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Project acronym: **INFRAMIX**

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## **D6.8**

### **Communication kit 2nd version**

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Dissemination level		
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PP	Restricted to other programme participants	
RE	Restricted to a group specified by the consortium	
CO	Confidential, only for members of the consortium	



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Editor:	Nikoletta Karitsioti

Author(s) – in alphabetical order		
Name	Organisation	E-mail
Nikoletta Karitsioti	ICCS	nikoletta.karitsioti@iccs.gr
Panagiotis Lytrivis	ICCS	panagiotis.lytrivis@iccs.gr
Stamatis Manganiaris	ICCS	stamatis.manganiaris@iccs.gr
Martin Dirnwöber	ATE	Martin.Dirnwoeber@austriatech.at
Robert Protzmann	FOK	robert.protzmann@fokus.fraunhofer.de
Wimmer Yannick	ASFINAG	Yannick.Wimmer@asfinag.at
Juan Salguero	AUTOPISTAS	juan.jose.salguero.ext@autopistas.com

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## Abbreviations and Acronyms

<b>Acronym</b>	<b>Definition</b>
EC	European Commission
PO	Project officer
GA	Grant Agreement
WP	Work Package
SMEs	Small and medium-sized enterprises
ITS	Intelligent Transport Systems



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## Executive Summary

This document is the description of the second version of the D6.2 Communication kit, which is prepared within WP6 Communication, Dissemination and Exploitation of INFRAMIX project.

INFRAMIX aims to prepare road infrastructure to support the coexistence of conventional and automated vehicles. Among its main objectives is to design, upgrade, adapt and test both physical and digital elements of the road infrastructure. The key outcome will be a “hybrid” road infrastructure able to handle the transition period and become the basis for future automated transport systems. The project developments will be assessed via simulation and on real stretches of advanced highways. This will help to ensure that the proposed adaptations will not jeopardize safety, efficiency and quality of service and will be appreciated by the users.

The D6.8 Communications kit 2nd version includes an updated version of the dissemination material provided in the D6.2 enriched with new material. More specifically, this version consists of the leaflet, the poster, the roll-up banner, the general presentation, the e-newsletters, the videos and the brochure. The communication kit is updated periodically and one more description will be reported on M36 in the project timeline.



## 1. Introduction

During the second year of the INFRAMIX project, the communication kit aims to continue informing the public, relevant search institutions, academic and industrial community on the project's general concept, including the objectives and expected results and also present the first results of the project. This will be the basis for the further development of the communication kit and the communication and dissemination strategy in general, since the communication kit has already been produced on a large scale at this stage and will be updated periodically within the project's lifetime.

More specifically, the communication kit, as has been described, includes the project brochure, banner, general presentation, e-newsletters and last but not least promotional videos. This kit is planned to be yearly updated (M12, M24, M36). In this second version, is presented the communication kit as is of this moment (M24). An updated version will follow the next year (M36). The communication kit is available both, in the online repository the consortium uses and in the INFRAMIX website, as well as in the Dissemination material webpage [here](#).

### 1.1 Intended readership

This Deliverable is disseminated both internally, within the consortium, and also externally, to any interested parties outside of the project. The intended readership primarily comprises the members of the INFRAMIX consortium, the European Commission (EC) as well as the INFRAMIX Project Officer (PO). The specific document could be used as a point of reference by all partners in order to use the appropriate material, safeguard the INFRAMIX brand identity and effectively disseminate the project.

### 1.2 Relationship with other INFRAMIX deliverables

This Deliverable lies in D6.2 Communications kit, while is closely related to D6.6 Communication Strategy and Plan.

## 2. Communication kit

### 2.1 INFRAMIX leaflet

The INFRAMIX leaflet (Annex 1) was designed and published within the TRA Conference 2018 in Vienna where INFRAMIX showed a strong presence. More specifically, the leaflet included the objectives and the expected impact of the project, the traffic scenarios that will be investigated as well as images from the two test sites in Spain and in Austria (including pictures of its equipment). The main contact points (the project coordinator and the dissemination manager) of the project, the partners, the website and the INFRAMIX social media were also included in the leaflet. A first update of the leaflet took place in the framework of ITS World Congress 2018 including new pictures and elements which resulted from the project's evolution. A second update was carried out for the 1<sup>st</sup> INFRAMIX Stakeholders Workshop, in order to include new partners' logos.

The general idea of the leaflet is to present the project briefly and in a comprehensible way, so as to inform the targeted audiences about INFRAMIX. The leaflet is constantly updated according the projects' needs and uploaded in the online repository.

### 2.2 INFRAMIX poster

The objective of the INFRAMIX poster is to promote the project mainly within the scientific community and secondly to the general public. To reach this objective, the poster has been adjusted to the project's website in terms of language, text and visual elements. It is used at



conferences, exhibitions and public meetings. Due to its low weight and its availability in various sizes it is in high demand among the partners.

The first version of the INFRAMIX poster was developed and published for the TRA Conference 2018 in Vienna. It was designed in line with the INFRAMIX brand identity and the communication guidelines. It was updated in the framework of ITS World Congress and stored in the online repository.

