ISSUE 9 | JANUARY 2017

FIRM

FEHRL INFRASTRUCTURE RESEARCH MAGAZINE

FEHRL

TWO FP7 PROJECTS ROSANNE AND LCE4ROADS COME TO AN END... p.6-7

Details of results provided in final conferences and reports

... WHILE AM4INFRA, RAGTIME, SKILLFUL, TRA VISIONS AND FUTURE-RADAR PROJECTS BEGIN UNDER H2020 p.8-9, 16-17, 19

Overview of projects and first few months of progress given

NEW FEHRL STRATEGIC EUROPEAN ROAD AND CROSS-MODAL RESEARCH AND IMPLEMENTATION PROGRAMME (SERRP)

New SERRP sets direction for next three years to be launched at FIRM17 >> p.4-5

PUBLISHED BY

FEHRL
Boulevard de la Woluwe 42/b3
1200 Brussels
Belgium
Tel. +32 2 775 82 45
www.fehrl.org
ISSN: 2294-8295

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.

EDITORIAL STAFF

Editor
Catherine Birkner
catherine.birkner@fehrl.org

Editorial team
Thierry Goger, FEHRL
Adewole Adesiyun, FEHRL
Andrzej Urbanik, IBDiM
Manfred Haider, AIT
Paulina Potemski, IFSTTAR

DESIGN AND LAYOUT
sanza Belgium

Most of the projects covered are supported by funding from the European Community's Seventh Framework Programme (FP7 2008-2013) and Horizon 2020 Programme.

WELCOME

to the ninth issue of FEHRL's Infrastructure Research Magazine (FIRM), which outlines how FEHRL provides transport infrastructure solutions for current and future challenges. In this issue, we highlight FEHRL's new Strategic European Road and cross-modal Research and implementation Programme (SERRP), which sets the direction for the next three years to be launched at our upcoming FEHRL Infrastructure Research Meeting (FIRM17), as well as an introduction to the five Horizon 2020 (H2020) projects we are involved in that have just started – AM4INFRA and RAGTIME (pages 8-9), SKILLFUL and TRA VISIONS (pages 16-17) and FUTURE-RADAR (page 19) – and the two FP7 projects that have just come to an end – ROSANNE and LCE4ROADS (pages 6-7).

Also in this edition, we highlight the progress and plans for the other H2020 projects we are involved in according to their respective FEHRL Research Area – namely SENSKIN, AEROBI, USE-iT, REFINET and Infravation for Design & Production Systems (pages 10-14), ECOROADS for Safety & Security (page 15) and SETRIS for Horizontal & Dissemination (page 18).

Finally, our recent Scanning Tour of Japan and South Korea on 23rd November – 1st December 2016 for seven participants from our members and an external stakeholder was a huge success with very positive feedback received and we plan to repeat the exercise in 2017.

We hope you enjoy your read!

Thierry Goger
FEHRL Secretary General
(**thierry.goger@fehrl.org**)

▶ For more information, see **www.fehrl.org** and:

www.linkedin.com/company/fehrl
twitter.com/FEHRL_comms
www.facebook.com/FEHRLSecretariat

LAUNCHING OF NEW SERRP

Over the last nine months, FEHRL has been working on developing the next SERRP, following the expiry of the last version, SERRP V, which centred on the Forever Open Road (FOR) concept covering the period 2011 to 2016. There are a few major changes with this iteration; firstly, given the rapid pace of development in vehicle automation, this document will cover a three-year timeframe rather than five years as previously. When FEHRL placed FOR at the centre of the last SERRP, we did not imagine that driverless vehicles would become a reality with major trials in Europe, such as the driverless truck trial undertaken in April 2016.

The second major change for the document is that whilst this document will focus heavily on challenges and opportunities related to FOR, its remit will be broader both in modes to cover synchromodality and the FORx4 concept, and in scope, to cover aspects such as governance, procurement and health and safety. There are seven key areas covered as shown in the diagram on the opposite page: Governance for Implementation which impacts the potential to implement innovation; Health and Safety to sit at the centre of all other areas; Cross and Multi Modal integration, recognising the road network as part of wider transport network; Maintenance and upgrading of ageing infrastructure covering technologies to keep our infrastructure safe and adapting for future transport scenarios; Digitalisation covering adaptation of infrastructure to vehicle automation and smart systems; Carbon and Environment, seeking to reduce the carbon intensity of our infrastructure as well as reducing noise and air pollution; and Security and Resilience, covering short term challenges in natural and man-made hazards and long term adaptation to longer term climate change.

Finally, this version of SERRP will cover implementation which has not been covered in previous versions, recognising that the key to improving Europe's transport infrastructure is taking research through to implementation. This also ties in with a change of focus in the FOR programme, which initially focussed on research priorities and is now moving towards demonstration and deployment.

FIRM 17
FEHRL Infrastructure Research Meeting
5-6-7 April 2017

MESSAGE FROM FEHRL'S PRESIDENT

Dear FEHRL members and partners,

HAPPY NEW YEAR!

2016 was a busy year for FEHRL. We have achieved excellent results. Thanks to each one of you, for putting so much effort and energy into the work you do either for or supporting the FEHRL organisation. Your efforts secure quality and strength in our business and give us power to 'make a difference'. I would especially like to thank FEHRL Secretary General Thierry Goger and his team for the very professional way they run the FEHRL organisation and for being so helpful about any questions.

FEHRL has a new Strategic European Road and cross-modal Research and implementation Programme (SERRP). The work has been demanding. Many people have been involved, and after a lot of cooperation, visionary thinking and coordination, the plan is now complete. This means that we now have priorities we agree upon for FEHRL, we know where we are heading and we can work together to fulfil the SERRP. 2017 will be an important year to show the strength in our work with research, development and innovation supported by the solid SERRP document and the organisation's common understanding of challenges.

SERRP will be presented at FIRM17 on 5-7th April 2017 at the Diamant Center in Brussels (see back page for more details). The headline for this meeting will be "The future transport system: a public-private enterprise embracing infrastructure and vehicles across all modes". A round table of the deployment of connected and automated vehicles and a workshop about training and knowledge transfer for transport stakeholders are among the events that will be organised. FIRM17 will also include the final conferences of two H2020 projects USE-IT and REFINET, as well as a session on the ERA-NET Plus Infravation programme and a mini-exhibition. Do not miss this one!

