

Sichere Intelligente Mobilität  
Testfeld Deutschland

**sim<sup>TD</sup>**



# sim<sup>TD</sup> – A Large Scale Field Trial with Co-operative Systems

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**sim<sup>TD</sup>**



# sim<sup>TD</sup> Motivation

## Challenges

### Mobility



Congestion generates annual economic cost of 17,4 bn. €  
(Estimate EU commission)

### Traffic Safety



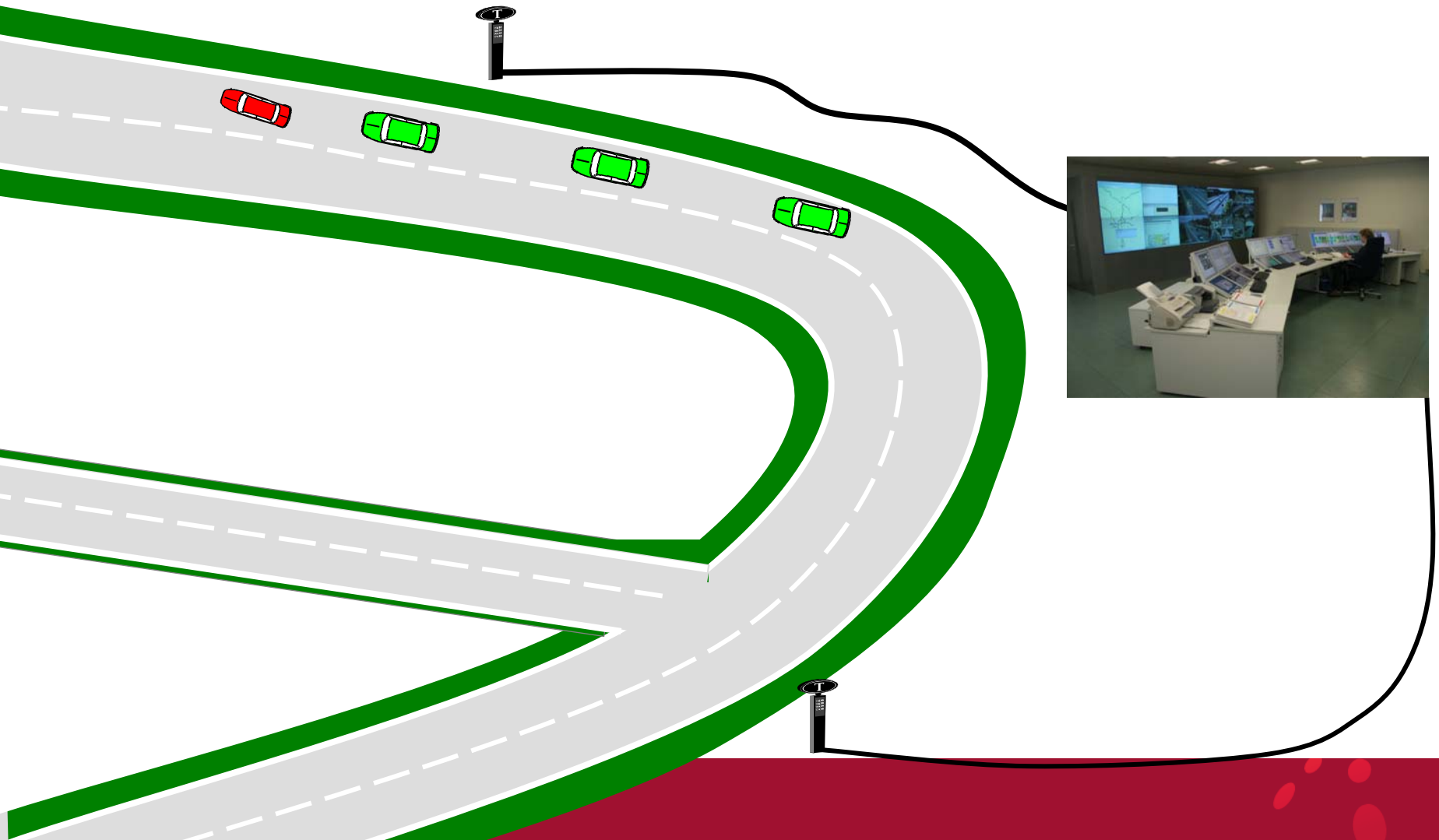
Accident statistics 2006:  
appr. 420.000 injured pers.  
appr. 5000 fatalities  
in Germany  
(Source Statistisches Bundesamt  
D.)

