

Road Safety on a Larger European Motorway Network

Smart Highways: available infrastructure and ATIS technologies to increase safety on motorway


Ewa Zofka, Adam Zofka
IBDiM

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Roadway Safety: Challenges

Challenges:

- Transport network challenges: congestion, scarcity of resources (can't add more infrastructure)
 - Ageing of road infrastructures
 - Advances in sensors, mobile communications, data processing
 - Automation in surface transport
 - Social challenges
- 
- The logo for the USE-iT project, featuring the text "USE-iT" in a bold, sans-serif font. "USE" is in blue and "iT" is in orange. The logo is set against a white background with a subtle shadow.

H2020 Projects bring solutions:

- ❑ **USE-iT** : **U**ser, **S**afety, **S**ecurity and **E**nergy in Transport Infrastructure
- ❑ **FOX**: **F**orever **O**pen Infrastructure across **(X)** all Transport Modes

Solution: More cooperation between infrastructure owners, transport operators and other stakeholders is needed



New Generation Roads

The Forever Open Road (FOR) Programme aims to create the next generation of road; one which is:

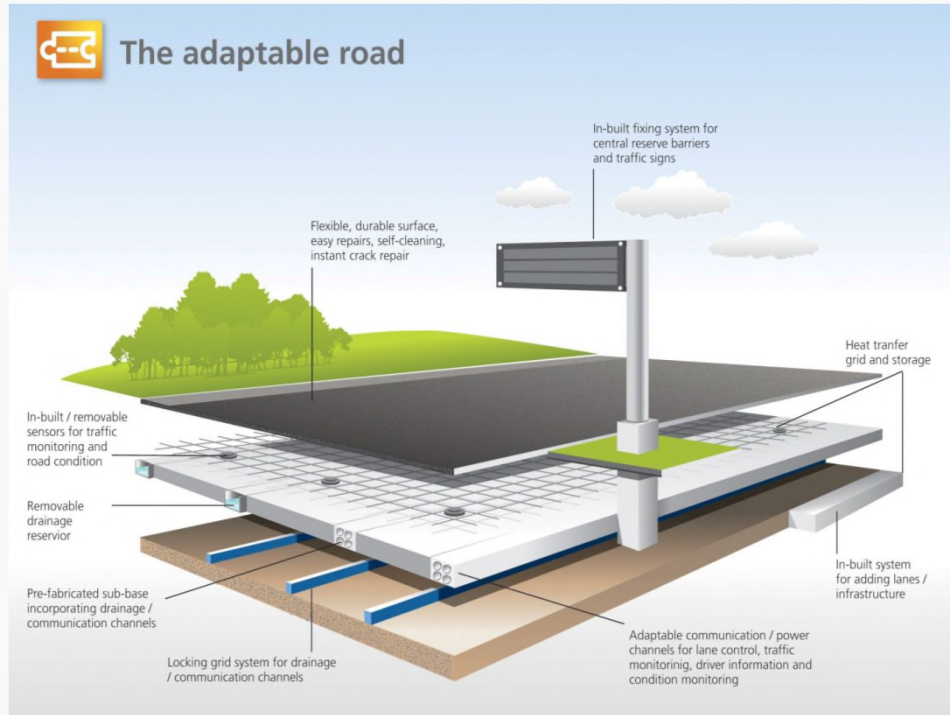
- **Adaptable**
- **Automated**
- Climate change **Resilient**

Goal: Reducing future road construction and maintenance costs by encouraging innovative technological solutions is the focus of FOR. **FEHRL**, launched FOR in 2011 as the first step towards a new generation of roads.

Vision: Roadways will be able to power vehicles; harvest solar energy; monitor, measure and report on their own performance and condition; and carry out some of their own maintenance.