The poster (Annex 1) includes information, such as the INFRAMIX's general concept, the objectives, the expected impact and the interim major results as well as the partners, the main contact points, the website and the social media of INFRAMIX project. A second update of the INFRAMIX poster was carried out for the EUCAD Conference.

The poster will be updated according to the project's needs whenever this is required and in order to stay aligned with the INFRAMIX presence on specific events. Additional posters may also be developed during the third year of the project, focusing on specific aspects and results.

### **2.3 INFRAMIX roll-up banner**

The aim of the roll-up banner is to present the project, its objectives and results mainly in conferences, addressing a more scientific audience. To reach this objective effectively, a roll-up banner (Annex 1) was designed in this second version of the communication kit in accordance with the INFRAMIX visual identity as well as with the previously developed dissemination material.

The roll-up banner was firstly used within the 1<sup>st</sup> INFRAMIX Stakeholders' Workshop, providing more details about the project's concept, focusing on the three scenarios to be covered in INFRAMIX and also giving the opportunity to all attendees to find out more about INFRAMIX by providing all available INFRAMIX channels and also the contact details.

The roll-up banner will be updated as necessary during the project, in particular it will be expanded with key results as the projects comes closer to its end.

### **2.4 INFRAMIX general presentation**

In order to provide a homogenous image of the project to the external actors and the public, a standardized presentation of the project (Annex 1) was also prepared and may be used by all partners to present or pick some basic slides in order to prepare their individual presentations when participating in external events.

The presentation includes the following information: the INFRAMIX objectives and facts, the consortium, the main activities and the expected impact. It also provides all the information how to access the project's website and social media as well as to contact the project's representatives. The presentation is stored in the online repository and will be updated regularly depending on the project's progress and the achieved results.

### **2.5 INFRAMIX e-newsletters**

The project aims to publish periodic e-newsletter on important milestones of INFRAMIX in order to support the ongoing needs of the project after launching all the project's activities. The newsletter's objective is to summarize the project's activities and outcomes and to proactively initiate conversations with multiple stakeholders about on-going research topics. The e-newsletters (Annex 1) include information about the project's progress and will address both the scientific community as well as SMEs and Industry. A mailing list has been created, including all the people that have expressed their interest about INFRAMIX project and specifically its newsletter according to the recent GDPR rules. INFRAMIX has already issued two e-newsletters, available at the INFRAMIX website [here](#), as well as in the online repository the consortium uses.

In addition, an e-blast has been prepared and sent to the INFRAMIX list on May, in order to announce the 1<sup>st</sup> INFRAMIX Stakeholders' Workshop and encourage them to register. The e-



blast is available in the online repository.

## 2.6 INFRAMIX promotional videos

The INFRAMIX project aims to provide videos to communicate the INFRAMIX messages in an easy and impactful way. The videos will be available on the project's website and social media, as well as on other available channels and platforms, such as YouTube, forums supporting the project's realization, the partners' websites e.t.c. The videos will also be displayed in relevant events and conferences which INFRAMIX will either organize or participate in.

Within the first year of the project's lifetime, the first version of the video was prepared. Given the lack of results at that time, the video focused mainly on the promotion of partners participating in INFRAMIX and their affiliation to the project's activities, as well as the general information of the project.

The first INFRAMIX video (Annex 1) is realized and presented in various events in the english language. It is stored in the INFRAMIX account on YouTube in order to be available for all partners and visitors. It was also broadcasted during the [ITS World Congress](#) 2018 at the project stand and the EUCAD Conference 2019.

The project's video will be updated within the third year of the project with the INFRAMIX results and solutions, in order to disseminate the project's effectiveness.

## 2.7 INFRAMIX brochure

In addition to the project's leaflet, a more informative brochure (Annex 1) was provided. The INFRAMIX brochure was developed and uploaded in the online repository as well as in the official INFRAMIX website [here](#). It is a 12 page booklet which contains extensive information about the project and its activities.

The INFRAMIX brochure will be distributed in different occasions and exhibitions to provide more specific information about the project. As there already is an INFRAMIX leaflet, which was developed in an early stage of the project and therefore only includes limited project results, we have the flexibility to further extensions and edits to the brochure in order to secure an up-to-date content. The INFRAMIX brochure was distributed within the 1<sup>st</sup> Stakeholders Workshop as well as in the EUCAD Conference 2019 and other external events that INFRAMIX partners participated in.

## 2.8 INFRAMIX paper description

According to the partners' needs specific dissemination material is prepared and added in the INFRAMIX communication kit. The INFRAMIX paper description (Annex 1) was developed and used to cover the needs of the INFRAMIX representation in a specific conference.

The INFRAMIX paper description is an A4 document, consisting of 4 pages, which briefly presents main information about the project, such as the concept, the objectives and expected results. Furthermore, it features information about the two test-sites and also the three scenarios for vehicle traffic flows.

The INFRAMIX paper description is available in the online repository the consortium uses and to the INFRAMIX website [here](#).

## 3. Conclusion

In order to summarize, INFRAMIX project developed a communication kit so as to support all the communication and dissemination activities of the project.

