Trafi

Annual Railway Safety Report 2014

Finnish Transport Safety Agency Trafi

A. Introduction

This Annual Railway Safety Report presents the state of Finnish rail safety and the operations of the Finnish Transport Safety Agency (Trafi) as the National Railway Safety Authority in 2014.

Section 41 of the Railway Act (304/2011) requires Trafi to publish an annual report on rail safety by 30 September each year. The Annual Railway Safety Report is delivered to the European Railway Agency (ERA). The Annual Railway Safety Report follows the structure recommended by the ERA. The version of the report following ERA's annual safety report template is only delivered to the ERA. A version largely identical in content but intended for the general public is submitted to the Ministry of Transport and Communications and published on the Trafi website.

The information in the Annual Railway Safety Report is mainly based on the safety reports submitted to Trafi by railway operators. Collection of data for the present report was successful, and nearly all the required data were available in the operators' safety reports.

B. Overall safety performance and strategy

B.1 Main conclusions on the reporting year

Rail safety remained at a good level in Finland in 2014. There were 15 significant accidents, clearly below the 2009–2013 average of 19.2.

The safety of train traffic in particular is at a good level in Finland. Measured in terms of the number of significant derailments and collisions relative to train kilometres, train traffic safety in Finland is among the best in Europe. No passengers or railway personnel have died in railway accidents in recent years.

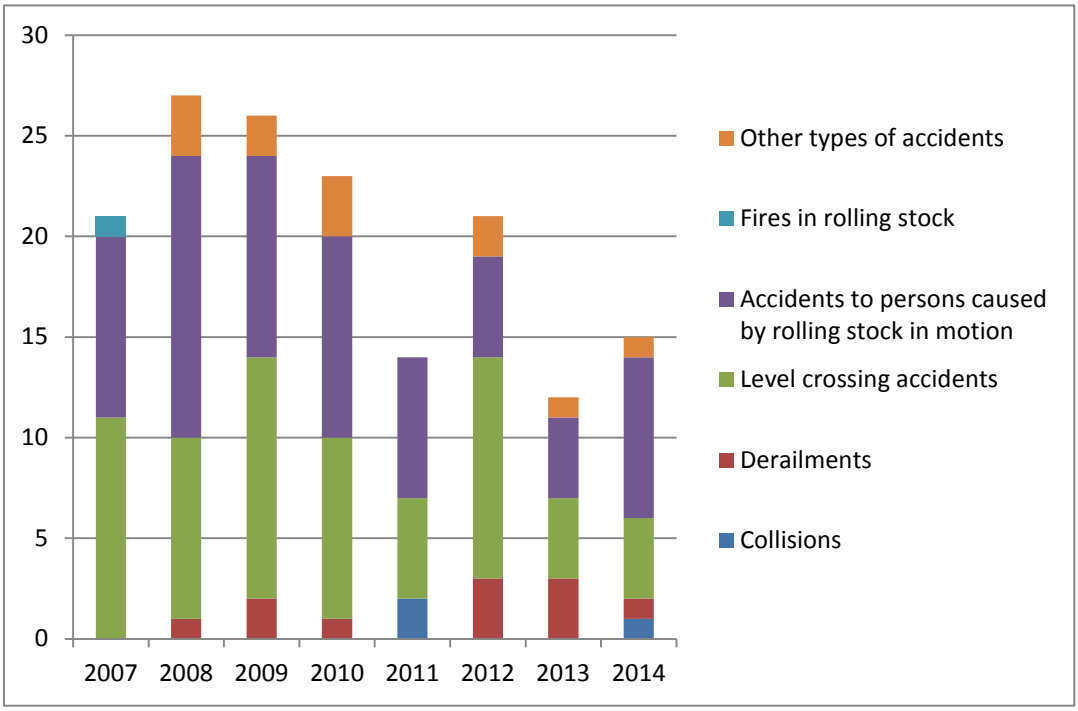


Figure 1. Significant accidents in 2007-2013 by accident type.

