

# FIRM

FEHRL INFRASTRUCTURE RESEARCH MAGAZINE



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Results and next steps highlighted at joint TRIMM/ERPUG event in Brussels

## FINAL PROJECT EVENT BRINGS SEAMLESS CLOSURE TO INCRIS PROJECT

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# FEHRL CELEBRATES ITS 25th ANNIVERSARY

25 YEARS

FEHRL

25 years of fostering research on road infrastructures in Europe and beyond >> p.6-7



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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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**25**  
YEARS

**FEHRL**





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Welcome to the fifth 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 25th anniversary and the recent event we organised to celebrate 25 years of fostering research on road infrastructures in Europe and beyond.



# 25 YEARS OF SUCCESS FOR FEHRL!

25  
YEARS

FEHRL

A lot has happened in the last 25 years. FEHRL has become a well-established organisation in Europe, has experienced all the European Commission (EC) Framework Programmes since its creation and witnessed the major changes in Europe and worldwide. Thanks to science and cooperative research, FEHRL has bridged the gap between non-connected nations. As a result of FEHRL's activities, a solid scientific research community on road infrastructure has been established across Europe. FEHRL has contributed therefore to creating the European Research Area and has indirectly supported the development of the European Union.

As you will read on pages 6-7, FEHRL's 25th anniversary event was the occasion to contemplate the accomplishments of the last quarter of a century, as well as bring forward ideas of what comes next, with a session focused on forward-looking developments for transport infrastructures, and to a larger extent for transport, the European Research Area, Europe and the world. Looking at examples of rapid and massive deployment of disruptive technologies in transport and in other sectors, it seems clear that no matter how we feel about change, once self-evident value is established, change will occur universally and quickly. In the next century, if we believe the interpretations derived from the Moore's law stating that the development of new Information and Communication Technologies will double every two years, and if we take into account the forecast from the Intergovernmental Panel on Climate Change about the effects of the climate change on our society and economy, we will probably face a very new situation where abrupt and extreme changes associated with high uncertainty will become the key

drivers of our society, hence of our R&D&I. Thus, the question which comes to my mind is: Do we have the courage and the foresight to embrace a new order of things, even if it takes us far beyond our comfort zone?

On page 5, our President highlights the wide range of activities covered by FEHRL, which also include the recent International Project Management training (read more on page 15) and Automated Road US Scanning Tour (page 9). We aim for the future to continue and extend these activities, as well as move beyond our own comfort zone to focus on both research and innovation, cooperating with industry and moving to more implementation and deployment of results. In addition, we will partner to tackle cross-modality and generate organisational synergy.

In this issue, we showcase the progress and plans for our flagship programme Forever Open Road (FOR) (pages 8-9), as well as some related projects and programmes – the ERA-NET Plus Infravation 2014 Call (page 19), TRIMM (pages 10-11) and SMARTRAIL (pages 12-13). And we show FEHRL's focus on dissemination and cooperation with articles on INCRIS (pages 14-15), TRA-Visions (pages 16-17) and FOSTER-Road (page 18). We hope you enjoy your read!

I also seize this opportunity to thank Govert Sweere for his hard work and dedication as FEHRL Executive Committee (FEC) Chairman and representative to the European Road Transport Research Advisory Council (ERTRAC), and to wish him all the best in his retirement.

Thierry Goger

FEHRL Secretary General ([thierry.goger@fehrl.org](mailto:thierry.goger@fehrl.org))

► For more information, see [www.fehrl.org](http://www.fehrl.org) and:



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# MESSAGE FROM STEFAN STRICK, FEHRL PRESIDENT

In October 1989, representatives from 13 European road research institutes met with the objective to establish cooperation on a European scale. In 2014, 25 years later, FEHRL is a strong, active and very well-known organisation.

Before the founding of FEHRL in 1989, some co-operation had already existed for many years between selected laboratories. The first meeting of FEHRL was held in October 1989 at TRRL in Crowthorne/UK with the participation of 13 research establishments undertaking road research. At the end of these two rich days, the participants had not only defined a name, but also the membership, professional subject areas of interest and the role of the organisation. Only one month after this, the map of Europe changed fundamentally, bringing a new European road system and ultimately a new FEHRL. From 1989 until now, the number of FEHRL members has increased from 13, the number of founding institutes, to more than 40 institutes in Europe and abroad, including four international associated members.

For a sustainable European road network, the identification of the research needs is imperative. Starting in 1991, these considerations resulted in the development of a rolling series of Strategic European Road Research Pro-

grammes (SERRP), which address both immediate short-term problems and future issues regarding the mobility of Europe's citizens.

From 2002 onwards, FEHRL experts have been actively involved in the creation of the Strategic Research Agendas of the European Road Transport Research Advisory Council (ERTRAC) and the European Construction Technology Platform (ECTP), which both provide important foundations for the formulation of the transport work programme of the European Commission.

The exchange of information on road research and its implementation is a central aim of FEHRL. Numerous reports on the results of the cooperative research have been produced, and expert meetings and regular FEHRL Infrastructure Research Meetings (FIRM) held where all current FEHRL projects are presented and critically reflected on by an international auditorium. The next one, FIRM15, is scheduled to be held in Brussels on 22nd-23rd April (see the advert on the back page). And since 2006, FEHRL has also been a very active participant at the biannual TRA conferences.

The joint efforts undertaken by the experts of the FEHRL community to develop the FOR programme have attracted attention in the transport

community and have so far significantly influenced programmes and projects both on national level as well as on European and on international level. It would be foolish not to use this huge pool of experience and expertise to its full extent – not only to cover issues of road transport, but also to include the expertise existing in other transport modes. With the first projects of the FOR programme underway, FEHRL is now developing the 'FOR x 4 initiative on transport infrastructure' as you can read about on pages 8-9.

Over the last 25 years, European and international FEHRL members have achieved impressive results, working hard to make their ideas and visions come true. FEHRL is not an abstract organization but a platform for the cooperation of our members. They are represented by a large number of highly qualified and experienced experts. Only with their willingness to cooperate has it been and will continue to be possible to develop our common FEHRL idea. Now is the perfect opportunity to say "Thank you" to everyone who has played his / her part in this development so far!