The present deliverable presents all the material currently available within the communication kit. All material follows a coherent visual scheme, based on INFRAMIX design, that allows INFRAMIX to promote its brand identity.





The general aim of the kit is to communicate the project, its activities and results in an effective way and make the results and deliverables of the project available in a comprehensible manner to all the potential audiences.

The communication kit is a live kit, which will carry on evolving alongside the project as has been indicated in the Grant Agreement. While entering the last year of the project, the communication kit it will be updated, mainly content-wise, in order to reflect the project's evolution and results and also adjust to specific audiences and occasions.



# Annex 1 – Communication kit

## INFRAMIX leaflet

  @INFRAMIX  INFRAMIX project

**Partners**

*austriatech*  

**Project Coordinator**  
AustriaTech Gesellschaft des Bundes  
für technologiepolitische Maßnahmen GmbH  
**Martin Dirnwöber** martin.dirnwöber@austriatech.at

**Dissemination Manager**  
ENIDE SOLUTIONS S.L.  
**David Quesada** david.quesada@enide.com

**INFRAMIX**

Preparing road infrastructure for mixed vehicle traffic flows

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

[www.inframix.eu](http://www.inframix.eu)



INFRAMIX is preparing the road infrastructure to support the coexistence of conventional and automated vehicles. The key outcome will be a *hybrid* road infrastructure able to handle the transition period and become the basis for future automated transport systems.

To achieve this goal INFRAMIX will employ new advanced microscopic traffic flow models, advanced simulation techniques, innovative control strategies, as well as appropriate new and adapted existing physical and digital infrastructure elements. All these will be cross validated against user appreciation and safety performance leading among others to a novel road infrastructure classification scheme.

The key elements of INFRAMIX are:

- Design new and upgrade existing physical & digital road infrastructure elements
- Develop a co-simulation environment
- Design and implement novel traffic estimation, monitoring and control strategies
- Develop hybrid testing system
- Design novel signalling and visualization elements
- Evaluate user's appreciation and acceptance
- Evaluate traffic safety
- Create a Road Infrastructure Classification Scheme

## EXPECTED IMPACT

INFRAMIX will provide key elements for a step by step introduction of automated driving. A set of targeted interventions related to physical and digital infrastructure will be carefully defined, as road infrastructure has to deal with several challenges:

- The construction of new roads is expensive and time consuming
- Europe has already a quite mature road network
- Roads have a quite long lifecycle

The interventions will be adaptable and incremental to cope with a variety of existing infrastructure and diverse traffic scenarios.

## 8 DIFFERENT USE CASES

### Scenario 1: Dynamic Lane

**Assignment** (incl. speed recommendations)

1. Real time lane assignment under dynamic penetration rate of automated vehicles
2. Exceptional circumstances e.g. adverse weather conditions
3. A conventional vehicle drives on a dedicated lane for automated vehicles

### Scenario 2: Roadworks zones

4. Single lane closure (e.g. short term constructions)
5. New lane design (e.g. long term constructions)

### Scenario 3: Bottlenecks

6. Automated vehicles driving behaviour adaptation in real time at sags
7. Lane change advice to connected vehicles at bottlenecks
8. Lane change advice combined with flow control at bottlenecks for all vehicles

## Real tests on modern highways



**autopistas**  
an Abertis company

**Girona**  
(Spain)



**ASFINAG**  
**Graz**  
(Austria)



# INFRAMIX poster



**INFRAMIX**

<https://www.inframix.eu>

@inframix    INFRAMIX project



**INFRAMIX** will help to prepare road infrastructure to support the coexistence of conventional and automated vehicles.

Its main objective is to design, upgrade, adapt and test both physical and digital elements of the road infrastructure. The key outcome will be a "hybrid" road infrastructure able to handle the transition period and become the basis for future automated transport systems. The project developments will be assessed via simulation and on real stretches of advanced highways. This will help to ensure that the proposed adaptations will not jeopardize safety, quality of service, efficiency and will be appreciated by the users.

INFRAMIX builds on three traffic scenarios: **dynamic lane assignment**, **roadworks zones** and **bottlenecks**. INFRAMIX addresses mainly highways, as they are expected to be the initial hosts of mixed traffic, but the key results can also be transferred to urban roads.



### Cases, expected impacts and interim major results

- Adaptation and development of simulation environments for mixed traffic scenarios
- Linking simulation environments to real traffic test sites (hybrid testing)
- Development, implementation and validation of traffic state estimation and traffic control algorithms for mixed vehicle traffic
- Specification of digital and physical elements (e.g. new visual signs) of the road infrastructure
- Evaluation of users' appreciation
- Evaluation of proposed INFRAMIX infrastructure measures with regards to traffic safety and efficiency
- Development of safety performance criteria for road infrastructure in mixed traffic
- Development of an infrastructure classification scheme for automated transport (similarly to the SAE levels of automation)
- Roadmap towards the long term vision of automated transport

### Simulation framework

Model interaction

Traffic situation modelling				Vehicle behaviour modelling			
Microscopic traffic flow	Macroscopic traffic flow	Cell-based models	Signal control	Vehicle control	Vehicle control	Vehicle control	Vehicle control
ICOS	ICOS	ICOS	ICOS	ICOS	ICOS	ICOS	ICOS

INFRAMIX Management Center

### Partners

### Project Coordinator

AustriaTech Gesellschaft des Bundes für technologiepolitische Maßnahmen GmbH  
**Martin Dirnwöber** [martin.dirnwöber@austriatech.at](mailto:martin.dirnwöber@austriatech.at)

### Dissemination Manager

ENIDE SOLUTIONS S.L.  
**David Quesada** [david.quesada@enide.com](mailto:david.quesada@enide.com)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 720016.