The few serious incidents that have occurred, such as the incident in March 2015 where a train ran through a set of points in Hyvinkää at an excessively high speed, show that we cannot rest on our laurels with respect to train traffic safety. Despite improvements in rail safety devices and operating models, serious train accidents remain possible.

The only significant collision in train traffic took place in Ryttylä, when a passenger train collided with a snow guard at a set of points. The resulting damage was in excess of the threshold for reporting the accident as significant. The only significant derailment took place on 6 June 2014 in Haapajärvi, when the bogie of a freight train derailed as a result of track buckling. The accident halted traffic for over six hours.

The number of level crossing accidents has been dropping steadily in recent years. A total of 32 level crossing accidents took place in 2014, of which four were categorised as significant. There are more than 3,000 level crossings in Finland. Level crossing accidents claimed two lives, in addition to which two people were seriously injured, indicating that more still needs to be done to improve the safety of level crossings.

Similarly to previous years, there were several close calls related to track work, which could have resulted in serious train traffic accidents. Typical dangers related to track work include overstepping the track work perimeter, carrying out track work without the appropriate permit, shortcomings in inspecting the works before the track is reopened to traffic and track damage caused by machinery. Dangerous situations often stem from shortcomings in workers' skills and competencies, poor planning and excessively tight schedules.

The number of accidents and injuries resulting from shunting operations was lower in 2014 than in previous years. The number of derailments in particular fell considerably thanks to the mild winter. However, more personal injuries occurred during shunting in 2014 than in previous years, and three shunting workers were seriously injured.

The number of incidents reported across the rail network has been increasing in recent years. Some of the increase is attributable to better reporting. It is nevertheless possible that the increase in track-related incidents is due to the track deteriorating as a result of increasingly inadequate maintenance.

Approximately 60 people perish each year in accidents resulting from trespassing on tracks. Despite continuous improvements in other areas of rail safety, efforts to reduce the number of trespasser fatalities have not been successful. The majority of trespasser fatalities are suicides. Research and experience from around the world show that both deliberate and accidental trespasser fatalities can be reduced. It is now time to abandon the traditional belief that nothing can be done about trespasser fatalities and take serious action to reduce their numbers.

The number of trespassers on railways appears to have increased in recent years as a result of a rise in vandalism and the "selfie" culture. Steps should be taken to increase children's and young people's awareness of the risks associated with trespassing and vandalising railways, in order to reduce the number of related incidents.

It would appear that, in 2014 as in previous years, Finland attained a level of safety consistent with the EU-wide safety targets in all risk categories. Finland does not currently have valid national safety targets.

B.2 National safety strategy, programmes and initiatives

Finland does not currently have a valid national rail safety strategy or plan.

The Finnish Transport Safety Agency (Trafi) continued to develop tools for operator and traffic risk assessment in 2014. These tools cover rail transport, aviation, shipping and road transport and are used for carrying out risk assessments and compiling risk profiles on operators and various functions.

Data used for risk assessment includes the findings of inspections and audits, data from operators' safety management systems, accident and incident reports and operators' safety reports. Trafi's risk assessment tools include operator risk profiles, a risk matrix for evaluating accidents and incidents, and a risk matrix for evaluating high-risk phenomena.

Such data will enable Trafi to allocate its limited supervision resources to critical high-risk areas in the future. Other Trafi operations, such as regulation and communication, can also be developed based on the results obtained using the risk assessment tools. A new risk assessment tool introduced in 2014 is an application called RISTO, which enables Trafi to compile operator-specific risk profiles. Another new addition is a tool for assessing risk potential in different kinds of accidents and incidents. The aim is to make coordination of Trafi's operations increasingly risk-based in 2015.

B.3 Review of the previous year

Trafi's railway processes ran smoothly in 2014, with no notable problems.

An efficient routine has already been established for handling safety authorisations and certificates. Safety authorisations were issued to 15 infrastructure managers and safety certificates to three shunting operators in 2014. By mid-June 2015, safety authorisations had been issued to 77 infrastructure managers and safety certificates to a total of 29 rail transport operators. The majority of safety certificate holders are shunting or heritage railway operators. In most cases, infrastructure managers and rail transport operators had to be asked once or twice to supplement their safety authorisation or certificate application. Additional information is often needed regarding descriptions of risk management and maintenance procedures and, in the case of infrastructure managers, traffic control arrangements.