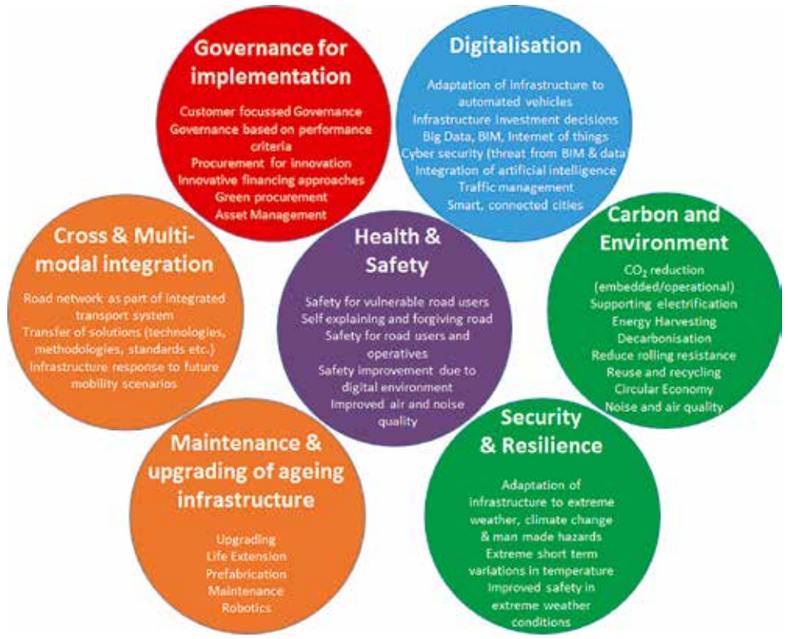
During the last year, FEHRL has also completed a survey about the European Transport Research Alliance (ETRA). The survey taught us that FEHRL members need more information about ETRA and the subjects identified to be of common interest to the member organisations in ETRA. FSB and FEHRL's administration will take responsibility for helping FEHRL members to keep updated about ETRA. When it comes to our involvement in ETRA, it has been decided that FEHRL will continue as a member. However, we have stressed that from our point of view, ETRA needs a more efficient way of working in the future.

TRB in Washington was the first event FEHRL attended in 2017. As in earlier years, we had a rather high number of meetings with cooperation partners. We especially enjoyed meeting our US member Federal Highway Administration (FHWA), where we continued and expanded our common business and rewarding relationship.

So, to all of you members of the FEHRL family and key stakeholders: I wish you a happy, interesting and fruitful new year through hard work and good discussions!

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

SERRP PRIORITY AREAS



ROSANNE PROJECT FINISHED AT END OF NOVEMBER 2016

The FP7 ROSANNE project, which finished at the end of October 2016, aimed to advance the harmonisation of measurement methods for skid resistance, noise emission and rolling resistance of road pavements and prepare for standardisation. The project aimed to perform pre-normative research to enable the creation or improvement of European standards, mainly in the field of the working group CEN/TC 227/WG 5 "Road Surface Characteristics". Due to the different status of standardisation at the project start for the three properties, four adapted strategies were followed:

1. For skid resistance: to advance the harmonisation of skid resistance measurements following the previous TYROSAFE project's Roadmap due to the substantial number of different procedures and devices currently in use.
2. For noise emission: to select from or combine the existing pass-by and trailer measurement methods for the pavement influence on road traffic noise emission into a standardised pavement noise emission characterisation method and demonstrate its viability for acceptance testing, monitoring and noise propagation calculations.
3. For rolling resistance: to create a technical basis for a possible new standard for assessing the pavement contribution to rolling resistance by trailer measurements.
4. For texture, reference tyres and reference surfaces: to explore the commonly used descriptors and compare with newer ones and define reference tyres for use in noise and rolling resistance measurements. Furthermore, reference surfaces were to be defined to facilitate reproducible comparisons of both noise and rolling resistance measurement results.

For all four parameters, substantial progress has been made towards reliable measurement methods. Besides the scientific reports, the key outputs of the project are draft documents which can be used as starting points for the standardisation process by CEN and ISO. Already during the lifetime the project, the work in CEN and ISO has benefitted from the technical output of ROSANNE. More details on the results can be found in the Final Summary Report, which is available on **www.rosanne-project.eu.**

Making key road surface parameters accessible to harmonised assessment and management enables the creation of products and services that can bring about considerable cost reductions for road authorities and industries with European-wide application due to the possibility to rely on common assessment methods. The guidelines and standards that will be created based on the results of ROSANNE are expected to further support the application and adoption of cost-effective innovation in the road infrastructure sector.

FINAL CONFERENCE ATTRACTS MORE THAN 90 PARTICIPANTS

The project held its final conference on Tuesday 11th October 2016 at project member BRRC's research centre at Sterrebeek, Belgium for more than 90 interested people. The Work Package leaders presented all the project results, as well as common issues concerning texture, reference tyres and reference surfaces and a demonstration of certain techniques used. The event also included the launch of the joint FEHRL-EUPAVE-EAPA publication on CO_2 savings by maintaining and upgrading roads. All relevant materials can be found at **www.rosanne-project.eu**.

▶ For more information, go to **www.rosanne-project.eu** or contact Project Coordinator **Manfred Haider** at **manfred.haider@ait.ac.uk**

PARTNERS

LCE4ROADS SUSTAINABILITY CERTIFICATE FOR ROADS PRESENTED AT FINAL CONFERENCE

On 17th November 2016, the LCE4ROADS consortium presented the project's final results in Brussels at its final conference. This conference gathered around 60 road infrastructure experts, including representatives from authorities and industry. It was opened by Steve Phillips, Secretary General of CEDR, who stressed the importance of adapting roads to future needs. The event was split in four thematic blocks:

- **The importance of managing sustainability in the life cycle of transport infrastructures;**
- **Practical implementation of sustainability performance indicators in the process of designing, building and managing road transport assets;**
- **The experience of developing a CEN Workshop Agreement (CWA) as a means for delivering project results;**
- **The need to join forces with other research initiatives related to sustainability aspects of roads (Twinning with USA).**

The LCE4ROADS research was launched in October 2013 when the partners elaborated on the roadmap to create a new, green, holistic and EU-harmonised certification system to assess the sustainability of road construction. LCE4ROADS aimed at creating a certificate that integrates the four criteria under the Life Cycle Engineering Approach (LCE): social, economic, technical and environmental.

The consortium partners represent a very broad range of stakeholders, i.e. large construction companies, SMEs, sectorial organisations, academia, standarisation bodies and research centres. The final outcome has been the elaboration of a new road certification system, a multi-criteria software tool and its respective guidelines. After a deep analysis of the state-of-art and receiving inputs from several stakeholders, the consortium has elaborated a list of 25 Key Performance Indicators to promote the use of greener, more cost-effective and safer technologies in the road construction for both asphalt and concrete pavements. LCE4ROADS shows the strong commitment of the road infrastructure industry towards more sustainable goals set at European (i.e. White Paper on Transport) and global level (i.e. COP 21). All the presentations displayed during the final event can be downloaded from the website at **www.lce4roads.eu**. The information about the CWA is available in the CEN Livelink website (**standards.cen.eu**) by clicking on *"Technical Bodies"*, *"CEN/WS SUSTINROADS"* and then *"CWA 17089:2016"* to get to CWA 17089:2016 (CEN/WS SUSTINROADS - Sustainability assessment of roads).