# INFRAMIX roll-up banner

**INFRAMIX**  
Road infrastructure ready for mixed vehicle traffic flows

**Vision**  
To help prepare road infrastructure to support the coexistence of conventional and automated devices with enhanced traffic flow efficiency, safety and user appreciation.

**Mission**  
To design, upgrade, adapt and test both physical and digital elements of the road infrastructure.

**3 traffic scenarios**

- 01 Dynamic lane assignment**
  - Real-time lane assignment under dynamic penetration rate of automated vehicles
  - Exceptional traffic situations (adverse weather conditions)
  - A conventional vehicle drives on a dedicated lane for automated vehicles
- 02 Roadworks zones**
  - Single Lane Closure (e.g. barrier construction)
  - New Lane Design (e.g. long-term construction)
- 03 Bottleneck**
  - Automated vehicle driving behavior adaptation (red time of stop)
  - Lane-Change Advice to connected vehicles at bottlenecks
  - Lane-Change Advice combined with flow control at bottlenecks for all vehicles

**Expected results**

- Road infrastructure for mixed traffic
- Infrastructure classification scheme
- Simulation platform
- Hybrid testing system

**Join INFRAMIX**

[www.inframix.eu](http://www.inframix.eu) [@inframix](https://twitter.com/inframix) [INFRAMIX project](https://www.linkedin.com/company/inframix-project) [info@inframix.eu](mailto:info@inframix.eu)

**Coordinator:**  
AustriaTech - Federal Agency for Technological Measures  
Martin Dirmwöber

**Dissemination Manager:**  
ENIDE SOLUTIONS S.L.  
David Quesada

**Partners:**  
austriatech, Fraunhofer, AISI/FINIAIG, virtual vehicle, TOMTOM, autopistas, enide, SIEMENS

**Work programme:** Horizon 2020  
**Starting date:** 01/06/2017  
**Duration:** 36 Months  
**Budget/EU contribution:** 4.899.403,75 euros

**At a Glance**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 723014.

**INFRAMIX general presentation (indicative slides)**

**Road Infrastructure ready for mixed vehicle traffic flows**

Speaker's name / affiliation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723014.

**INFRAMIX project facts**

**Duration:** 1 June 2017-31 May 2020  
**EC Funding:** 5M €  
**Coordinator:** AustriaTech  
**Consortium:**  
Austriatech, ICCS,  
Asfinag, Fraunhofer, Siemens,  
Virtual Vehicle, Autopistas,  
Enide, Technical University of Crète,  
TomTom, BMW

**Website:** <https://www.inframix.eu/>  
**Social media:** @inframix INFRAMIX project

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## Real tests

2 modern highways for real tests

### Girona (Spain)

**Test-site Autopistas**

Autopistas

### Gratz (Austria)

Traffic Scenarios	Spain	Austria	Hybrid testing	Co-simulation environment
Dynamic Lane Assignment	X			X
Roadworks		X	X	X
Bottlenecks	X	X	X	X