In terms of railway supervision, in recent years Trafi's focus has shifted towards auditing the safety management systems of safety certificate and authorisation holders. Trafi's audits aim to establish whether safety authorisation and certificate holders actually follow their safety management systems in practice. In 2014, Trafi audited 15 safety management systems. The audited organisations included both rail transport operators and infrastructure managers. In addition to audits, Trafi carried out inspections on track work, transport operations and the condition of level crossings.

The new Railway Act, which was drawn up in 2013, entered into force at the beginning of 2014. The related amendments were necessitated by changes to national procedures and EU regulations. Efforts to lighten regulation continued in 2014 with the launch of a comprehensive review of railway competence regulations, which will involve examining whether these regulations are still up to date and whether there is scope for improving and lightening regulation. Work to this end continues in cooperation with the Ministry of Transport and Communications. A total of 10 railway regulations were also issued in 2014, most of which were revisions to earlier provisions transposing EU interoperability regulations into national law.

B.4 Focus areas for the next year

Trafi underwent an organisational reform at the beginning of 2015; the primary aim for 2015 is to have different railway processes interact seamlessly within the new organisational

structure. From the perspective of railways, the reform simplified the organisational structure by bringing different railway functions closer together within the organisation. In the new matrix organisation, Trafi's Rail Transport Director is responsible for ensuring that railway-related processes run smoothly.

Another important future priority is establishing practices for the risk-based management methods developed in previous years. Preparing, in open and active cooperation with ERA, for the changes brought about by the Fourth Railway Package will become a priority towards the end of 2015 and particularly in the coming years.

With regard to regulation, Trafi will continue to focus on regulation lightening.

C. Developments in safety performance

C.1 Detailed analysis of the latest recorded trends

Safety of train traffic

There were few accidents in train traffic in 2014 and train safety remained at a good level. Measured in terms of the number of significant derailment and collision accidents involving train traffic, Finland's train traffic safety is among the best in Europe. A total of 15 significant accidents occurred in 2014, which was three more than in 2013 but still clearly below the 2008–2013 average.

The relatively good safety situation in 2014 is also evidenced by the fact that the Safety Investigation Authority did not conduct a single actual investigation into the incidents that took place during the year. The Safety Investigation Authority did, however, conduct preliminary investigations into two of the derailments that occurred amongst train traffic in 2014.

Derailments

Two wagons of a freight train derailed at a set of points in a rail yard in Parikkala on 10 January 2014, when the train was travelling at 33 kilometres per hour. The derailed wagons knocked over one of the rail yard's main signal posts. The accident did not result in any personal injuries. According to the investigation report by the Safety Investigation Authority, the accident was caused by a broken leaf spring in one of the freight wagon's wheel sets *(Safety Investigation Authority, R2014-E1*). The leaf spring had actually broken on an earlier route, but the damage had been overlooked when the train was inspected before its departure. The accident was the result of the leaf spring becoming detached altogether, causing the wagons to derail.

The other derailment investigated by the Safety Investigation Authority in 2014 took place in the Viinikka rail yard in Tampere on 18 May 2014, when three wagons belonging to a freight train derailed at a set of points (*Safety Investigation Authority, R2014-E2*). A total of 130 metres of track was damaged as a result of the derailment. One point machine was also broken, and the derailed wagons' wheels suffered minor damage, but no personal injuries were sustained. The derailment was caused by a wheel on one of the lighter wagons mounting the check rail at the points where the track was bent. As the heavier wagons at the rear of the train pulled the wagons further apart, the wagons in the middle of the train began to 'straighten out' the curve on which the points were located.

Two derailments of train traffic occurred in 2014 in addition to the derailments for which preliminary investigations were conducted by the Safety Investigation Authority. The only derailment of the year that was categorised as significant took place on 6 June 2014 in Haapajärvi, when the bogie of a freight train derailed as a result of track buckling. The categorization as a significant accident is due to the fact that the accident halted traffic for a period of more than six hours.

