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FIRM

FEHRL INFRASTRUCTURE RESEARCH MAGAZINE

FEHRL

30 FEHRL ANNIVERSARY

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INNOVATION FOR TRANSPORT INFRASTRUCTURE

Transport infrastructure is the lifeblood of modern society, but often struggles to meet demands and expectations on reliability, availability, maintainability, safety, environment, health and cost. FEHRL's role is to provide solutions for the challenges now faced and anticipate the challenges to come. Through innovation, the operation of transport infrastructure can address society's needs.

FEHRL encourages collaborative research into topics such as mobility, transport and infrastructure, energy, environment and resources, safety and security as well as design and production.

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WELCOME

to the thirteenth issue of the FEHRL Infrastructure Research Magazine (FIRM), which outlines our call for co-creation as the right approach to respond together appropriately to the current and future transport infrastructure challenges. This issue features the highlights of FEHRL's contribution to the successful INFRAVATION programme, which ended in December 2018, as well as our efforts to develop resilient transport infrastructure (RESIST).

This issue features articles on the Digital Infrastructure Hubs aiming at boosting market uptake of mature solutions at regional levels (RIMA), preparing our road network for the upcoming challenges of automated and connected vehicles which is also addressed with careful attention (STAPLE & CO-EXIST), and finally safety being a permanent priority, FIRM Magazine promotes the upcoming progress made by the SAFE10T project.

As an enabler in the creation of the Transport Research Arena (TRA) event and as a regular supporter of each TRA edition since, FEHRL support the preparation of the upcoming TRA 2020 in Helsinki, as well as the associated TRA VISIONS 2020 competition that aims at awarding top European senior researchers and promising junior fellows in the field of transport research.

In addition, FEHRL present the expected skills and competence for the transport sector in 2030 and onwards (SKILLFUL). In this article, the reader will find proposals for amendments of the current curricula as well as new curricula to match the requested expertise of tomorrow. A few pilot courses are also featured in order to test the courses developed.

Finally, found on the back-cover of this issue, the final announcement for the FEHRL Research Infrastructure Meeting (FIRM), which will take place on 26-28 March 2019, at the Blue Point Brussels Conference Centre. FIRM 2019 will have a special flavour since FEHRL will seize the opportunity to celebrate their 30th Anniversary and we hope to welcome you numerously for this special occasion!

Enjoy your reading!

Thierry Goger
FEHRL Secretary General
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30 FEHRL ANNIVERSARY

▶ For more information, also see:

www.linkedin.com/company/fehrl
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MESSAGE FROM FEHRL'S PRESIDENT

FEHRL - POSITION AND MISSION

FEHRL celebrate their 30th anniversary this year.

Being about the same age as my children, we can expect FEHRL to be a grown-up by now. An organization still eager to develop itself and eager to develop the research and innovation field within the transport sector as well.

FEHRL consist of more than 30 member-organisations, both national technical research centres and national road administrations, as well as representatives from non-European countries.

FEHRL provide a coordinated structure for cooperation between the research centres and third parties. Through research collaboration, FEHRL's objectives are to provide scientific input for European and national government policy, to create and maintain efficient and safe road networks, to increase innovation, and to improve the energy efficiency of highway engineering and operations. All this within the framework of protecting the environment and increase quality of life.

For the period of 2017-2020, FEHRL's strategic plan for roads, cross-modal research and implementation, has seven priorities:

1. **Governance for implementation which impacts the potential to implement innovation;**
2. **Health and Safety to sit at the centre of all other areas;**
3. **Cross and Multimodal integration: recognizing the road network as part of wider transport network;**
4. **Maintenance and upgrading of ageing infrastructure: covering technologies, to keep our infrastructure safe and adapting towards future transport scenarios;**
5. **Digitalization: covering adaptation of infrastructure to vehicle automation and smart systems;**
6. **Carbon and Environment: seeking to reduce the carbon intensity of our infrastructure, as well as reducing noise and air pollution;**
7. **Security and resilience: covering short term challenges in natural and man-made hazards, and adaptation to longer term/ ongoing climate change.**

With these strategic priorities, FEHRL signal a strong will to contribute to the development of the transport sector both as research providers, with a coordinated structure, and as facilitator of broad cooperation within the transport sector.

What we can also see from FEHRL's strategy, is that during the last 30 years, FEHRL have moved from being a cooperation of road research institutes to an organization that covers a broader perspective in the transport sector as a whole. An important part of FEHRL's strategy has been to establish closer connections with industry, which is essential for bringing research results into innovation, all the time seeking for better ways of cooperation, of understanding research needs and for taking research results into practice. Always seeking for the wealth of creation good research offers. Always trying to make a difference.

FEHRL is 30 years young and eager to further develop cooperation with its partners. We also look forward to being part of the creation of new models for cooperation within the transport sector.

Marit Brandtsegg
FEHRL President
(**marit.brandtsegg@vegvesen.no**)

FEHRL:
FROM EARLY HOPES TO A CORNERSTONE FOR INNOVATION IN TRANSPORT INFRASTRUCTURE

Now after 30 years of existence, FEHRL is an international association comprising the national research/technical centres of more than 30 countries. FEHRL's mission is to promote and facilitate collaboration on road and infrastructure research, and provide high quality information and advice on relevant technologies and policies. Staff from the national institutes provide the technical input for all projects. Through the specification and delivery of research, FEHRL's main objectives are to:

- **Increase innovation in road and infrastructure construction, and related industries;**
- **Provide scientific input to policy on road and infrastructure matters.**

But how did FEHRL begin? At the initiative of David Cornelius, Director of the Transport and Road Research Laboratory (TRRL) UK, John Porter from TRRL visited several road research laboratories in Western Europe during the Spring of 1989 to investigate if there would be interest among the road research laboratories for closer cooperation. This initiative led to the first meeting of directors of road research laboratories from EU and EFTA countries.

Once FEHRL was created, the major objective was to carry out common research, mak¬ing use of the most qualified experts in the member institutes. This led to the development of the 1st in a rolling series of Strategic European Road Research Programmes (SERRP). These are operated on a five-year timeframe with a specific research agenda formulated for each period.

