



Concept Study on Traffic Management Systems
based on Mobile Communication Networks:

Centralized traffic management and virtual traffic signs

12.04.2005
Uwe Sandner

Outline

- Deficiencies of Existing Traffic Concepts
- Shortcomings and Disadvantages of today's situation
- Proposed Solution: A new traffic paradigm
 - Vision
 - System design
 - Advantages and value proposition
 - Business Case
 - Timeline
 - Feasibility
- Conclusion: Positive business case for relevant problem

Situation today: Existing traffic concepts show deficiencies



Overload



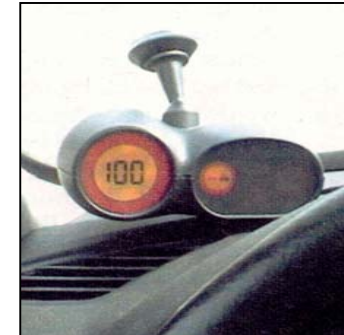
Complexity



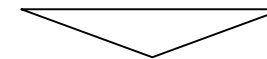
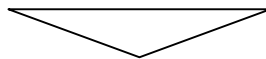
Stress



Traffic Management



Problem awareness



Today's traffic signs and traffic management can be optimized

Shortcomings of current Traffic Management

- Deficiencies and inconvenience for the driver
- Increasing need for dynamic traffic management due to increasing traffic
- High cost for existing traffic signs and dynamic traffic management installations
- Economic loss due to traffic inefficiency
- Advanced 3rd party traffic services complex to setup and still in their infancy

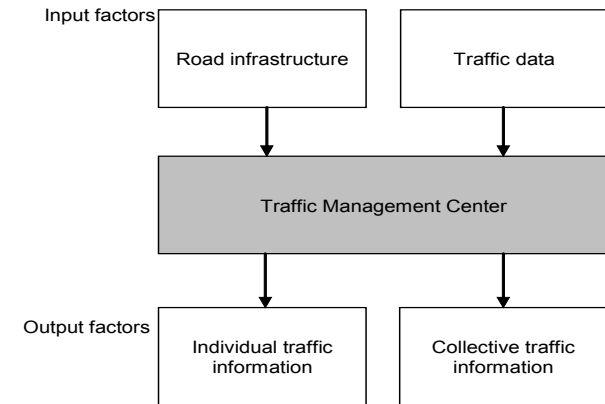
Need for disruptive solution

Vision: Virtualization of traffic signs and dynamic traffic management

- **Virtual Traffic Signs**
 - Replacement of conventional traffic signs by a display in the car
 - Provision via wireless communication system
- **Centralized Traffic Management**
 - End to end mobile solution with centralized traffic management system
- Cooperation of public authorities, the legislator, car manufacturers, wireless infrastructure providers, carriers and device manufacturers
- Large economic benefits and cost savings for the public and value added for the driver
- Introduction in several steps over a timeframe of 15 years.
- Positive business case