Collisions

No collisions between items of rolling stock took place in train traffic in 2014. There were six collisions with obstacles on the tracks. The number of derailments and collisions among train traffic remained similar to previous years.

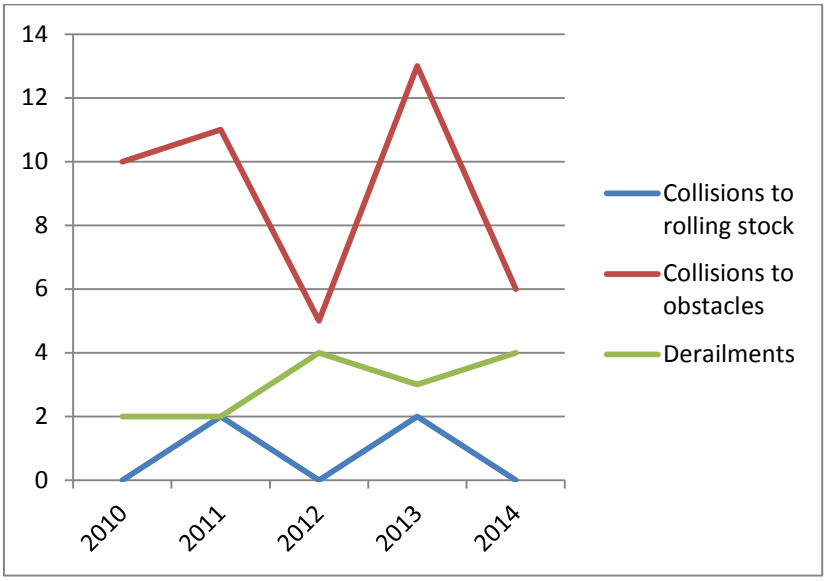


Figure 2. Collisions and derailments in train traffic 2010-2014.

The only collision of the year to be categorised as significant took place on 10 January 2014 in Ryttylä, when an IC train collided with a snow guard at a set of points. No personal injuries were sustained, but the costs incurred from the damage to rolling stock and the track exceeded the threshold for reporting the accident as significant, which is EUR 150,000. The consequences of other collisions involving train traffic were less severe, and the obstacles involved were buffer stops, an excavator's bucket and railway crossing infrastructure.

Other accidents

There were eight rolling stock fires in train traffic in 2014, which was slightly less than in previous years. Fires in rolling stock typically start from the wagons' electrical systems or the engine. No fires that would be categorised as significant have occurred in Finnish rolling stock in recent years. The number of level crossing accidents was lower than the long-term average, but trespasser fatalities were slightly higher than in previous years. Both level crossing accidents and trespasser fatalities are discussed in more detail below. Four accidents involving dangerous goods took place in train traffic in 2014, but no hazardous substances were released into the environment in these cases.

Incidents and precursors

As train traffic accidents are rare and variations in their numbers tend to be random, when assessing the safety of train traffic we need to examine trends in the occurrence of incidents that might be the precursors of accidents. However, no conclusions can be directly drawn

from changes in the number of incidents, as the statistical definitions used in incident reporting have changed and some incident classes are not comparable year on year.

There were 56 broken rails in 2014. The number of broken rails varied between 19 and 62 in the five-year period from 2007 to 2013. A total of 105 incidents of track buckling were reported in 2014, which was significantly more than in previous years. Buckling refers to discontinuations in rail geometry that require a track to be closed down or speed restrictions to be imposed. Buckling caused by hot weather in the summer is one example of this. The increase in rail failures and track buckling may be due to better reporting, railway embankment failures and general deterioration of the tracks.

