Existing international rules and regulations on level crossings

By Isabelle Fonverne, UIC

The rules of behaviour for road users when crossing railway lines are principally defined in the “Convention on Road Traffic” and the “Convention on Road Signs and Signals” both signed in Vienna in 1968 (list of signatories: on UNECE website). These legal instruments are managed by UNECE and do apply worldwide (except for some countries that have only signed or others that have signed but not ratified the Vienna Convention). In addition to the regulatory documents UNECE published a set of best practices: “Consolidated Resolution on Road Traffic and the Consolidated Resolution on Road Signs and Signals”.

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The above documents specify the compulsory basic regulations for road users and pedestrians for all countries – signatories of the Conventions. This approach guarantees the necessary minimum coherence in the level crossing rules. Under the terms of these conventions the TRAINS have priority at all level crossings, therefore road users and pedestrians must respect these ROAD signs and signals and STOP when the train is approaching.

It should be noted that the European Agreement supplementing the Convention on road traffic contains even stricter provisions on traffic at level crossings.

The rules and especially the signs and signals in the Convention are subject to amendments if demanded by the document signatories. Although there are no such initiative today, they might not be excluded in the future, since the current level crossing signage was developed long before the science of human factors. Future analyses might thus lead to a need to reassess the currently used signage and proposals for their modifications. (There are already a number of objections against warning signs labelling the level crossing, since the picture used on them depicts a steam locomotive or old gates – not understood by young generations). In some countries changes are being made, such as converting flashing red lights to fixed red signals, leading to potential confusion on cross-border road journeys. In this context, ELCF and UIC are working together on the creation of a future multidisciplinary group on the road/rail interface to review these road signs and signals.
Fatalities at level crossings in the EU account for 30% of all railway fatalities, 1.2% of all road fatalities

By Isabelle Fonverne, UIC

**FIGURES IN THE EU**

The European Union is composed of 27 countries with 502 million people in 2012. According to the European Railway Agency (ERA), there are 123,000 level crossings on the national railways (in 2010) with an average of five level crossings per 10 line-km.

Only 29% of them are active level crossings with user protection (manual or automatic barriers, and/or visual and audible warnings). Other level crossings are called passive level crossings (no protection, road signs only: STOP for example).

Level crossings are the second highest source of accidents and fatalities after trespass on the railway. In 2010 there were 619 accidents in the EU (831 in 2009) causing 359 fatalities in 2010 (without suicides) (405 in 2009).

According to ERA, in the EU in 2010 45% of level crossing accidents were caused by passenger cars, 20% by heavy vehicles, 22% by pedestrians (older people, dog walkers, other leisure walkers, vulnerable people, people hurrying to catch a train).

In the EU fatalities at level crossings account for 30% of all railway fatalities but only 1.2% of all road fatalities (0.2% in Great Britain, lowest rate in Europe). There were 35,500 fatalities on the roads in 2009 of which only 405 fatalities were at level crossings, that is why it is seen as a minor problem for the road but a key issue for the railways. Level crossing accidents represent ca. 10% of total irregularities of the railway traffic depending on the severity of the accident.

You can find the latest ERA Safety performance report on the ERA website. See also ERA graphs: http://www.era.europa.eu

**WORLDWIDE FIGURES**

There are 7.3 billion people living on Earth in 2012. According to estimations there might be one million level crossings in the world and over 6,000 fatalities at level crossings per year (there are huge differences according to countries). According to the World Health Organization (WHO) over one million people are killed on the roads each year worldwide, 90% of them occurring in low and middle income countries. WHO has calculated that road traffic accidents cost between 1-2% (in high-income countries) of the Gross National Product according to the country. The global population has been growing particularly drastically in poor or developing countries and will continue even more in the future. Road and the rail traffic have also been significantly increasing very much also; therefore we must expect that the interface between these two transport modes to become the scene of increasing conflict in balancing the needs of the community, the economy and safety.

Kerang Accident, Australia in 2007

Causes of level crossing incidents

By Isabelle Fonverne, UIC

Level crossings represent almost 50% of all train accident risks caused by third persons which is very difficult for the railway sector to control. Almost 98% of all accidents at level crossings (at least in Europe) are caused by the misuse of road users and pedestrians mainly living or working near level crossings. Misuses may be split between a lack of understanding (errors) and deliberate violations.