TWINNING WITH NSPC

The project also featured in twinning activities with the US-based National Sustainable Pavement Consortium to foster the exchange of knowledge between both sides of the Atlantic through synergies that might improve the current trends that look forward to enhance the sustainability performance of pavements. Thus far, the most positive aspects of these twinning activities are:

- **Identification of common fields for research that may positively impact both the US and Europe.**
- **The development of processes for know-how sharing.**
- **Access to dissemination means through research committees.**
- **Enhanced outcomes for both projects as a result of the complementary approaches, strengths, and broader perspective gained though the collaboration.**
- **Identification of future fields of collaboration and creation of a far reaching network of relevant actors for future research initiatives.**

▶ For more information, contact **Project Coordinator Aquilino Antonio Alvarez Castro** at **aquilinoantonio.alvarez.castro@acciona.com**

From left to right: Project Coordinator at final conference and the project Consortium at the last General Assembly on 16th November 2016.

PARTNERS

AM4INFRA PROJECT TO BUILD A COMMON FRAMEWORK FOR A EUROPEAN LIFE CYCLE BASED ASSET MANAGEMENT APPROACH FOR TRANSPORT INFRASTRUCTURE NETWORKS

Achieving a well-integrated, optimal performing transport infrastructure network in Europe is a key element in the White Paper on Transport's overall ambition for a single European Transport Area in 2050.

The 24-month Coordination and Support Action (CSA) AM4INFRA, which just started in September 2016, will deliver the first ever common European asset management framework approach that enables consistent and coherent cross-asset, cross-modal and cross-border decision making on infrastructure in the context of the White Paper on Transport. It aims to overcome the legacy of European transport networks under which they have been developed incrementally (and mostly fragmented) over time within the specific setting of mode and country under various policies and service levels. AM4INFRA builds on ongoing bottom-up actions, best practices and contemporary experiences of four national infrastructure agencies (NIAs) that are considered frontrunners in the development and application of asset management in their networks governance.

The common objective of this CSA is to launch a life cycle and risk based Asset Management framework approach that enables the effective governance of transport infrastructure networks across Europe. The framework approach will be supported by data management tools and whole life cycle models that ensure the transparency and compatibility of optimisation and collaboration actions within infrastructure governance, following a clear distinction in roles and responsibilities between asset owner, asset manager and service provider.

The overall concept, its major conceptual elements and the targeted results are depicted in the figure 1 below. The envisioned common framework comprises three major elements: common language, common data and data management, and common approach represented as three separate cogwheels. These three cogwheel elements need to be aligned and in place to make the framework operational and enable the roll out to network owners and assist managers in Europe.

Figure 1. Overall concept, major conceptual elements and targeted project results

THE INNOVATIONS OF AM4INFRA ARE:

- **To provide NIAs with insight into how asset management procedures and practices would support their decision making processes in network management, and subsequent operational requirements**
- **To provide NIAs with a common, practical framework for a life-cycle and risk-based Asset Management approach capable of governance on the highest aggregation level of (cross-modal) network considerations;**
- **To enable NIAs to acquire meaningful data and sharing knowledge and good practices to achieve "learning by doing" and continuous improvement of the operations**
- **To bring together NIAs across the modes to strive to optimise their networks' performance in a comprehensive, multimodal vision and strategy building on the needs and expectations of their stakeholders.**
- **To provide NIAs across the modes with the means for replication in order to foster a wider roll-out of the developed framework approach, creating impact beyond this project.**

AM4INFRA is granted under the H2020 topic of MG-8.4b-2015 – 'Smart governance, network resilience and streamlined delivery of infrastructure innovation' and held its kick-off meeting in Brussels, Belgium on 12th September 2016.

For more information, see **www.am4infra.eu** or contact Project Coordinator **Jenne van der Velde** at **jenne.vander.velde@rws.nl**

PARTNERS

RAGTIME INVESTIGATES RISK BASED APPROACHES FOR ASSET INTEGRITY MULTIMODAL TRANSPORT INFRASTRUCTURE MANAGEMENT

An efficient asset management process is needed to ensure cost-effectiveness, in planning, delivery, operation and maintenance of large infrastructures or infrastructures network. Infrastructure asset management generally focuses on the later stages of a facility's life cycle, specifically maintenance, rehabilitation, and replacement. However, a process of efficient asset management must define methods and tools for asset tracking, management of maintenance activity, determine the life cycle and replacement costs of the assets, assistance in determining funding strategies, optimising capital investments in operation and maintenance, and help with the replacement of assets. Currently, the procurement, design, construction, exploitation and public communication to the final users and society of land transport infrastructures:

- **are not multimodal,**
- **are not cross-assets but focused on individual assets,**
- **lack a common risk based approach and the implementation of resilient concepts throughout the whole life cycle**

This fragmentation hinders lifecycle objectives as well as creating information gaps between these processes.

To address these issues, there is the need to establish a common framework for governance, management and finance of transport infrastructure projects that will ensure the best possible return from limited investment funds in transport infrastructures.

The 36-month RAGTIME H2020 Research and Innovation action (RIA) project, started in September 2016, aims to do this by developing, demonstrating and validating an innovative management approach, laying out a whole system planning software platform, based on standard multiscale data models, able to facilitate a holistic management throughout the entire lifecycle of the infrastructure.

The concept proposed in RAGTIME is to move from current Assets Integrity Management (AIM) approaches towards Advanced Asset Integrity Management (AAIM) of transport infrastructures network across all phases in the lifetime of an infrastructure project. The concept is interdependent of three modules: governance module, finance, economic and risk module and technical management module to focus on engineering aspects, which altogether enable owners and operators to ensure the best return of their investments.

OVERALL APPROACH AND METHODOLOGY

The project has been structured into three main phases:

Phase I (Setting the scene and defining the AAIM framework) – focuses on defining the technical, legal and economic requirements to be introduced in the platform, gathering existing and new standard asset management tools and determining how each of these aspects have to be interrelated in the management of infrastructure through entire lifecycle.

Phase II (Investigation & Development of AAIM) - focuses on the different issues related to the three different tools to be integrated in the existing standard asset management tool.

Phase III (Integration and Validation) – focuses on demonstration and validation of the AAIM approach for three case studies.