**Objectives of the European  
white book will not be  
achieved with  
conventional systems alone**

**Leverage the potential of  
communications to improve  
this situation.**



# How Can Communication Help – An Example





# How Can Communication Help – An Example

## Improved Local Traffic Information

**Traffic Information Upload**  
Transmission of information via C2I communication to traffic management center (wireline, WiMAX, radio relay, ...)

- First vehicle is not equipped with communication unit. Accident cannot be avoided/alleviated using communication.
- ↪ Second vehicle (equipped with communication unit) informs following vehicle about accident (car-to-car communication).
- ↪ Second vehicle transmits accident information to road-side unit (RSU) for relay to traffic management center.
- ↪ Traffic management center refines local information using additional sources and relays refined information to RSU for dissemination in the relevant geographic area
- ↪ Passing vehicles are warned in time by the RSUs about the accident zone.

# What Sort of Communication Is Needed?

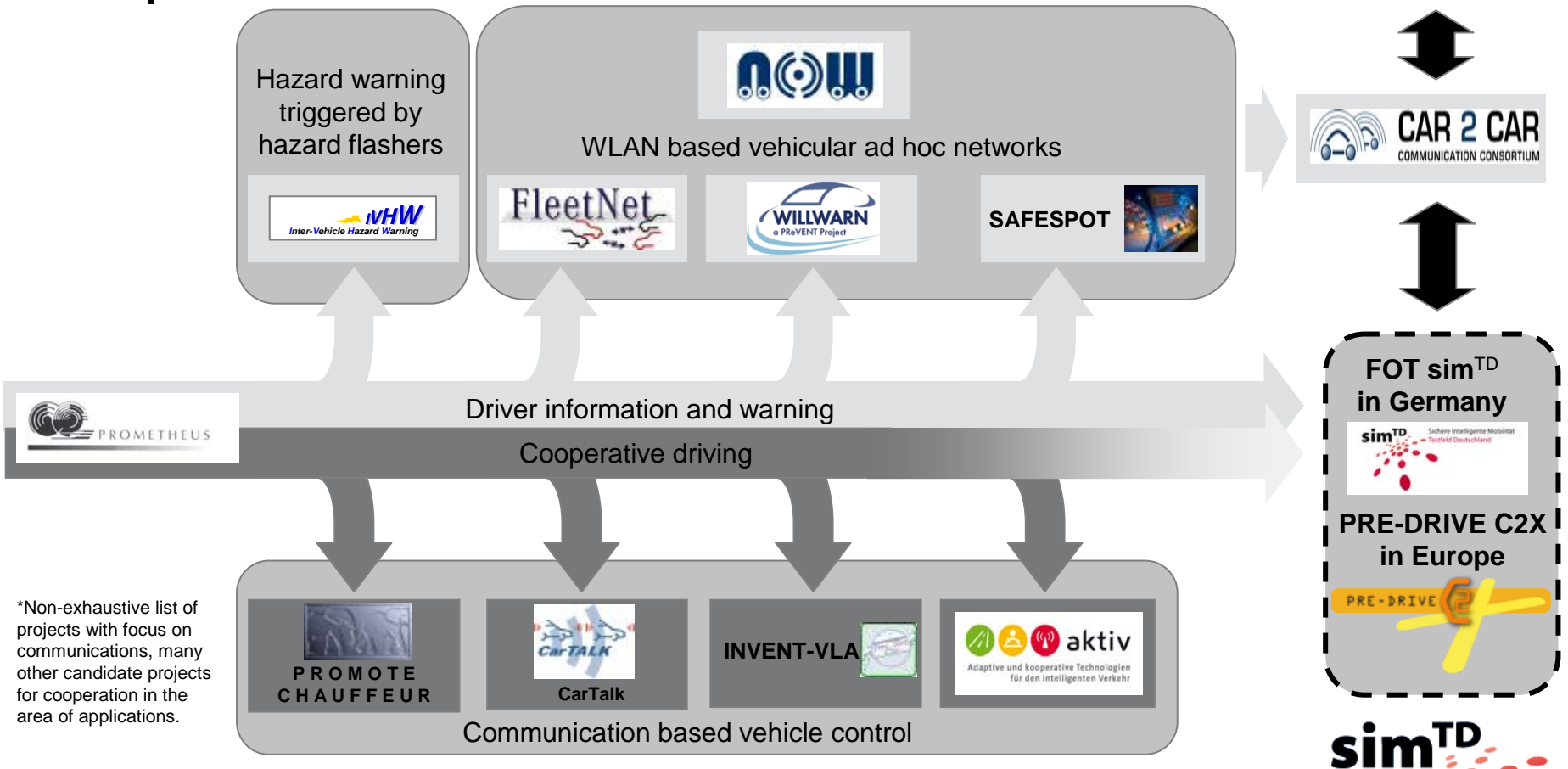
## Results of the various research projects on Car-to-X (C2X) communications