Stefan Strick  
FEHRL President ([praesident@bast.de](mailto:praesident@bast.de))



# FEHRL CELEBRATES ITS

On Thursday 13th November 2014, FEHRL celebrated 25 years of fostering research on road infrastructures in Europe and beyond with an afternoon event for around 70 key stakeholders, partners and institute members at FEHRL member, the Belgian Road Research Centre (BRRC) in Sterrebeek, near Brussels, Belgium. Entitled *"A great support to research for road infrastructures in Europe and beyond"* and chaired by Thierry Goger, Secretary General, the event was structured into two sessions:

## FIRST SESSION: 25 YEARS FOSTERING RESEARCH ON ROAD INFRASTRUCTURES IN EUROPE AND BEYOND

This session covered a series of short presentations by key FEHRL members and stakeholders about the highlights of the past quarter of a century. Following a short opening by Thierry Goger, Ann Vanelstraete, Head of Department at BRRC, welcomed everyone to the venue on behalf of BRRC.

Stefan Strick, President of another member, the German Federal Highway Research Institute (BAST) and FEHRL's current President, gave an interesting and complete retrospective on FEHRL's main achievements and added-value (which is summarised in his column on page 5). One of these is FEHRL's involvement in the series of Transport Research Arena (TRA) conferences, and he was followed by Patrick Malléjacq, Director for European and International Affairs at member, the French Institute of Science and Technology for



Transport, Development and Networks (IFSTTAR), who presented the lessons learnt from IFSTTAR's management of TRA2014 in Paris last April.

The application of research outcomes was the topic of the presentation then made by Steve Phillips, Secretary General of the Conference of European Directors of Roads (CEDR), who outlined FEHRL's comprehensive work in conjunction with CEDR over the past years.

To conclude the first session and stress the added-value of cooperative research to leverage considerably the results and decrease significantly the duplication of efforts, Manfred Haider, Chairman of the Research Coordinators and Head of Business Unit at FEHRL member, the Austrian Institute of Technology (AIT), presented the viewpoint of researchers on international collaborative research.

## SECOND SESSION: FORWARD-LOOKING DEVELOPMENTS

The second session, focused on future road and transport infrastructure developments, started with an engaging presentation on FEHRL's flagship FORx4 (Forever Open Road, Rail,

Runway and River) Co-Modal Transport Initiative for Research by Bob Collis, Director of Infrastructure at FEHRL member, Transport Research Laboratory (TRL) and FEHRL Executive Committee member. Bob took the audience on a journey where transport is inclusive and seamless, encompassing all transport modes as well as every level of analysis and decision.

Several external stakeholders then shared their respective future visions, starting with Torsten Klimke, Deputy-Head of Unit, Research and Innovative Transport Systems Unit at DG MOVE of the European Commission. He outlined how road infrastructures are a key element for the future of European mobility, which included his expectations for FEHRL. The highlight on the EC's Horizon 2020 programme, and in particular the accent on innovation, introduced perfectly the next presentation dedicated at fostering Industry driven research in transport. Gunter Zimmermeyer, Chairman of the European Research Group on Environment and Health in the Transport Sector (EUGT) and Vice President of the Deutsche Verkehrswacht (DVW), shared his key elements for success towards more Industry driven research in transport.

# 25TH ANNIVERSARY

Georgia Aifadopoulou, Deputy Director of HIT/CERTH (Hellenic Institute Transport), on behalf of George A. Giannopoulos, President of European Transport Research Alliance (ETRA), then presented how ETRA works to enhance cooperation between European and International Transport Research Organisations.

Alongside globalisation, it is clear that industry and the authorities throughout the world are exposed to similar challenges and often come across similar solutions independently from each other. The time has come to foster synergy within Europe and to enlarge cooperation beyond European borders, not only with good political declarations but in concrete actions. To that extent, Debra Elston, Office Director, Corporate Research, Technology and Innovation Management at FEHRL member, Federal Highway Administration (FHWA), in the USA, featured the first ever endeavour of a "real common pot" between Europe and the USA for Research in Transport, implemented thanks to the MoU between FEHRL and FHWA. Debra shared how FEHRL is an enabling agent for international cooperation and how FHWA and FEHRL have moved from a conceptual agreement to tangible achievements which bode well for future development.

And finally Hélène Jacquot-Guimbal, General Director of IFSTTAR and Vice-President of FEHRL, summarised the forward-looking visions and brought the

session to an end. This included the continuing involvement of women in research.

## GETTING CLOSER TO STAKEHOLDERS

The event ended with the signing of the Memorandum of Understanding (MoU) with CEDR between Stefan Strick and CEDR Chairman, Simon Grima, also Chief Officer of the Roads and Infrastructure Directorate of Transport Malta (see photo to the right). This MoU aims at developing further the cooperation between FEHRL and CEDR and opening up the potential areas of future collaboration. This important memorable instant laid down the foundation to a promising cooperation between FEHRL and CEDR, enabling in particular a seamless transition from innovation to implementation.

The event was followed by a cocktail where a FEHRL birthday cake was enjoyed by everyone. Copies of all relevant materials are available on the FEHRL website. Contact [isabelle.lucchini@fehrl.org](mailto:isabelle.lucchini@fehrl.org) for any further information.

*From top to bottom:  
Stefan Strick and Simon Grima,  
Debra Elston, and Torsten Klimke*







# FOREVER OPEN ROAD

## THE STORY OF SUCCESS SO FAR

The Forever Open Road (FOR) programme was first conceived in 2009. Since then, there have been great efforts made by the FEHRL community to develop the basic idea, and to achieve the remarkable success in the five years that followed.

During 2010, FEHRL members prepared the FOR Research and Development plan, which outlined the technologies required to realise the concept. This was followed in 2013 by the publication of roadmaps for each of the three FOR elements (Adaptable, Automated and

Resilient), as well as two specific roadmaps covering innovation themes of the Adaptable element (Asset management challenges for road networks and Transport infrastructure integrated with land use planning (TIILUP)).

In each of the individual roadmaps, the sub-themes are divided according to the three milestones defined for each topic.