During this period, the programme for COST Actions (European Cooperation in Science and Technology), established by the European Ministers of Education and administered by the Commission, attracted FEHRL. FEHRL found the COST programme of benefit to its goals and several COST Actions, based on SERRP topics, were accepted.

Later on, the continuous efforts by FEHRL in promoting road research agendas, through the series of SERRPs, supported by professional interaction with the relevant DG's of the Commission, resulted in a number of FEHRL promoted RTD projects being funded by the EC.

First FEHRL meeting, Crowthorne, October 1989

PARTNERSHIPS AND COOPERATION

The first organisation with whom cooperation was established was FERSI (Forum of European Road Safety Institutes), which was considered a sister organisation to FEHRL. Many FEHRL laboratories are also FERSI institutes. EAPA (European Asphalt Pavement Association) was a natural partner with whom to seek cooperation and EAPA took an active part in the development of SERRP II, and supported FEHRL vis-à-vis the Commission. Since then, FEHRL has developed strong links with organisations such as EAPA, ECTP, ECTRI, ERF, ERTRAC, EUPAVE, CEDR and many others.

Over the years, FEHRL have also developed strong links with the European Technology Platforms. In October 2002, FEHRL participated in the first negotiations aiming at establishing the European Road Transport Research Advisory Council (ERTRAC) which was officially launched by the Commission on 25 June 2003 with a view to develop a shared vision of all stakeholders in the road transport sector and prevent unnecessary fragmentation and duplication of research efforts. FEHRL has been a member of ERTRAC since its inception.

FEHRL has just recently (14 November 2018) signed a Memorandum of Understanding (MoU) with the European Construction Technology Platform (ECTP) with a commitment to co-create the future of transport infrastructure for a better European cohesion and competitiveness.

On the international scene, building on the already existing cooperation, FEHRL signed a Memorandum of Cooperation with the US Federal Highway Administration (FHWA) to establish a common transparent coordination and communication platform that enables continual collaboration of FEHRL members and FHWA, to leverage experience and expertise, to identify and address current and future highway transport needs as part of a transportation system, and to meet societal goals. This Cooperative Agreement has led to many successes which includes the participation of the United States Department of Transportation (USDOT)/Federal Highway Administration (FHWA), in the ERA-NET Plus (EN Plus) Infravation transnational programme – the first time the USA will contribute funding to an EN Plus Call.

Infravation
An Infrastructure Innovation Programme

FINAL INFRAVATION EVENT IN ROTTERDAM!

The final INFRAVATION event took place on 4 October 2018, in conjunction with the 2018 Innovation Expo in Rotterdam, the Netherlands.

Nine ERA-NET Plus INFRAVATION innovation projects have successfully finished the work and presented their final results to around 80 people.

The welcome speech at the final INFRAVATION event was given by Herma de Wilde, Director of Rijkswaterstaat. Main results and achievements of the INFRAVATION programme were presented by Peter Wilbers, INFRAVATION Programme Coordinator of Rijkswaterstaat, who also gave a short presentation on INFRAVATION transnational initiative, demonstration activities of INFRAVATION projects and deployment solutions. Finally, it was a great pleasure to have a keynote speech given by Jean-François Aguinaga, Head of Surface Transport Unit at DG RTD, European Commission.

The final INFRAVATION event was divided into morning and afternoon sections. The morning section started with the three sessions:

- **1st session - *Extension of life-span of bridges and justifiable postponement of maintenance*. Four INFRAVATION projects presented their final results: FASSTBRIDGE, SUREBRIDGE, SEEBRIDGE, SHAPE.**
- **2nd session - *Low maintenance road surface pavements*. Three INFRAVATION projects presented their final results: ECLIPS, HEALROAD and SEACON.**
- **3rd session - *Green road surface pavements*. Two INFRAVATION projects presented their final results: ALTERPAVE and BIOREPAVATION.**

After each projects' presentation, a panel discussion with infrastructure owners, called *Implementation and exploitation of the projects' solutions*, was led by Arno Willems, from Iv-Infra. The invited panellists were: David Kuhen (FHWA), Simon Neisichi (IROAD) and Joris Vijverberg (RWS). The discussion was focused on the exploitation of results and how to facilitate the implementation of the solutions developed within the INFRAVATION projects.

The afternoon section was transferred to the 2018 Innovation Expo 'RDM Onderzeebootloods' in Rotterdam, where Peter Wilbers, INFRAVATION Programme Coordinator of Rijkswaterstaat, presented the INFRAVATION programme and the main achievements, solutions and final results of each INFRAVATION project.

Finally, an interactive and fruitful discussion with participants was led by Thierry Goger, FEHRL Secretary-General, during which valuable questions were raised regarding those nine INFRAVATION projects.

INFRAVATION PROJECTS

For roads	AlterPave	ALTERPAVE - use of end-of-life materials, waste and alternative binders as useful raw materials for pavements construction and rehabilitation
	BioRePavation	BIOREPAVATION - innovation in bio-recycling of old asphalt pavements
	ECLIPS Enhancing Concrete Life in Infrastructure through Phase Change Systems	ECLIPS - enhancing concrete life in infrastructure through phase-change systems
	HEAL ROAD	HEALROAD - induction heating asphalt mixes to increase road durability and reduce maintenance costs and disruptions
	SCONSEA	SEACON - sustainable concrete using seawater, salt-contaminated aggregates, and non-corrosive reinforcement
For bridges	FASSTbridge	FASSTBRIDGE - fast and effective solution for steel bridges life-time extension
	SEEBRIDGE Semantic Enrichment Engine for Bridges	SEEBRIDGE - automated compilation of semantically rich BIM models of bridges
	SHAPE	SHAPE - predicting strength changes in bridges from frequency data safety, hazard, and poly-harmonic evaluation
	SURE BRIDGE Sustainable Refurbishment of Existing Bridges	SUREBRIDGE - sustainable refurbishment of existing bridges

For more information please see the project website: **www.infravation.net/** or contact INFRAVATION Programme Coordinator of Rijkswaterstaat **Peter Wilbers** at **peter.wilbers@rws.nl**

