VIENNA 2018 TRA TRANSPORT RESEARCH ARENA

A digital era for transport

solutions for society, economy and environment

SAFER-LC project: Safer Level Crossings by integrating and optimizing road-rail infrastructure management and design

Grigore M. Havârneanu, UIC, France
Annika Dreßler & Jan Grippenkoven, DLR, Germany
Anne Silla, VTT, Finland
Eduardo Prieto, FFE, Spain
Marie-Hélène Bonneau, UIC, France

SAFER-LC

Hosted and organised by:

Austrian Ministry for Transport, Innovation and Technology

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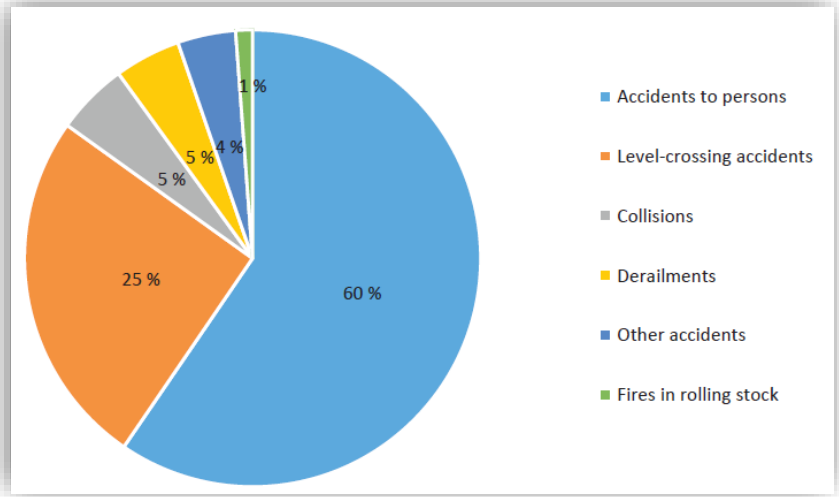
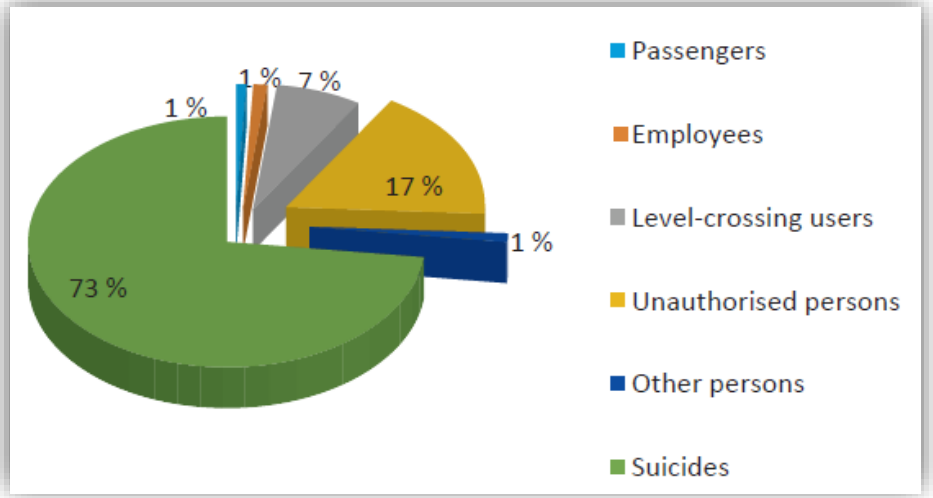
Background



Breakdown of significant accidents per type (EU-28; 2011-2015)



Relative share of fatalities per victim category among all fatalities (EU-28; 2011-2015)

Source: European Agency for Railways (ERA, 2017)

SAFER-LC: Key facts

- Framework: H2020 Call 2016-2017 Mobility for Growth
- Topic: MG-3.4-2016: Transport infrastructure innovation to increase the transport system safety at modal and intermodal level (including nodes and interchanges)
- Proposal selected in January 2017
- www.safer-lc.eu