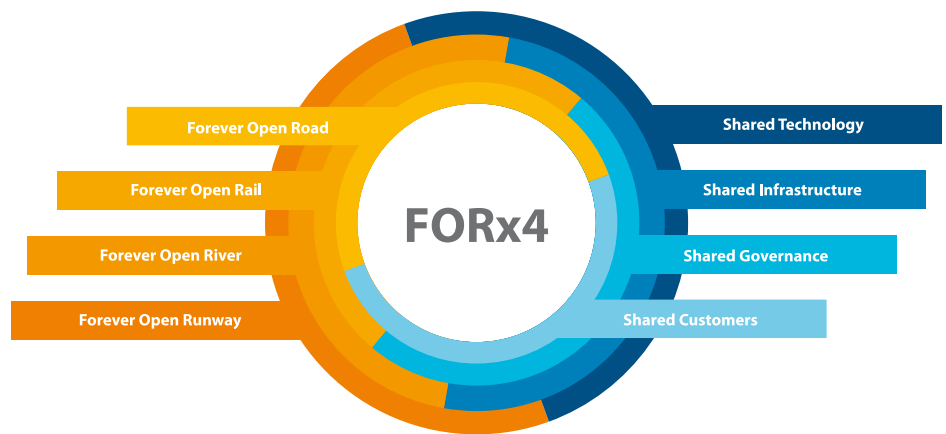
The first stage, **Milestone 2015**, is concerned with proving single technologies. The list of the FOR labelled projects that builds on state-of-the-art practices clearly shows the implementation of the roadmaps. This has led to a comprehensive portfolio of proven solutions - Mile-

stone 2015 has been largely reached. So far, more than 40 national, European and international projects are contained in the FOR database (accessible from the "Projects" tab of [www.foreveropenroad.eu](http://www.foreveropenroad.eu)), covering a high number of topics of all roadmaps.

For the achievement of **Milestone 2**, the integration of successful single technologies to be proven in sub-systems, a multi-faceted vision was developed.

Finally, the third stage of FOR, **Milestone 2025**, will be reached when technologies are integrated to the full-scale systems level. By 2025, full-scale systems field tests will have yielded





first conclusive results. By then, three corridors/routes that are significant to the European economy are intended to be effectively upgraded in line with the FOR concept.

The joint efforts undertaken by the experts of the FEHRL community reflect the urgent necessity of FOR and have attracted the attention of the transport community. So far, the FOR programme has significantly affected programmes and projects on a national as well as European and international level. FOR has influenced several national programmes, e.g. the French “5th Generation Road”, the German “Road in the 21st Century”, Norway’s “Ferry-free E39” programme and the “Exploratory Advanced Research” (AER) in the USA.

One very important result for FOR is the support of the ERA-NET Plus Infravation 2014 Call by the European Commission (EC). Infravation was initiated as a pooled research fund to develop transport infrastructure which addresses the challenges identified in the EC’s White Paper on Transport: Smart, Green and Integrated transport. The transnational Call for proposals on “Advanced systems, materials and techniques for next generation infrastructure” was successfully launched in March 2014 (see separate article on page 19) and has received a very high response.

Another success was the perception of the research needs for infrastructure by the EC, reflected in the uptake of these needs in several topics of Call 2014 of the Horizon 2020 programme. As an example, the ideas responding to the research needs of topics MG.8.1 and MG.8.2 (Challenge: Infrastructure) have resulted in a high number of proposals.

FOR is FEHRL’s flagship programme, as well as the central part of its Strategic European Road Research Programme (SERRP V). SERRP V also considers the multi-modal aspect and calls for greater research cooperation between experts in all transport sectors. Due to the strong technical overlaps in infrastructure requirements, there is a possibility for many complementary research actions, e.g. for bridges, earthworks and materials. Moreover, much can be learnt from the other modes as well as many experiences can be shared. That is why a more integrated research and innovation programme is beneficial for a high-performance, safe and reliable transport network.

FOR has featured at numerous events, including an Invited Session at TRA2014 in Paris in April 2014 (featured in the last issue of this magazine), and even won a prize at the World Road Association-PIARC Congress in Mexico in September 2011. The 2014 FEHRL US Scanning Tour, held from 6-13th December, was focused on the Automated Road element and included visits to FHWA and other selected institutes to gain insights into Connected and Automated Driving. The 2013 Scanning Tour focused on asset management and the 2012 one on climate change adaptation (Resilient Road).

Various publications have also published articles about FOR, including World Highways, Thinking Highways and the European Voice.

#### MOVING ON TO FORx4

In the EU’s White Paper, a seamless integrated transport system is envisaged: The user requests a single trans-

port network, across which people and goods are able to flow freely. In order to reach this goal, we need a transport system that will serve Europe’s growing demand for business and leisure, and that is always available – the **Forever Open Road, Rail, Runway and River** or **FORx4** initiative.



In FEHRL’s FORx4 initiative, FOR needs are widened up to a multimodal approach and the focus is on infrastructure innovation for seamless mobility. The initiative contains the four modes of road, rail, runway and river and four shared domains of infrastructure, technology, governance and most importantly, customers. FEHRL prepared a ‘Point of View’ document for FORx4 in late 2013, entitled “A Co-Modal Transport Initiative for Research” and now seeks to engage with stakeholders from other modes to develop a broad strategy for the programme, to build a detailed research plan and to develop the required intermodal research themes, topics and demonstrators in detail over the next decades.

The success of the FOR programme encourages us all to proceed with FORx4!



► For more information, contact Bob Collis at [bcollis@trl.co.uk](mailto:bcollis@trl.co.uk)

# FINAL CONFERENCE, NATIONAL WORKSHOPS AND FINAL REPORT BRING SUCCESSFUL END TO TRIMM

As reported in the June 2014 FIRM magazine and previous issues, TRIMM (Tomorrow's Road Infrastructure Monitoring and Management) is a 36-month EC FP7 project that focused on advanced infrastructure monitoring techniques that have not yet been implemented. TRIMM was limited to cover bridge, pavement and road equipment monitoring techniques. The TRIMM consortium comprised five SMEs, FEHRL and nine FEHRL institutes, in all representing 11 European countries. The project has just finished on 30th November 2014 with a successful final conference and four national workshops, as well as the TRIMM Final Summary Report as one of the final deliverables.



