

# Road Infrastructure Support

## Example: Road Works

Yannick Wimmer  
ASFINAG

**austriatech**

**SIEMENS**  
Ingenuity for life



virtual  vehicle

 **ASFINAG**

 **autopistas**  
an Abertis company

**enide**

 **Fraunhofer**  
FOKUS

**TomTom** 



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723016.

## ISAD Levels

Carreras, A., X. Daura, J. Erhart, S. Ruehrup. 2018. "Road infrastructure support levels for automated driving (EU-IP1488)". 25th IST World Congress, Copenhagen, Denmark, 17-21 September 2018. 10 pages.

	ISAD	Name	Infrastructure side	AV side	Digital information provided to AVs			
					Digital map with road signs	VMS warnings, incidents, weather	Microscopic traffic situation	Guidance: speed, gap, lane advice
Conventional Infrastructure	E	Conventional infrastructure / no AV support		Road geometry and road signs have to be recognized by AVs on their own				



INFRAMIX General Assembly, Barcelona 2019

## ISAD Levels

Carreras, A., X. Daura, J. Erhart, S. Ruehrup. 2018. "Road infrastructure support levels for automated driving (EU-IP1488)". 25th IST World Congress, Copenhagen, Denmark, 17-21 September 2018. 10 pages.

	ISAD	Name	Infrastructure side	AV side	Digital information provided to AVs			
					Digital map with road signs	VMS warnings, incidents, weather	Microscopic traffic situation	Guidance: speed, gap, lane advice
Conventional Infrastructure	E	Conventional infrastructure / no AV support		Road geometry and road signs have to be recognized by AVs on their own				
	D	Static digital information / map support	Digital map data (including static road signs) complemented by physical reference points	Traffic lights, short term road works and VMS have to be recognized by AVs on their own				



## ISAD Levels

Carreras, A., X. Daura, J. Erhart, S. Ruehrup. 2018. "Road infrastructure support levels for automated driving (EU-IP1488)". 25th IST World Congress, Copenhagen, Denmark, 17-21 September 2018. 10 pages.

	ISAD	Name	Infrastructure side	AV side	Digital information provided to AVs			
					Digital map with road signs	VMS warnings, incidents, weather	Microscopic traffic situation	Guidance: speed, gap, lane advice
Conventional Infrastructure	E	Conventional infrastructure / no AV support		Road geometry and road signs have to be recognized by AVs on their own				
	D	Static digital information / map support	Digital map data (including static road signs) complemented by physical reference points	Traffic lights, short term road works and VMS have to be recognized by AVs on their own				
Digital Infrastructure	C	Dynamic digital information	All static and dynamic information can be provided to the AVs in digital form	AVs perceive infrastructure support data				