Like the AM4INFRA project on the opposite page, RAGTIME falls under the H2020 topic of MG-8.4a-2015 – Smart governance, network resilience and streamlined delivery of infrastructure innovation. The kick-off meeting was held in Bilbao, Spain on 20th–21st September 2016.

▶ For more information, see **www.ragtime-asset.eu** or contact Project Coordinator **Maria Zalbide** at **maria.zalbide@tecnalia.com**.

PARTNERS

SENSKIN project Consortium discussing progress at the third plenary meeting on 2nd-3rd November 2016.

SIGNIFICANT TECHNICAL PROGRESS MADE DURING FIRST 18 MONTHS

PARTNERS

The aim of the 42-month H2020 project SENSKIN is to develop an inexpensive, low power, wireless, skin-like sensor that offers spatial sensing of irregular surfaces (transportation bridges in particular). The project started in June 2015 with the extraction and structuring of the end-user requirements and the development of the system specifications and architecture.

SENSOR AND DATA ACQUISITION PROGRESS

Following this, the system development has now fully started and the project is already in the first prototyping stage where the second sensor prototype has been produced, together with its data acquisition system. At the same time, the SENSKIN communication system is in the process of reaching its first prototype, where the integration work for the whole SENSKIN prototype is expected to start. In parallel, the development of the structural assessment module has started, focusing on a finite modeling required for the whole bridge.

Meanwhile, the rehabilitation Planning Module, the Decision Support System (DSS) and SENSKIN package integration works have also started on technical descriptions for measures and reviews of strengthening measures for Germany (cost factors, materials, environment, etc.). There been some significant progress on the development of the SENSKIN sensor that can be summarised as follows: materials for the stretchable capacitor and electrodes have been selected, the silicone layers have been developed and the two films will be put together back to back to form a stretchable capacitor. The sensors have a very stable output in a relatively large range of strain rates. The sensors also show quite a linear output in a range of pre-strains between 0% and 20%. The results obtained so far indicate that the selected sensor design is feasible, as well as materials, and may be considered as a basis for further developments. At the same time the data acquisition module is being designed and consists of an analogue electronics part and a subsequent digital signal processor (DSP). The design of the sensor has been improved both in terms of performance, ease of fabrication and encapsulation.

RECENT DEVELOPMENTS WITH THE COMMUNICATION SYSTEM

The first testing of the equipment has now started and the communication between the gateway and sensor node using SENSKIN Operation Logic Protocol (SOLP) and Delay-tolerant networking (DTN) has been tested as a proof of concept. The first tests have provided on demand measurement, request configuration files and log files, remote firmware update of CC1310. The full integration with the Sensor/data acquisition (DAQ) kit is still ongoing and expected to finish in the next months. The communication system prototype is now being finalised with electronics, printed circuit board (PCB) design and integration steps.

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

FIRST YEAR OF AEROBI PROJECT

The 36-month H2020 AErial RObotic System for In-Depth Bridge Inspection by Contact (AEROBI) project has just completed its first year. This innovative project, driven by the bridge inspection industry, is adapting and integrating recent research results in low flying unmanned robots with arms, intelligent control in robotics, computer vision and sensing, in an innovative, integrated, low flying, robotic system with a specialised multi-joint arm that will scan concrete beams and piers in a bridge for potential cracks on the surface or concrete swelling or spalling.

Following a complete and comprehensive document on user requirements (all the aspects of the inspection of a bridge) produced by Egnatia Odos and Netivei Israel, AEROBI started the development phase. The first step consisted in designing the overall system (air vehicle, data link and Ground Control Station). This was completed by the specifications that will be the basis for system acceptance after the integration phase. Extensive work has been done on the computer vision capabilities. Large sets of bridge anomalies pictures have been used to understand precisely what needs to be detected and how the measures need to be carried out.

Due to the complexity of the system, the approach chosen is an iterative development, especially for the air vehicle capability. It was thus necessary to quickly perform preliminary trials to identify early in the development phase the possible challenges and risks. These preliminary trials took place on 19th and 20th December 2016 on a real bridge 150 km south-east of Seville. The bridge is operational and starting to age (the upper part was destroyed by a storm two years ago), so the trials were very realistic and enabled the unmanned aerial vehicle (UAV) navigation around it to be tested. The main focus of the trials was to detect and identify anomalies with the camera mounted on the UAV demonstrator. The results have been used to better specify the AEROBI platform and make the computer vision algorithms more robust. The campaign was concluded by a de-briefing session with the end-users that were given the occasion to amend or complete their needs and specifications.

THE CONFIGURATION OF THE SYSTEM WAS:

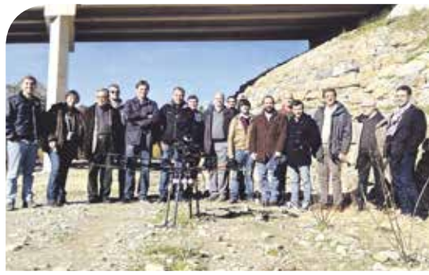
- The UAV prototype equipped with a commercial camera.
  The final AEROBI platform will be much bigger (two metres in diameter) to accommodate all sensors and the robotic arm
- The Ground Control Station composed of the piloting module and the exploitation module. The end-users could use the exploitation module and orient the mission.

For safety reasons, the UAV was piloted manually with the operator always in sight of the platform.

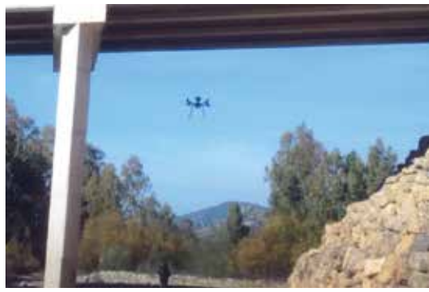
The system was demonstrated on two flights. The first flight was a detection/identification of anomalies mission and the second a flight to demonstrate airworthiness. The easy and quick change of batteries was demonstrated between the two flights (around 20 minutes for each flight).

The tests were a real success both for the Remotely Piloted Air System and the computer vision module. Even very tiny anomalies were detected, sometimes invisible to the eye from a distance of two metres. The performances for the detection of anomalies are therefore very satisfactory since the system is over-performing (compared to end-user expectations) and the next step will be to teach it what is important or not.

AEROBI reached thus an important milestone as the project now has a first workable version of the system which will support future developments. The end-users acknowledge this important step that demonstrated that the visual inspection of a span could be performed in less than 30 minutes.



Project partners with the UAV prototype with the camera



The inspection mission under the bridge

PARTNERS

▶ For more information, contact Project Coordinator Philippe Chrobocinski at philippe.**chrobocinski@airbus.com** or see **www.aerobi.eu**.