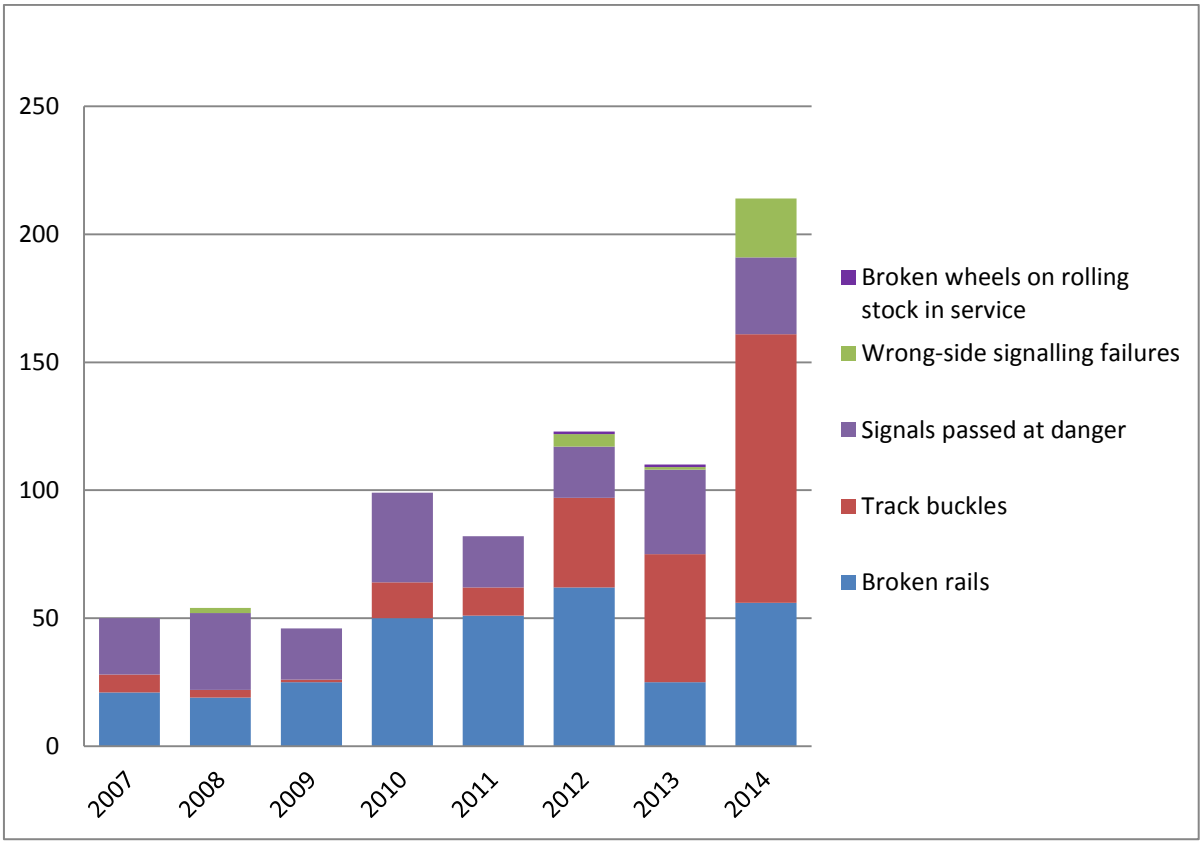


Figure 3. Precursors in 2007-2014

Wrong-side signalling failures are incidents where, due to a technical fault, the signalling system gives a train permission to proceed despite the track not being clear. Wrong-side signalling failures numbered 23 in 2014, which was clearly more than in previous years. Most of this increase can be explained by changes in classification principles. The majority of wrong-side signalling failures reported in 2014 were incidents in which the ATP system failed to restrict a train's speed according to the speed limit or where balises had been incorrectly installed or were in the wrong place.

There were 30 instances of signals passed at danger in 2014. These kinds of incidents have caused several major accidents around the world. When enabled, the ATP system in Finland is efficient in preventing the consequences of signals passed at danger by stopping the train involved. The number of instances of signals passed at danger in Finland has varied between 20 and 35 in recent years.

No broken axles or wheels were reported in train traffic in 2014. One rolling stock axle was broken in connection with track work. There were nine incidents where wagons became uncoupled, which was clearly less than in previous years. On the other hand, the number of so-called hot box cases, where a bearing overheats, increased considerably. Hot box cases

numbered 190 in 2014, while the number of incidents in recent years has varied between 104 and 147. The majority of hot box cases are caused by brake dragging due to the incorrect use of brakes, or technical faults.