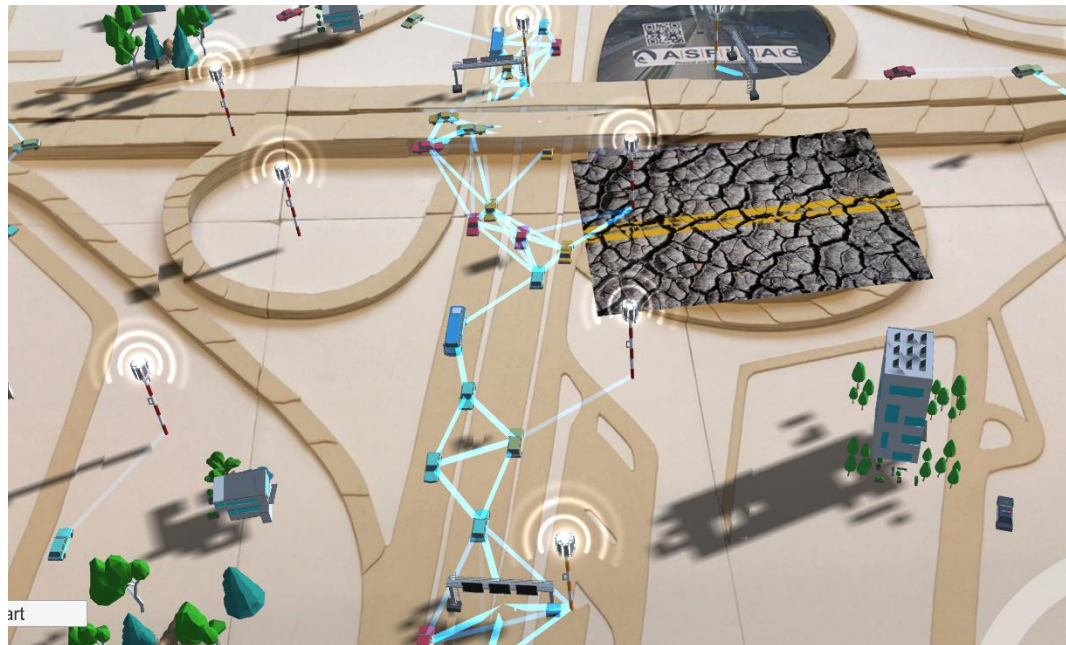




## ISAD Levels

Carreras, A., X. Daura, J. Erhart, S. Ruehrup. 2018. "Road infrastructure support levels for automated driving (EU-IP1488)". 25th IST World Congress, Copenhagen, Denmark, 17-21 September 2018. 10 pages.

	ISAD	Name	Infrastructure side	AV side	Digital information provided to AVs			
					Digital map with road signs	VMS warnings, incidents, weather	Microscopic traffic situation	Guidance: speed, gap, lane advice
Conventional Infrastructure	E	Conventional infrastructure / no AV support		Road geometry and road signs have to be recognized by AVs on their own				
	D	Static digital information / map support	Digital map data (including static road signs) complemented by physical reference points	Traffic lights, short term road works and VMS have to be recognized by AVs on their own				
Digital Infrastructure	C	Dynamic digital information	All static and dynamic information can be provided to the AVs in digital form	AVs perceive infrastructure support data				
	B	Cooperative perception	Infrastructure is capable of perceiving microscopic traffic situations	AVs perceive infrastructure support data in real time (C-ITS Day 1)				



## ISAD Levels

Carreras, A., X. Daura, J. Erhart, S. Ruehrup. 2018. "Road infrastructure support levels for automated driving (EU-IP1488)". 25th IST World Congress, Copenhagen, Denmark, 17-21 September 2018. 10 pages.

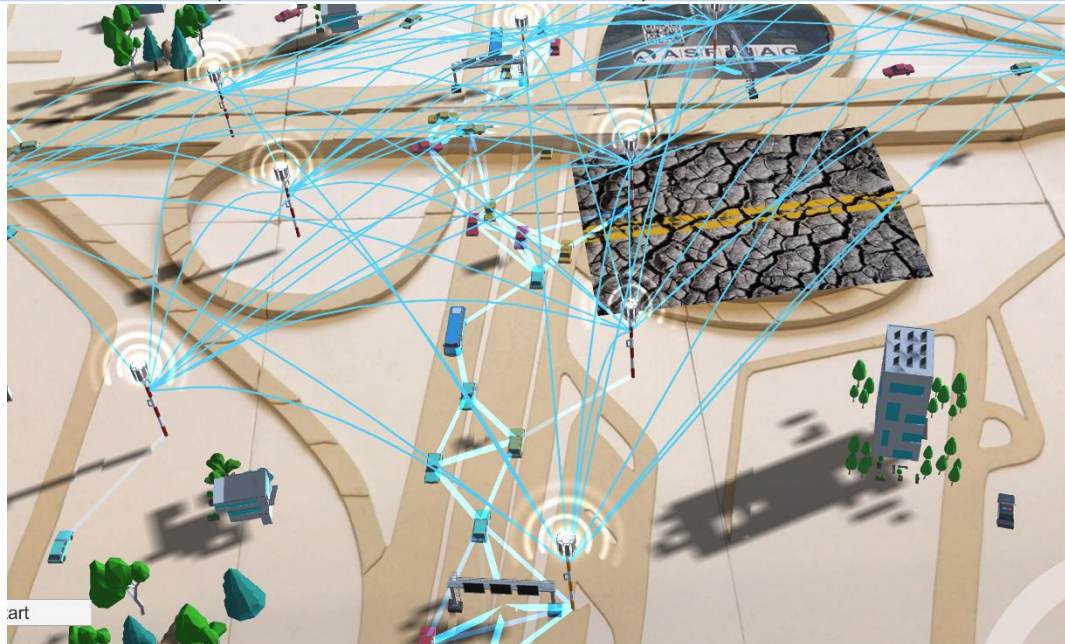
	ISAD	Name	Infrastructure side	AV side	Digital information provided to AVs			
					Digital map with road signs	VMS warnings, incidents, weather	Microscopic traffic situation	Guidance: speed, gap, lane advice
Conventional Infrastructure	E	Conventional infrastructure / no AV support		Road geometry and road signs have to be recognized by AVs on their own				
	D	Static digital information / map support	Digital map data (including static road signs) complemented by physical reference points	Traffic lights, short term road works and VMS have to be recognized by AVs on their own				
Digital Infrastructure	C	Dynamic digital information	All static and dynamic information can be provided to the AVs in digital form	AVs perceive infrastructure support data				
	B	Cooperative perception	Infrastructure is capable of perceiving microscopic traffic situations	AVs perceive infrastructure support data in real time (C-ITS Day 1)				