Second stakeholder workshop held in Brussels on 15th September 2016

USE-IT PROJECT GEARS UP TO END

USE-iT (Users, Safety, security and Energy and carbon in Transport infrastructure) is a 24 month Coordination and Support Action (CSA) project which will finish on 30th April 2017 so is now gearing up to the end, and at the same time ensuring that it aligns all its activities with its sister project FOX (Forever Open Infrastructure across (X) all transport modes). In the first year, in parallel with FOX, the Consortium undertook a review of technologies across transport modes and four domains of shared governance, infrastructure, technologies and customers. These were then prioritised by the consortium, through a survey and the first stakeholder workshop, held in January 2016. From this, the main research challenges for each Work Package (WP) were developed and presented at the second workshop held in September 2016. Two webinars were also held in June and December 2016 to present the same findings to stakeholders who could not attend the workshops.

The **User Information** WP seeks to give useful and timely information so that customers can make seamless journeys over multiple modes, and to provide a framework for different transport operators and modes to support this. The top three research areas identified at the workshop were, 'Active integrated transport data and communications', 'Standards and service quality assurance' and 'Transport user expectations and acceptance factors'. The research areas with the most potential for cross-modal research were on gathering, sharing and making use of data, real time information, new technologies for journey modelling/planning, user behaviour and research on the social effects of combined mobility.

The **Safety and Security** WP is effectively split into these two categories. For safety, the areas prioritized were: 'Data sharing', 'Education and human factors', 'Safety management strategies', 'Driver state monitoring', 'Cross-modal V2V communication' and 'Automation'; whilst for the security element, 'security by design' 'cyber security', 'security in transit environments' and 'remote detection of explosives' were prioritized and have been taken forward for further consideration.

In the **energy and carbon** WP, the focus is on reducing the energy and carbon of the vehicles, operational energy (e.g. street lighting) and the embodied energy contained within the infrastructure (e.g. carbon content of concrete). Eight shared challenges across modes were identified along with six research opportunities of; 'hydrogen and electric vehicles', 'influencing travel choice', 'optimising routes', 'sustainable procurement', 'energy storage and management' and 'reuse and recycling of materials'.

Moving towards the conclusion of the project, the activities to be undertaken will be to develop the research challenges and opportunities in greater detail to provide an investment roadmap for research procurers and challenge infrastructure owners and operators. An additional activity will be to find areas of synergy, for example, improved user information and improved safety could lead to increased use of public transport, which in turn will reduce carbon. In addition, there are also close links with the technical WPs of FOX, of construction, inspection, maintenance and recycling and reuse. The USE-iT final deliverable will be a summary report to be outlined at the USE-iT final conference to be held during the FIRM17 conference in Brussels on 5–7th April 2017 (see back page for more detail).

Since the FOX project will finish at the end of October 2017, more details will be given in the next issue of this magazine.

▶For more information on the USE-iT and FOX projects, go to **www.useitandfoxprojects.eu** or contact Project Coordinator Thierry Goger at **thierry.goger@fehrl.org**

USE-iT PARTNERS

Participants at WP4 SIP workshop in Rome

REFINET DISSEMINATION EVENTS IN SECOND HALF OF 2016

WP4 SIP WORKSHOP AND SESSION AT ECTP CONFERENCE

As part of the dissemination activities within Rethinking Future Infrastructures Networks CSA (REFINET), two events have been recently organised: a workshop in Rome on 26th October 2016 and a session at the ECTP conference in Brussels on 17th November 2016.

D'Appolonia, as leader of Work Package (WP) 4 entitled "Deploying the Strategic Implementation Plan (SIP)", coordinated the organisation of the Rome workshop where Tecnalia presented the SIP, including a list of R&I priorities and D'Appolonia presented the Deployment of the SIP.

This workshop was the occasion to discuss the deployment strategies with a number of experts including infrastructure managers and operators from Italy and Romania. Feedback gathered during the workshop in dedicated interactive sessions enabled the start of this strategy to be created and to be linked to effective case studies to be used as pilots to assess viability and effectiveness. During the workshop, the following topics were deeply investigated:

- Use of the REFINET Multi-Modal Transport Infrastructure (RMMTI) Model in supporting the identification of priorities in innovations for Transport Infrastructure (TI) networks
- Use of the REFINET platform in supporting strategic planning decisions as well as types of data or information or parameters needed to be available and exploited by the platform to support this.
- Use of financial instruments such as Pre-Commercial Procurements (PCP) and Public Procurement of Innovation (PPI) to facilitate the deployment of existing or incoming technologies in TI networks.

REFINET also organised a thematic session at the ECTP conference in collaboration with the ECTP Infrastructures and Mobility (I&M) Committee on "The transport infrastructure of the future". It included two presentations:

- Introduction on ECTP I&M strategy and REFINET, by Jesús Rodríguez, Managing Director of PTEC and REFINET dissemination manager. It summarised ECTP initiatives and collaborations on innovation in transport infrastructures since 2004, including some reference to reFINE, roadmap for cross-modal transport infrastructure innovation, TRA conferences, Infravation ERA-Net Plus, Shft2Rail and STRIA. Then REFINET was introduced with comments on the scope, the dissemination activities and the network of stakeholders and experts, as well as the FOX and USE-iT complementary CSAs. The presentation finished with some thoughts on the planned actions to promote R&I in transport infrastructures to be carried out through the ECTP I&M committee.
- REFINET answers to the need for innovation in transport Infrastructures by Clemente Fuggini from D'Appolonia.
The target audiences of REFINET are transport infrastructure managers and policy makers, public bodies and Member State authorities. This presentation summarised REFINET including the vision and roadmap, the RMMTI Model, collection of best practices and catalogue of technologies and identification of R&I priorities. The presentation finished with some comments on the clustering of technological demands and development of a REFINET platform.

PARTNERS

▶ For more information, see **www.refinet.eu** or contact Project Coordinator Alain Zarli at **alain.zarli@cstb.fr**

INFRAVATION FEATURES AT AND AROUND IALCEE 2016

TWO KEY EVENTS ON 18-19TH OCTOBER 2016

The Fifth International Symposium on Life -Cycle Civil Engineering (IALCCE2016), which took place from 16-19th October in Delft, the Netherlands, brought world experts together to share recent progress and formulate future directions to life-cycle civil engineering. The programme included an Infravation forum session on the afternoon of Tuesday 18th October in Delft, the Netherlands. The forum, entitled "Infravation: advancing infrastructure innovations through transnational collaboration", featured members of the Infravation Management Group and the nine Infravation innovation Project Coordinators.