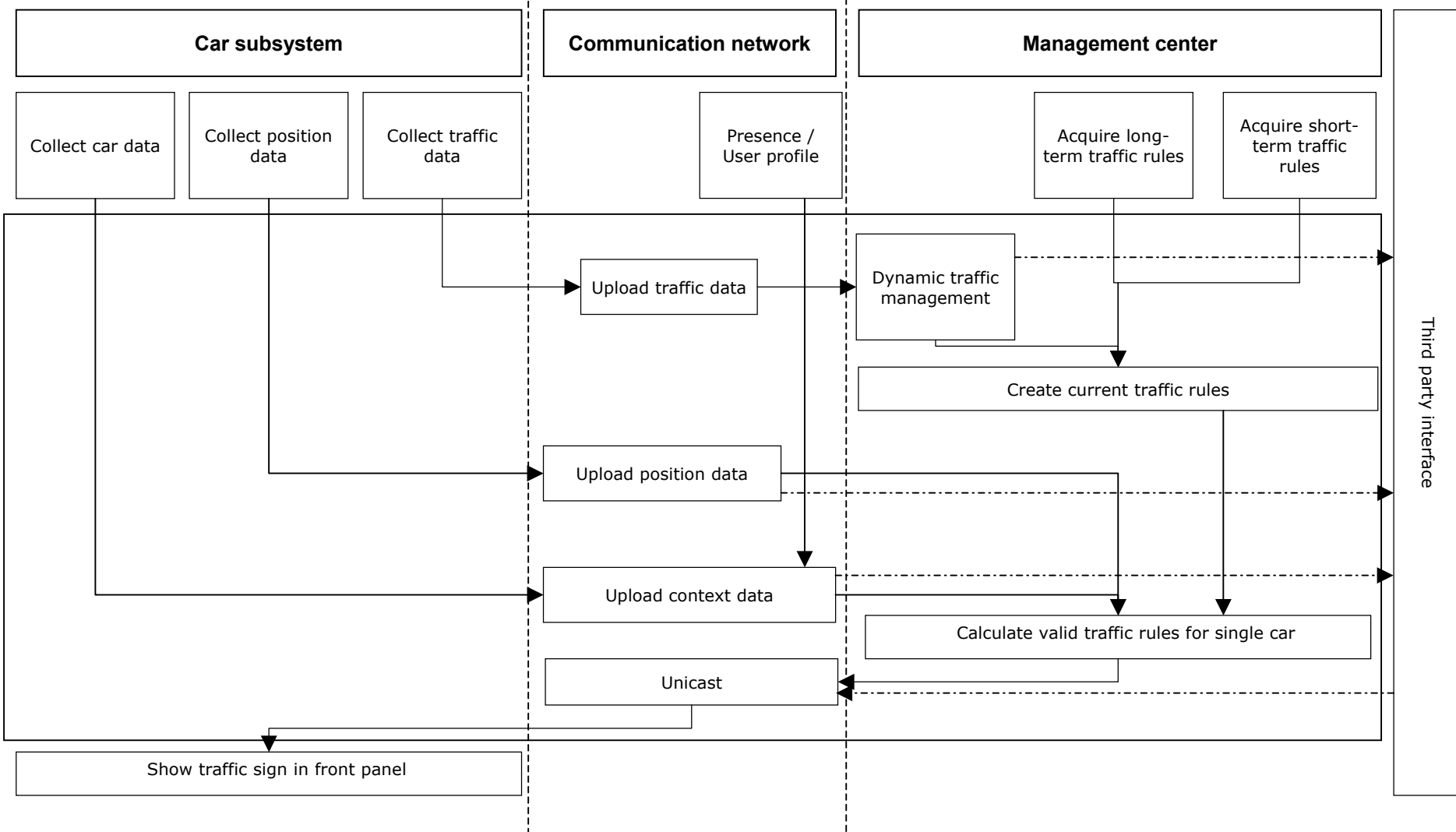
Virtual Traffic Signs



Centralized Traffic Management

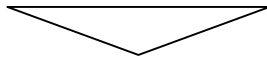
New paradigm for traffic control

Proposed System Design

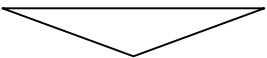


Advantages of the system lead to **value added** to the driver

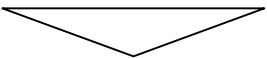
Direct advantages for the driver



- Information can be **targeted efficiently** to the driver
- Information can be brought to the driver with **high usability**

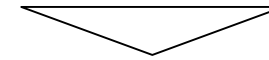


- More convenience for the driver
- Higher efficiency in information absorption
- Less stress
- Less accidents

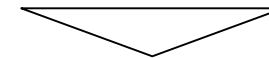


Value added to the driver

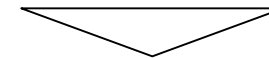
Advantages through TM



- **Traffic flow** and **safety** is improved
- Environmental and noise pollution are reduced

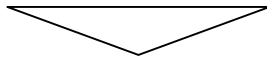


- Higher traffic speed
- Less stress

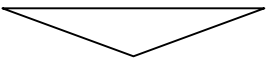


Advantages of the system lead to benefits for the public

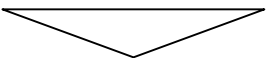
Indirect economic benefits



- **Less traffic congestions** and **environmental pollution** due to **better** and **cheaper** traffic management
- **Less accidents** due to more convenience for the driver

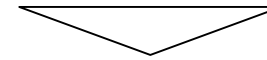


- **Reduced economic loss** due to traffic congestions, environmental pollution and less accidents