**Errors**
- Familiarity, time pressure, environmental factors, poor visibility, age
- Distraction (mobile phones and satnavs are major sources of distraction, smoking, eating and operating the radio are also common distractions)
- Misinterpretation of GPS indications
- Fatigue (according to EC figures: 20% of crashes involve heavy commercial vehicles on the roads)

**Violations**
- Speeding, zigzagging, STOP signs not respected, influence of drugs or alcohol (according to EC: 30% of fatal road accidents in the EU are caused by speeding, 25% of crashes on the roads are caused when driving under the influence of alcohol or drugs)
- According to RFF, France:
  - 50% of car collisions between a train and a car lead to a fatality. To compare: 5% only when it is a pure road accident
  - A train runs up to 160 km/h even in cities in France and is heavy: at least 1,500 tons; a train doesn’t have time to brake and cannot divert its route at the last moment: at 90 km/h, it takes 800 to 1,200 m for the train to stop, a car stops within 70 m

OL Inc. USA working on the 3Es: Engineering, Enforcement, Education

By Helen Sramek, Operation Lifesaver Inc., USA

Operation Lifesaver USA (www.oli.org) is pleased to have joined its partner countries for the 2012 observance of International Level Crossing Awareness Day (ILCAD) as we celebrate our 40th anniversary.

Operation Lifesaver is a non-profit international public education program first established in 1972 to end collisions, deaths and injuries at highway-rail crossings and on railroad rights-of-way. Operation Lifesaver programs operate in all 50 states, and we are gratified that countries around the world are adopting similar programs to educate the public about how to remain safe at crossings or around train tracks.

Rail safety is a shared responsibility between public entities like our U.S. Department of Transportation and the private sector, which is represented by the railroads, their suppliers and other stakeholder groups. As a non-profit organization, Operation Lifesaver works with the public and private sectors to leverage resources in educating the public on safe behavior at the crossing or on rail property.

Operation Lifesaver’s public awareness and education programs, along with engineering improvements and increased enforcement of level crossing safety laws, have contributed to an 84% decline in crossing collisions since 1972, when our organization began.

Our most effective methods of reaching the public were on full display during the U.S. observance of ILCAD 2012 the week of June 4th. Coordinated activities took place in more than 15 states across the U.S., including crossing safety programs with law enforcement special safety education trains, safety presentations, press conferences, advertising and social media campaigns, and other events. Safety training for professional truck drivers was also a focus, especially our “ProDriver Challenge” interactive online training: www.oli.org/prodriver.

Although total U.S. level crossing incidents were lower in the first quarter of 2012 vs. 2011, deaths and injuries from crossing crashes rose – as did pedestrian-train deaths and injuries. We will not be satisfied until we push these numbers to zero.
Engineering

By Isabelle Fonverne, UIC

Engineering, including research and development: physical equipment and protection, together with research into innovative means of increasing safety. Many companies have made risk assessments, systematic inspections prioritising the closure or upgrading of level crossings according to the volume of road and rail traffic, the topography.

Different solutions have been adopted or proposed so far:

■ Closing or upgrading level crossings replacing passive by active protections (full barriers, four semi barriers instead of two, or two full barriers to prevent zigzagging, flashing lights and bell): in Portugal, they have 58% fewer level crossings since 1999)

■ Closing or upgrading footpath crossings, farm crossings

■ Improving information available to signallers to locate train positions (trial on-train global positioning systems: GPS)

■ Detection of trains with 4 captors (2 on both tracks) listening train vibrations (tested in Norway at unprotected farm level crossings with low traffic)

■ Installing obstacle detectors on the tracks (in Israel for example, but very expensive and it stops the train traffic regularly)

■ CCTV cameras to observe and understand behaviours: study of human factors, decision making, variations in incident rates – geographical, socio economics, driving standards

■ Speed bumpers to decrease speed

■ Improving the vertical alignment of the road

■ Improving traffic signs and signals, make them more visible or remove some (too much information confuses the road user)

