SAFER Level Crossing by integrating and optimizing road-rail infrastructure management and design

Reporting

Project Information

SAFER-LC

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Project website

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Project closed

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Periodic Reporting for period 2 - SAFER-LC (SAFER Level Crossing by integrating and optimizing road-rail infrastructure management and design)

Reporting period: 2018-11-01 to 2020-04-30

Summary of the context and overall objectives of the project

Over the past few years, there is one person killed and close to one seriously injured every day on level crossings. Therefore SAFER-LC aims to improve safety and minimize risk by developing a fully integrated cross-modal set of innovative solutions and tools for the proactive management and design of level-crossing infrastructure.

These tools will enable road and rail decision makers to find even more effective ways to detect potentially dangerous situations leading to collisions at level crossings, prevent incidents at level crossing by innovative design and predictive maintenance methods, and mitigate the consequences of incidents/disruptions due to accidents or other critical events.

The project focussed both on technical solutions, such as smart detection services and advanced infrastructure-to-vehicle communication systems and on human processes to adapt infrastructure design to end-users and to enhance coordination and cooperation between different stakeholders from different transportation modes.

The project first identified the needs and requirements of rail-road infrastructure managers and LC users and then sought to develop innovative smart detection and communication systems and adapt them for use by all types of level crossing users.

A series of pilot tests across Europe were rolled out to demonstrate how these new technological and non-technological solutions can be integrated, validate their feasibility and evaluate their performance.

The project delivered a bundle of recommended technical specifications (for standardisation), human processes, organizational and legal frameworks for implementation.

Finally, SAFER-LC developed a toolbox accessible through a user-friendly interface which integrated all the project results and solutions to help both rail and road managers to improve safety at level crossings.

Work performed from the beginning of the project to the end of the period covered by the report and main results achieved so far

The project started with WP1 which was completed with the following achievements:
- The identification and analysis of regional disparities in Europe and beyond.
- The analysis of the various railway accident databases.
- The definition of needs and requirements of Infrastructure Managers.

Based on the results of WP1, WP2 developed the following outputs
- The state of the art of LC safety analysis with the identification of key safety indicators concerning human errors and violations.
- The Human Factors Assessment Tool.
-the evaluation of a series of human-centered low-cost countermeasures.

In parallel, WP3 has developed technological solutions to improve safety at level crossings through sharing information between rail and road stakeholders and giving warnings to trains or vehicles approaching.

The developments planned in WP3 were completed with the following results:
- Development of a risk evaluation system.
- Development of a smart detection system
- Deployment of vibration sensors as part of the monitoring of LC infrastructure.
- integration of the detection technologies with communication systems to share information on LC status with road drivers, train driver or control rooms.

WP4 started with the description of each test site including the layout and capabilities as well as the safety measures, data and indicators to be tested and collected from each one of them. 17 measures were piloted and then evaluated according the defined methodology.

WP5 which main achievements were to perform a cost benefit analysis and provide final recommendations. First a general cost-benefit analysis approach was developed. Based on this, a holistic business model has been developed, tested, taking into account the evaluation of the safety solutions piloted within the SAFER-LC project. This work led to the identification of the best solutions for deployment and proposed the Business Model with an organisational structure for the solutions developed.

In addition, the communication standards used in the SAFER-LC tests have been listed and recommendations have then been given for future deployment in rail and road in order to improve the

safety at LCs. Recommendations targeting National Policy makers was also developed.

In the framework of WP6, regular dissemination actions have been performed with among others, articles in UIC electronic newsletter, presentation of the project in several events, organisation of 4 workshops and 2 conferences. Finally, the SAFER-LC toolbox gathering all results has been developed, tested and evaluated by the partners and external experts.

All the developments were done in compliance with the ethics requirements set out in WP8.

Progress beyond the state of the art and expected potential impact (including the socio-economic impact and the wider societal implications of the project so far)

SAFER-LC provided
- LC accident prevention by reducing human error and unsafe behaviour related to infrastructure design;
- New system to raise human awareness about incident/accident prevention at LCs;
- Particular attention to vulnerable users;
- Smart detection of risky situations, infrastructure failures or degradation which may lead to accident;
- Better cooperation between road and rail stakeholders with provision of comprehensive information;
- Technical system/operational process integration to form a solid and practical pro-active security system, harnessing the synergy between road and rail.

SAFER-LC project demonstrated, in situ, the potential technical solutions to allow communication between LC users and operators. The mitigation of human error should lead to the reduction in number or elimination of accidents and near-accidents (which are almost never reported) hinges on properly adapted technical solutions deployed within an appropriate human, legal and organisational framework.

Moreover SAFER-LC provided the SAFER-LC toolbox, a free online tool (https://toolbox.safer-lc.eu/) with both practical and scientific aims. On the one hand it is a guide to best practice designed to integrate (in a user-friendly and accessible way) the recommendations and solutions developed during the project. On the other hand, it is based on empirical evidence collected from the scientific literature, practical case studies, and from the project lab and field tests results and evaluation.

Logo of the project

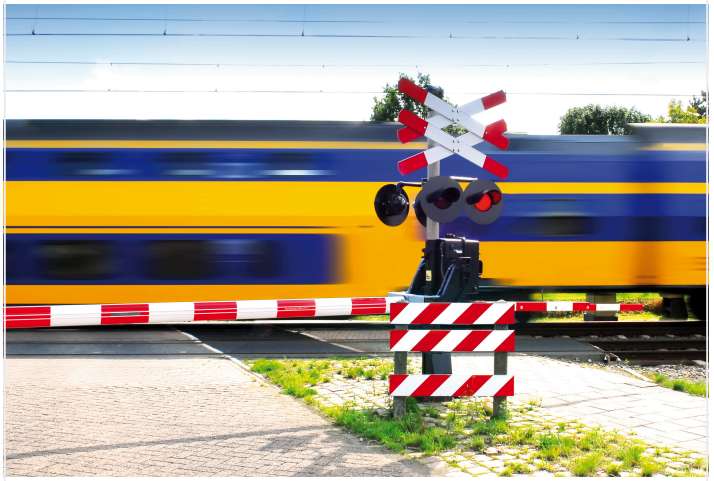

image illustrating the project

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Permalink: https://cordis.europa.eu/project/id/723205/reporting