## HIGH TURNOUT AT FINAL CONFERENCE

More than 100 people attended the TRIMM final conference on October 23rd-24th 2014 at the Diamant Center in Brussels, Belgium. The meeting was organised in conjunction with the European Road Profile User's Group (ERPUG), whose objectives fit very well with the TRIMM project.

This one and a half day event was composed of a mix of speeches from TRIMM and ERPUG, including exhibitors, invited experts and TRIMM project partners. Among the keynote speakers were Steve Philips from CEDR and Mats Wendel from the Swedish Road Administration, presenting the Road Administration's needs. Possibilities were covered by the TRIMM results, ERPUG and exhibitor presentations. The topics of the meeting were divided into blocks responding to TRIMM's objectives:

- Reducing costs and environmental impact, increasing efficiency and safety
- Enhancing the role of condition data in asset management
- Multipurpose monitoring for application across all levels of asset management
- New and emerging technologies for monitoring road pavements
- Texture measurement
- Continuous monitoring of bridges
- Pavement profile measurement
- Pavement profile quality assurance (QA)
- Tyre/road noise
- Rolling resistance and ride effects on fuel consumption and wear and tear on vehicles
- Innovative contract and performance control
- Pavement profile analysis
- Pavement surface texture (measurement, analysis, QA)
- Automated pavement condition survey
- Data usage at road, project and network levels

The TRIMM project's contribution to the conference covered advances in the areas of monitoring of roads and bridges, together with implementation aspects such as indicator framework and added-value of monitoring. The TRIMM presentations were integrated in the themes of the joint agenda with ERPUG and covered areas such as the use of 3D images, real time data collection, structural health monitoring and management and much more.

## EVENT ORGANISED IN COOPERATION WITH ERPUG

It has been recognised that Europe needs a forum to share thoughts, experiences, developments, innovations and practices of how to adapt to the ever changing challenges in the area of road surface monitoring. With the American Road Profile User's Group (RPUG) as an example, an initiative has been taken to start a similar European group. ERPUG shares the latest and hottest topics such as:



Robert Karlsson



Photos from the Turkish national workshop and final conference



ERPUG also organised an exhibition and get-together event including dinner to facilitate networking amongst researchers, manufacturers, companies and stakeholders. Among the exhibitors/sponsors showing the latest in monitoring were:

- Pavemetrics ([www.pavemetrics.com](http://www.pavemetrics.com))
- Pathway Services ([www.pathwayservices.com](http://www.pathwayservices.com))
- LMI Technologies ([www.lmi3d.com](http://www.lmi3d.com))
- Dynatest ([www.dynatest.com](http://www.dynatest.com))
- Ramboll ([www.ramboll.com](http://www.ramboll.com))
- Roadscanners ([www.roadscanners.com](http://www.roadscanners.com))
- Vectra Lehman & Partners ([vectragermany.com](http://vectragermany.com))
- Fugro ([www.fugro.com](http://www.fugro.com))
- Greenwood ([www.greenwood.dk](http://www.greenwood.dk))

► For more information including the agenda, presentations and photos, see the specific “Final conference” section of [trimm.fehrl.org](http://trimm.fehrl.org) and [www.erpug.org](http://www.erpug.org)

### FOUR NATIONAL WORKSHOPS IN POLAND, TURKEY, ROMANIA AND CZECH REPUBLIC

FEHRL organised four TRIMM national workshops in the run up to and after the TRIMM final conference to complement this event and bring the project to key national stakeholders. These one-day events as listed below included presentations and discussions on the possibilities and needs in road infrastructure assessment.

- National Workshop 1:  
24<sup>th</sup> September 2014 - FEHRL member IBDiM - Warsaw, Poland - 30 participants.
- National Workshop 2:  
17<sup>th</sup> October 2014 - FEHRL member KGM - Ankara, Turkey - 45 participants
- National Workshop 3:  
30<sup>th</sup> October - FEHRL member CESTRIN - Bucharest, Romania - 55 participants
- National Workshop 4:  
20<sup>th</sup> November - FEHRL member CDV - Brno, Czech Republic - 35 participants

At most of the events, the English presentations were interpreted simultaneously into the national language. They featured a mix of speeches from TRIMM project partners on each of the technical Work Packages carried out during the project and FEHRL member researchers.

► For more information, see the specific “National workshop” section of [trimm.fehrl.org](http://trimm.fehrl.org)

### TRIMM FINAL SUMMARY REPORT

One specific Deliverable of the TRIMM project is the Final Summary report which gives an overview of the results of the different Work Packages. This report is broken down into chapters which are aligned with the themes of the final conference to introduce the project and present the needs for monitoring information in asset management and possibilities for the improved assessment and monitoring of bridges, as well as the improved monitoring of roads. A final chapter outlines the proposed implementation of monitoring information in asset management. For more information and to download the report, see the specific “Project results” section of [trimm.fehrl.org](http://trimm.fehrl.org).

### PARTNERS



► For more information on the project as a whole, contact Project Coordinator Robert Karlsson at [robert.karlsson@vti.se](mailto:robert.karlsson@vti.se), go to the TRIMM group on [in](https://www.linkedin.com/company/trimm) or see [trimm.fehrl.org](http://trimm.fehrl.org)



# SMARTRAIL LEADS TO OPTIMISED WHOLE LIFE MANAGEMENT OF RAIL INFRASTRUCTURE ELEMENTS

In order to effectively manage ageing railway infrastructure, a well-defined safety assessment framework is required. In the 36-month FP7 Smart Maintenance of Ageing Rail Infrastructure (SMARTRAIL) project, which finished at the end of August 2014, a reliability-based framework was developed for optimised whole life management of rail infrastructure elements including **bridges, tracks and slopes**. Here we present the main results of the project.

## LIFE CYCLE ANALYSIS - WHOLE LIFE CYCLE TOOL

In order to make rational choices on the economic and environmental benefits of any remedial works, a life cycle analysis (LCA) and life cycle cost (LCC) tool were developed within the project. The tools, available on [smartrail.fehrl.org](http://smartrail.fehrl.org), were used to prove the environmental and economic cost benefits associated with the remediation techniques demonstrated in the project.

forced concrete in Croatia, the use of geosynthetics to prevent ballast fouling in Slovenia, and the demonstration of the efficacy of a new technique which uses vertical anchors to provide a smooth variation of stiffness across the transition zone for the reconstructed Buna Bridge in Croatia.