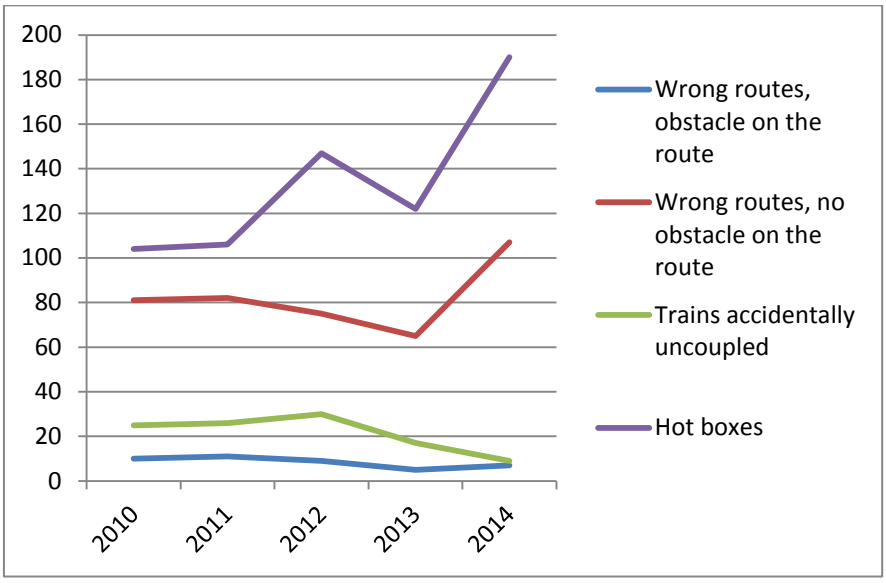


Figure 4. Incidents in train traffic in 2010-2014

The number of wrong routes increased considerably in 2014. There were a total of 114 such incidents, while their number has varied between 70 and 93 in recent years. Typical cases include routing passenger trains onto tracks where there are no platforms or routing electric trains onto non-powered tracks. If there is an obstacle on the route, these kinds of incidents can also result in a significant accident. In approximately 90% of cases, there are no obstacles on the track. Wrong routes are often caused by incorrect operation of the traffic control system. To address the increase in the number of these kinds of incidents, the Safety Investigation Authority has launched a thematic investigation into wrong routes that occurred in 2015.

Vandalism on railways has increased alarmingly. The Finnish Transport Agency recorded 537 acts of vandalism in 2014, while the number of cases reported in 2011 was just 215. Some of the increase is probably attributable to better reporting, but there also appears to have been an actual increase in vandalism. The reason for this is difficult to pinpoint. Typical acts of vandalism include placing obstacles on the track, creating graffiti and damaging equipment. Vandalism is dangerous for both the perpetrators and third parties. At its worst, vandalism can cause a train to derail. Cases of vandalism are centred in and around larger population centers. The Finnish Transport Agency has increased cooperation with local police forces in order to reduce vandalism. A larger police presence has proven to be an efficient way of reducing vandalism locally.

Observations relating to the technical safety of infrastructure

As in previous years, 82% of Finland's state-owned rail network was covered by the Automatic Train Protection (ATP) system, and 98% of all train traffic was operated on tracks where the ATP system is in use.

A total of 121 level crossings were eliminated in 2014, leaving 3,384 remaining at the end of the year. Of these, 767 are equipped with warning systems and 2,617 are not.

Costs of significant accidents

The costs incurred by society from significant railway accidents in 2014 amounted to EUR 18,018,810. This figure was slightly higher than in the years 2011–2013, but clearly lower than in 2009 and 2010. Damage to rolling stock and infrastructure accounted for EUR 987,112 and fatalities and personal injuries for EUR 17,031,698 of the costs incurred from accidents in 2014. The costs incurred from fatalities and personal injuries were higher than in 2013.