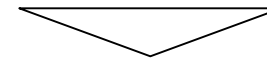


Benefits for the public

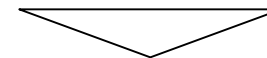
Direct cost savings



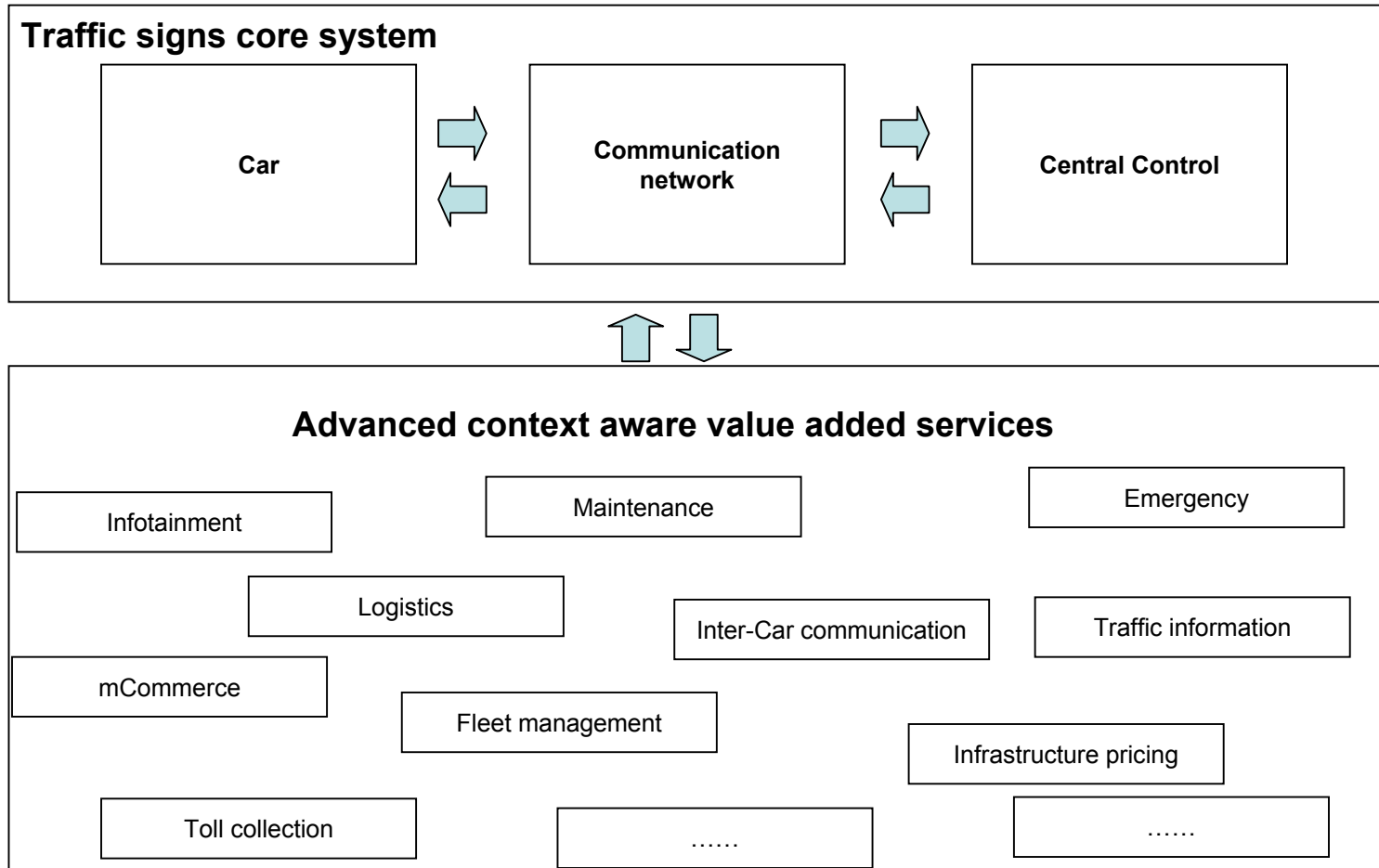
- Traffic signs become **obsolete** (no cost for maintenance, grounding, signs)
- **Improved workflow** between authorities