## INNOVATIVE USER PLATFORM

The SMARTRAIL project was a truly collaborative project which through the establishment of a user platform, involved major stakeholders including rail operators, infrastructure managers, engineers, researchers, regulatory bodies and policy makers from the beginning of the project. A particular feature of the project is the publication of the following non-technical user guidelines, which can be downloaded from [smartrail.fehrl.org](http://smartrail.fehrl.org).

- **Bridge Scour Monitoring A Guideline - WP1**
- **Reliability based Infrastructure Safety Framework Guideline - WP2**
- **Implementation of Geosynthetics Guideline - WP3**
- **Life Cycle Assessment Whole Life Cycle Tool Guideline - WP4**

## NEW TECHNIQUES

Methods to obtain real-time information on the performance of rail infrastructure, which could feed the reliability based model and allow updating of the safety level were developed and tested on railway infrastructures across the EU. These techniques included; the development of innovative sensors to monitor the corrosion rate of steel and concrete bridges, the application of geophysical techniques as a non-destructive method of evaluating the condition of open-track and embankments, the use of simple accelerometers to derive a vibration based method of measuring the development of bridge scour and the development of an early warning system for rainfall induced landslides.

## DEMONSTRATION PROJECTS

The framework documentation includes typical distributions of stochastic variables and recommends target levels of reliability. The approach was illustrated by the application of the methodology to two demonstration projects, a steel railway bridge in Poland and a 150-year-old railway embankment in Ireland. Given the different challenges faced by infrastructure managers across the EU and the range of local materials available to effect solutions, a series of full-scale demonstration projects was undertaken in conjunction with infrastructure managers who participated in the SMARTRAIL project. These included the remediation of a metallic bridge using ultra high-strength fibre rein-



# RESULTS PRESENTED AT FINAL CONFERENCE

The practical application of the scientific research findings was the key theme running through the final conference held on 25-26th August in Ljubljana, Slovenia. The agenda featured presentations of the cutting edge science developed, as well as three engaging and salient keynote speeches. The programme concluded with a lively round table debate on the future of the project.

## 1. SMARTAIL SCIENTIFIC RESULTS

Project Coordinator Dr. Ken Gavin (UCD) opened the meeting with an overview of the project, following which WP leaders presented a summary of the main project outcomes.

For **WP1 (Monitoring and Inspection)**, WP leader Dr. Ken Gavin explained how an instrumented smart slope experiment was performed in Ireland with two types of sensors, suction probes and water content probes. Work on monitoring bridge loading (Adaptronica) and corrosion monitoring (ZAG) at demonstration sites in Poland and Slovenia were also described.

Professor Eugene O'Brien of Roughan and O'Donovan Innovative Solutions (ROD-IS) outlined that **WP2 (Assessment and Models)** covered methods to extend the life and optimise rehabilitation/renewal. The tasks were explained by Dr. Stefan Lachinger (AIT) and Arkadiusz Mroz (Adaptronica).

For **WP3 (New rehabilitation technologies to extend service life of existing railway infrastructure)**, Stanislav Lenart (ZAG) presented work on open tracks, Marko Vajdic (IGH) on Transition Zones, Duo Liu of (TUM) on Modelling, Tanja Mikulic (IGH) on Tunnels, Irina Stipanovic (UT) on Bridges and Aljosa Sajna (ZAG)

on a novel application of Ultra High Performance Fibre Reinforced Concrete (UHPFRC). Parts of **WP3** and **WP4 (Whole Life-Cycle Cost Calculation Tools)** were picked up by Stanislav Lenart (ZAG) and Simon Kovačič (SŽ), while Karmen Fifer Bizjak (ZAG) presented the LCC tool.

## 2. DIVERSE AND ENGAGING KEYNOTES

Keynote speakers included Andreas Zimmer of UNECE's Trans-European Railway (TER) Project, Stefan Eisenbach (UBIMET) and Prof. Meho Saša Kovačević (University of Zagreb).

Full project results, deliverables, conference presentations and supporting documents are available on [smartrail.fehrl.org](http://smartrail.fehrl.org). Contact [smartrail\\_admin@ucd.ie](mailto:smartrail_admin@ucd.ie) for more information or see the SMARTAIL group on [in](https://www.linkedin.com/company/smartrail).

## PARTNERS



Opening Session of the Smartrail Final Conference (Ljubljana, Slovenia)



Roundtable Session at Smartrail Final Conference (l-r) Michael Robson, Irina Stipanovic, Eduardo Fortunato, Eugene O'Brien, Andreas Zimmer, Stefan Eisenbach



Smartrail Final Conference second day visit to a building site for railway rehabilitation



Smartrail Final Conference Site Visit: (l-r) Witold Opinski, Vladimir Soloviev, Brian Bell, railway museum staff, Ales Žnidarič



# FINAL PROJECT EVENT CLOSURE TO INCRI

The INCRIS FP7 project, which aimed to improve international cooperation and develop an R&D road infrastructure strategy for Ukraine, has successfully drawn to an end in November 2014 after 36 months. Due to the current complicated political situation in Ukraine, the final project event was held in Warsaw, Poland, following the mutual decision of the project partners.

## PARTNERS



The event, held at the Road and Bridge Research Institute (IBDiM) on 24th November 2014, was attended by the representatives of each of the Consortium members. The aim of the event was to summarise the project's achievements and consider further project opportunities for DNDI to foster its involvement in the most promising research programmes.

The presentations given by the participants were mainly focused on the project achievements and findings per Work Package. In his presentations, Valeriy Vyrozhemsky, the Project Coordinator, emphasised that the key priorities of DNDI to facilitate international partnership consisted of:

- Continuing to closely cooperate with EU research centres under the FEHRL umbrella and beyond within the area of DNDI's research interest.
- Seeking wider involvement in EU research programmes and opportunities to develop joint research projects.