## Keep track on INFRAMIX

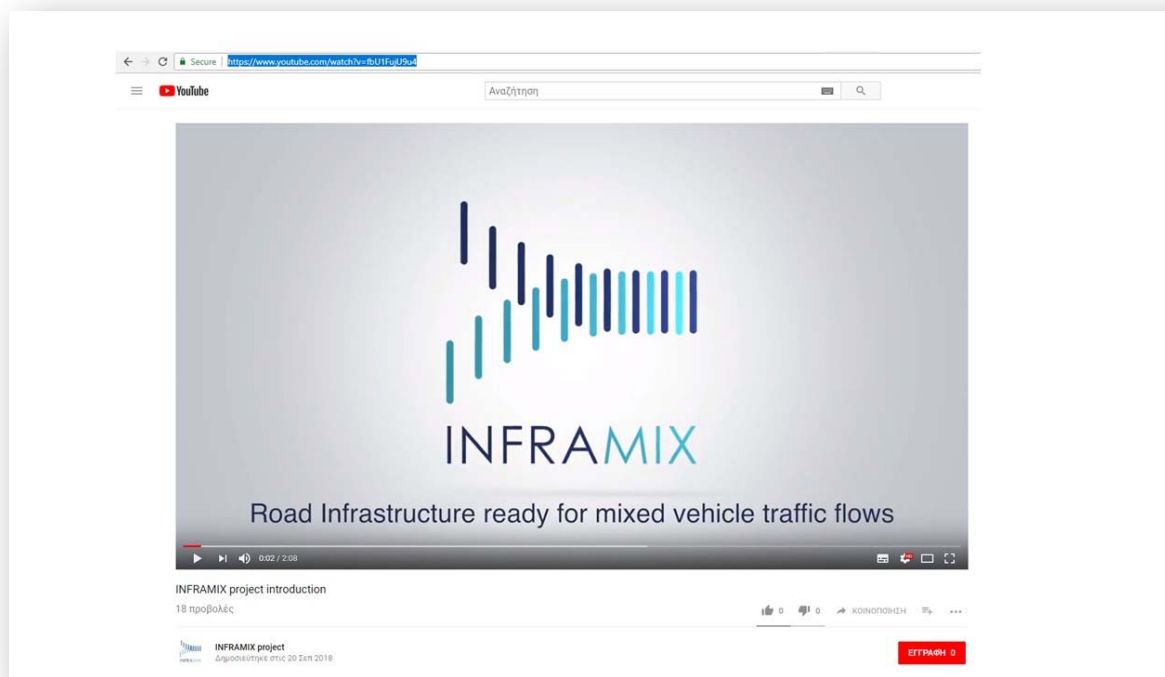
- Website: <https://www.inframix.eu/>
- Twitter: @inframix
- Linkendin: inframix project
- Sign up to our newsletter: <https://lists.inframix.eu/wws/subscribe/news>
- Contact us:
  - Project coordinator : Martin Dirnwöber  
martin.dirnwöber@austriatech.at
  - Dissemination Manager: David Quesada  
david.quesada@enide.com

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## INFRAMIX video

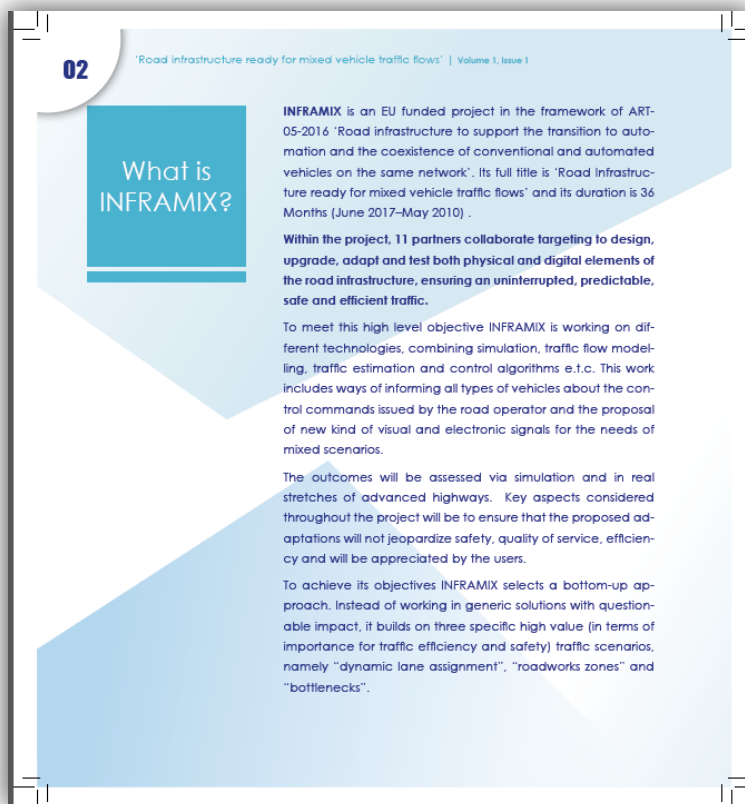
<https://www.youtube.com/watch?v=fbU1FujU9u4>