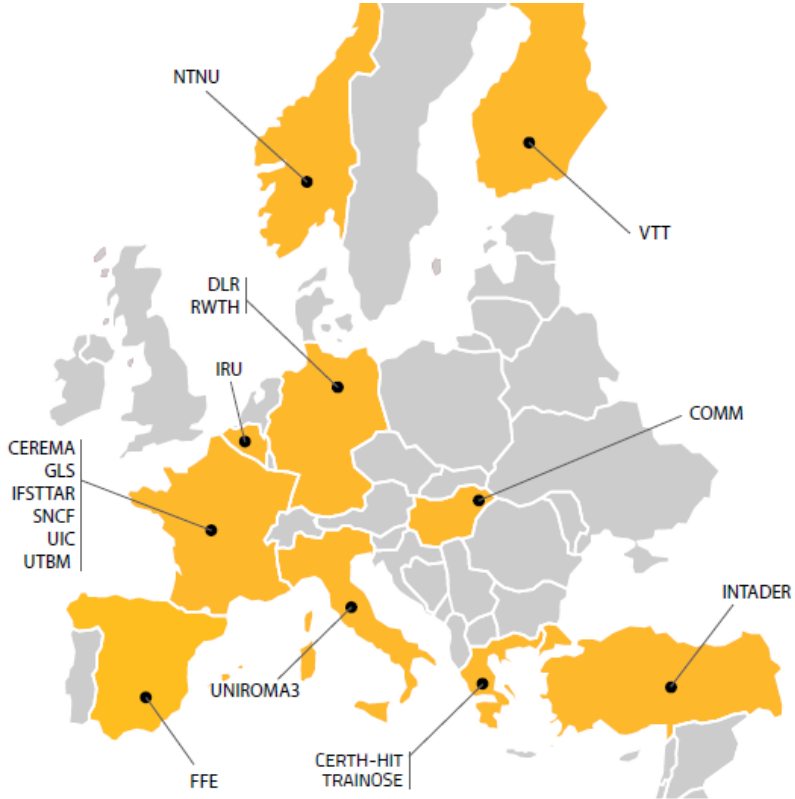
Key facts

Time frame: 01/05/2017 – 30/04/2020

Budget: 4.8 M€

Work effort: 487 PM

Consortium



17 partners from 10 countries

- Coordinator: UIC Security Division
- 1 association
- 3 UIC members (IMs, RUs)
- 6 research centres
- 4 universities
- 2 industries

Objectives

Improve safety and minimize risks at and around LCs

Focus on **technical solutions** (early detection, communication between vehicles)

Focus on **human processes** (adapt the infrastructure to end-users, human centred measures, VRUs)

Develop a toolbox which will integrate all the project results and solutions

Methodology

- **Analysis of LC safety systems** and definition of needs and requirements of the rail and road users for safer level crossings (WP1)
- **Development of innovative measures**: human centered low-cost measures (WP2) & technical solutions (WP3)
- **Lab-tests, field-tests and evaluation** of the measures (WP4)
- **Cost-benefit analysis** and elaboration of recommendations (WP5)
- Collection of all results in a **toolbox** (WP6)





Human Factor at LCs

Design for ‘self-explaining’ and ‘forgiving’ infrastructure

Analysis of HF in LC safety systems

- Review a bibliographical database
- Literature analysis according to a standard template
- Identify key safety indicators concerning human errors and violations

HF methodological framework

- Analyse how measures can be better adapted from a user perspective
- Identify evaluation criteria
- Focus on specific VRUs

Design and evaluation of HF low-cost measures

- Collect information on countermeasures
- Design new measures and/or upgrade existing ones
- Evaluate the measures

Sets of criteria

Background classification criteria
- Feasibility for LC type
- Feasibility for environmental conditions
- Feasibility for type of user
- Feasibility for further socio-demographical factors
- Intended effect mechanism

Estimation of **short term** safety effects on road user behaviour
(These refer to direct, immediate reactions)

Criteria to assess the behavioural safety effects
- Conspicuity factors
- Cognitive factors
- Rule knowledge
- (Risky) decision-making

Estimation of **long term** safety effects on road user behaviour
(These involve learning processes and experiences leading to behavioural adaptation or indirect effects on safe bahviour)

Criteria to assess the user experience and social perception
- Acceptance
- Trust in the system (Reliability)
- Level of self-explanatory nature (Usability)

Other assessment criteria
- Integration with road and railway environment, other safety measures

Criteria for behavioural safety effects

Function involved	Indicator (i.e. behavioural output that can be measured as dependent variable to assess the safety effect)	Factors influencing the behavioural effect
Detection	**Detectability of approaching LC and / or train** • Speed and timing of detection **Prevalence of errors** • Number of errors (i.e. perception) / correct detections	• Sight distances • Signs • Crossing angle
Identification	**Road users' workload** • Road users' focus of attention (focus on other road users and/or road) • Looking left and right (yes/no, how often) • Timing of reactions **Prevalence of errors** • Type and number of errors (e.g. attention, memory etc.)	• Tiredness / fatigue • Overload with stimuli • External and visual distraction • Gender, age, disability • Use of addictive substances
Rule knowledge	**Correct action to the correct hint / cue** • Knowing the hint / cue from the traffic rule / traffic sign etc. • Knowing required behaviour (i.e. what to do when you detect the hint / cue) **Prevalence of errors** • Number of errors / correct replies **Prevalence of violations** • Type and number of violations	• Knowledge and understanding of the correct action
Risky decision-making	**Risky behaviours and prevalence of violations** • Type and number of violations (at active LC) • Speed choice / Approach speed (at passive LC) (+/- km/h) • Trajectories • Verification behaviours for frequent users • Time to collision (TTC) when a train is coming • Interaction with other road users **Prevalence of errors** • Type and number of errors (e.g. biased decision)	• Perception of probability • Perception of dangerousness • Perception of legal consequences • Perception of cost-benefits • Motivational factors • Personality of the road user • Frustration and impatience • Suicide or vandalism

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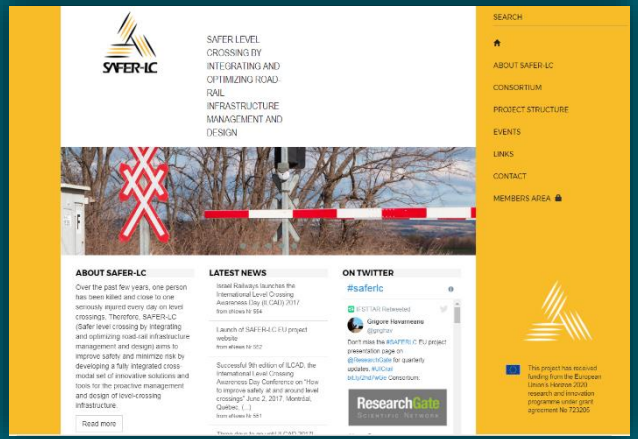
SAFER-LC Mid-term Conference
10 October, Madrid at FFE HQ



Contact

info@safer-lc.eu
#SAFERLC on social media
havarneanu@uic.org