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The European Research Project SAFER-LC (Safer Level Crossing), held its mid-term Conference on 10 October 2018 in Madrid, at the Spanish Railway Foundation (FFE)

(*Madrid, 11 October 2018*) The SAFER-LC project, funded by the European Commission within H2020 programme and addressing the issue of safety of level crossings, presented the mid-term results and the way forward on 10 October in Madrid, in the presence of around 80 participants from 18 countries in Europe.

The SAFER-LC project led by UIC (International Union of Railways), started in May 2017 and will last 36 months. It aims to improve safety and minimise risk by developing a fully-integrated cross-modal set of innovative solutions and tools for the proactive management and design of level-crossing infrastructure. The project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723205. The SAFER-LC Consortium is composed of 17 partners from 10 different countries (France, Finland, Norway, Spain, Greece, Germany, Italy, Belgium Hungary and Turkey): rail and road associations (UIC, IRU), infrastructure managers and railway operators (SNCF, TRAINOSE), rail research institutes and universities (CEREMA, FFE, IFSTTAR, VTT, NTNU, DLR, UNIROMA3, UTBM), and SMEs and providers (Commsignia, Geoloc Systems, Intader).

This one-day conference was opened by Mr César Lopez, General Manager of the Spanish Railway Foundation (FFE), who underlined the importance of integrating both road and rail visions for improving safety and security at level crossing. Jacques Colliard, Head of UIC Security Division, put emphasis on the interest of European funded projects to bring together experts from the road and rail sectors with complementary skills.

The first two sessions were dedicated to the SAFER-LC project achievements, the ongoing work and the next steps within specific work packages.

Regarding Human Factors at level crossings, two main achievements were presented:

- The Human Factors assessment tool: this tool has been developed and will be applied to assess the solutions evaluated within the project from a human perspective in the short- and long-term, for example from the point of view of behavioural improvement, acceptance, reliably, usability.
- A set of measures to enhance LC Safety has been collected and will be tested and evaluated, for example: LCs as self-explaining as possible, improving visibility, using signs and symbols that road users are familiar with, conveying relevant message via onboard systems.

The second session was dedicated to technical solutions for smarter Level Crossings.
Ongoing development focuses on:

- Technologies to detect dangerous situations such as an advanced off-line video surveillance system based on machine learning for modelling and analysing LC user behaviour in order to assess the risk at LC, optimised real time Automatic Incident Detection (AID) dedicated to LC (detection of dangerous situations such as vehicles stopping at LC, vehicles zig-zagging on the LC, pedestrians crossing while barriers are closed, etc.) and newly developed and readily available smart wireless sensing technologies as well as photogrammetric device, for monitoring and remote maintenance of LC.
- Communication systems to increase awareness of users (road users and rail infrastructure managers and operators) on this detected situation. V2X, ITS-G5, LTE, communication systems will be integrated and tested to share the information related to the dangerous situations detected.

These developments will be integrated, tested and evaluated from both technical and human factors perspective in the next phase of the project. Three types of testing environments have been selected: simulation, controlled environment, real-world field tests. Nine pilot tests are now being implemented and the tests will be trialled until April 2019.

The next sessions were dedicated to learning from related projects at national and international level:

- ADIF, Spanish Railway Infrastructure Manager, described the LC protections system in Spain as well as an ongoing research project on new real time surveillance system based on artificial vision.
- INSPIDE, a technology company that collaborates with the Innovation Plan of the Spanish Directorate-General for Traffic DGT, presented the onboard vehicle solution COMOBITY to better protect vulnerable users (cyclists and pedestrians).
- CDV, Research centre for transport in the Czech Republic, explained the risk factors at level crossings with flashing lights in the Czech Republic.
- FPZ, the University of Zagreb which works closely with Croatian Infrastructure Manager (HZ) gave an overview on the level crossing safety campaign in Croatia.

- PRORAIL, Rail Infrastructure Manager in the Netherlands, described innovative measures recently deployed.
- SAFE STRIP H2020 project on “Safe and Green Sensor Technologies for self-explaining and forgiving Road Interactive applications” was presented by ERTICO. A Safer Rail Crossings User Case will be developed and tested together with SAFER-LC.
- DIGIM UIC Global project on Digital Impacts on Business processes was also presented and in particular the POC (Proof Of Concept) developed by VIA Rail Canada on how to estimate the closing time of LCs and advise cars drivers on good behaviour (waiting or taking alternative routes).

Finally, the next steps of the SAFER-LC project were explained as follows:

- Execution of the Pilot Tests
- Evaluation of the measures from technical and human factors point of view
- Development of business models
- Design and development of the toolbox to gather solutions and recommendations to prevent accidents at LC

Rail and road infrastructure managers and operators, safety authorities, level crossing users, C-ITS providers, standardisation bodies, policy makers and researchers and other stakeholders involved in enhancing safety of level crossings will be kept informed on the outputs and results of the project.

The presentations and the achievements of the SAFER-LC project are publicly available on the website at www.safer-lc.eu

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