Figure 1. Panel session

Figure 2. 2018 Innovation Expo

PARTNERS

anas
CDTI
CEDR Conférence Européenne des Directeurs des Routes Conference of European Directors of Roads
European Commission
U.S. Department of Transportation Federal Highway Administration
Bundesministerium für Verkehr, Bau und Stadtentwicklung
FEHRL
VEGAGERDIN
Road Directorate
NETIVEI ISRAEL
Statens vegvesen
Rijkswaterstaat Ministry of Infrastructure and Water Management
TRAFIKVERKET
TÜVRheinland

RESIST TO INCREASE THE RESILIENCE OF SEAMLESS TRANSPORT OPERATION TO EXTREME EVENTS

RESIST
RESilient transport InfraSTructure to extreme events

On 5 and 6 September 2018, the new H2020 RESIST project kicked off in Athens, Greece. The project aims to increase the resilience of seamless transport operation to natural and man-made extreme events, protect the users of the European transport infrastructure and provide optimal information to the operators and users of the transport infrastructure.
RESIST falls under the H2020 topic of MG-7-1-2017 Resilience to extreme (natural and man-made) events.

Extreme weather conditions, climate change, damages to the infrastructure (caused by natural and man-made hazards) and traffic impediments negatively impact the reliability of mobility solutions. Risk analysis, adaptation measures and strategies need to be developed that enable minimizing the impact of both natural and man-made extreme events on seamless transport operation, protect the users of the transport network in case of extreme conditions, as well as provide optimal information to operators and users of the transport infrastructure.

Despite the relatively good safety record of the transport sector, sudden failures of infrastructure assets are not uncommon. Extreme weather events, such as heavy rain and flooding, can result in bridge collapses and earthworks failures, which are safety critical issues. Furthermore, transport infrastructure operators are tasked with ongoing maintenance activities regarding infrastructure assets, whereby decisions regarding where to prioritise investments are often tricky due to the complex nature of transport networks and the vast quantity of infrastructure assets.

The 36-month RESIST project will use risk analyses and further develop recent exploitable research results in robotics, driving under stress, sensing and communications, to dramatically improve the speed and effectiveness, while reducing the cost, of structural vulnerability assessment, situation awareness, response operations and increased users' protection under extreme events towards a high level of resilience of the transport infrastructure. The project will address extreme events on critical structures, implemented in the case of bridges and tunnels attacked by all types of extreme physical, natural and man-made incidents, and cyber-attacks.

The RESIST technology will be deployed and validated at two pilots in real conditions and infrastructures.

PILOT 1:

Egnatia Motorways Bridge T9, Peristeri area, Greece.
Simulations will be used to assess the impact of the various extreme events e.g.: • high winds • floods • severe earthquakes • explosions car Impact • cyber security attacks and etc.

PILOT 2:

a) Millaures Viaduct at A32 Motorway, Italy
Simulations will be used to assess the impact of the various extreme events as in Pilot 1 and evaluate the proposed individual solutions and the integrated platform.

b) St. Petronilla Tunnel of the A32 Highway, Italy
An actual field evaluation and demonstration of the proposed system in GPS denied environment.

EXPLOITABLE OUTCOMES

- **Substantial improvement of smooth continuity of mobility of people and freight even in the case of serious disruptions due to natural or man-made circumstances.**
- **Resilience to damage due to extreme weather conditions, including reduction of maintenance and retrofitting needs.**
- **Contribution to achieve reliable modal interchanges allowing continuous fluid traffic flow even during or after disruption.**
- **High level of resilience of the transport infrastructure to sustainable development and of impact on and adaptation to climate change conditions.**

1ST RESIST WORKSHOP IN THESSALONIKI

The 1st RESIST Workshop called 'End-Users & Technical Requirements for the RESIST System' was held on 5 December 2018, in Thessaloniki. The main focus of the Workshop was to engage the asset managers and operators about innovative solutions for resilient transport infrastructure, and define the users' requirements for drones' information acquisition on bridges and in tunnels.

The Workshop was attended by 24 participants (both internal and external stakeholders) and was specifically targeted at road, rail, bridge and tunnel asset managers, owners and operators. During the Workshop, essential user requirements and pilots were defined involving critical structures and scenarios for the field tests planned in the project.

▶ For more information, see **www.resistproject.eu/** or contact Project Coordinator Angelos Amditis at **a.amditis@iccs.gr**

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Realaiz

RIMA | Robotics for Inspection and Maintenance

INSPECTION AND MAINTENANCE OF INFRASTRUCTURE USING ROBOTICS

Inspection and Maintenance (I&M) represents a huge economic activity (450 Bn€ market) spanning across sectors such as energy, transport and civil engineering. EU hosts over 50% of I&M robotics offer but there is a bottleneck connecting it to the market and high potential applications.

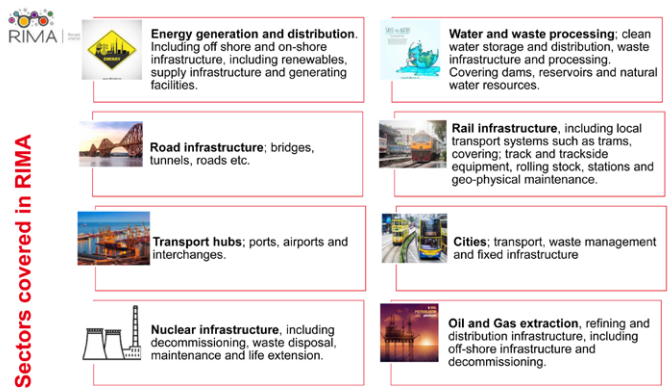
RIMA (Robotics for Inspection and Maintenance) is a 4-year H2020 funded project that aims to establish a network of 13 Digital Innovation Hubs (DIH) on robotics sharing best practices and providing services to facilitate uptake of I&M technologies.