- **Cost savings** due to obsolete signs and improved workflows

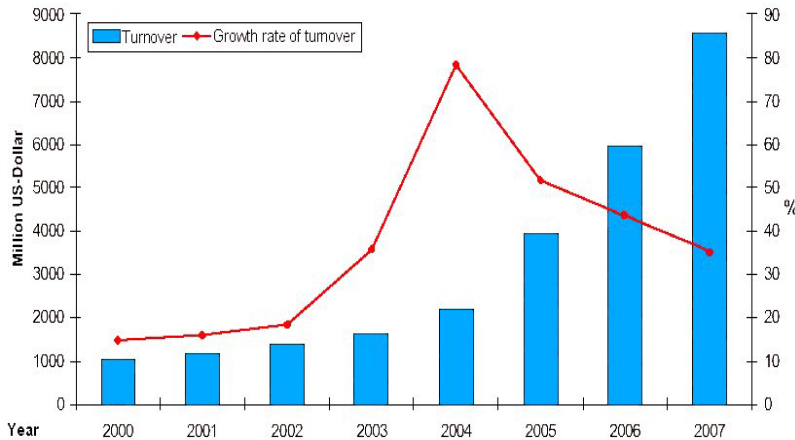


System can be a core for traffic oriented services & applications

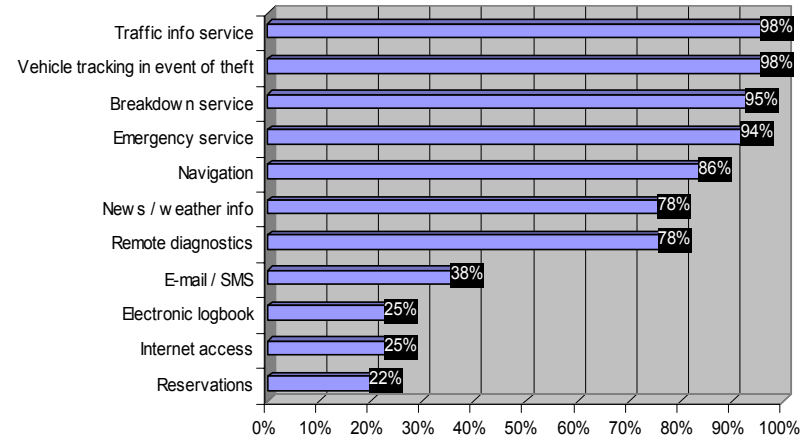


System may become a basis for advanced telematic services

Market for telematic applications is growing



Source: Frost & Sullivan. The European Automotive Telematics Market for Hardware and Services 2001



Source: EBT Drive Study – Consumer Clinic with GM employees in UK & Germany

Penetration

Status 2002

Scenario 2010

Telematics enabled cars

2,5 Mio. vehicles

100 Mio. vehicles

Mobile

950 Mio. subscribers

2.5 Bio. subscribers

Internet

530 Mio. users

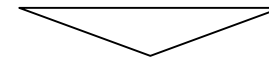
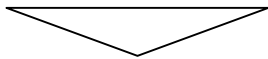
1.8 Bio. users

Source: Telematics Research Group. Worldwide Telematics, Regional Markets and Forecast. 2002