## ISAD Levels

Carreras, A., X. Daura, J. Erhart, S. Ruehrup. 2018. "Road infrastructure support levels for automated driving (EU-IP1488)". 25th IST World Congress, Copenhagen, Denmark, 17-21 September 2018. 10 pages.

	ISAD	Name	Infrastructure side	AV side	Digital information provided to AVs			
					Digital map with road signs	VMS warnings, incidents, weather	Microscopic traffic situation	Guidance: speed, gap, lane advice
Conventional Infrastructure	E	Conventional infrastructure / no AV support		Road geometry and road signs have to be recognized by AVs on their own				
	D	Static digital information / map support	Digital map data (including static road signs) complemented by physical reference points	Traffic lights, short term road works and VMS have to be recognized by AVs on their own				
Digital Infrastructure	C	Dynamic digital information	All static and dynamic information can be provided to the AVs in digital form	AVs perceive infrastructure support data				
	B	Cooperative perception	Infrastructure is capable of perceiving microscopic traffic situations	AVs perceive infrastructure support data in real time (C-ITS Day 1)				
	A	Cooperative driving	Infrastructure is capable of perceiving vehicle trajectories and guide single AVs (or AV groups)	AVs are guided by the infrastructure in order to optimize traffic flow (C-ITS Day 2+)				

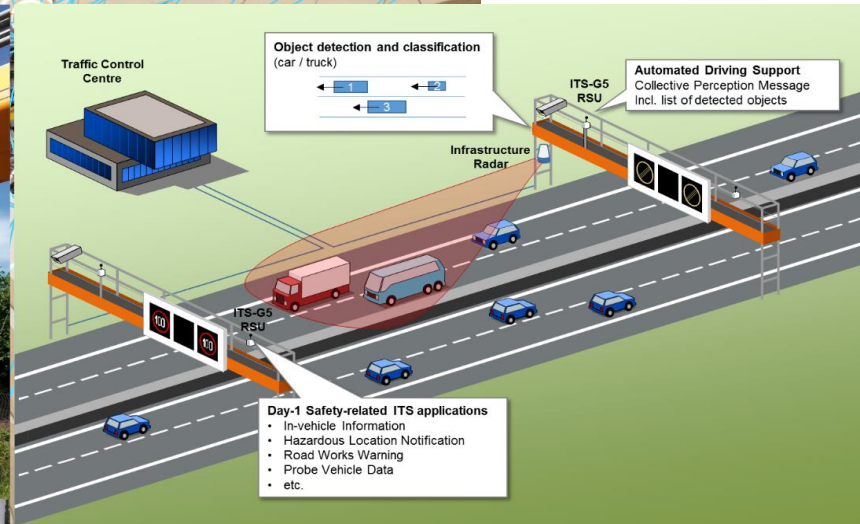




## ISAD Levels

Carreras, A., X. Daura, J. Erhart, S. Ruehrup. 2018. "Road infrastructure support levels for automated driving (EU-IP1488)". 25th IST World Congress, Copenhagen, Denmark, 17-21 September 2018. 10 pages.