## INFRAMIX brochure






### Which are the INFRAMIX objectives?

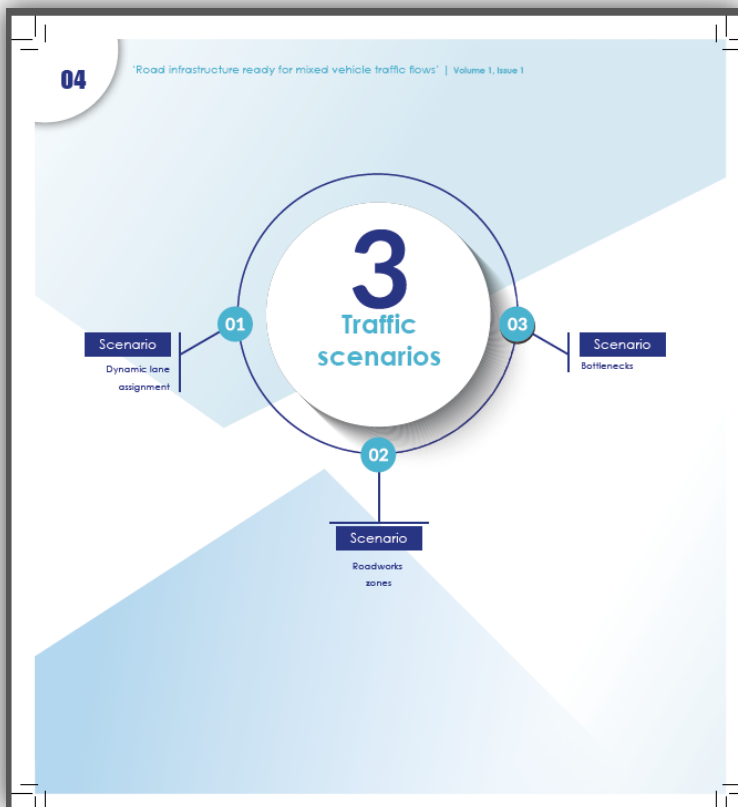

03

- Design new and update existing physical & digital road infrastructure elements;
- Develop a co-simulation environment; combining the modelling of the vehicle behaviour with the traffic simulation to examine mixed traffic scenarios under various penetration rates of automated vehicles
- Design and implement novel traffic estimation, monitoring and control strategies;
- Develop hybrid testing system; coupling infrastructure elements and vehicles on real roads with virtual traffic environment including representative mixed traffic situations
- Design novel signaling and visualization elements;
- Evaluate traffic safety and user's appreciation;
- Create a Road Infrastructure Classification Scheme

**Short-term vision**



**Long-term vision**



**05**

- Real-time lane assignment under dynamic penetration rate of automated vehicles
- Exceptional traffic situations-adverse weather conditions
- A conventional vehicle drives on a dedicated lane for automated vehicles

**Dynamic lane assignment**

**Roadworks zones**

- Single Lane Closure (e.g. short term constructions)
- New Lane Design (e.g. long term constructions)

**06**

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**Bottlenecks**

- Automated vehicles driving behaviour adaptation in real time at sags
- Lane-Change Advice to connected vehicles at Bottlenecks
- Lane-Change Advice combined with Flow Control at Bottlenecks for all vehicles



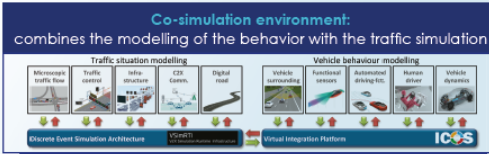
**Real tests in modern highways**

**autopistas**  
an Abertis company

Girona (Spain)

**ASFiNAIG**

Graz (Austria)



The Spanish test site is located within the Mediterranean Corridor between Barcelona and the French border. The specific highway segment is over 20km of four-lane carriageway. Each lane is 3,5m wide. The internal hard shoulder is 1m and the external hard shoulder is 2,5m. The highway median is 5m wide (in average). The test site includes four intersections and a 180m tunnel. The Average Daily Traffic (ADT) in this section was around 30.000 vehicles per day in 2016, and the speed limit is 120km/h.

The currently available ITS equipment includes different types of VMSs, video cameras, Bluetooth antennas, and magnetic sensors for measuring occupancy and 1 Weather station. ITS-G5 short range communication and cellular communication are available at the test-site, and a proprietary Fibre Optic ring network with 10 Gb Bandwidth connects all the equipment from the test-site to the TMC in real-time.





The **Austrian Test Site** includes 20km of A2 motorway between Laßnitzhöhe and City of Graz. The test site is equipped with gantries, mobile VMS, roadworks warning equipment, ITS-G5 RSUs, video cameras (traffic management, single vehicle detection), single-vehicle counters, environmental sensors and radar detection. It enables testing of newly developed visual information, ITS-G5 short-range communication, cellular communication and real-time

communication with the traffic control center. The infrastructure is based on a fibre-optic network that provides IP-based network connectivity to gantries.

The additional intention of the Austrian test site is to provide for each test run the complete precise trajectories of the tested vehicle as well as all vehicles in the surrounding traffic for the testing party to analyse. The data can be played back via a 3-D simulation tool.



### INFRAMIX expected impact

Given that the new roads' construction is an expensive and time consuming project and also that Europe has a quite mature road network, and considering the fact that roads have a quite long lifecycle, and considering the fact that roads have a quite long lifecycle (especially compared with vehicles), **the only way to prepare our existing road network for automation is through targeted interventions both physical and digital.** This is even more important for the long transition period where we expect a step by step introduction of automation and mixed traffic on roads with different capabilities and installed equipment. In this respect, INFRAMIX is expected to have an important impact as it will deliver specific solutions with tangible integrated interventions, both physical and digital. These will be tested and validated beforehand through the use of innovative modelling technologies (**new traffic flow models and advanced simulation tools**) guaranteeing this way their efficiency, traffic safety but also users' appreciation and acceptance.

This set of interventions will be adaptable and incremental to cope with a variety of existing infrastructure (old, new, etc.) and **diverse traffic scenarios** (percentage of automated vehicles, of connected vehicles etc.). The fact that they will also be tested in quite demanding scenarios **on the actual road networks** of the consortium partners will ensure that the proposed scenarios will be realistic and aligned with modern road design and engineering principles.

Moreover, INFRAMIX will propose a scheme for classifying road infrastructure into "automation-appropriate" levels by listing connectivity and automation capabilities of each road segment, while informing road users about its capability to host automated vehicles of different levels of automation and connectivity.