Among the key outcomes of the research cooperation between the

INCRIS partners, a field of potential cooperation with IBDiM was identified during a short visit of IBDiM experts to DNDI in January 2013 as part of **Work Package (WP) 1 Networking**. This topic of the "Use of coal waste in the construction of road embankments" was emphasised as the most promising priority, based on the common issue of the use of coal waste in both Ukraine and European countries. The idea could result in the development of a joint research project on the use of coal waste in road construction.

Dissemination activities were mentioned as one of the major project achievements that contributed to raising awareness and knowledge exchange between Ukrainian and the European researchers on the topics of common research interest. This included the INCRIS newsletter, the INCRIS website ([incris.fehrl.org](http://incris.fehrl.org)) and its translation into Ukrainian, three INCRIS articles in this magazine, and the translation of the FEHRL Strategic European Road Research Programme V (SERRP V) brochure from English into Ukrainian.

In connection with the prolongation of the project and based on the positive

1: INCRIS final project event. 2, 3, 4: Fifth IPM training session





# EVENT BRINGS SEAMLESS PROJECT



feedback of the previous International Project Management (IPM) training modules, the fifth (and final) IPM training session was held on 4-6th November 2014 as part of **WP2 Training** within the framework of INCRIS. It was focused basically on the requirements and procedure of participation in Horizon 2020 projects. In order to shed more light on financial aspects in Horizon 2020, **whole day financial management training** session was held on 7th November 2014 in the FEHRL Office in Brussels.

One of the ambitious objectives of **WP3 Strategy Building** was to develop a new long-term research and development strategy for DNDI to increase its scope, regional coverage and prepare it to better respond to the socio-economic situation of Ukraine. Based on the stakeholder expectations studied during the project, DNDI's new R&D strategy was proposed by the joint efforts of INCRIS partners, whose implementation can be significantly promoted by the development and use of an innovative system for project tendering. An Action Plan was developed as a practical course for the new R&D

strategy implementation that would lead DNDI from its current research strategy towards the new one. The ideas behind the new R&D strategy were presented during two R&D strategy workshops in Kiev that contributed to raising awareness of the national stakeholders and decision-making authorities.

One of the final event agenda issues was focused on lessons learned and next steps. Each partner provided its feedback, including its vision regarding added value and analysis of the "minuses" of the project. On the whole, the assessment of the INCRIS project was very positive. It was unanimously recognized that:

- The partners have been committed to the project.
- The project has achieved its objectives.
- DNDI has been given the opportunity to take part and lead an EC project.
- INCRIS has had a positive impact on and prestige for DNDI.

One of the core issues considered during the final INCRIS event, were project opportunities for DNDI in the upcoming Horizon 2020 calls. Leif Sjögren of VTI presented VTI's views on successful international cooperation and caused a lively discussion. And some ideas of possible project opportunities for DNDI were presented by Adebole Adesiyun of FEHRL.

As a conclusion to the meeting, the partners agreed that the following aims of INCRIS have been successfully reached:

- Opportunity to meet researchers from other countries.
- Opportunity to visit research laboratories across Europe.
- Identification of fields of cooperation.
- Dissemination of research results made possible.
- Project management skills enhanced.
- Opportunity to work on other EC projects during secondment.
- Development of new R&D research strategy.



► For more information, go to [incris.fehrl.org](http://incris.fehrl.org) or contact Valeriy Vyrozhemsky at [vv@dorndi.org.ua](mailto:vv@dorndi.org.ua)





In the June issue of this magazine, we outlined the winners of the two TRA Visions ([www.travisions.eu](http://www.travisions.eu)) competitions for transport research awards, which were announced at TRA2014 in April 2014. Here we go into more detail about two of the winners of the **EU Champions of Research competition** using extracts from the submitted entries to the competition.



# BRIDGING THE GAP BETWEEN UNIVERSITY AND INDUSTRY

The European research career of Professor Eugene OBrien, winner of the cross-modal award, spans over 20 years and has helped to bridge the gap between university and industry. His research has focused among other things on Bridge Traffic Loading and Weigh-in-Motion. He is a professor of Civil Engineering at University College Dublin (UCD) and Director at Roughan & O'Donovan Innovative Solutions (ROD-IS).

Low-cost methods were developed of monitoring and strengthening road infrastructure. Eugene's contribution was to develop ways by which strengthening of structures can be avoided by demonstrating that they are in fact safe, even though they may have deteriorated since first built. This is possible by exploiting unknown reserves of strength.

new company (ROD-IS), in partnership with an established firm of consulting engineers, which has been involved in a number of EU-funded projects. A Marie Curie Industry Academia Partnerships and Pathways project called Long Life Bridges is an example. Long Life Bridges has developed a bi-modal tuned mass damper to extend the fatigue life of bridges which has been tested on a railway bridge in Sweden.

Prof Eugene OBrien's research has been consistent with the principles of European transportation policy – **more sustainable, seamless, competitive, and responsive**. For example, thanks to his work, infrastructures have been made more sustainable by extending their lives through the quantification of risks, especially the risk of bridges being overloaded. The following are some of the innovative ideas from EU-funded projects with his participation:



**ARCHES - ASSESSMENT AND REHABILITATION OF CENTRAL EUROPEAN HIGHWAY STRUCTURES, FP6 PROJECT; 2006 – 2009**

ARCHES focused on the infrastructure maintenance demands of the then new member states of the European Union.



**ASSET - ADVANCED SAFETY AND DRIVER SUPPORT FOR ESSENTIAL ROAD TRANSPORT, FP7 PROJECT; 2008 - 2011**

ASSET aimed to contribute to the improvement of safety in sustainable road transportation. The project continued the work on bridge loading but in a more holistic framework. Eugene's contribution included the development of road pavement and railway track deterioration models that can be used to predict the remaining service life of these infrastructures. These allow for more cost efficient maintenance planning, preventing overdesign while ensuring that pavements and track are sufficient to remain in service for their entire design life.