	ISAD	Name	Infrastructure side	AV side	Digital information provided to AVs			
					Digital map with road signs	VMS warnings, incidents, weather	Microscopic traffic situation	Guidance: speed, gap, lane advice
Conventional Infrastructure	E	Conventional infrastructure / no AV support		Road geometry and road signs have to be recognized by AVs on their own				
	D	Static digital information / map support	Digital map data (including static road signs) complemented by physical reference points	Traffic lights, short term road works and VMS have to be recognized by AVs on their own				
Digital Infrastructure	C	Dynamic digital information	All static and dynamic information can be provided to the AVs in digital form	AVs perceive infrastructure support data				
	B	Cooperative perception	Infrastructure is capable of perceiving microscopic traffic situations	AVs perceive infrastructure support data in real time (C-ITS Day 1)				
	A	Cooperative driving	Infrastructure is capable of perceiving vehicle trajectories and guide single AVs (or AV groups)	AVs are guided by the infrastructure in order to optimize traffic flow (C-ITS Day 2+)				

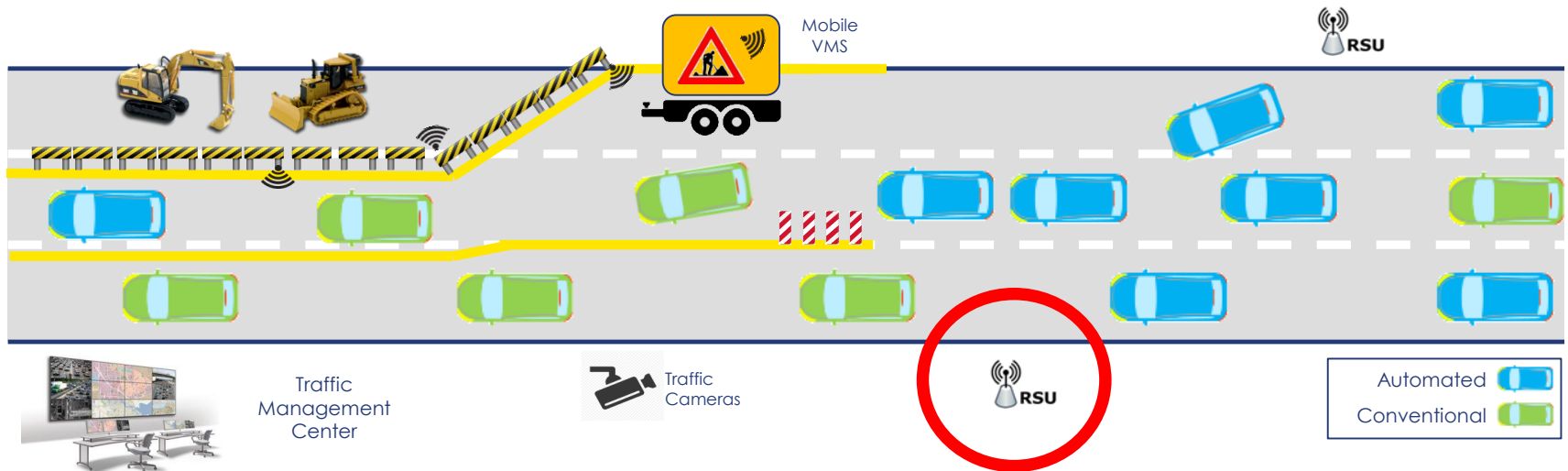




# INFRAMIX Scenario 2

## Roadworks Zone

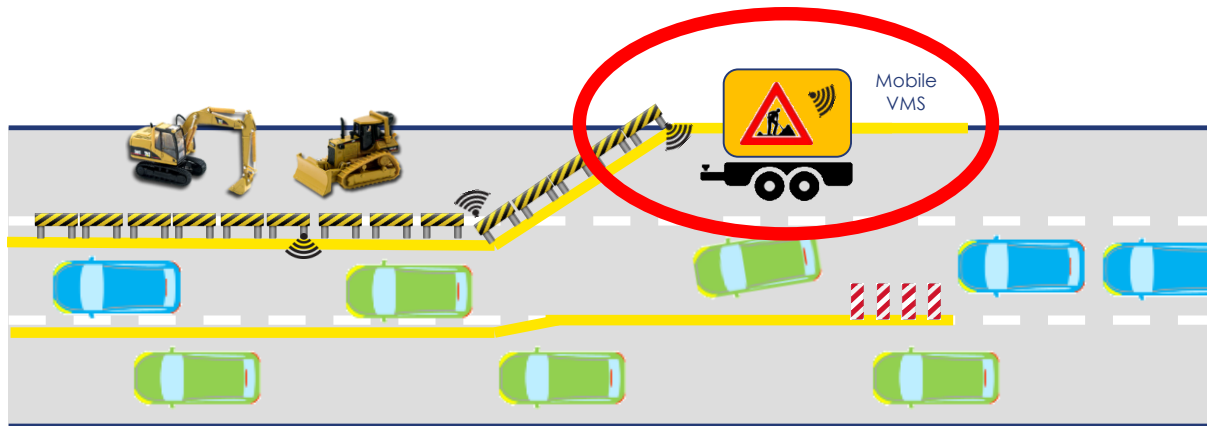