Peter Wilbers, Coordinator of the Infravation programme from Rijkswaterstaat, gave a welcome and brief overview and he was followed by a short pitch by five of the nine project Coordinators: HEALROAD by Daniel Castro-Fresno, Full Professor, University of Cantabria, FASSTBRIDGE by María Zalbide, Project Manager, TECNALIA, SHAPE by Andrea Benedetti, University of Bologna, Italy, SUREBRIDGE by Reza Haghani, Associate Professor, Chalmers University of Technology and SEACON by Federica Lollini, Assistant professor,Politecnico di Milano.

Thierry Goger, FEHRL Secretary-General, led the ensuing lively forum discussion which focused on innovations, outcomes and implementation. This included three Project Coordinators - Daniel Castro-Fresno, Full Professor, University of Cantabria (ALTERPAVE), Emmanuel Chailleux, Researcher, IFSTTAR (BIOREPAVATION) and Narayanan Neithalath, Professor, Arizona State University, Tempe, AZ (ECLIPS). He was joined by three high-level representatives from National Road Authorities - Kjersti Kvalheim of NPRA, Katharine Petros of FHWA and Ruud Smit of Rijkswaterstaat.

As well as this Infravation IALCCE 2016 forum session, an Infravation Steering Group meeting was held in the morning of Tuesday 18th October and a meeting of the Scientific Panel and the coordinators of the research projects in the morning of Wednesday 19th October at a venue very close to the IALCCE conference. The focus for 2017 will be the demonstration projects to be held for each of the projects, which gear them up for onward implementation.

SPECIAL IALCCE SIDE EVENT – INTERNATIONAL MARKET EVENT

A special side event to IALCCE 2016 was held on the afternoon of Wednesday 19th October called the "International Market Event - Infravation innovation projects" for more than 100 mostly Dutch road infrastructure experts from both the private and public sector. Jean Luc Beguin, member of the Executive board for Rijkswaterstaat and Chief Engineer/Director Programmes, Projects and Maintenance, gave a welcome and brief overview and he was followed by a short pitch by eight of the nine project Coordinators (SEEBRIDGE was unfortunately not able to attend either event). Besides the already mentioned Coordinators and projects in the previous day's forum session, the following projects were presented: ALTERPAVE by Daniel Castro-Fresno, Full Professor, University of Cantabria, BIOREPAVATION by Emmanuel Chailleux, Researcher, IFSTTAR, ECLIPS by Narayanan Neithalath, Professor, Arizona State University, Tempe, AZ. Following the pitches, the audience was invited to visit poster sessions for each of the Infravation projects. During these sessions and also at the concluding plenary session, there were fruitful discussions about sharing knowledge and implementing project results.

2017 STARTS WITH TRB

Infravation has already started the year off at TRB with a lively session organised on 9th January with presentations from Rijkswaterstaat, FEHRL and discussions with US funder FHWA and the European Commission.

▶ See **www.infravation.net/events** for all the presentations, photos and video clips from these sessions. For more information, contact Call Manager, Richard van der Elburg at **richard.vander.elburg@rws.nl**

THREE TEST SITES ALLOW ECOROADS PROJECT TO PROGRESS SIGNIFICANTLY

As reported in the August issue of this magazine, the first set of field tests were performed in March and April 2016. Specifically:

- **Road Safety Inspection (RSI) was performed on 6-7th March at the Kennedy tunnel in Antwerp, Belgium,**
- **Road Safety Audit (RSA) and RSI were performed on 5-6th April at the Krrabe tunnel, located along the Tirana – Elbasan highway in Albania.**

Feedback from both tests varied from each other, due to the different number of external observers - higher in Krrabe tunnel - and the additional RSA operation performed at Krrabe. Both compared the operations actually conducted with the procedures of the Deliverable D5.1 Definition of common procedures for the joint safety inspections (see **www.ecoroadsproject.eu/library** for all Deliverables).

Following this first set of tests, the second workshop with stakeholders took place on 2nd June 2016 in Brussels to review the application of the two (road infrastructure and tunnel) Directives and analyse the reports and feedbacks of the first two joint safety operations. Deliverable D3.2 Results of the first two joint safety operations: discussion amongst the key stakeholders describes the results of the discussions with the key stakeholders.

The second set of field tests was performed between mid-August and the end of October 2016. Specifically, this included joint RS operations at:

- **BAB A71/Rennsteig Tunnel, Thüringen, Germany on 17-18th 2016**
- **Belgrade bypass Strazevica Tunnel, Serbia on 27-28th September 2016**
- **Demir Kapija Tunnel, the Former Yugoslav Republic of Macedonia on 18-19th October 2016**

Deliverable D5.3 Final report on the field tests,soon to be available, describes the procedures followed at those five field tests. For each test site, a similar structure was followed.

The organisation of all test sites was time consuming and very instructive. The facilitator of each test site had to start in advance of the planned site visit, since collecting all relevant data (maps, pictures, video, accident data) was a huge work and not always centralised by one contact person. After each inspection, the core Team also delivered the Road Safety Report and sent it to the Infrastructure Manager. The Infrastructure Manager commented on each topic of the RSA/RSI Report in the 'Response to the Audit/Inspection Report'. For confidential reasons, these reports are not included in the Deliverable.

The third workshop will be held in Brussels, organised by ERF on 21st February 2017. During this workshop, participants will discuss the results of the last three joint safety operations and the preliminary version of the guidelines.

The five field tests went in general according to plan. The evaluation sheets of each test site led to the same type of suggestions and comments and there were no significant deviations in the findings of the various inspection teams. Everyone involved learned valuable lessons and the ECOROADS team and external experts proved in practice that the theory of combined inspections could work in reality with real experts. A very interesting exchange took place between partners from different countries, road safety and tunnel experts, as well as ECOROADS members and the local Road Authority members.

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

PARTNERS

SKILLFUL PROJECT BEGINS UNDER H2020

Transport is a rapidly developing and changing sector, facing problems in developing, attracting and retaining appropriate workforce. The sector is increasingly depending on specialised equipment and products. Future jobs will therefore require new and advanced skills in engineering, as well as in supporting operations. At the same time, the growing interdisciplinary character of transport activities will require professionals with developed skills in safety, security, logistics, IT, behavioural sciences, marketing and economics. As a consequence, new training and education methods and tools need to be developed (e.g. face-to face classrooms, on the job training, web-based training, immersive virtual learning environments (IVLE), etc.), which address the different needs of the various skill levels (from low skilled workers to high skilled managers/researchers), while also incorporating lifelong learning aspects.

The H2020-funded SKILLFUL (which stands for "Skills and competences development of future transportation professionals at all levels") project, launched on 1st October 2016, is part of the effort to tackle this challenge. The vision of SKILLFUL is to identify the skills and competences needed by the transport workforce of the future (in 2020, 2030 and 2050 respectively) and define the training methods and tools to meet them.