■ Reducing the boom gate closure timing

■ Improving visibility by cutting vegetation, adding led lights on the barriers, or along the tracks, double side lights (to avoid problems with the sunset or sunrise, or snow covering the light)

■ Installing overhead lights to prevent high trucks to tear off electric wires and catenaries

■ Posting automatic safety messages well before specific level crossings where queues form regularly (tested in the UK)

■ Painting markings on pavement (yellow painting, zebras: France, Israel, Japan…)

Level crossings represent a big operational risk for the rail community and road fans would prefer to have priority and see all level crossings closed. We could engineer out the problem and remove all level crossings but it would restrict mobility in many places. In addition building bridges or underpasses is not always possible in built up areas (buildings around level crossings in small countries like Japan or in the Netherlands) it is also very expensive (EUR 5-10 million in Europe). Preventing access can be done by Engineering means, including gates or barriers, road signs and light signals, by Education and then through Enforcement measures when Education has failed.

That is why the European Level Crossing Forum (ELCF) was formed with its first meetings in 2005. ELCF brings together road and rail safety experts from across Europe with a strong commitment to reduce accidents and fatalities at level crossings. ELCF promotes the multi-modality of the issue through involvement in various projects including the international awareness day at level crossings, the European Road Safety Action Plan, encouraging joint inspections by road and rail authorities and comparison of road signs.

Other Task Forces, Committees, Commissions, Foundations, Railway Research Institutes (RSSB in the UK, RISSB in Australia, Tracksafe in Australia, Chris Cairns Foundation in New Zealand, Operation Lifesaver in USA, Canada, Estonia and Argentina) base their work on three to five main pillars: Enabling, Engineering, Education, Enforcement, Evaluation.
Dedicated Short Range Communications (DSRC) – Cooperative ITS for Safer Railway Crossings

By Terry Spicer, Public Transport Victoria

A world-first trial of a technology capable of significantly reducing railway level crossing accidents by allowing vehicles to “talk to each other” is currently being trialled in Melbourne, Australia. See the AusDSRC Cluster website at AusDSRC Cluster.

Public Transport Victoria (PTV) is participating in the trial of a level crossing warning system known as Dedicated Short Range Communication (DSRC) technology.

The three-year development and field trials of the technology is administered under the Automotive Cooperative Research Centre (AutoCRC), a Federal Government innovation funding authority, with the research, system development and field trials carried out by the La Trobe University’s Centre for Technology Infusion. For more information, visit latrobe.edu.au.

DSRC is one of a class of technologies used for Cooperative Intelligent Transport Systems (C-ITS) which allow vehicles to communicate with other vehicles and infrastructure and exchange information including their position, speed, direction, etc. The system is then able to calculate whether collisions are likely to occur and provides in-vehicle audible, visual and even tactile warnings to drivers in time to avoid the collision.

The use of DSRC in motor vehicles is being developed in Europe, the United States, and Japan, by vehicle manufacturers and government authorities as a collision avoidance and traffic management system. For more information, visit the US DOT at its.dot.gov The third and final field trial stage of the AU$5.5 million new technology ITS study is currently underway at two Melbourne metropolitan and one regional level crossings. 100 road and rail vehicles have been fitted with the technology during the field trials. The first regional field trial was completed in April 2012 and the remaining two metropolitan trials are being completed in July/August 2012.

Enforcement

By Isabelle Fonverne, UIC

Laws are used to prosecute those who endanger themselves or others on the railway:

- Level crossing legislation
- Closure, diversion, management, partnership working
- Working with the rail accident investigation authorities and rail regulators
- Working with the police, collecting prosecution data, witness statements
- Working with the judiciary, magistrates and prosecution services
- Lobbying for stronger enforcement and penalties for offenders

- Installation of speed radars: in the UK, in France (135 euro fine and four points off the driving license, Network Rail in the UK finance vans with nine cameras inside, the British Transport Police posts some vans at level crossings, films offenders, checks plate and insurance and sends the fine to the offender’s home)
- Installation of fixed cameras at red lights to make photos of offenders in France

Since the installation of such cameras or radars in France, RFF has had almost no barrier broken and collisions between cars and trains have drastically dropped.