- › Short Term
- › Long Term



# INFRAMIX Scenario 2

## Roadworks Zone

- › Short Term
- › Long Term



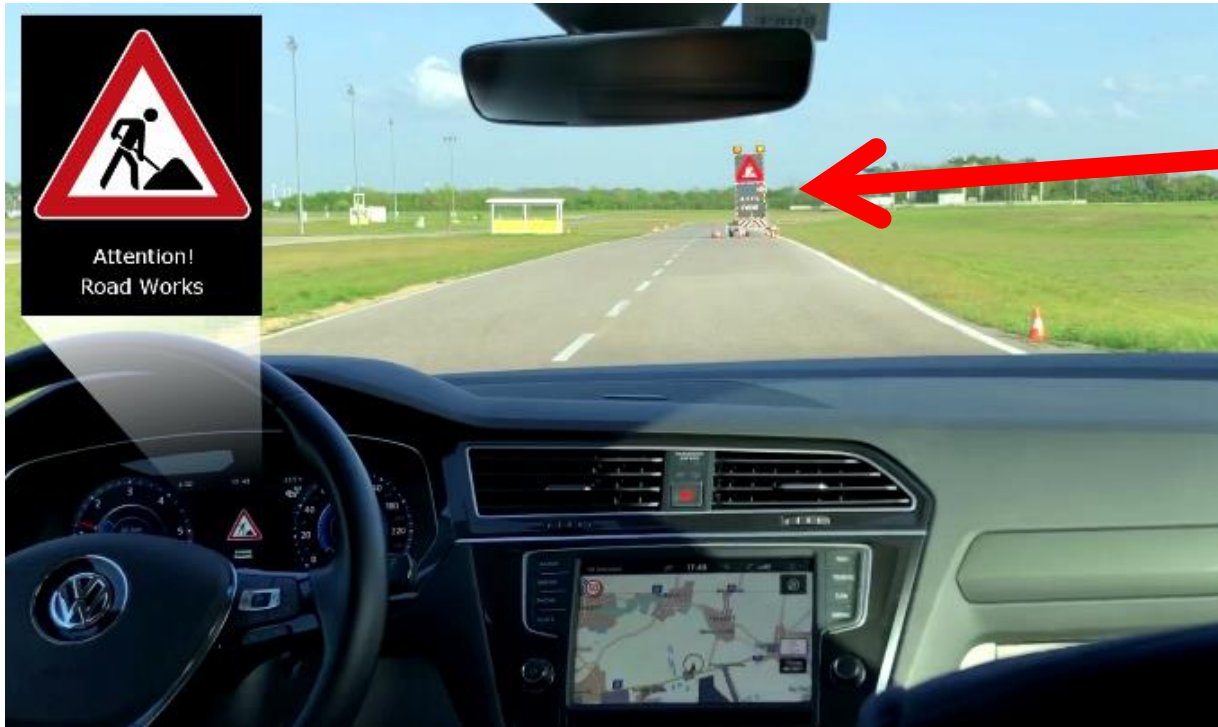
Traffic  
Management  
Center



# INFRAMIX Scenario 2

## Roadworks Zone

- › Short Term
- › Long Term

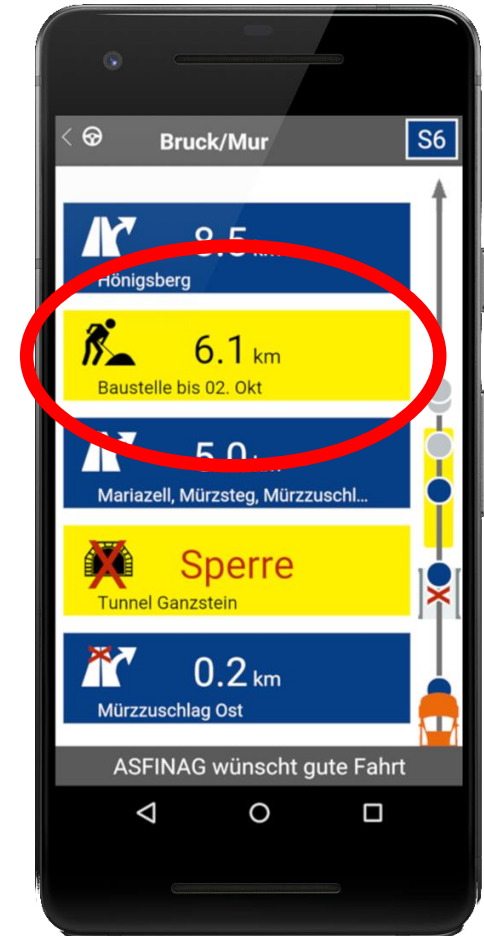




# INFRAMIX Scenario 2

## Roadworks Zone

→ Integrated in Asfinag Unterwegs App



# Advance information of road works is vital

However, 5% - 10% of safety trailers are hit by vehicles each year



## State-of-the-art:

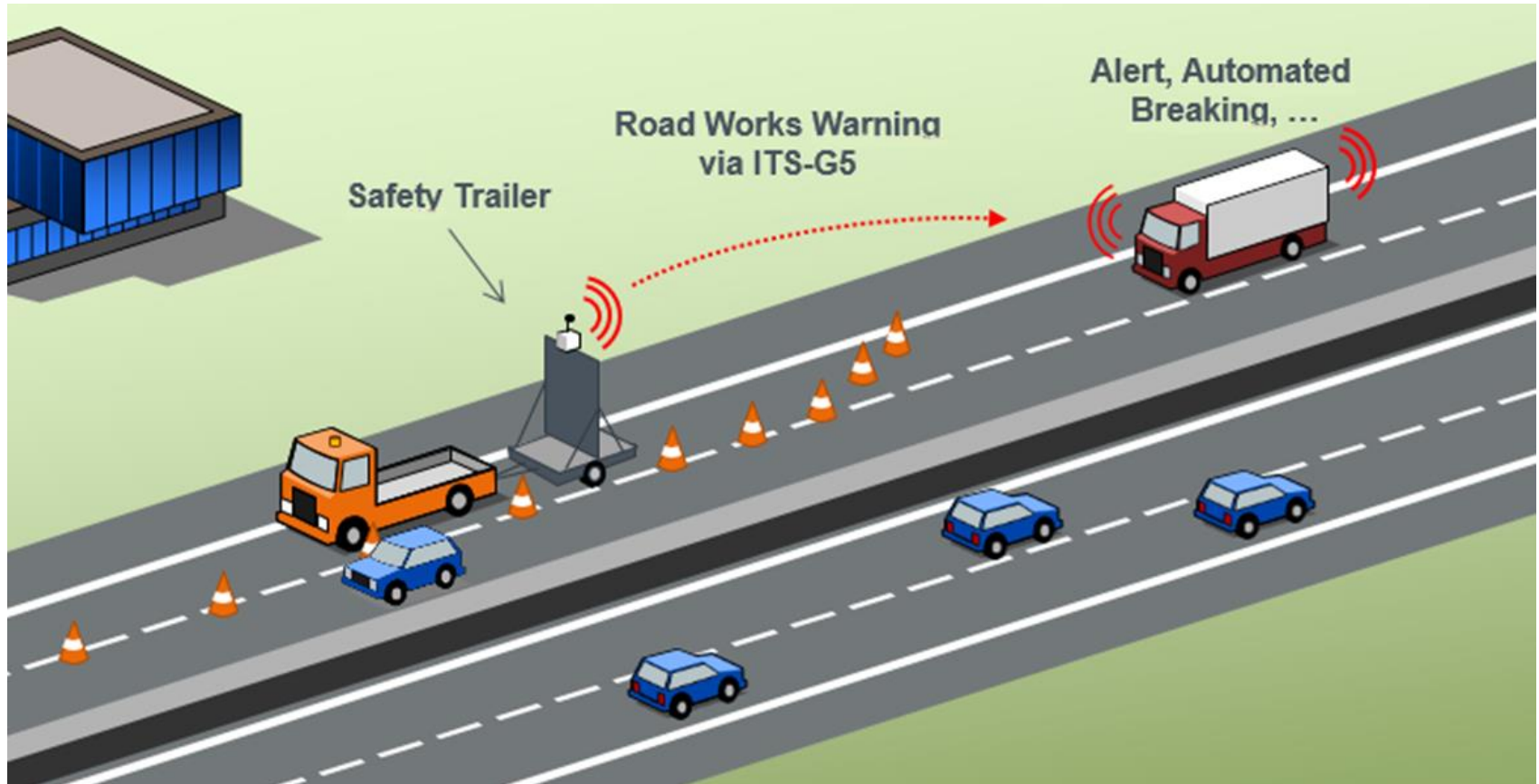
Voice messages via CB radio in 6 languages on 4 channels