Market supports advanced telematic solutions

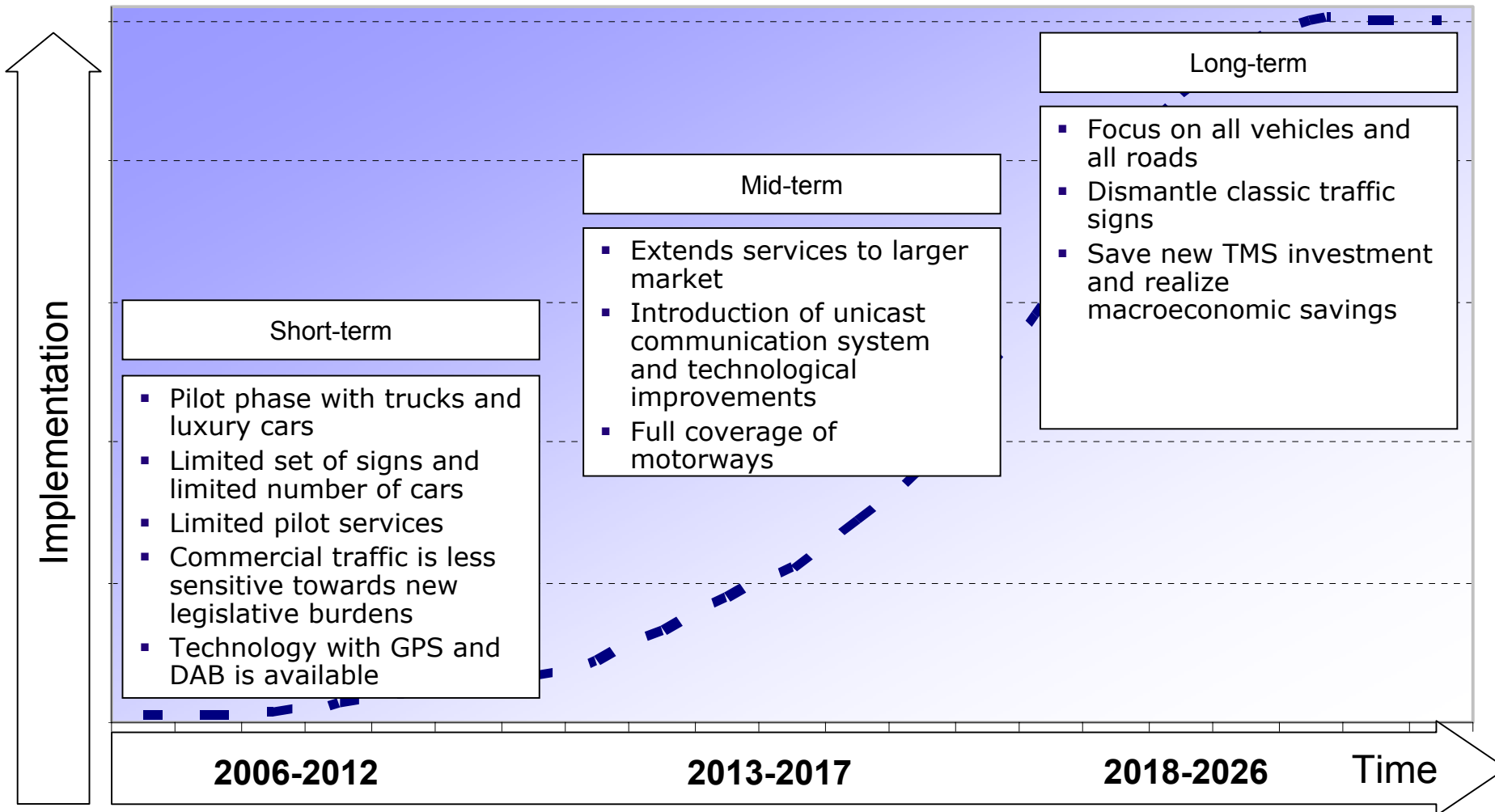
Value proposition and business case

- Economic benefits due to shorter time needed to travel, less accidents and pollution
- Convenience for the driver as value added
 - Cost for in-car hardware transferred to car buyers
- Cost savings due to obsolete signs
 - dramatic reduction of investments in traffic signs
 - dramatic reduction of efforts for maintenance of traffic signs
- Access to system can be sold to third party providers
 - Fleet management services
 - Location based services
 - Infotainment & Entertainment
- Possibility to support infrastructure pricing



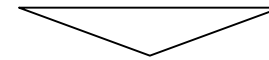
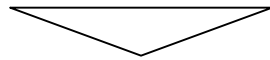
Positive business case of 1 Bil. € NPV

Introduction in several stages

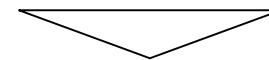
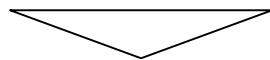


High requirements

- **Reliability:** Devices, communication channels, positioning service and system architecture have to be highly reliable
- **Security:** Access to the system must be limited and malicious changes have to be prevented
- **Safety:** Fallback mechanisms and consistency checks enforce maximum safety for the driver
- **Accuracy:** Positioning and traffic rules must represent actual situation of car
- **Privacy:** Personal information of drivers has to be protected



- Industry faces this challenges for all car IT
- Next generation communication networks (UMTS and beyond 3G) and positioning technologies (Galileo and beyond) offer needed functionalities
- Adaptation of laws possible to provide safe framework



Solution is technologically feasible

Conclusion

- Virtual traffic signs and centralized traffic management
 - ... promise vast benefits
 - ... address the needs of an mobile society
 - ... are technologically feasible
 - ... allow a successful business case

Team and Contact

Uwe Sandner

Technische Universität München
Center for Digital Technology and Management (CDTM)
Arcisstraße 21
80290 München
Phone: +49 (0)89 289 28 485
e-mail: uwe@cdtm.de

Dr. Michael Lipka

SIEMENS AG
Information and Communication Mobile
ICM N PG SP RC AS
St.-Martin-Strasse
81617 München
Phone: +49 (0)89 636 75120
e-mail: michael.lipka@siemens.com

Frank Danzinger

Ludwig-Maximilians-University
Center for Digital Technology and Management (CDTM)

Silvia Appelt

Ludwig-Maximilians-University
Center for Digital Technology and Management (CDTM)

Patrick Nepper

Ludwig-Maximilians-University
Center for Digital Technology and Management (CDTM)

Christian Wachinger

Technical University of Munich
Center for Digital Technology and Management (CDTM)