For better exploitation of published research, in 2008, Eugene formed a



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## PARTNERS

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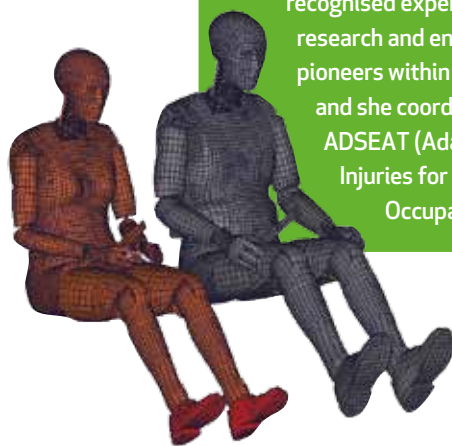




# INCREASING EQUALITY IN VEHICLE SAFETY

## WORLD'S FIRST VIRTUAL AVERAGE FEMALE DUMMY MODEL

Dr Astrid Linder of VTI, Sweden, winner of the Road award and overall winner, is an internationally-recognised expert within traffic safety research and engineering. She is one of the pioneers within the whiplash testing field and she coordinated the FP7 project ADSEAT (Adaptive Seat to Reduce Neck Injuries for Female and Male Occupants).



Whiplash injury is a common and costly injury that can occur as a result of a vehicle crash, generally at relatively low speed from all impact directions, although rear impacts are most often seen in injury statistics. It is estimated that annually, 800,000 citizens suffer whiplash injuries in the European Union alone. Some 40,000 of these injuries result in long-term suffering with an associated socio-economic impact of approximately €10 billion per annum. Insurance estimates show that such injuries account for approximately 70% of the costs of all injuries leading sustained in vehicle crashes.

The majority of those experiencing initial neck symptoms recover within a week of a car crash. However, 5–10% of individuals experience different levels of permanent disabilities, and are in severe pain for extended periods of time or for life.

ADSEAT (Adaptive Seat to Reduce Neck Injuries for Female and Male Occupants) focused on improving the

prevention of whiplash injuries for females and males alike. By focusing project resources on the latter group, the influence gender and additional factors have on whiplash injury risk was highlighted. The project developed the world's first virtual model of an average female crash test dummy which is already commercially available. The model, EvaRID, has made it possible, for the first time in the history of crash testing, to address occupant protection for both an average female and average male. The ADSEAT project has resulted in a variety of innovative achievements which include:

- **Compilation of injury and crash data showing the risk of whiplash injury for males and females separately.** The data revealed that females are at a higher risk of these injuries than males.
- **The development of EvaRID (Eva female, RID – Rear Impact Dummy), the world's first virtual crash test dummy representing an average female.**
- **Constructed a prototype dummy model, called BioRID 50F, representing the weight and size of an average female.**



Dr Astrid Linder with the EvaRID model

- **Sled testing with BioRID 50F** allowed direct comparison to the dynamic performance of vehicle seats with the existing BioRID II dummy, which represent an average male.
- **Suggestions for new and improved whiplash injury criteria values for female occupants in rear impact testing.**



▶ For more information, contact Astrid Linder at [astrid.linder@vti.se](mailto:astrid.linder@vti.se)

### PARTNERS



# NEW ERTRAC TASK FORCE ON CONNECTIVITY AND AUTOMATED DRIVING

The automation of road vehicles has recently gained greater visibility, climbing high on the agenda of companies and public authorities in Europe as in other regions like the USA and Japan. The field of connectivity and automation of vehicles offers opportunities for introducing innovative systems to assist drivers and progressively introduce more automated driving. Several societal objectives that ERTRAC addresses in its Strategic Research Agenda could benefit from these innovations: road safety, energy efficiency, reliability, and comfort, to name the most obvious. This makes this area of research of high importance, and has prompted ERTRAC to take action in its mission as the platform responsible for setting research and innovation roadmaps at European level.

ERTRAC gathers all stakeholders and then also has the opportunity to integrate the views of the different actors of the transport system: researchers working on the vehicles, infrastructures, IT systems, as well as public transport and freight transport operators, local

authorities and national ministries who invest and regulate on the matter. The European Commission has supported ERTRAC for using its multi-stakeholder capacity to address this challenge with an integrated approach and deliver recommendations. A Task Force was created in June 2014, calling for all ERTRAC members to join. Since many activities are already ongoing in this field within the European associations that are members of ERTRAC, it was decided to base the work on the existing organisations and documents, such as the iMobility Forum Working Group on Automation, the activities of ERTICO ITS Europe, and draft roadmaps available at CLEPA and EPoSS.

The first task was to clarify the landscape of existing activities: who is doing what in Europe relating to connectivity and automated driving, at European and national level and add information about the activities in the USA, Japan and other countries, in order to situate Europe among the world competition. With the objective of building a joint European roadmap, the priority appeared to be agreeing on a common definition of automated driving, e.g. the different levels of automation, and explaining the different functions and applications. A challenge here is to give space for the different applications (for vehicle types and usages) and different approaches (progressive automated

driving or fully automated transport solutions) which have different time-frames and different requirements (e.g. on infrastructure needs). The ERTRAC roadmap should deliver a mapping which brings clarity to this landscape and unifying the language used when discussing this field.

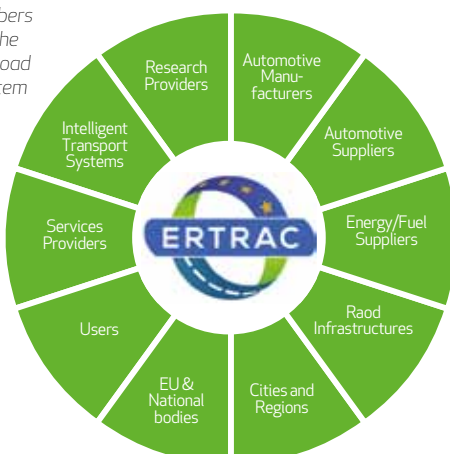
The objective of the Task Force, once this context and definition task is done, is to build research and innovation roadmaps for the different applications (highways, urban environments, restricted areas), for all types of vehicles (passenger cars, delivery vehicles, buses, trucks). The remaining technological challenges will be listed on a timeline, together with the framework conditions identified as playing a role for the deployment of these systems, such as the regulatory and liability matters, but also societal aspects such as user preferences and acceptance.

The Task Force is supported by the FOSTER-Road project and involves FEHRL members AIT and IFSTTAR.