Drivers speak more than 20 languages



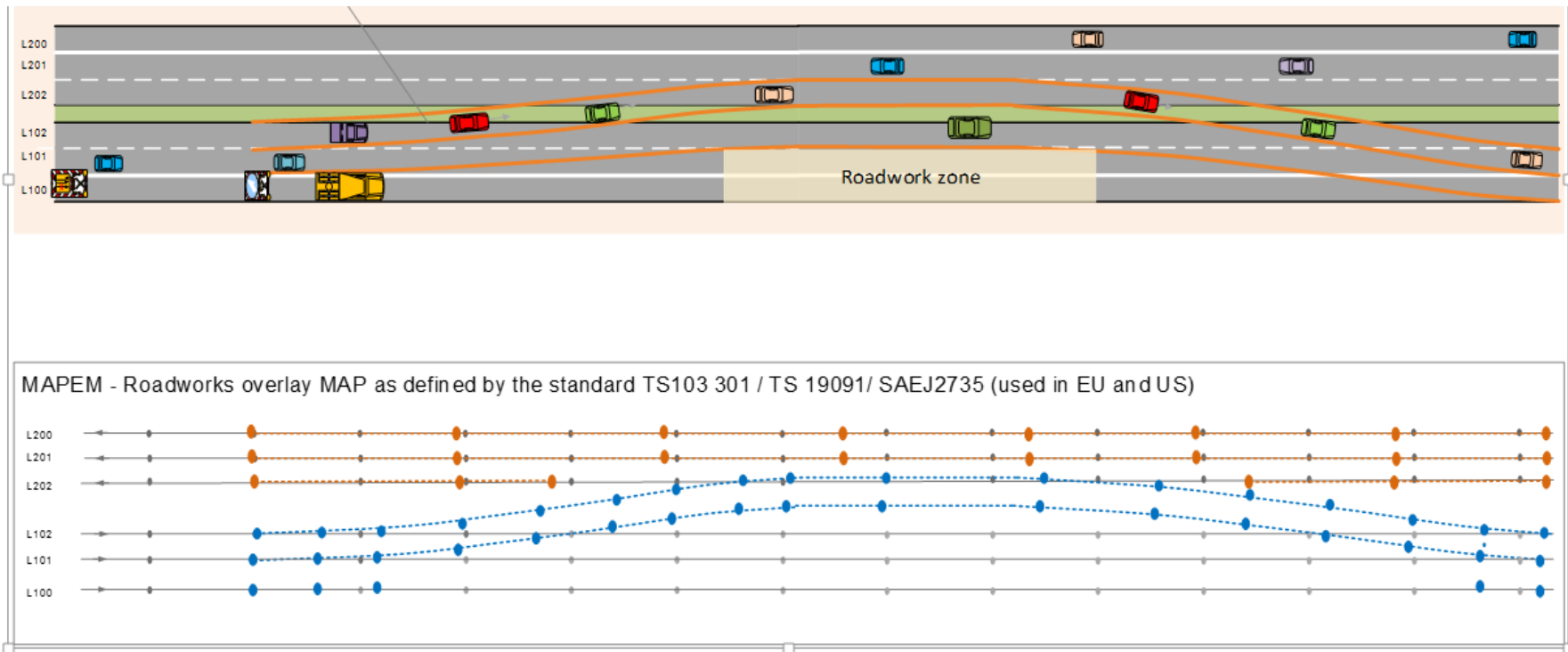
# ITS-G5 provides One language for road safety.