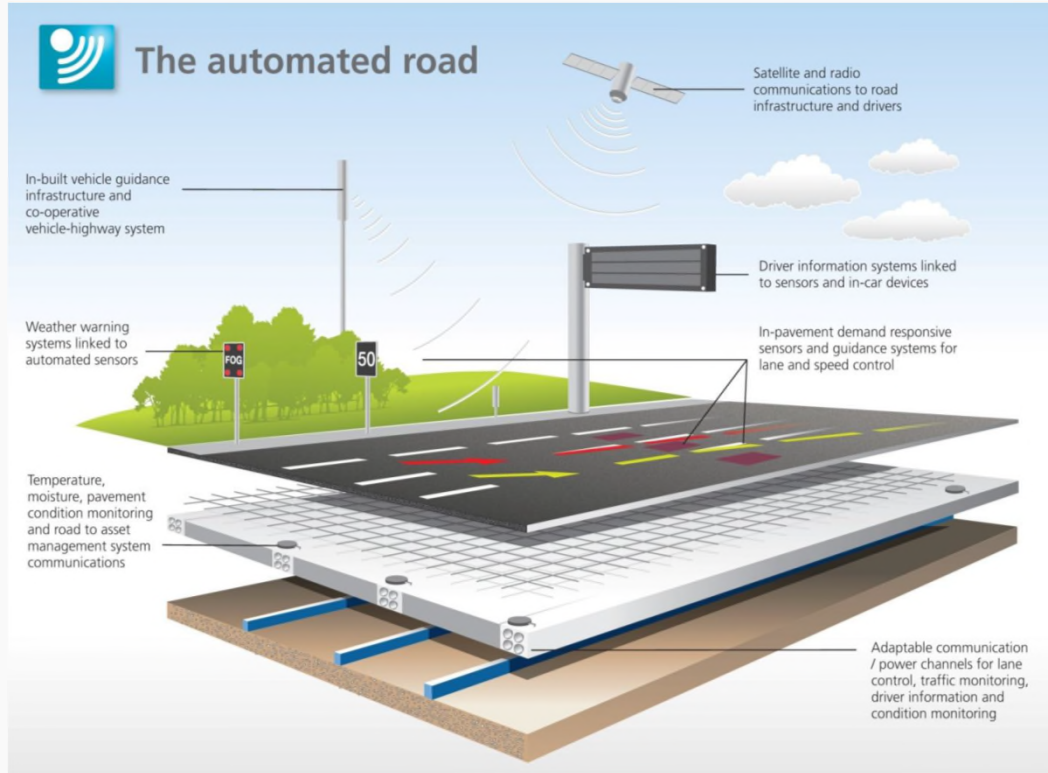


New Generation Roads: Adaptable



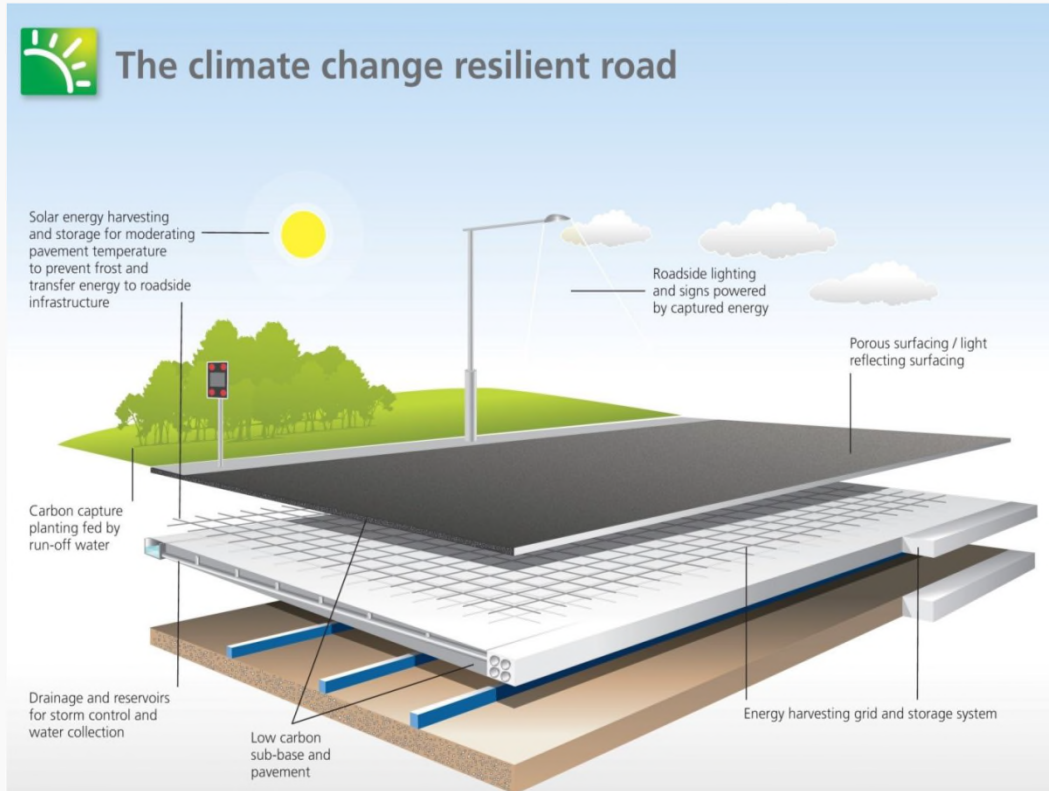
- Developing new forms of road construction, such as prefabrication
- Providing for enable fast and effective maintenance to reduce delays;
- Using robotized methods of on-road maintenance and traffic control to improve safety;
- Self repairing and self cleaning roads to reduce costs and environmental impact;
- Using harvested solar energy to moderate road temperature and reduce the need for winter maintenance,
- Low noise and low spray pavements.

