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Infravation

An Infrastructure Innovation Programme

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EN Plus Infravation Partners

- Dutch Ministry of Infrastructure and the Environment
- Federal Ministry of Transport, Building and Urban Development, Germany
- Danish Road Directorate
- Norwegian Public Roads Administration
- Swedish Road Administration
- Icelandic Road Administration
- French Ministry of Ecology, Sustainable Development and Energy
- Centre for the Development of

Infravation to feature at IALCCE 2016

Following the **kick-off of the nine innovation projects** in the last quarter of 2015, the ERA-NET Plus Infravation programme has featured both **at TRB2016 in January** and **at TRA2016 in April**.

The 2016 annual event for the programme will be part of the fifth International Symposium on Life-Cycle Civil Engineering, **IALCCE2016** in Delft, the Netherlands from 16-19th October 2016. It will be designed as a forum session on the afternoon of Tuesday 18th October entitled '*Infravation: advancing infrastructure innovations through transnational collaboration*'. And on the afternoon of Wednesday 19th October, an international market event is planned to focus on the implementation of resulting innovations.

For more information, contact the Call Manager, Richard van der Elburg at **richard.vander.elburg@rws.nl**, see the **Infravation website** or join the following social media:

- **The Linked In group**
- **The Twitter feed**

Update on innovation projects

A special factsheet has been produced, giving outline information on the nine projects, which can be downloaded **here**. Here are some recent selected highlights:

- Industrial Technology, Spain
- Italian National Roads and Highways Authority
- National Transport Infrastructure Company Ltd (NETIVEI ISRAEL)
- Federal Highway Administration, USA,
- FEHRL
- TUV Rheinland

FP7 Coordination and Support Action

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ALTERPAVE: The regional-based Supply Management Plan (allocated in WP5) has been developed, which looks at the availability of waste within the partner countries and is expected to help stakeholders evaluate the use of alternative materials such as by-products, reclaimed asphalt pavement (RAP) , biobinders, rejuvenators or refined engine oïl bottoms. At the same time, one of the two rejuvenators to be used in further stages of the project has been selected. Accordingly, the design of the asphalt mixtures with this rejuvenator and maximised use of RAP and industrial by-Products has just started.

BIOREPAVATION: Due to the late arrival of the materials in the USA, the actions relating to the project task entitled "Assessment of the aging potential at the lab level for selected bio-material blends and determining a way to evaluate mitigation of too rapid oxidation" have been delayed and began by mid-june 2016.

ECLIPS: The researchers have identified several types of phase change materials (PCM) that can serve either as micro inclusions within concrete or can be contained in porous hosts and then delivered in concrete. Preliminary characterisation and property evaluation of these materials have been carried out. Laboratory experiments at all the partner institutions are underway, dealing with designing PCM containing concretes for adequate mechanical properties, crack resistance, and durability. Two journal papers based on preliminary work have been published and disseminated. Work is ongoing to develop alternate microencapsulation strategies for phase change materials in concrete so as to ensure their long term durability in concrete. Mixture designs for PCM containing concretes are also being developed.

FASSTBRIDGE: Several meetings and update telephone conferences have been held including a Steering Committee meeting on 12th April in Berlin, Germany, and a flyer has been produced. The requirements of the Carbon-Fiber-Reinforced Polymer (CFRP) strengthening system have already been defined, and the resin formulation is Under progress by COLLANTI. The study of the bridge in Madrid has already started, and an in situ visit conducted by DRAGADOS and VIA-M.

HEALROAD: Asphalt beams have been healed by applying two methods: infra-red lamps and electromagnetic induction. A suitable methodology of healing with both methods has been proposed. The research done so far has discovered that the main mechanism affecting asphalt self-healing is the thermal expansion of bitumen. Different tests are being made to assess the effect of metal in the mechanical properties of asphalt concrete and porous mixtures.

SEACON: In addition to progress in laboratory work and dissemination of preliminary results (documented on the website), the two field demonstrations have been scheduled for construction in late 2016. Most notable is the five-span Halls River Bridge of the Florida Department of Transportation whose features will be presented at a workshop planned in Tampa, Florida, for early May 2017.

SEEBRIDGE: The partners have been working steadily to put together the various components of the envisaged bridge modeling system. The Information Delivery Manual is now complete, and the ensuing Model View Definition work well underway. The SeeBIM - Semantic Enrichment Engine for BIM - tool enhancement is complete, and can be tried at vclab.technion.ac.il . A total of 14 highway bridges have been scanned (three in Atlanta, Georgia in collaboration with the Georgia Department of Transportation , 10 in Cambridge, UK, and one in Haifa, Israel in collaboration with Netivei Israel; four have been filmed for photogrammetry - three in Atlanta and one in Haifa) and can be seen on the website. The consortium held its midterm meeting on 14th-15th July at Georgia Tech in Atlanta, with the participation of Katherine Petros from FHWA, the project's scientific liaison.

SHAPE: Designs have been completed and tender documents produced for a 1/3 scale concrete and a steel bridge to be built in structures laboratory at Bologna university. The experiments are designed to measure changes in the frequency patterns during destructive testing and results will be correlated against Finite Elements modelling.
A number of bridges have been monitored with the CX1 accelerometer in the UK, Italy and US to identify amplitude and frequency peaks for the individual structure and connected structural elements. For concrete and steel bridges the dominant frequency range have been found to be up to ca. 50Hz, while for masonry bridges up to ca. 300Hz. The software has been modified to allow frequencies up to 1000Hz to be identified.

Eight bridges have been selected in Italy, UK and US for long-term monitoring to help seasonal variations and possible long-term changes to be assessed for the structure. Design of the instrumentation have been developed for interior (e.g. box-girder) and exterior (e.g. beams) applications and includes a CX1 accelerometer, NUC computer, battery, solar panel and wireless data transfer system. The first bridge to be instrumented with the CX1 accelerometer will be the Hammersmith flyover in London using an interior system to monitor the effects of recent strengthening works.

SUREBRIDGE: A public kick-off was held on 27th May 2016 in Rotterdam with the City of Rotterdam as host. The event aimed to introduce the project and find potential stakeholders for implementation of the SUREBRIDGE results.

Work Package (WP) 3 is now developing the FRP deck concept for San Miniato bridge (the case study bridge) and its connection to the

existing concrete deck. The conceptual design of the deck is accomplished. To acquire a sustainable solution for connection between the FRP and concrete decks, a solution has been found to use steel fiber reinforced high performance mortar instead of epoxy bonding. The new solution will pose less impact on the environment and involves less health hazards. Prototyping of the pre-stressing device, for application of strengthening CFRP laminates, is accomplished and preliminary tests on large scale beams are scheduled in late August.

The overall strengthening design concept is being carried out in WP4 and the preliminary findings indicate that the solution offers the following advantages:

1. Increased ultimate bending capacity of up to 50%
2. Improved serviceability and durability due to application of Pre-stressed CFRP strengthening laminates (mainly due to reduction of crack width)
3. Improved fatigue performance of reinforced concrete girders