I Objective	Digital Innovation Hubs Network
II Objective	Support to Cross border experimentation with EU SMEs
III Objective	Education and training on Robotics for I&M
IV Objective	Connect the EU I&M robotics to other domains – share best practises

The challenge is to reinforce this connection and to provide education and training on robotics I&M, and to connect the value chain - research, technology companies, service providers, end users and investors - for accelerating economic growth in the field:

- **RIMA is building upon the network pioneered by SPRINT Robotics extending it to all relevant sectors across the value chain.**
- **The RIMA network encompasses:**
  - **leading research organizations supporting one DIH per region aligned with regional policies and industry sectors.**
  - **sectorial associations who will make a bridge with end users and industries.**
- **RIMA will offer services including support to testing and technology transfer, coaching and training on robotics for I&M, process optimization and communication.**
- **RIMA will advise on funding opportunities relying on the S3 Thematic Platform on robotics for I&M federating the common ambition of 13 EU regions.**
- **Network sustainability will be ensured by adapting the SPRINT business model.**

The RIMA project kick-off meeting was held on 9 and 10 January 2019 in Paris - Palaiseau, France.



EXPECTED RESULTS

- **Increased competitiveness of EU I&M Robotics**
- **Economic added value by increased productivity and availability of the critical infrastructure**
- **Social and environmental impact through improved safety and less emission of hazardous substances**
- **The constitution of a sustainable and scalable (open to new members) DIH network aligned with the industrial and European policies and ambitions**

Principle of interactions between RIMA and Work Programme

For more information please contact Project Coordinator **Christophe Leroux** (CEA LIST) at **Christophe.leroux@cea.fr**

PARTNERS

TOWARDS AUTONOMOUS DRIVING!

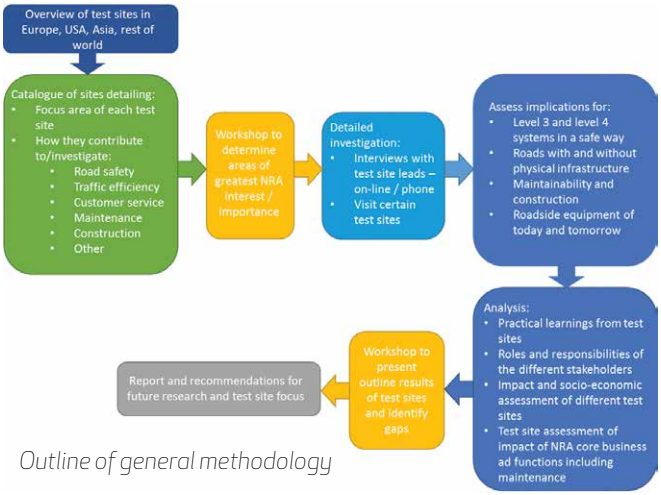
Current developments and ambitions for the future of the road transport system imply higher levels of automation. Over the past few years, automation of road vehicles has gained an increasing presence on the agendas of companies and public authorities. The technical reliability of automation depends on its functionality under varying road infrastructure, traffic and environment conditions as well as on a safe interplay between traditional and automated vehicles.

Connected and automated vehicles potentially offer solutions to some key challenges for National Road Authorities (NRAs), such as reduction of accidents, increasing network capacity and extending mobility to those who are unable to drive. As a result of this potential, both industry and certain national governments are undertaking trials to test the technology for specific scenarios and also to understand the human acceptance and perception of such systems. There are numerous test sites, both on and off road, which have started around the globe to test automated and connected technology for a number of applications. These generally fall into the following categories:

- **Test sites of automated vehicles on tracks, with or without a driver, at low and high speeds;**
- **Testing of vehicles on the road, with a driver ready to take over at low or high speeds;**
- **Testing of low speed pods in urban areas for specific applications;**
- **Testing of vehicle platoons, operated through V2X communication.**

Far less attention has been paid to questions around the implications for NRAs, both positive (e.g. narrower lanes and closer running significantly increasing capacity) and negative (e.g. narrower lanes and closer running increasing rutting and pavement damage), around what, if any additional requirements will be required in terms of e.g. improved white line road marking quality or 5G capacity, or what might become redundant, e.g. distance signs. With the exception of road safety, less attention still, has been paid to the key issues to 2040 of traffic efficiency, environment and customer service and some of the practical, day to day implications for NRAs such as the potential for automated inspections, surveys, maintenance and repair.

The 24-month STAPLE (SiTe Automation Practical Learning) project, which started on 01 September 2018, aims to provide a comprehensive review of technological and non-technological aspects of the most relevant connected and automated driving test sites in order to understand the impact of these sites on the NRA's core business and functions. This project will provide NRAs with the necessary know-how on connected and automated driving test sites, with the aim of supporting their core business activities, such as road safety, traffic efficiency, customer service, maintenance and construction.



Outline of general methodology

THE MOST RELEVANT PROJECT OUTPUTS THAT WILL BE AVAILABLE FOR IMPLEMENTATION AND USE ARE:

- **An online catalogue of connected and automated test sites that will provide national road authorities with an overview of the most relevant test sites in Europe and beyond, with general information.**
- **Report on practical learnings from test sites will provide road authorities with comprehensive knowledge on technological and non-technological aspects of test sites, including design, safety, infrastructure, roles and responsibilities of different actors, cultural and economic considerations, business cases and the influence on the NRA core business.**
- **Report on NRA impact and socio-economic impact assessment will show to what extent the sites clearly identify potential areas of concern to NRAs and how they align to their mission. Moreover, socio-economic assessment will be undertaken to investigate how the test sites consider how humans will interact with connected and automated vehicles.**
- **Final report of recommendations for future test sites will provide road authorities with recommendations and practical guidance for future test sites, in the context of addressing key needs and gaps of NRAs that are not addressed by current sites.**

SPECIFIC OPPORTUNITIES TO GET INVOLVED:

- **Whilst we have good contacts, any information you can provide on test sites in your countries would be welcome.**
- **There will be workshops and conferences on STAPLE at the FIRM 19 and TRA 2020 conferences.**

▶For more information contact Project Coordinator **Dr Adewole Adesiyun** at **adewole.adesiyun@fehrl.org** or see **www.stapleproject.eu**

PARTNERS

CONNECTED AND AUTOMATED MOBILITY IN THE CITIES

CoEXist

'AV-Ready' transport models and road infrastructure for the coexistence of automated and conventional vehicles.

