additional services**
- Internet access and local information services
- Internet-based usage of services
- Location-dependent services

As a first result the simTD consortium has carried out a methodologically proven process to select the following functions from the categories traffic, driving and security as well as additional services to be implemented:

**simTD project structure.**

**Professionally planned and performed.**

<table>
<thead>
<tr>
<th>Sub-project 0</th>
<th>Project management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work package 0.1:</td>
<td>Technical coordination, controlling and administration</td>
</tr>
<tr>
<td>Work package 0.2:</td>
<td>Dissemination</td>
</tr>
<tr>
<td>Work package 0.3:</td>
<td>Cross-sectoral functions and quality management</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sub-project 1</th>
<th>Requirements analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work package 1.1:</td>
<td>Functions</td>
</tr>
<tr>
<td>Work package 1.2:</td>
<td>Validation and optimisation objectives, methods and metrics</td>
</tr>
<tr>
<td>Work package 1.3:</td>
<td>Derived tests</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sub-project 2</th>
<th>System design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work package 2.1:</td>
<td>Overall architecture</td>
</tr>
<tr>
<td>Work package 2.2:</td>
<td>Vehicle-related sub-system</td>
</tr>
<tr>
<td>Work package 2.3:</td>
<td>Infrastructure-related sub-system</td>
</tr>
<tr>
<td>Work package 2.4:</td>
<td>Project test system</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sub-project 3</th>
<th>System integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work package 3.1:</td>
<td>Vehicle set up and integration</td>
</tr>
<tr>
<td>Work package 3.2:</td>
<td>Infrastructure setup and integration</td>
</tr>
<tr>
<td>Work package 3.3:</td>
<td>Functional tests</td>
</tr>
<tr>
<td>Work package 3.4:</td>
<td>Experiment equipment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sub-project 4</th>
<th>Experiment execution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work package 4.1:</td>
<td>Design of the experiment</td>
</tr>
<tr>
<td>Work package 4.2:</td>
<td>Experiment execution and fleet management</td>
</tr>
<tr>
<td>Work package 4.3:</td>
<td>Evaluation and examination</td>
</tr>
<tr>
<td>Work package 4.4:</td>
<td>Setup and operation of Infrastructure and ITS Central Station</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sub-project 5</th>
<th>Evaluation and general conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work package 5.1:</td>
<td>Evaluation of field experiment</td>
</tr>
<tr>
<td>Work package 5.2:</td>
<td>Business and national economic aspects</td>
</tr>
<tr>
<td>Work package 5.3:</td>
<td>Legal and regulatory conditions</td>
</tr>
<tr>
<td>Work package 5.4:</td>
<td>Operating models and roll-out scenarios</td>
</tr>
</tbody>
</table>

*map illustration: The simTD test field Hesse centred around Frankfurt am Main.*
- Motorways
- Rural roads
- Inner-city roads
Notice traffic blocks before they are visible. Recognise risky situations before they get out of hand. Reach your destination fast, safe and relaxed. This vision of safe and intelligent mobility motivates our research project simTD. The vision can be made real with the help of electronically connected vehicles and infrastructure: car-to-x communication.

Car-to-x communication allows information exchange both between vehicles and between road users and traffic centres. Following and oncoming road users will be notified of potentially dangerous situations to enable them to react on time and appropriately.

Car-to-x communication allows transmitting anonymised traffic information to the traffic centres. These can then operate roadside infrastructure more adequately and issue reliable traffic development forecasts. Such information can then support road users in adapting their routes and allow them to reach their destinations fast, comfortable and safe.

The duration of the project is 48 months. Within this period three overlapping project phases will build upon each other.

**Project phase 1**
Requirements
Specification of functions and architecture
Prototype implementation of ITS Vehicle Station (IVS), ITS Roadside Station (IRS)

**Sub-project 1**
Requirement analysis

**Sub-project 2**
System design

**Sub-project 5**
Assessment and framework conditions

**Sub-project 0**
Project management
The EU Commission estimates 2006 that traffic jams in Germany cause macroeconomic costs of about 17 billion Euro each year. Despite improvements in active and passive vehicle safety, the numbers of road injuries (410,000) and fatalities (4,500) are still very high (estimated 2008 by German Federal Statistical Office).

Many experts assume that the situation can only be further improved by supplementing the autonomous vehicle systems with communication-based solutions. Car-to-x communication is being tested in a large-scale field operational test in Germany. The German Frankfurt-Rhine-Main region was selected because its infrastructure is ideally suited for conducting a highly relevant field test.

The research project focuses on technical implementation and testing of a hybrid communication system. In addition to established mobile communication technologies, this involves a system adapted for automotive purposes, which is based on the well-known WLAN standard. With the help of this hybrid communication system, the effectiveness of car-to-x functions can be tested. Of particular importance in this context are the integrated connection and the seamless integration of vehicle, communication and traffic technologies into one overall system. A further important aspect of simTD is the investigation of suitable roll-out-scenarios for car-to-x communication systems. This also involves value-added services and commercial applications to prepare the ground for eventual fast market penetration.
In addition, the Hessian model region offers excellent infrastructure equipment to collect traffic data and also traffic control facilities as well as all relevant road categories. This allows results to be transferred to other regions.

The Hessian Road and Traffic Authority is a partner with vast experience in large scientific projects.

The simTD test field is located in the Frankfurt-Rhine-Main area of Hesse. With more than 100 ITS Stations consisting of ITS Vehicle Stations and ITS Roadside Stations installed by the Hessian traffic centre (VZH) and the Integrated Traffic Management Center Frankfurt (IGLZ), car-to-x communication will be tested under real conditions.

The Frankfurt-Rhine-Main area is an important German traffic hub with major traffic generators such as the Frankfurt Airport, the Frankfurt Trade Fair and the stadium. The area is characterised by high traffic density and therefore allows experiments on all road safety and traffic efficiency functions under normal everyday conditions.
Comprehensive and seamless networking between vehicles and infrastructure is a technological challenge that should not be underestimated.

As a first step, relevant vehicle systems such as certain data buses need to be connected to an in-vehicle communication platform, the so-called “ITS Vehicle Station”. This station will transmit relevant data to the other road users and the traffic infrastructure.

In order to ensure safe and reliable communication also with high traffic density, the ITS Vehicle Station is using wireless technology which was specifically developed for this automotive field of application. The technology is based on the well-known WLAN standard. Information can either be transferred directly to other vehicles or to ITS Roadside Stations installed along the road. If the communication partner is not located in close vicinity to the sender, other vehicles can transmit or store and forward information.

Moreover, mobile wireless technologies such as UMTS and GPRS are integrated. This can bridge the WLAN connectivity gap (e.g. if roadside infrastructure is lacking) and support many value-added services.

**simTD: technology.** Networking and implementation providing maximum reliability.

**simTD technology: Communication processes and key functions within the Test Field Germany.**

*simTD’s essential research and development objective will be integration of vehicle, communication and traffic technologies into one system. This requires research ensuring that vehicles recognise information on driving conditions and risks in a standardised way. The aim is to forward such information precisely so that they can be translated into traffic control measures such as variable traffic signs or vehicle-related systems as quickly as possible.*