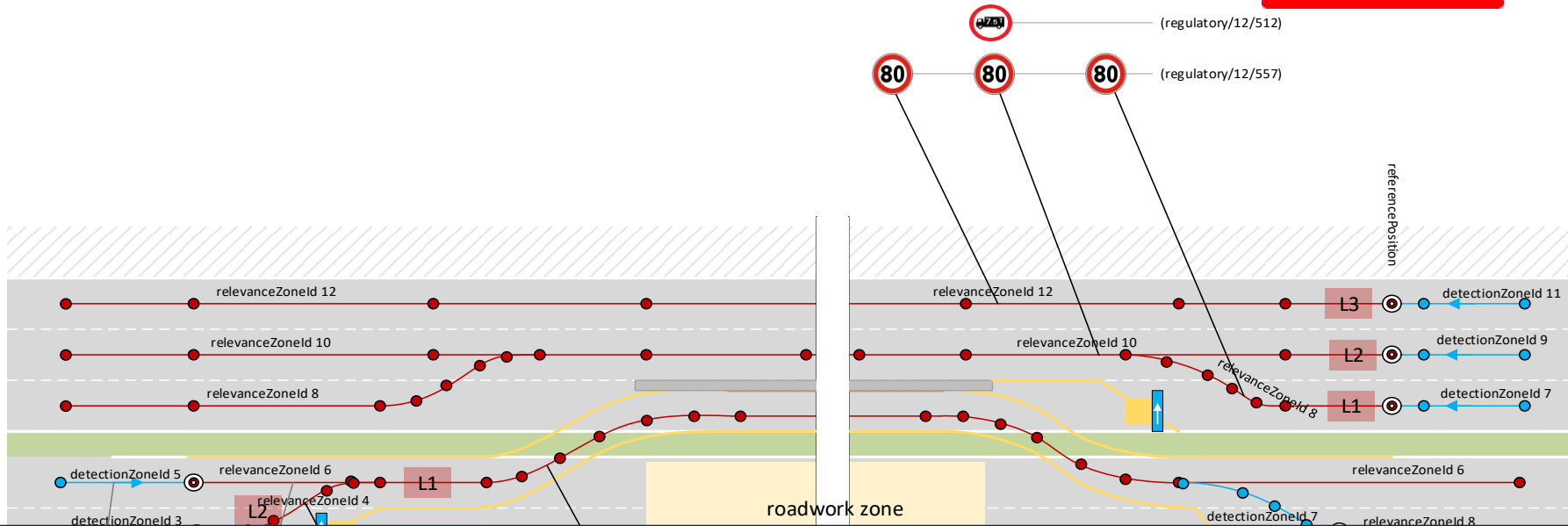
# Usecase long term RW



→ This means lane design change!



# Usecase long term RW



## Infrastructure support:

- Map w/o new layout – ISAD **D**
- - including (dynamic speed) limits – ISAD **C**
- Map support - map layers featuring new layout – ISAD **B**
- Lane change and gap advice dependent on traffic – ISAD **B**
- Guide single vehicles or vehicle groups through RW zone – ISAD **A**





**Yannick Wimmer**

**ASFINAG MAUT SERVICE GMBH**

**Am Europlatz 1**

**1120 Vienna, Austria**

**Tel +43 (0) 50108-12457**

**Mobile +43 (0) 664 60108-12457**

**[yannick.wimmer@asfinag.at](mailto:yannick.wimmer@asfinag.at)**

**[www.asfinag.at](http://www.asfinag.at)**



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723016.