Current road transport and infrastructure planning tools are not able to adequately account for the significant impact automated vehicles (AVs) will have on traffic efficiency, safety and road infrastructure requirements. Most (urban) road authorities are ill-prepared for the expected growth in AVs and there is fear among road authorities that they might be overrun by this new technology.

The mission of H2020 CoEXist project is to systematically increase the capacity for road authorities in getting ready for the transition towards a shared road network with increasing levels of automated vehicles (AVs), both in terms of vehicle penetration rates and levels of automation, using the same road network as conventional vehicles (CVs).

To do so, CoEXist has developed an Automation-ready Framework, which aims to support local authorities in reducing uncertainties and building up their capacity to make structured and informed decisions about the comprehensive deployment of CAVs.

COEXIST USE CASES

CoEXist fosters technological development of microscopic and macroscopic modelling tools, connected and automated vehicle (CAV) simulators, and CAV control logics. The modelling tools are demonstrated in eight use cases, in four different European cities with different urban structures and traffic compositions. Moreover, the project is developing a tool to, based on the modelling results, assess whether the analysed infrastructure is AV-ready, i.e. can handle the introduction of AVs without significant decline in traffic performance, space efficiency, or safety. In this way, tipping points in AV penetration at which road infrastructure needs to be adapted to become AV-ready, will be identified, and design recommendations will be given for its adjustment.

USE CASES IN HELMOND, THE NETHERLANDS

In the framework of CoEXist, Helmond hosts two use cases, which are strongly related to the innovative and Living Lab character of the city, and which correspond to the specific mobility challenges of a cycling city like Helmond.

- **I Use Cases: Signalised intersection including pedestrians and cyclists**
- **II Use Case: Transition from interurban highway to arterial**

USE CASES IN MILTON KEYNES, UNITED-KINGDOM

The city of Milton Keynes, located around 80km north of London, is one of the United Kingdom's fastest growing cities. The city has developed two demonstration use cases which whilst designed specifically to address Milton Keynes' transport challenges, also have potential to inform other cities on how to consider preparing for greater levels of road-vehicle automation.

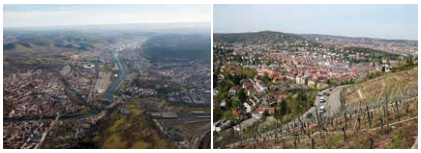
- **I Use Case: Waiting and drop-off areas for passengers**
- **II Use Case: Loading and unloading areas for freight**

USE CASES IN GOTHENBURG, SWEDEN

Gothenburg is a port city between Oslo and Copenhagen, and is Sweden's second largest city. The city of Gothenburg hosts two use cases, demonstrating both microscopic and macroscopic tools. In Gothenburg, there are a lot of urban spaces with a variety of designs. The city wants to understand how CAVs can be accommodated in these types of areas.

- **I Use case: Shared space (to determine the traffic effects on shared spaces when an automated last mile service is introduced).**
- **II Use case: Accessibility during long-term construction works (to investigate the impact of the introduction of CAVs during long-term construction works).**

USE CASES IN STUTTGART, GERMANY



Stuttgart is the capital of Baden-Wuerttemberg and Europe's strongest region in terms of exports which supports its strength through the automotive and mechanical engineering sectors. Two use cases are foreseen for the city of Stuttgart within CoEXist:

- **I Use case: Impacts of CAVs on travel time and mode choice on a network level**
- **II Use case: Impact of driverless car- and ridesharing services**

PARTNERS

City of Gothenburg · iD4CAR · Rupprecht Consult · Stuttgart · FEHRL · Gemeente Helmond · vti · milton keynes council · POLIS · PTV GROUP · VEDECOM · tass international · Università degli Studi Firenze · Universität Stuttgart

For more information, see **www.h2020-coexist.eu**, follow CoEXist on Twitter @H2020_CoEXist or contact Project Coordinators Daniel Franco **d.franco@rupprecht-consult.eu** or Wolfgang Backhaus **w.backhaus@rupprecht-consult.eu**

ASSET MANAGEMENT AND SAFETY OF INFRASTRUCTURE

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The SAFE-10-T project is developing novel solutions for the management of transport infrastructure to increase safety levels and network capacity along the TEN-T network

Effective asset management for transport infrastructure is crucial to ensuring the safety of network users. Infrastructure owners, including those responsible for road, rail and inland waterway networks, are faced with ageing infrastructure assets, climate change impacts, as well as increased traffic demands.

The SAFE-10-T project is developing a Decision Support Tool (DST) to support the reliable management of bridges, tunnels and earthworks along the European TEN-T network. The results of the project will support effective infrastructure maintenance planning that considers the multi-modality at the TEN-T network, as well as future scenarios in terms of traffic demand and climate change hazard scenarios.

MONITORING AND MODELLING

The project is developing probabilistic methods of safety analysis for bridges, tunnels and earthworks. In addition, novel machine learning applications for real-time condition monitoring of these assets are being developed. For bridges, the advanced probabilistic safety assessment methodology has been applied to two case study bridges, as described in Deliverable 1.2 Report on Advanced Safety Model for Bridges. Furthermore, an advanced dynamic modelling approach has been employed to demonstrate the type of loading induced by Connected Autonomous Vehicles. For tunnels, a safety assessment has been carried out for a number of immersed tube tunnels in the Netherlands, as described in Deliverable 1.3 Report on Advanced Safety Model for Tunnels.

NETWORK ANALYSIS

The project is conducting an analysis of current and future demand for road, rail and inland waterway transport along the TEN-T network. To support this objective, an online survey has been developed for the purposes of data collection in relation to transport users, see **www.safe10tproject.eu/news/-safe-10-t-questionnaire**.

The project is also developing a European-scale, multi-modal traffic simulation model that can be employed to evaluate the impacts of a potential infrastructure failure in terms of traffic disruption along the TEN-T network.