At the same time **provide a roadmap and guidelines** both for the short and for the long term (towards automated transport systems) to support infrastructure owners, road operators and relevant authorities.



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## Key expected results

Road infrastructure for mixed traffic	<ul style="list-style-type: none"> <li>• New traffic signs for mixed traffic</li> <li>• Novel traffic monitoring recommendations (wireless messages extensions)</li> </ul>
Infrastructure Classification Scheme	<ul style="list-style-type: none"> <li>• Indication of the infrastructure connectivity, automation capabilities, capability to host vehicles of different levels of automation and connectivity</li> <li>• A guide of how to incrementally upgrade levels of infrastructure to avoid stranded investments</li> </ul>
Simulation platform	<ul style="list-style-type: none"> <li>• Investigation of several cases with safety critical impact</li> <li>• Testing of innovative traffic control algorithms               <ul style="list-style-type: none"> <li>• With increased traffic densities in exceptional conditions</li> <li>• With different rates of conventional and automated vehicles</li> </ul> </li> </ul>
Hybrid testing system	<ul style="list-style-type: none"> <li>• Testing of new developments of connected and automated driving</li> <li>• Emulation of critical traffic situation in a safe artificial environment</li> </ul>

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PARTNERS

**We are on the Web!**

[www.inframix.eu](http://www.inframix.eu)

**PROJECT FACTS**

*Project title:* Road Infrastructure ready for mixed vehicle traffic flows

*Starting Date:* 01/06/2017

*Duration:* 36 Months

*Budget (EU funding):* 5.000.000 €

**Coordinator**

AustriaTech – Gesellschaft des Bundes für technologiepolitische Maßnahmen GmbH  
Martin Dirnwöber  
martin.dirnwöber@austriatech.at

**Get social**

INFRAMIX project

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## INFRAMIX paper description (A4)

### “Road infrastructure ready for mixed vehicle traffic flows”

#### What is INFRAMIX ?

INFRAMIX is an EU funded project in the framework of ART-05-2016 'Road infrastructure to support the transition to automation and the coexistence of conventional and automated vehicles on the same network'. Its full title is 'Road Infrastructure ready for mixed vehicle traffic flows' and its duration is 36 Months (June 2017–May 2010).

Within the project, 11 partners collaborate targeting to design, upgrade, adapt and test both physical and digital elements of the road infrastructure, ensuring an uninterrupted, predictable, safe and efficient traffic.

To meet this high-level objective INFRAMIX is working on different technologies, combining simulation, traffic flow modelling, traffic estimation and control algorithms e.t.c. This work includes ways of informing all types of vehicles about the control commands issued by the road operator and the proposal of new kind of visual and electronic signals for the needs of mixed scenarios.

The outcomes will be assessed via simulation and in real stretches of advanced highways. Key aspects considered throughout the project will be to ensure that the proposed adaptations will not jeopardize safety, quality of service, efficiency and will be appreciated by the users.

To achieve its objectives INFRAMIX selects a bottom-up approach. Instead of working in generic solutions with questionable impact, it builds on three specific high value (in terms of importance for traffic efficiency and safety) traffic scenarios, namely "dynamic lane assignment", "roadworks zones" and "bottlenecks".

#### INFRAMIX objectives

- Design new and update existing physical & digital road infrastructure elements;
- Develop a co-simulation environment; combining the modelling of the vehicle behaviour with the traffic simulation to examine mixed traffic scenarios under various penetration rates of automated vehicles
- Design and implement novel traffic estimation, monitoring and control strategies;
- Develop hybrid testing system; coupling infrastructure elements and vehicles on real roads with virtual traffic environment including representative mixed traffic situations
- Design novel signaling and visualization elements;
- Evaluate traffic safety and user's appreciation;
- Create a Road Infrastructure Classification Scheme



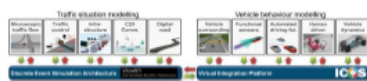
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 723016.



“Road infrastructure ready for mixed vehicle traffic flows”

	<p><b>Dynamic lane assignment</b> (incl. speed recommendations)</p> <ul style="list-style-type: none"> <li>• Real-time lane assignment under dynamic penetration rate of automated vehicles</li> <li>• Exceptional traffic situations-adverse weather conditions</li> <li>• A conventional vehicle drives on a dedicated lane for automated vehicles</li> </ul>
<p><b>Roadworks zones</b></p> <ul style="list-style-type: none"> <li>• Automated vehicles driving behaviour adaptation in real time at sags</li> <li>• Lane-Change Advice to connected vehicles at Bottlenecks</li> <li>• Lane-Change Advice combined with Flow Control at Bottlenecks for all vehicles</li> </ul>	
	<p><b>Bottlenecks</b></p> <ul style="list-style-type: none"> <li>• Single Lane Closure (e.g. short term constructions)</li> <li>• New Lane Design (e.g. long term constructions)</li> </ul>

Real tests in modern highways



Co-simulation environment: combines the modelling of the behavior with the traffic simulation

Hybrid testing: coupling infrastructure elements and vehicles on real roads with virtual traffic environment