New Generation Roads: Automated



- Comprehensive, interoperable communications system linking driver, vehicle, road and operator;
- Integrated sensors and systems to measure and monitor road condition and performance;
- Enabling future vehicle to highway guidance, speed control and direction guidance;
- In-road vehicle guidance using to change lane usage and manage traffic;
- Powering vehicles from the highway and harvesting solar energy;
- Monitoring traffic and road conditions as well as vehicle performance to improve reliability and efficiency;
- Incident monitoring and automated response systems to reduce delays;

New Generation Roads: Resilient



- Integrating the road with its environment to make effective use of water, energy and planting;
- Means of dealing with extreme weather conditions, e.g. storms, wind, heat and cold.

Concept of Smart Highway



Concept of Smart Highway

Smart Infrastructure

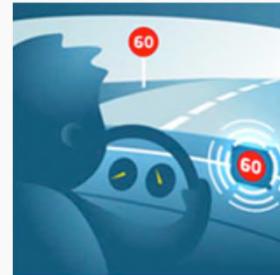
- electric vehicles and charging infrastructure;
- in pavement sensors (e.g., moisture, temperature, strain, vibration, weigh-in-motion), laser scanners,
- smart digital signage (ERF's **concept of roads that cars can read**) and roadway markings
- overhead DMS to display traveller info and safety warnings,
- communications infrastructure (fiber, radio, wi-fi, GPS stations, etc.),



Infrastructure



Technology



Design

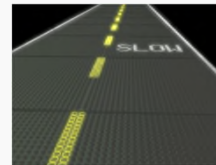
Concept of Smart Highway

Smart Technology

- **ITS and ATIS:** disseminate roadway condition info, weather, traffic to motorists via intelligent devices
- **driver support systems** to make more efficient use of energy and increase safety: adaptive speed, automated lane departure systems
- **connected vehicles**

Smart Design

- **ORT lanes** allow collecting tolls electronically without need to stop (much safer), maintenance is done without need to close lanes.
- **Smart and resilient pavements:** use innovative materials on pavement surface to increase safety and lifecycle of maintenance: porous pavements, photovoltaic highway (France), solar roads Netherlands, modular pavements - M



Infrastructure



Technology



Design



Seamless Maintenance

Maintenance of ORT Equipment:

- Florida unique overhead gantry design that allows maintenance workers access to equipment without closing lanes or disturbing traffic. The gantry provides an area large enough for maintenance employees to work above the roadway, and all ETC equipment is positioned on a lever that allows workers to pull the equipment up into the work area.