THE SKILLFUL AIMS ARE THREEFOLD:

1. **To critically review the existing, emerging and future knowledge and skills requirements of workers at all levels in the transportation sector, with emphasis on competences required by important game changers and paradigm shifters (such as the electrification and greening of transport, automation, MaaS, etc.);**

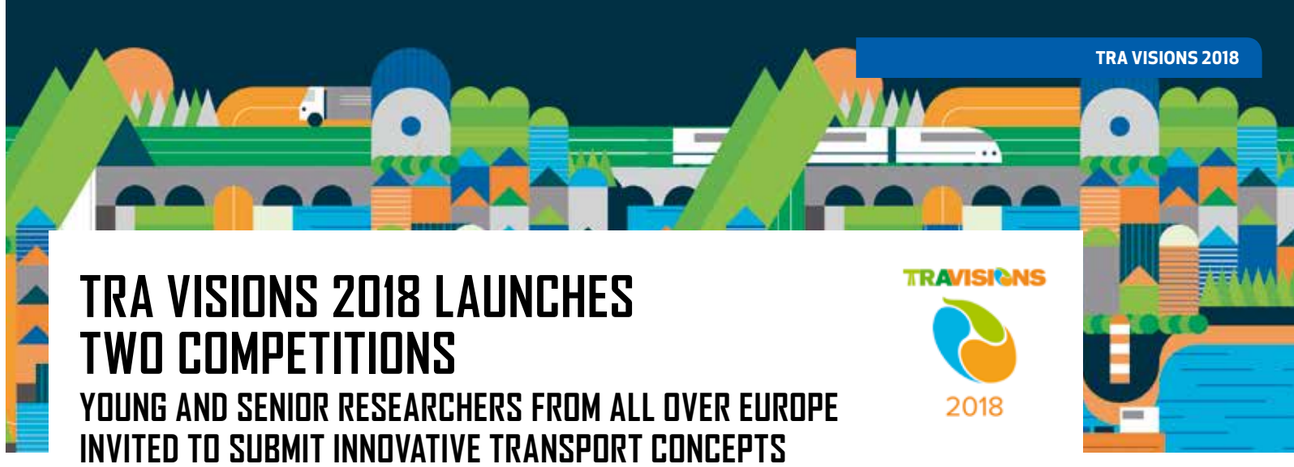
2. **To define the key specifications and components of the curricula and training courses that will be needed to meet these competence requirements optimally, with emphasis on multidisciplinary education and training programmes;**

3. **To identify and propose new business roles in the education and training chain, in particular those "knowledge aggregator", "training certifiers" and "training promoter", in order to achieve Europe-wide competence development and take-up in a sustainable way**

Since the project has only been running for a few months, it has so far focused on the identification of the parameters that are probably going to affect – to a varying extent - the future transportation sector (such as key paradigm shifters and game changers, key enabling and supporting technologies, emerging novel services, etc.), as well as the identification and benchmarking of existing and novel training/education methodologies, tools and systems. The identification of such factors will guide the Consortium through the new, emerging and changing skills that the professionals of the transportation sector should have in the future (in short, medium and long term) and will also help them define and develop the most suitable training programmes and tools, so as to cover the constantly emerging challenges.

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

PARTNERS



TRA VISIONS 2018 LAUNCHES TWO COMPETITIONS

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

The two European-funded TRA Visions 2018 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, waterborne or cross-modal transport systems? Which are efficient and sustainable solutions to the arising questions on mobility issues?

The European project TRA Visions 2018 invites young and senior researchers from all over Europe to enter their ideas of all kind concerning these and other questions to the competitions.

For the young researcher competition the deadline for a first short abstract is **30th June 2017**. Following this, participants are requested to develop and submit their full idea by **30th October 2017** where they need to provide a report, a short presentation and a project poster accompanied by an optional short video.

Senior researchers can enter the competition either by submission of a technical paper/abstract to the TRA 2018 conference website (**www.traconference.eu**) or direct submission of a recently published technical paper to the TRA Visions 2018 website **(www.travisions.eu**). To be eligible a paper must be technical in nature and relate to EU funded transport research.

The submission phase 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, waterborne and cross-modality).

The final winners of the competitions will be announced during a prestigious award ceremony at the Transport Research Arena Conference 2018 (TRA 2018) in Vienna on 16-19th April 2018 (see **www.traconference.eu** for more details).

The concepts must be submitted under one of the TRA 2018 conference topics, which cover the general areas of:

1. **Environment and Energy Efficiency**
2. **Vehicles & Vessels – Design, Development and Production**
3. **Advanced Propulsion Systems**
4. **Smart Urban Mobility & Logistics**
5. **People Mobility – Systems and Services**
6. **Freight Transport and Logistics**
7. **Transport Infrastructure**
8. **Connected and Automated Transport**
9. **Digital Technologies for Transport**
10. **Safe, Secure and Resilient Transport Systems**
11. **Human Dimension in Transport**
12. **Socio-Economics, Innovation and Policy**

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 are the Institute for Automotive Engineering (ika) of RWTH Aachen University, Foundation WEGEMT - A European Association of Universities in Marine Technology and Related Sciences (WEGEMT), BALance Technology Consulting GmbH, Politecnico di Torino (POLITO), Newcastle University (UNEW), FEHRL, Austria Institute of Technology (AIT) and University College London (UCL).

The award ceremony takes place during the TRA conference, which is held every two years and aims at getting science, research and industry closer together and pointing out challenges and opportunities they can efficiently face together in order to create an efficient and sustainable mobility of people and goods.

▶ For more information, contact **George Smyrnakis** at **george.smyrnakis@newcastle.ac.uk**, look up **TRA Visions** on Facebook, Twitter or Linked In or see **www.travisions.eu**

PARTNERS

UPDATE ON LAST SIX MONTHS OF SETRIS PROJECT ACTIVITY

PARTNERS

COORDINATORS

SUPPORTED BY

As reported in previous issues of this magazine, the purpose of the "Strengthening the European Transport Research and Innovation Strategies" (SETRIS) project is to deliver a cohesive and coordinated approach to research and innovation strategies of air, road, rail and waterborne transport modes in Europe. The project Consortium comprises partners from European transport research and industry communities, along with all five of the transport related European Technology Platforms (ETPs).

Work Package (WP) 1, "Connecting passengers for seamless travel and sustainable mobility" explores ways in which to assist passengers to transfer seamlessly between transport modes, to reach their final destinations smoothly, predictably and on time. This WP has two separate but clearly complementary Tasks, focused on (i) urban and (ii) long distance transport systems.