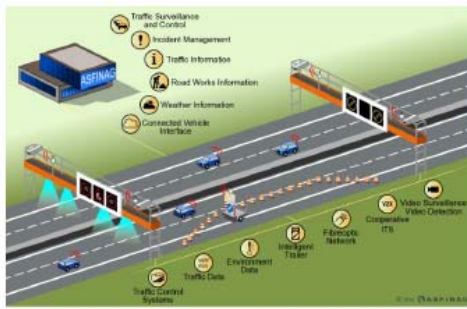
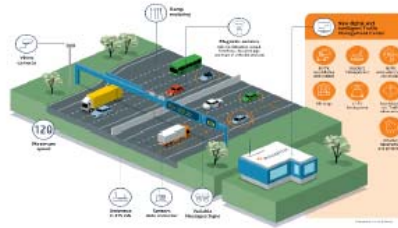




“Road infrastructure ready for mixed vehicle traffic flows”

The Spanish test site is located within the Mediterranean Corridor between Barcelona and the French border. The specific highway segment is over 20km of four-lane carriageway. Each lane is 3.5m wide. The internal hard shoulder is 1m and the external hard shoulder is 2.5m. The highway median is 5m wide (in average). The test site includes four intersections and a 180m tunnel. The Average Daily Traffic (ADT) in this section was around 30.000 vehicles per day in 2016, and the speed limit is 120km/h.

The currently available ITS equipment includes different types of VMSs, video cameras, Bluetooth antennas, and magnetic sensors for measuring occupancy and 1 Weather station. ITS-G5 short range communication and cellular communication are available at the test-site, and a proprietary Fibre Optic ring network with 10 Gb Bandwidth connects all the equipment from the test-site to the TMC in real-time.



The Austrian Test Site includes 20km of A2 motorway between Laßnitzhöhe and City of Graz. The test site is equipped with gantries, mobile VMS, roadworks warning equipment, ITS-G5 RSUs, video cameras (traffic management, single vehicle detection), single-vehicle counters, environmental sensors and radar detection. It enables testing of newly developed visual information, ITS-G5 short-range communication, cellular communication and real-time communication with the traffic control center. The infrastructure is based on a fibre-optic network that provides IP-based network connectivity to gantries.

The additional intention of the Austrian test site is to provide for each test run the complete precise trajectories of the tested vehicle as well as all vehicles in the surrounding traffic for the testing party to analyse. The data can be played back via a 3-D simulation tool.



“Road infrastructure ready for mixed vehicle traffic flows”

INFRAMIX expected impact

As the construction of new roads is an expensive and time consuming project while Europe has already a quite mature road network, and considering the fact that roads have a quite long lifecycle (especially compared with vehicles), the only way to prepare our existing road network for automation is through targeted interventions both physical and digital. This is even more important for the long transition period where we expect a step by step introduction of automation and mixed traffic on roads with different capabilities and installed equipment. In this respect, INFRAMIX is expected to have an important impact as it will deliver specific solutions with tangible integrated interventions, both physical and digital. These will be tested and validated beforehand through the use of innovative modelling technologies (new traffic flow models and advanced simulation tools) guaranteeing this way their efficiency, traffic safety but also users' appreciation and acceptance.

This set of interventions will be adaptable and incremental to cope with a variety of existing infrastructure (old, new, etc.) and diverse traffic scenarios (percentage of automated vehicles, of connected vehicles etc.). The fact that they will also be tested in quite demanding scenarios on the actual road networks of the consortium partners will ensure that the proposed scenarios will be realistic and aligned with modern road design and engineering principles.

Moreover, INFRAMIX will propose a scheme for classifying road infrastructure into "automation-appropriate" levels by listing connectivity and automation capabilities of each road segment, while informing road users about its capability to host automated vehicles of different levels of automation and connectivity.

At the same time provide a roadmap and guidelines both for the short and for the long term (towards automated transport systems) to support infrastructure owners, road operators and relevant authorities.

Key expected results

Road infrastructure for mixed traffic	<ul style="list-style-type: none"> <li>• New traffic signs for mixed traffic</li> <li>• Novel traffic monitoring recommendations (wireless messages extensions)</li> </ul>
Infrastructure Classification Scheme	<ul style="list-style-type: none"> <li>• Indication of the infrastructure connectivity, automation capabilities, capability to host vehicles of different levels of automation and connectivity</li> <li>• A guide of how to incrementally upgrade levels of infrastructure to avoid stranded investments</li> </ul>
Simulation platform: combines the modelling of the vehicle behavior with the traffic simulation	<ul style="list-style-type: none"> <li>• Investigation of several cases with safety critical impact</li> <li>• Testing of innovative traffic control algorithms             <ul style="list-style-type: none"> <li>➢ With increased traffic densities in exceptional conditions</li> <li>➢ With different rates of conventional and automated vehicles</li> </ul> </li> </ul>
Hybrid testing system: coupling infrastructure elements and vehicles on real roads with virtual traffic environment	<ul style="list-style-type: none"> <li>• Testing of new developments of connected and automated driving</li> <li>• Emulation of critical traffic situation in a safe artificial environment</li> </ul>



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