Equipment Lowering System

- A variable speed limit sign lowered on its Crown International pole for maintenance beside the M4 motorway in Wales.



Siemens Electric Highway

Dedicated lanes to move heavy commercial vehicles out of left and middle lane: adapted **hybrid trucks** are supplied with electricity from overhead contact lines via the active pantograph, which can connect and disconnect at speeds up to 90km/h.

Benefits:

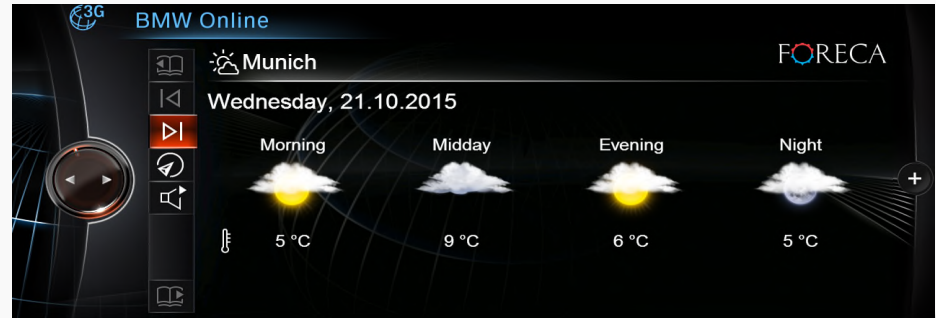
- Increase safety
- Sustainable: significant CO2 emission reductions, noise reduction



ATIS – Advanced Traveler Information Systems

ATIS:

- In vehicle advanced weather information, incident information and rerouting (interactive maps)
- When connected vehicles V2V and V2I communication will enable transferring information between vehicles and infrastructure to predict and inform of safety issues ahead of time so motorway drivers can make decisions to take alternate routes or simply slow down.



Dynamic Truck Parking Signs along motorway

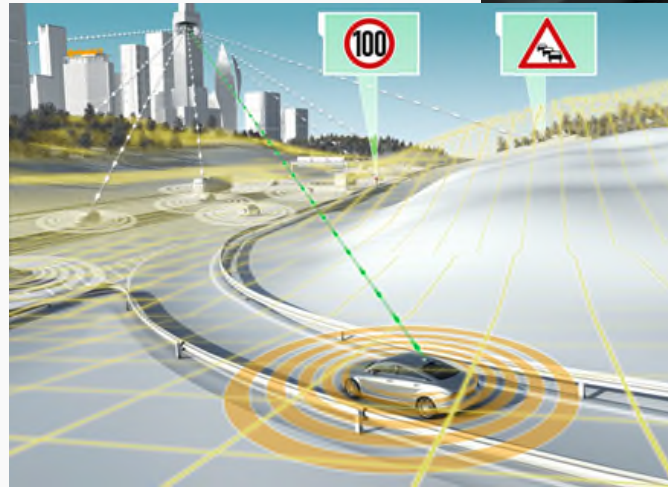
ATIS for trucks: Dynamic truck parking signs: total of 115 dynamic message signs are installed at five parking areas along the A5 motorway in Germany to provide truck drivers with information about available parking spaces.

The aim is to reduce the time spent in looking for parking spaces and **increase traffic safety** by enabling drivers to take mandated rest breaks. An online platform also provides drivers with real-time information on available parking spaces.



ATIS – Digital Motorway

Digital A9 motorway test bed: to show how vehicles on a motorway can **share hazard information**, Continental, Deutsche Telekom, Fraunhofer ESK and Nokia Networks have carried out a real-time demonstration of communication between vehicles via the Deutsche Telekom LTE cell network. The project aims to improve road safety and traffic management.



Questions? Thank you!



**Instytut Badawczy
Dróg i Mostów**
**Road and Bridge
Research Institute**

For Questions Please Contact:

Ewa Zofka

Project Coordinator

ezofka@ibdim.edu.pl

Phone: +48 532 296 709