Considering 'urban', SETRIS Deliverable 1.2 provided an overview of the current status for passengers' transport priorities. This identified what will need to change to allow implementation success and who the early enables and adopters will be. For 'long distance', SETRIS Deliverable 1.3 aims to define a truly integrated long distance transport system along with an understanding of the conditions required to achieve it.

In doing this, SETRIS WP1 partners investigated the current status of modal and cross-modal Strategic Research and Innovation Agendas (SRIA), gaining insight to the ETP's opportunities to further collaborate to address those problems that can only be addressed by cooperation. The next steps are to combine both user needs and policy requirements to develop an 'Urban Mobility Implementation Plan' and a Synergies Report with which to consider a joint implementation plan for long distance.

In **WP2 "End to end logistics"**, the five Transport-related ETPs and a wide variety of stakeholders agreed a definition of the concept of a "truly integrated transport system for sustainable and efficient logistics", recently published in SETRIS's Deliverable D2.5:

> A truly integrated transport system for sustainable and efficient logistics is based on an open and global system of transport and logistics assets, hubs, resources and services operated (in an open environment and framework conditions) by individual companies. They are fully visible and accessible to market players hence creating a network of logistics networks. Coordination of logistics, transport, infrastructure and supply networks aim to move, store, supply and use physical objects throughout the world in a manner that is economically, environmentally and socially efficient, secure and sustainable. The system will be based on physical, digital, and operational interconnectivity, enabled through modularization as well as standardisation interfaces and protocols.

A variety of considerations are detailed in the Report, including:

- **Key characteristics, components and requirements of the system in the urban and long distance contexts**
- **Trends and policies impacting the process of its achievement**
- **Key enablers and barriers identified**

Current WP2 activity sees the building of a SRIA and Implementation Plan, to pave the way towards the implementation and achievement of the truly integrated transport system for sustainable and efficient logistics.

▶ To view more detail of SETRIS's activity, please access the EC-approved Deliverable Reports at **newrail.org/setris/about-setris/downloads/**. For more information, contact **Project Coordinator Belinda Fairbairn** at **belinda.fairbairn@ncl.ac.uk**.

FUTURE-RADAR PROJECT STARTS TO SUPPORT ERTRAC & EGVIA

The new 48-month H2020 FUTURE-RADAR project, started on 1st January 2017, supports ERTRAC's holistic approach for achieving a 50% more efficient road transport system by 2030. The dissemination of deliverables to the relevant stakeholders will strengthen the European Research Area for transport research and consequently support the development of innovations for a globally competitive European transport industry.

FUTURE-RADAR follows on from the previous FOSTER-ROAD project to support the European Technology Platform ERTRAC and the European Green Vehicle Initiative Association (EGVIA) to create and implement the needed research and innovation strategies for a sustainable and competitive European road transport system. Moreover FUTURE-RADAR facilitates the exchange between cities in Europe, Asia and Latin America on urban electric mobility solutions.

Linking representatives of all stakeholder groups, the activities include project monitoring, strategic research agendas, international assessments and recommendations for innovation deployment as well as twinning of international projects and comprehensive dissemination and awareness activities.

ERTRAC ANNUAL CONFERENCE 2017 TO BE HELD ON 8TH MARCH IN BRUSSELS

Every two years, ERTRAC holds a conference in Brussels with the objective to set the scene of European research for Road Transport. The 2017 edition, to be organised with the support of FUTURE-RADAR, will be of high importance because of the preparation of the next European framework programme financing R&D (FP9). The event will address key topics for transport innovation such as Automated Driving, Electro-Mobility, and an integrated approach to reduce CO_2 emissions. The ERTRAC long-term vision for transport will be debated with the audience, and drafts of European roadmaps will be presented and distributed for public consultation: on automation, electrification, and urban mobility.

▶ For more information, contact Xavier Aertsens at **xavier.aertsens@ertrac.org** or see **www.ertrac.org**

PARTNERS

TWO FINAL OUTPUTS OF FOSTER-ROAD

From collaborative research projects to market deployment: 12 success stories

The European Framework Programmes have been important mechanisms to achieve European transport policy goals related to mobility, energy efficiency, safety, emission reduction, economic growth and competitiveness. Thousands of projects have been carried out with funding from European programmes. A major target of co-funded RTD projects is the creation of technologies, methodologies and processes, and their implementation as successful innovations. The added value and benefit of the European Commission's financial support is tremendous, though impossible to quantify. This collection of factsheets gives a snapshot of European road transport innovations using 12 success stories that represent the wide range of RTD in this sector carried out in collaborative projects. See **www.ertrac.org/index.php?page=ertrac-publications**

ERTRAC Recommendations to the Horizon2020 Work Programme 2018-2020

A wide consultation of stakeholders was undertaken during 2016 by the ERTRAC Working Groups: the members have been asked to provide ideas for topics to be funded by the next Transport call of H2020, and workshops have been organised to discuss these ideas and gather them into a few recommendations for the European Commission.

The result of this consultation is a set of topics for the following research fields: Urban Mobility, Long Distance Freight Transport, Road Safety, Connected and Automated Driving, and Global Competitiveness. These areas are considered as key for multi-stakeholders research collaboration: gathering industry, research, infrastructure and public authorities. And they also reply to important societal challenges of transport in Europe. These Recommendations built in ERTRAC have been sent to the European Commission services (DG R&I, DG Move and DG CNECT), who are now responsible for drafting the Work Programme.

5-7TH APRIL 2017

COME AND JOIN US AT

FIRM 17
FEHRL Infrastructure Research Meeting
5-6-7 April 2017

FIRST ANNOUNCEMENT

JOIN US AT THE FEHRL INFRASTRUCTURE RESEARCH MEETING 2017 (FIRM17) ON 5 - 7TH APRIL 2017 AT THE DIAMANT CENTER IN BRUSSELS.

The theme will be *"The future transport system: a public-private enterprise embracing infrastructure and vehicles across all modes"*. Key highlights will include:

- The presentation of FEHRL's new Strategic European Road and cross-modal Research and implementation Programme (SERRP),
- Key addresses from the main stakeholders (EC, CEDR, PIARC, ERTRAC, ECTP),
- An outline of the vision for the future cross-modal transport infrastructure and its implementation plan,
- A round table of the deployment of automated connected vehicles,
- A workshop about training and knowledge transfer for transport stakeholders,
- The final conference for the USE-iT and REFINET projects.

The registration fee of €190 +VAT includes three days of conference and cocktail.

▶ Contact Isabelle Lucchini at **isabelle.lucchini@fehrl.org** for more details.

FEHRL REFINET INFRASTRUCTURE MOBILITY USE-iT FOX

FEHRL MEMBERS

FEHRL ASSOCIATES

FEHRL