GLOBAL SAFETY FRAMEWORK

The DST that is being developed in the project is underpinned by a global safety framework and a big data platform. The objective of the DST is to support decision making in relation to the management of transport infrastructure along the European TEN-T based on quantitative data. End-users will be able to assess the impact of interventions for infrastructure assets, including bridges, tunnels and earthworks, in terms of multi-modal transport disruption at network level. The targeted end-users are government authorities and infrastructure owners that will use the DST to make strategic investment decisions regarding transport infrastructure.

DEMONSTRATION PROJECTS

The novel methodologies developed in the SAFE-10-T project are being applied to three demo sites:

1. PORT OF ROTTERDAM, THE NETHERLANDS

The Port of Rotterdam is one of the busiest in the world, which supports the transportation of goods via rail, road and inland waterways throughout Europe. SAFE-10-T will examine the impact of a potential failure of a road and rail bridge that provides a critical connection from the port to the rest of Europe.

The project will analyse the bridge according to a probabilistic fatigue assessment, which is the primary concern for the bridge. Furthermore, the study will quantify the impacts of a potential bridge failure in terms of the disruption to freight transport across Europe and will consider future traffic growth scenarios.

2. PORT OF RIJEKA, CROATIA

The Port of Rijeka is located on the Kvarner Gulf in the northern Adriatic Sea. There is an ongoing redevelopment project to improve the transport connection from the port with the international road and rail corridors in Croatia. The Brajdica tunnel provides an important rail connection that links the port to the TEN-T Mediterranean corridor, and is currently undergoing redevelopment to support increased traffic capacity.

SAFE-10-T will demonstrate the short- and long-term benefits of installing a structural monitoring system for the Brajdica tunnel to support optimised maintenance planning through the integration of a whole life-cycle cost assessment model. The impact of various tunnel failure modes will be considered in terms of the multi-modal traffic flow, particularly on passengers who use this route during holiday season and freight transport across Europe.

Maintenance strategies will be considered from the perspective of economic and societal costs.

3. SEVERN CROSSING, UNITED KINGDOM

The Severn Crossing provides an important transport link between south-west England and the south of Wales under the estuary of the River Severn, which supports significant traffic flow, particularly daily commuters. The rail connection consists of a brick-lined tunnel that was constructed in the 19th century. The tunnel suffers from the ingress of water and significantly relies upon a pumping station. Furthermore, the tunnel lining is prone to lose bricks and requires substantial condition assessment monitoring to be routinely conducted.

SAFE-10-T will explore the potential use of an automated condition survey method based upon image recognition algorithms, as opposed to the more traditional labour-intensive visual surveys.

Keep up to date with all the latest project developments, including published reports, as well as stakeholder events, by checking our website **www.safe10t-project.eu** for regular updates or joining our LinkedIn group: **www.linkedin.com/groups/862342**.

Project Consortium

For more information contact Project Coordinator **Paul Doherty**, Gavin and Doherty Geosolutions Ltd. at **pdoherty@gdgeo.com**

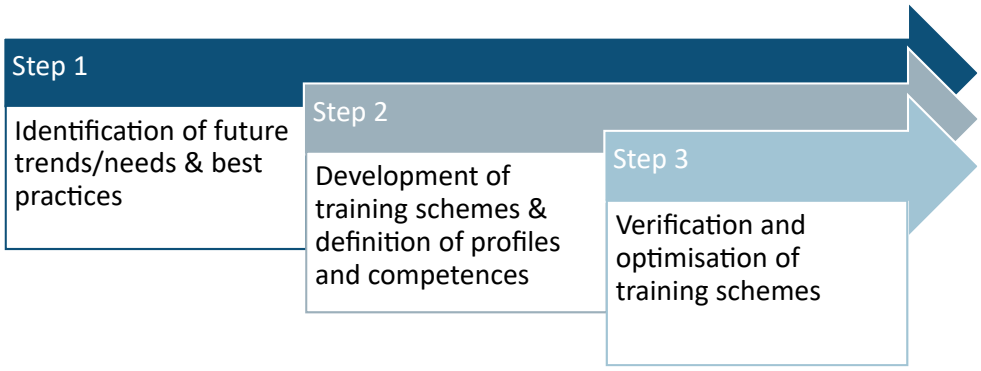
IMPLEMENTATION OF THE PILOTS FOR FUTURE TRANSPORTATION PROFESSIONALS

PARTNERS

SKILLFUL (Skills and competences development of future transportation professionals at all levels) project looks closely at the needs of the European transportation system, which is a rapidly developing and changing sector. For example, as the overall trend is to increase automation, the sector will depend more and more on specialised equipment and products, and therefore future transportation professionals will require new and advanced skills and competences in engineering, as well as in back office operations. At the same time, the increasing interdisciplinary characteristics of transport activities will also require developed skills in safety, security, logistics, IT, behavioural sciences, marketing and economics from transport workforce.

An additional consequence of the above, is the fact that a new paradigm needs to be developed, integrating the disciplines and combining traditional training methods (e.g. face-to face classrooms, on the job training, etc.) with alternative methods and learning systems (such as web-based training, immersive virtual learning environments/ IVLE, etc.) whilst addressing the different needs of the various skill levels (from low skilled workers to high skilled managers/ researchers) and incorporating lifelong learning aspects, which seem particularly important for the low and middle-skills segments of the workforce.