- Short-range communication technology (based on ITS-G5A IEEE 802.11 (European profile) in 5.875 GHz to 5.905 GHz frequency range) can work well in vehicle environments
  - Low network acquisition time (under 100 msec)
  - Fast transaction times (on the order of 100 msec)
  - Priority mechanisms for safety applications installed
  - Spectral crowding/interference minimized through dedicated spectrum
  - Communications range (about 300 m) can support envisioned safety applications
  - Methods for geo-addressing are available
  - Existing infrastructure can be effectively interfaced with roadside units
  - The breadth/applicability of applications based in this technology is better understood



# On the Way to a Communication System for Improving Road Safety and Efficiency

## Cooperation Model



\*Non-exhaustive list of projects with focus on communications, many other candidate projects for cooperation in the area of applications.



## Open Questions / Issues

- To test and validate technologies and functions for car-to-infrastructure and car-to-car communications in a setup that is representative for a realistic deployment environment.
- To evaluate the effectiveness and benefits that can be gained by applications and services enabled by car-to-infrastructure and car-to-car communications.
- To gather sufficient information to support a deployment decision for a country-wide (if not cross-border-wide in case of Europe) introduction of car-to-infrastructure and car-to-car communications technologies.

A large scale field operational trial (FOT) is needed to answer these questions.

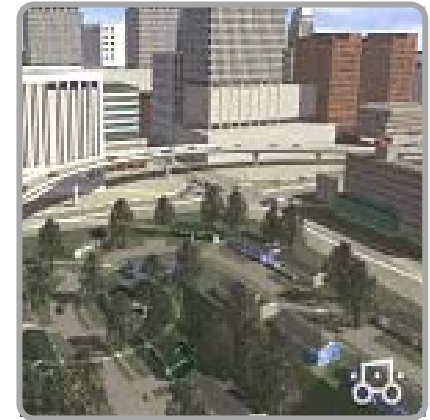
sim<sup>TD</sup> provides this FOT and is the next necessary step to prepare for an informed deployment decision for cooperative systems.



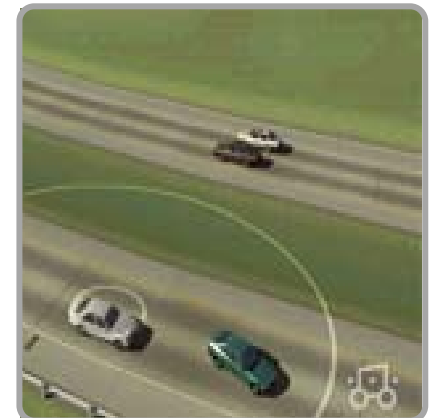


# Topics of sim<sup>TD</sup>

- Demonstration and evaluation of the effectiveness of applications in three categories
  - Mobility / traffic management
  - Safety / hazard warning
  - Additional / commercial services
- Further refinement and validation of technologies/systems for C2X communication developed in recent years.
- 1. Prototypical setup of a communication network
  - Integration of traffic management centers / traffic agencies via car-to-infrastructure communication (RSUs), networking of RSUs and servers
  - Setup of a hybrid system: Cellular radio (e.g., GSM/UMTS) as baseline, short-range communication technology (based on ITS-G5A IEEE 802.11) to enable real-time operation.
- Prototype car communication unit (CCU) and roadside unit (RSU)
- Assess deployment strategies and models for operation of C2X communication, economic implications



C2I communication



C2C communication



# sim<sup>TD</sup>: Project Partners

- Partners:
  - Vehicle manufacturers: Audi, BMW AG, BMW F+T, Daimler, Ford, Opel, Volkswagen
  - Suppliers: Bosch, Continental
  - Region: Stadt Frankfurt, HLSV (Verkehrszentrale Hessen)
  - TelCo/Provider: Deutsche Telekom
  - Science: Fraunhofer, DFKI, Uni Würzburg, TU München, HTW Saarbrücken, TU Berlin



# Project Facts

- Duration: September 1, 2008 – August 31, 2012
- Budget: appr. 53 Mio. € (appr. 30 Mio. € funding)  
plus infrastructure investment
- funded by Federal Ministry of Economics and Technolog (BMW*i*)  
Federal Ministry of Education and Research (BMBF)  
Federal Ministry of Transport, Building & Urban Affairs (BMVBS)

