

# Prototyping for Road-based User Testing of Safety-related Traffic Telematics Services

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## ABSTRACT

Future vehicle-to-infrastructure (V2I) services will support drivers with a vast amount of highly safety-relevant real-time information about the traffic situation and dangerous incidents on the highway. Yet it is unclear how to optimally make this information accessible to the driver without the risk of further distraction. As a concrete solution approach for investigating respective HCI research challenges, we introduce the ROADS SAFE toolkit, a highly flexible widget-based framework for the rapid prototyping and road-testing of novel in-car information systems.

## 1. THE ROADS SAFE TOOLKIT

With technological advances such as “smart roads” which are able to target specific cars and notify them about current incidents in real-time, drivers are confronted with a vast amount of new information. When developing the human-machine-interface (HMI) for such advanced safety information services, frequent interaction design iterations and early testing on the road are of central importance to validate preliminary results from simulator studies: a trial and error approach with already launched systems is unacceptable due to potential costs of failures (cf. [1]). HCI research issues of interest include the assessment of increasingly realistic visualizations offered by today’s Personal Navigation Devices (PNDs), the effects of different screen arrangements (such as fullscreen map views, split screens, and hybrid views combining different perspectives), and the respective value of these alternatives in future application scenarios such as an emergency stop recommended at a specific location.

Our proposed solution, the ROADS SAFE toolkit, supports the investigation of these research questions by allowing for rapid prototyping and facilitating frequent design iterations. Being executed on a state-of-the-art laptop computer with a small external display for the driver, it is not limited to the computing power and graphical capabilities of current in-car technology (cf. FLUID [2]) and enables the simulation of functionality not fully implemented due to technical or time restraints in a Wizard-of-Oz approach.

Three main ideas constitute the concept of the toolkit we developed. All HMI elements are encapsulated as *widgets* which define their appearance and behavior. Due to a central data repository sharing all relevant parameters such as the current location, speed, and a list of active incident mes-

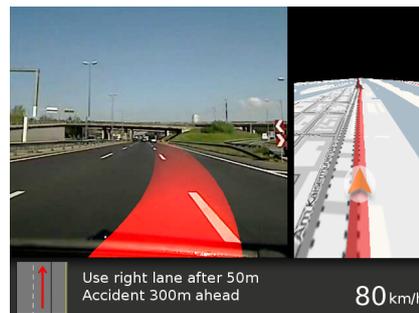


Figure 1: An example skin combining an Augmented Reality widget and a bird’s eye map.

sages, the development and integration of novel widgets is facilitated. The overall layout is defined by a *skin*, which places and combines widgets at certain screen locations and thus allows for the quick adaption of the visual appearance. For each test drive, a *scenario* is prepared, which defines a sequence of skins to be presented as well as audio files to be played in different test sections.

Figure 1 shows an exemplary skin combining a traditional map visualization in a bird’s eye perspective with an advanced Augmented Reality view. Reducing implementation effort to a minimum, the red navigation overlay can be controlled by a human observer in the background during a road study. This functionality as well as further manifold possibilities of the toolkit will be demonstrated in a live presentation.

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## 3. REFERENCES

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