The whole SKILLFUL project process is divided into three major steps:



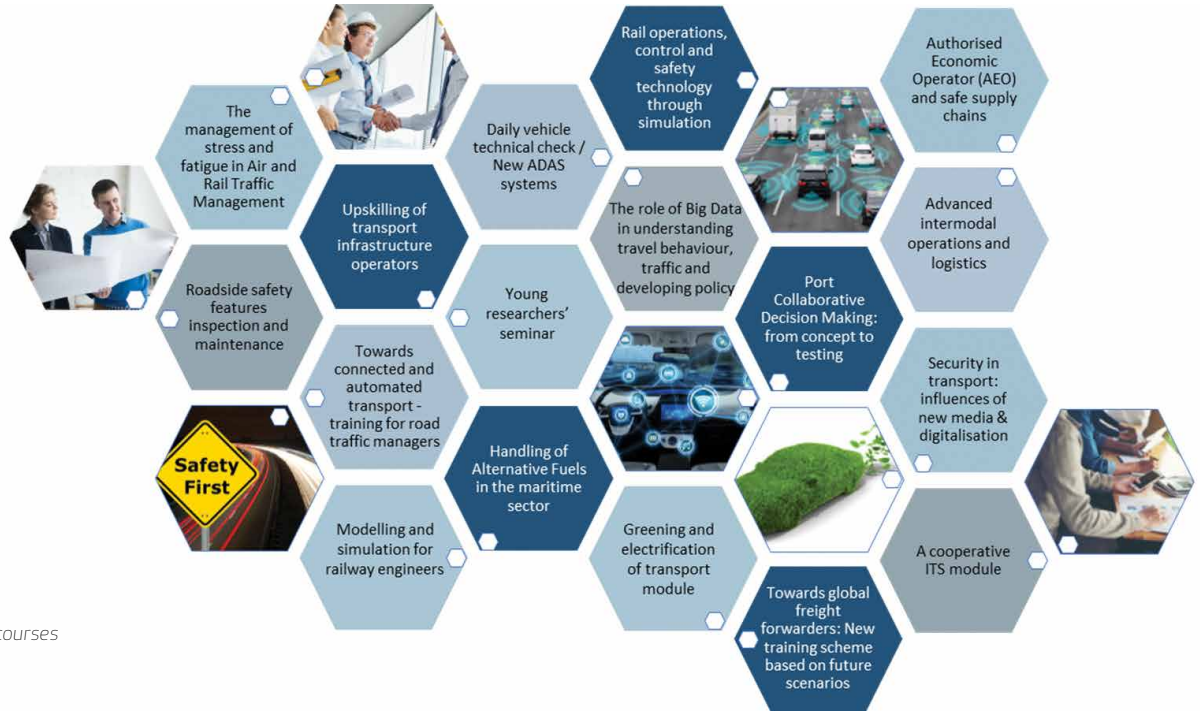


Fig. Pilot courses

SKILLFUL aims to utilise existing and emerging (of TRL 6 to 9) training/education methodologies, tools and knowledge, to design novel training/education schemes (of current TRL 3 to 5) and Pilot several of them, to ascertain their usefulness and assess their impact; thus, bringing them to TRL 6 (for the non-piloted ones) up to TRL 8 (for the ones that will be included in the Pilots).

For this purpose, 5 different knowledge activities have been organised within SKILLFUL and are related to the development of relevant training courses, namely the following:

1. **Transport infrastructure operators' training schemes.**
2. **Young scientists' seminars.**
3. **Lifelong training schemes for low to middle-skilled segments of transport professionals.**
4. **Interdisciplinary thematic courses on key technologies, services and trends.**
5. **Towards a pan-European Transport master curriculum.**

In the context of the above activities, 34 training courses were developed by the SKILLFUL Partners. Covering in good balance all above knowledge creation activities, from these courses, 17 are being piloted within the project, again covering all knowledge creation activity types.

These 17 SKILLFUL training courses are being assessed within the SKILLFUL pilots, on 37 pilot sites in 12 different countries (namely, Brazil, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Portugal, Slovakia, Spain and UK). The pilots cover all modes, while also a wide variety of transport occupations, focusing mainly to the middle skilled workers. The courses are piloted at University level and in Vocational level, depending on the targeting audience and on the course's objectives and expected outcomes.

The whole evaluation procedure of SKILLFUL training courses, consist of 3 parts:

a) **Internal expert walkthroughs, which has taken place prior to any evaluation activities with actual users. In cases where the results from this internal evaluation process indicated need for changes in the training courses, these have been taken under consideration by the developers and courses have been updated.**

b) **Training programme instantiation and evaluation with real users and**

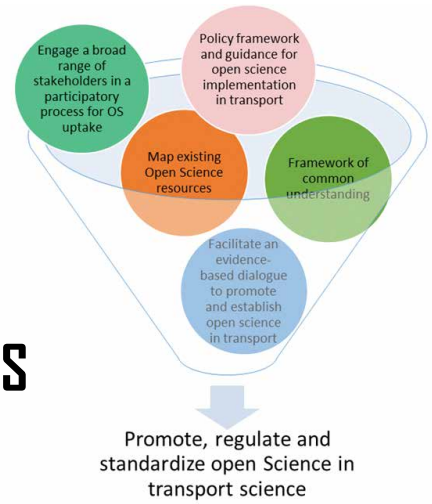
c) **Advisory Board Members and external experts' post-evaluation that will certify if and when the training programme will be appropriate and ready for implementation.**

For more information, see **www.skillfulproject.eu** or contact Project Coordinator Thierry Goger at **thierry.goger@fehrl.org**

EUROPEAN FORUM AND OBSERVATORY FOR OPEN SCIENCE IN TRANSPORT

BE-OPEN

BUILDING OPEN SCIENCE PLATFORMS IN TRANSPORT RESEARCH!



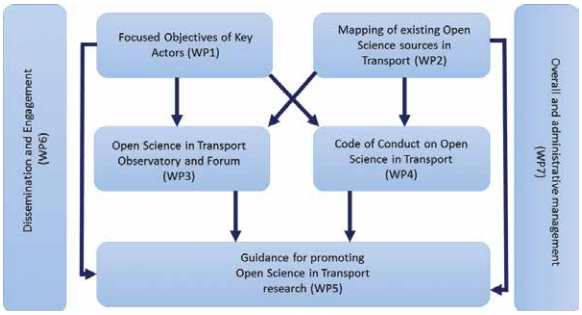
Open Science is a modern movement that represents a new approach to practicing science, in a way that increases openness, integrity and reproducibility of research. It aims at making scientific process and results more transparent and accessible at all levels and to everyone. The rapid growth of digital technologies and new collaborative tools become enablers of Open Science, allowing to speed up the process of adopting open habits and facilitating the sharing of large volumes of information, study materials and data. Europe has the culture and ability to share research activities across national boundaries, which along with its remarkable research and knowledge base, put it in a leading position in the world to promote and expedite the new Open Science way of working.