**The sim<sup>TD</sup> consortium highly appreciates the support  
of the German Federal Ministries for the project!**



Bundesministerium  
für Wirtschaft  
und Technologie

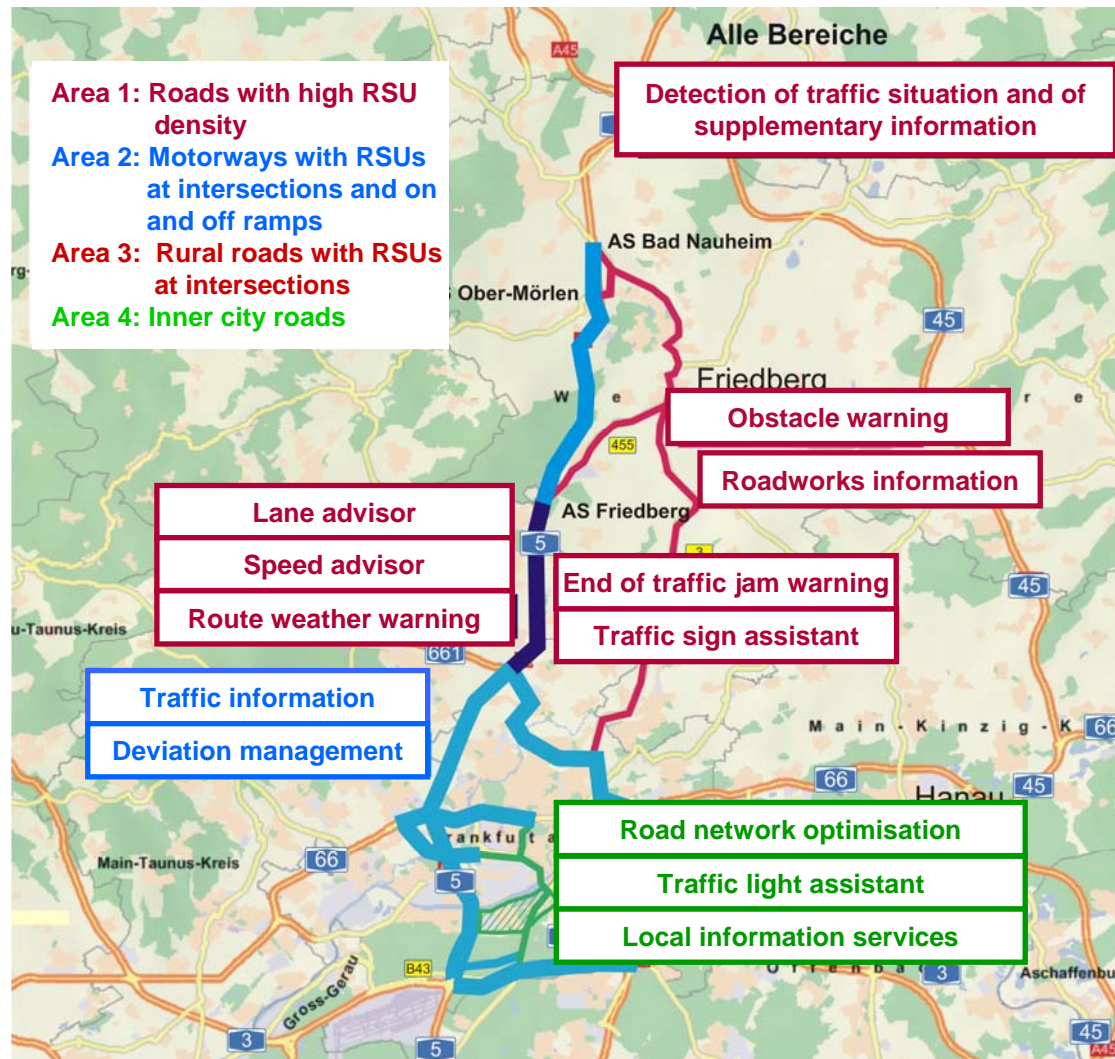


Bundesministerium  
für Bildung  
und Forschung

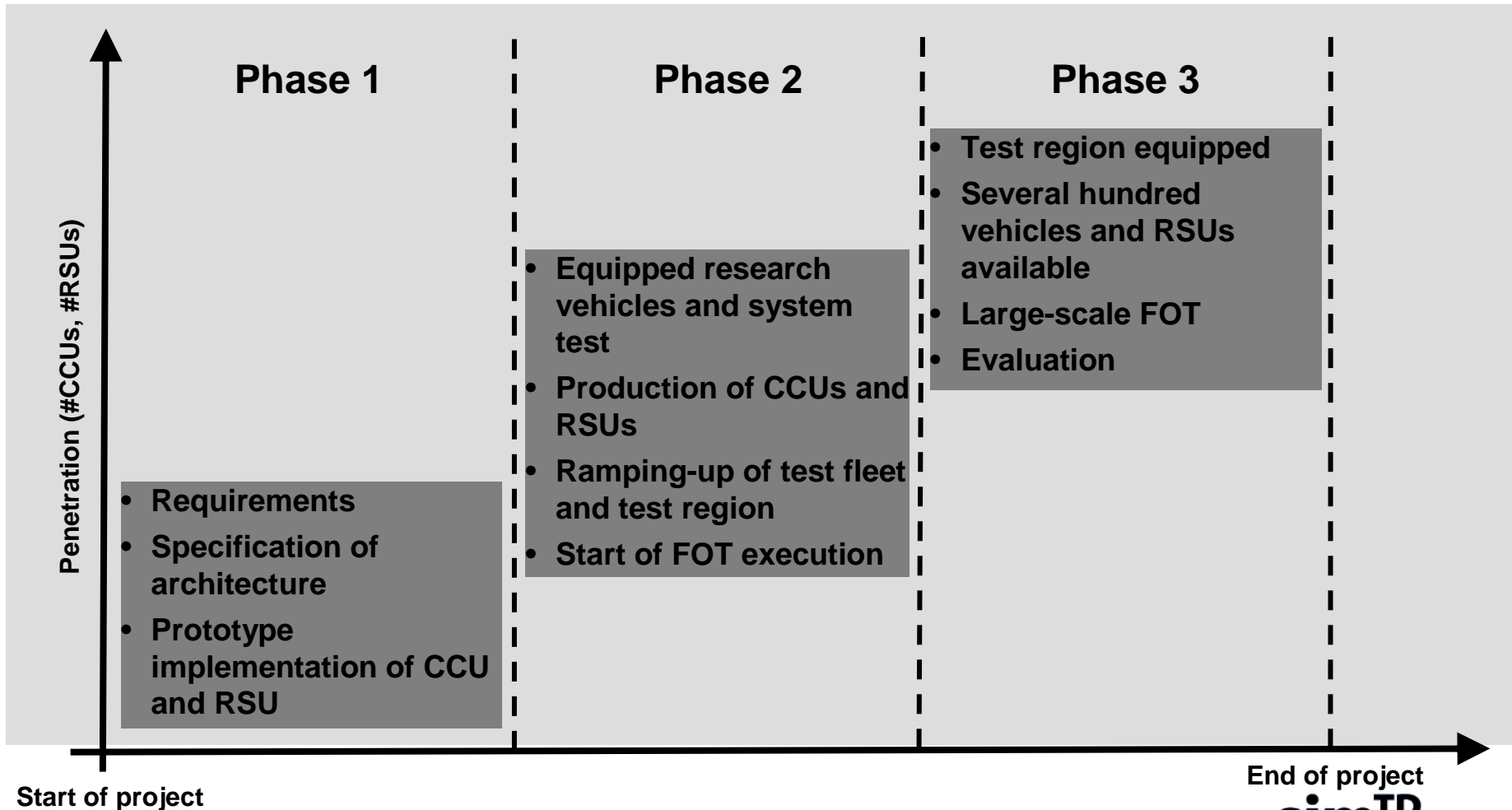


Bundesministerium  
für Verkehr, Bau  
und Stadtentwicklung

# sim<sup>TD</sup> Test area and applications to be tested



# sim<sup>TD</sup> Project Phases



End of project  
**sim<sup>TD</sup>**

# Summary and Conclusion

- sim<sup>TD</sup> is worldwide the first field operational trial that is large enough to
  - test and validate technologies and systems for C2X communication in a real-life environment that exceeds the demonstrator status,
  - to examine the entire spectrum of applications with regard to the effects on traffic safety and efficiency, and
  - to assess operating models and introduction scenarios.
- sim<sup>TD</sup> is the next necessary step to prepare for an informed deployment decision





An aerial, high-angle photograph of a busy city intersection at night. The scene is illuminated by streetlights, creating a mix of warm yellow and cool white light. Numerous cars are visible, some stopped at a traffic light and others in motion, their headlights and taillights creating a sense of activity. Long, horizontal light trails from the cars' headlights and taillights stretch across the road, indicating the flow of traffic. The road markings, including lane lines and arrows, are clearly visible. The overall atmosphere is one of a bustling urban environment.

Thank you!

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