ARCHITECTURE OF DSRC-BASED COOPERATIVE - ITS FOR LEVEL CROSSING SAFETY

![Diagram of DSRC-based Cooperative - ITS for Level Crossing Safety](image-url)
Education - ILCAD campaign

By Isabelle Fonverne

ELCF signed the European Road Safety Charter in 2009. This committed ELCF to the first awareness campaign at level crossings in 2009, Isabelle Fonverne being the ELCF Secretary and the Coordinator of ILCAD.

The first campaign, the European Level Crossing Awareness Day (ELCAD) coordinated by UIC, was held on 25 June 2009. This was a collaborative effort built on existing national initiatives and involving major railway undertakings, the road sector, infrastructure managers, government agencies from many member states, the European Commission, law enforcement authorities and media.

The focus was to link together a series of existing national campaigns all on the same date, around a common theme and branded in a unique way which would be held at various locations in every participating member state of the European Union. The key message to be delivered was, “Stop accidents! Europe for safer level crossings.” The objective was to raise awareness of the risks at the road/rail interface, focusing on the behaviour of users at level crossings.

The second edition, called International Level Crossing Awareness Day (ILCAD) on 22 June 2010 became a worldwide campaign with almost 40 countries. It had a single theme to address users’ behaviour with the catchphrase “Act safely at level crossings” translated in 25 different languages.

The European Commission financed a video called “Just in time” for the ILCAD campaign, which was shown in railway stations, schools, press conferences, company briefing sessions and press conferences throughout the world, used on internet worldwide. Railway staff attended level crossings, with road authority staff and police, issuing safety leaflets and using speed controls, signal controls and other educational and enforcement methods. A common website was created for the occasion.

Educating farmers, bus drivers, employers, suppliers of farmers and machinery

(Involve satellite navigation equipment manufacturers, insurance companies)

Education of children at a level crossing in Norway

Educating the judiciary and politicians, making misuse socially unacceptable

The third edition took place on 9 June 2011, an international press conference and big events around the campaign took place in Warsaw, Poland at the invitation of PKP PLK, the Polish railway infrastructure Manager. They organised 23 crash tests throughout the country, a road show for children in the main cities of the country, all with high media coverage on a national or local level. They organised an exhibition of photographs of bad accidents, others also exhibited the crashed cars in public areas.

Public education campaigns with children

Making pedestrians and road users aware of train speed and noise, and potential hazards associated with them

Almost 40 countries participated with smaller or bigger campaigns depending on human and financial resources, time, and involvement. ILCAD communicated a great deal on social networks. The partners themselves published dedicated facebook and website pages for their campaign. They created mascots for the campaign (elephant, hedgehog, Superman…) and created also videos for the occasion (New Zealand, Poland, Estonia, Serbia..).
We also had large press coverage (500 articles, news at peak hours, TV programmes, press conferences...).

The fourth edition was officially launched on 7 June 2012 at RFF headquarters in Paris and in 42 countries in the whole of the EU, North and South America, Australia, New Zealand, South Africa, Israel and newcomers this year: Cameroon, Norway, Morocco and Turkey.

RFF organised a big campaign from 7 June to 5 July at 12 different level crossings across the country. A French press conference was held at the level crossing in Mennecey in the Parisian suburbs on 5 July with the French Minister of Transport, Mr Frédéric Cuvillier.

ILCAD has been growing year after year because SAFETY is a worldwide issue no matter the language or the culture to achieve one universal goal: Save lives!

Education is the core issue because of the misbehaviour of level crossing users and addressing this issue is an everyday effort. In addition Education cannot succeed without improving engineering or deploying enforcement measures. Finally to be efficient, the railways cannot tackle this road/rail interface safety issue alone, this implies the cooperation of all stakeholders concerned: rail and road infrastructure managers, political institutions, police forces, justice, education specialists, researchers and the media....

Partners distributed safety flyers in public areas, issued posters on the dangers of driving when distracted (using mobile phones or texting) posted at level crossings. ALAF issued a newsletter sent per internet to its members throughout the Latin American continent. The University of Technology in Buenos Aires organised a huge seminar on level crossing safety on 7 June broadcast across the whole country.