► For more information, contact Xavier Aertsens at [xavier.aertsens@ertrac.org](mailto:xavier.aertsens@ertrac.org) or see [www.ertrac.org](http://www.ertrac.org) and [in](https://www.linkedin.com/company/ertrac)

ERTRAC members represent all the actors of the road transport system



## PARTNERS

CONCERN





## ONE YEAR ON FOR ERA-NET PLUS INFRAVATION 2014 CALL

### CALL GENERATED MORE THAN 100 PROPOSALS IN FIRST STAGE; SECOND STAGE PROCEEDING

The ERA-NET Plus Infravation 2014 Call for proposals on 'Advanced systems, materials and techniques for next generation road infrastructure' started almost a year ago as a trans-national pooled research fund to develop transport infrastructure innovations which address the challenges identified in the European Commission (EC) White Paper on Transport: Smart, Green and Integrated transport. Its objective is to enable a high-quality infrastructure offering high service levels to the user/economy/society through solutions for both new and existing infrastructure. The Infravation Call has an available budget for co-financing of €9 million and falls under the scope of SST.2013.1-3. (ERA-NET Plus 'Advanced systems, materials and techniques for next generation infrastructure'). The EC and Infravation are liaising closely to avoid funding duplicate research (in Horizon 2020 and FP7) and make sure research projects are complementary.

This Call, launched on 3rd March 2014, aimed at cost-effective advanced systems, materials and techniques in road infrastructure construction and maintenance, including repair, retrofitting and revamping and generated **more than 100 proposals**. The solutions called for include materials technology, methods and processes, and supporting systems, such as for monitoring, communication and energy. A Guide for Applicants was developed to guide potential proposers through the application process of a project proposal, which contains information about the background, objectives and the scope of the Call, as well as information about formal conditions for participation, timeline and how to apply. For the submission of proposals, a Call Management Tool (CMT) was developed at [www.cmt-infravation.net](http://www.cmt-infravation.net), which is available on the Call section of the Infravation website ([www.infravation.net](http://www.infravation.net)).

Proposers have since followed a two-step submission and evaluation procedure. The light proposal stage, which concluded on 30th June 2014 at 5pm (Brussels time), saw the formation of consortia and developing of ideas. One of the key triggers for this was the Information and Brokerage Event held in Brussels for more than 100 people on 20th March 2014. More than 100

light proposals with coordinators from 10 different countries were submitted to the CMT, involving 521 partners from 28 countries. The total requested amount of co-financing was about €122.4 million. This meant an average requested amount per proposal of €1.2 million.

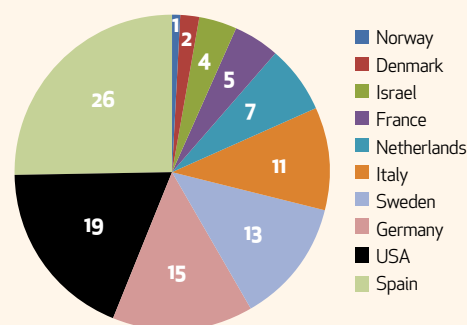
The evaluation of the submitted light proposals ended on 30th September 2014. Coordinators of the favourably evaluated proposals had until 30th November 2014 to prepare and submit their full proposals, which are now being evaluated by international independent experts on road infrastructure innovation. Following the international review period from December-April 2015, the negotiation of grant agreements is set to run from April-August 2015.



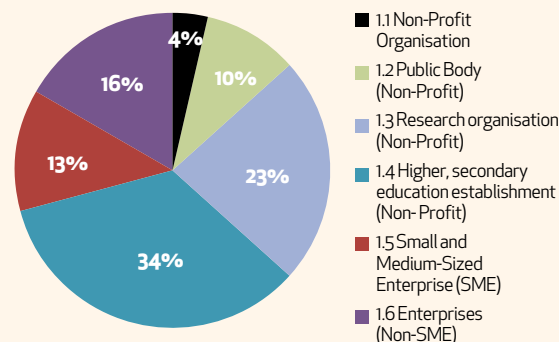
► For more information, contact the Infravation Call Secretariat at [david.doerr@de.tuv.com](mailto:david.doerr@de.tuv.com) and [miriam.stephan@de.tuv.com](mailto:miriam.stephan@de.tuv.com), see [www.infravation.net](http://www.infravation.net) or join the following social media:

### COORDINATORS OF ALL INFRAVATION PROPOSALS:

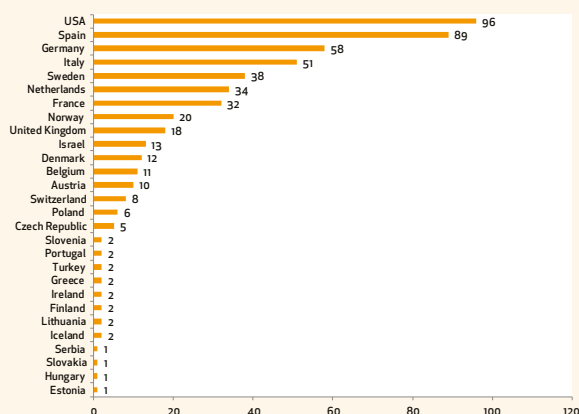
#### COUNTRY OF ORIGIN



#### TYPE OF ORGANISATION



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22<sup>ND</sup>-23<sup>RD</sup> APRIL 2015

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FEHRL Infrastructure Research Meeting

## AT THE DIAMANT CENTER IN BRUSSELS, BELGIUM

With the theme of *"Innovative maintenance of Transport Infrastructure - faster, cheaper, more reliable, safer, greener"*, FIRM15 will feature FEHRL's FORx4 (Forever Open Road, Rail, Runway and River) Co-Modal Transport Initiative for Research and include sessions on:

- **Infrastructure level:** Engineering and technical solutions
- **System level:** Maintenance operations including monitoring inspections
- **Governance level:** Management and financial issues

A detailed programme will be available early in 2015.

- Contact Isabelle Lucchini at [isabelle.lucchini@fehrl.org](mailto:isabelle.lucchini@fehrl.org) for more details.



### FEHRL MEMBERS



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