As the way in which science and research are carried out has changed, BE-OPEN project aims to assist in operationalising Open Science in transport research at the European level, through a series of targeted coordination and support activities. BE-OPEN is a 30-months H2020 Coordination and support action started on 01 January 2019, and addresses the call MG-4-2-2018 Building Open Science platforms in transport research.

BE-OPEN brings together a strong partnership comprising leading transport research institutions and research networks at pan-European level, covering all transport modes (i.e. road, rail, water, air), and partners with high-level expertise in Open Science practice who are at the forefront of relevant developments in Europe, complemented by an advisory board of world-leading experts engaged in international initiatives.

THE MAIN AIM OF BE-OPEN

Achieving Open Access to publications, making their underlying data FAIR (Findable, Accessible, Interoperable, Reusable) and open where possible, and using open and collaborative processes and infrastructure via the European Open Science Cloud (EOSC) will be key factors in making transportation researchers share-reuse-reproduce science and in bringing such a critical sector closer to the society for enabling open innovation and citizen science.



OVERALL STRUCTURE OF THE WORK PLAN

BE-OPEN has brought on board key transport and open science related communities in a two-fold action plan:

- **to engage them in a participatory approach fostering a dialogue on Open Science (what exists, what should be done, how it should be done) among relevant stakeholders in Europe and around the world;**
- **to develop a detailed roadmap for the implementation of sustainable open science modules which include key practices, infrastructures, policies and business models, all taking into account the specificities of the transport research domain, and the use and integration of existing-infrastructures and the emerging EOSC initiative.**

▶ For more information please contact Project Coordinator Maria Boile at **boile@certh.gr**

PARTNERS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824293

TRA VISIONS 2020 LAUNCHES TWO COMPETITIONS

YOUNG AND SENIOR RESEARCHERS FROM ALL EUROPE INVITED TO SUBMIT INNOVATIVE TRANSPORT CONCEPTS

The two European-funded TRA Visions 2020 competitions – one for young researchers and the second for senior researchers – have started their ideation phase. Young and senior researchers throughout Europe are invited to submit innovative concepts on future transport matters to enhance efficient and sustainable transport and mobility of people and goods.

Ever more people and goods are moving around the world in constantly shorter timeframes. This makes innovative transport solutions an important necessity. What could future transport look like? How can existing systems and infrastructure cope with the rising strain, be it road, rail, air, waterborne or cross-modal transport systems? Which are efficient and sustainable solutions to the arising questions on mobility issues?

The European project TRA Visions 2020 invites young and senior researchers from all over Europe to enter their ideas concerning these and other questions to the competitions.

For the young researcher competition, the deadline for a short abstract is 30 June 2019. Following this, the participants are requested to develop and submit their full ideas by 31 October 2019.

Senior researchers can enter the competition either by submission of a paper via the TRA 2020 conference website (**www.tra-conference.eu**) or directly through the TRA VISIONS website (**www.travisions.eu**). If submitted via the TRA conference website, the authors need to record their interest in the competition when registering their paper.

The submission phase of both competitions will be followed by an evaluation of ideas period during which a judging panel comprising experts from universities, research institutes and industry, will determine which are the top three ideas per transport mode (road, rail, airborne, waterborne, and cross-modality).

The final winners of the competition will be announced during a prestigious award ceremony at the Transport Research Arena Conference (TRA 2020) in Helsinki on 27 – 30 April 2020. The TRA conference is held every two years and aims at getting science, research and industry, closer together and at pointing out challenges and opportunities they can efficiently face together in order to create an efficient and sustainable mobility of people and goods (**see www.tra-conference.eu** for more details).

The concepts must be submitted under one of the TRA 2020 conference topics, which cover the general areas of:

1. **Climate change, mitigation & resilience**
2. **Digitalisation, digital safety & cyber-security**
3. **Automation & robotisation**
4. **Electrification, energy & power alternatives**
5. **User-focused mobility services, servitisation**
6. **Social change & quality of life**
7. **Technology & engineering**
8. **Planning, modelling & system design**
9. **Policy & regulation, market efficiency, competitiveness**
10. **Transport safety & security**
11. **Investments, finance & public-private partnerships**
12. **Innovation & human capital**

TRA Visions is an initiative funded by the European Commission and takes place every two years. It awards a prize for innovative concepts for transport solutions to both young researchers and senior ones in European-funded projects throughout Europe. The project consortium members responsible for organising the competition:

WEGEMT (**www.wegemt.com**)
BALance Technology Consulting (**www.bal.eu**)
Deep Blue (**dblue.it**)
CERTH HIT (**www.imet.gr**)
VTI (**www.vti.se**)
UCL (**mecheng.ucl.ac.uk**)
FEHRL (**www.fehrl.org**)
ECTRI (**www.ectri.eu**)

▶ For more information, please contact the TRA VISIONS team at **info@travisions.eu**. look up TRA Visions on Facebook, Twitter or Linked In or see **www.travisions.eu**

PARTNERS

26-28 MARCH 2019

COME AND JOIN US AT

30 FEHRL ANNIVERSARY

FIRM 19
FEHRL Infrastructure Research Meeting
26-28 March 2019

JOIN US AT THE FEHRL INFRASTRUCTURE RESEARCH MEETING 2019 (FIRM19) ON 26-28 MARCH 2019 AT THE BLUE POINT IN BRUSSELS.

The theme will be "On-Ramp to innovation: Let's co-create together our future transport infrastructure". Key highlights will include:

- The celebration of FEHRL's 30th Anniversary,
- Key addresses from the main stakeholders about the development of innovative solutions,
- Key addresses in bridging the gap between innovation and deployment,
- An interactive session about boosting robotics applications in the field of road inspection and maintenance,
- An interactive session connected and automated driving test sites,
- An interactive session about the development of skills and competences of the future transportation professionals,
- The registration fee of €190 +VAT includes three days of conference and participation to FEHRL's 30th Anniversary Cocktail.

▶ **Visit www.fehrl.org for more information and programme,**
or contact Chris Irons at chris.irons@fehrl.org for more details.

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