Leaflets, flyers, posters, stickers, green books, tags, calendars, quizzes for children, mascots have been issued by ILCAD partners and used at level crossings, in public areas, in schools, on internet...

Since 1999 REFER in Portugal has started a railway safety policy aiming at reducing the number of accidents and fatalities. Since that date they have counted 58% fewer level crossings. The objective fixed in 2006 to decrease the number of accidents by 60% by 2015 has been already achieved and anticipated in 2011. Indeed since 1999 the number of accidents has been reduced by 84%. The number of fatalities has been reduced by 86%.

This was possible through the closure and upgrading of level crossings, better engineering measures, risk mitigation, awareness and education campaigns. REFER started awareness campaigns in 2009 by participating in ELCAD.

As far as Evaluation is concerned REFER evaluated its actions towards the public during ILCAD 2010 by conducting a public survey. The results were published in the Green Book.
Crash tests in Poland

By Katarzyna Kucharek, PKP PLK

In 2011 PKP Polish Railway Lines Company organised crash tests on rail-road level crossings in 23 Polish cities and towns along with press briefings to raise awareness as part of the International Level Crossing Awareness Day (ILCAD). The scenario of every crash test was pretty much the same. Just like in real life: a vehicle stuck on railway tracks, a fast approaching train, a huge impact, sound of cracking windows, squealing train brakes, clouds of dust, bent metal and finally rescue units – fire department, police, paramedics working as fast as they can as human life depends on the precious seconds ticking away...

12th Global Level Crossing Symposium and 22nd International Rail Safety Conference (IRSC) from Sunday 7 to Friday 12 October 2012, London, UK

By Alan Davies, RSSB

The Global Level Crossing and Trespass Symposium (GLXS) is a biennial event that brings together safety professionals from road, rail, enforcement and regulatory authorities around the world. Delegates can exchange information and share good practice for improving the way in which the at-grade interface between road and rail systems is managed. This year the event will be held in London, hosted jointly by RSSB, Network Rail and the Office of Rail Regulation.

In several locations the locomotive drivers hit obstacles at 40 km/h, which at first might not seem to be a great speed but anything above that speed poses a real threat to a locomotive driver. Despite the fact that all possible safety measures were taken we did experience some incidents including overhead traction shortcut and different rolling stock and track damages. If the speed was greater, the risk of seeing a train derailing would have significantly increased. Everything was however planned up to the smallest detail to ensure the safety of the locomotive drivers as well as a wide audience gathered on a dedicated site. The crash tests were accompanied by railway security guards and law enforcement officers who carried out rescue operations.

We deeply believe that we can influence people’s behaviour and increase their safety awareness by showing them some shocking consequences of level crossing accidents. The crash tests were very widely covered by mainstream and local media. On the occasion of the UIC General Assembly in Warsaw, UIC members and staff members were invited to see one of them at a level crossing in the suburbs of Warsaw and attend the ILCAD 2011 press conference organised on 7 June 2011.

The theme of GLXS will be ‘Working together to improve safety and performance at level crossings’. This will include sessions on educating the public, human behaviour and enforcement, as well as technical sessions on intelligent systems, innovation and modelling. Trespass on the railway will be an additional item for discussion, since many people have expressed an interest in this subject.

The theme of this year’s IRSC will be ‘Leadership, Culture, Behaviours and the integration of Human Factors into Management Systems’.

The symposium is being run for the first time in conjunction with the International Railway Safety Conference (IRSC), which is being held just a short distance away. The two events will come together for part of the programme, so delegates at both can look forward to networking with an even wider range of safety experts.

The events will run from Monday 8th to Wednesday 10th October. On Thursday 11th October, after the formal part of the symposium, there will be technical tours, which will give delegates the opportunity to visit the new Network Rail National Centre at Milton Keynes and learn more about recent innovations at level crossings and visit some of the different types of crossing used in Britain. Friday 12th will include a visit to learn about other rail safety issues at the Hitachi maintenance depot, Ashford, where train operator Southeastern’s high speed trains are maintained.

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