The Case for Improving Work Zone Management and Communications in a Highly Automated Driving World
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Corporations in Germany, and USA.

Headquarters in Bernburg (Germany).

Additional offices in Germany (Leipzig), UK, and USA.

Public and private sector customers worldwide.

10 Solutions including Work Zone.
Any technology which helps:
   To increase drivers and workers safety.
   To reduce impact on traffic.

During the entire life cycle:
   From planning until completion.
Problem:
Work zones cause congestion.

Option for solution:
Find the best time by using historical traffic patterns.
Problem:

Work zones on diversion route cause congestion.

Option for solution:

Identify conflicts:

- By location (nearby).
- By location and diversion routes:
  - Pre-defined routes.
  - Navigation routes.
- By location and other road restrictions.
Problem:
Not all conflicts are detected.

Option for solution:
Coded work zone locations.
All work zones in one system:
  Work zone information system which can be used all agencies (state, county, city, ...).
Planned Work Zones:
Do not always follow the plan.
Also lacking in data to meet the **demands and requirements for CAV**.

Option for solution:
Send coded information about traffic control to vehicles (CAV)
Automatically update the information:

- Traffic flow (speed):
  - Service providers (HERE, Inrix, TomTom, Google, ...).
- Sensors (iCone, ...).
Creating accurate data in Germany

In Germany, since the 1990’s, the State Police are responsible for making notifications, changes and cancellations about traffic incidents.

Information is created, stored, and distributed to websites and traffic information providers, including broadcasters and in-vehicle navigation systems.

Each of the 16 Federal States use their own TIC system, to create and exchange data.
AWSA: Moving work zone warning system in Saxony Anhalt.

Uses existing business processes and systems.

First European project to increase traffic safety using Smart Work Zones.
Saxony-Anhalt

Area:
8th largest federal state
~7,900 square miles

Population (2015):
10th largest population
2.245 Million
About LSSB

Autobahn (Interstate roads):
290 miles.
7 road maintenance departments.

Federal, State, County roads:
4,340 miles.
21 road maintenance departments for Federal, State, County roads.
Accidents on autobahns in 2017:
4,800 total.
2,000 caused by trucks.
27 people killed.

Road agency employee killed during truck accident in 2014 and 2017.

7-10 warning trailers lost by accidents per year.

Source: LSBB
Project objectives

Increase:
- Safety of workers (construction and otherwise).
- Drivers safety.

Minimize:
- The risk of accidents.
- Traffic disruption at work zones.

Technology can be used by old and new vehicles.

Use existing information systems and existing business processes.

Source: LSBB
The project

New.

- TICO
- LSBB
  - Moving and planned work zones

Existing systems.

- LMS ST
  - Police
- Radio Stations
- Road Agencies & Vehicles
### Location and Work Zone data reported automatically

#### Table: Location and Work Zone data

<table>
<thead>
<tr>
<th>TIC ID</th>
<th>Name</th>
<th>Description</th>
<th>Identifier</th>
<th>Activity</th>
<th>Planned duration</th>
<th>Non-codeable information</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>RD/119_75</td>
<td>A9 Berlin Richtung</td>
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<td>green care</td>
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#### Work Zone Details

- **TIC ID:** RD/119_75
- **Description:** A9 Berlin Richtung Halle/Lipzig zwischen Köthen und Cölln
- **Identifier:** 75
- **Activity:** green care
- **Location:** A9 Berlin to Halle/Lipzig between Köthen and Cölln

#### Traffic Control

- **Normal traffic control:**
- **Data producer:** AWZA
- **Mooting:** Yes
- **Time zone:** UTC+01:00 Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna
- **Object version create time:** 1/3/2018 2:30:33 PM
- **Object version end time:** 1/3/2018 2:30:33 PM
- **Object version type:** deleted
- **Server time:** 1/3/2018 2:30:33 PM
- **Date create time:** 1/3/2018 2:30:33 PM

#### Diagram:

- Map showing location and work zone data.
Data is automatically updated
The achievement

Moving work zones are now available:
- Common navigation systems via RDS/TMC.
- Apple and Google traffic data.
- In traffic announcements and web sites.

Short and long term work zones are available.

All work zones are available at Mobility Data Marketplace.

TIC Implementation cost 150k € ($175K)
- Add $1~2k per warning trailer unit.

Source: LSBB
A Personal Experience

A crash on the A14
State Police create a Traffic Event and dispatch emergency responders.

Information is distributed to navigation systems via RDS/TMC.

Apple and Google traffic.

Broadcasters, web sites, ...
Drivers clear a lane

Drivers move to the sides of the road

- Trucks to the right, cars to the left, leaving a center lane opening for emergency vehicles to pass.
- Backup eventually reached ~10km (more than 6 miles).
Emergency responders, and a Mobile Warning Trailer arrive.

Warning trailer provided more accurate location.

Message entered on warning trailer, including arrow board direction.

Closure information automatically updated based on actual sign location AND actual message delivered on the sign!
Warning trailer can be “old” equipment.

On-Board transmitter unit with GPS and Internet connection, powered by the same battery as the sign.

Can be placed at any location.

Data is sent to drivers via RTTI, RDS-TMC, ..., and received using in-vehicle navigation device or other means.
2018:
  Operations started in Mar 2018.
  At least one warning trailer per road maintenance agency.

2019:
  60 warning trailers will be in use.

Solution can be used worldwide.
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