Safety in shunting

Minor accidents are more common in shunting than in other train traffic. In shunting, safety depends on the actions of individual workers rather than the technical safety devices used in train traffic. For example, ATP devices are not compulsory in shunters, and even where an ATP device is in use the system only controls the shunter's maximum speed. Shunting can also be performed with a local permit, in which case the workers need to operate the points themselves. The high number of shunting-related incidents stems from the dangers involved in repeatedly uncoupling and coupling items of rolling stock. Other factors that increase the risks of shunting work are the challenges involved in moving rolling stock by pushing, the critical importance of communications and inadequate maintenance of private sidings.

This report examines shunting-related accidents on the basis of statistics compiled by VR Group Ltd. VR Group's statistics do not cover all shunting operations, but they are the most comprehensive statistics currently available on shunting-related incidents in Finland. Shunting-related accidents are typically either collisions or derailments. The number of collisions has decreased slightly in recent years. VR Group reported 83 shunting-related collisions in 2014. Most of these were collisions with buffer stops, wagons or depot doors. In 2014, the shunting-related collision with the most serious consequences occurred in Kotka on 10 July, when one shunter rear-ended another. Both engines suffered considerable damage in the collision.

Only 49 derailments took place in connection with shunting in 2014. Shunting-related derailments have numbered more than one hundred a year in previous years. In a typical shunting-related derailment, the bogie of an empty wagon jumps the rail due to snow and ice having accumulated on the channel rail or at a crossing. Due to the low snowfall in the winter of 2014, there were very few derailments. The first months of 2015 were snowier than the year 2014 and considerably more shunting-related derailments were reported. Other common reasons for derailments during shunting include brake shoes left on tracks and the poor condition of private sidings.

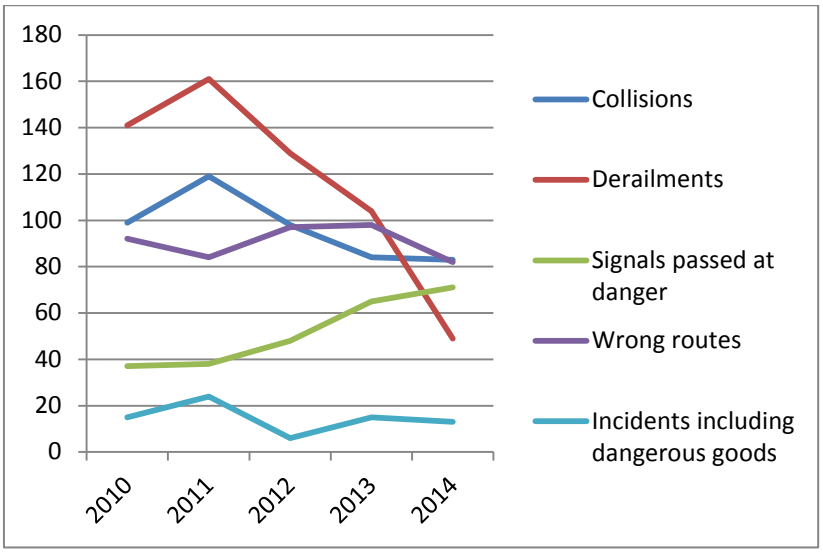


Figure 5. Shunting incidents in 2010-2014

The number of cases in which shunters pass signals at danger has increased slightly. The risk that such incidents will occur during shunting is higher than in train traffic, as the APT system does not control whether shunters observe signals. A peculiar case of a shunter passing a signal at danger occurred on 5 December 2014 in Raahe, when a shunter left the local Rautaruukki factory without a driver. The shunter had travelled approximately 10 kilometres onto the state-owned rail network, passed a stop signal and opened a set of points before it could be stopped with the help of another engine. The driver had exited the cab and left the shunter idling. The driver must have left the engine in gear with the dead man's switch disabled and the brakes off for it to have started moving on its own.

There were 82 wrong routes involving shunters in 2014. This figure was slightly lower than in previous years. Shunting-related incidents involving the carriage of dangerous goods (CDG) include incidents where hazardous substances are released into the environment and accidents involving wagons carrying dangerous goods. There were a total of 13 CDG incidents in 2014. No clear trend can be discerned in the number of CDG incidents.

The majority of work-related injuries suffered by railway personnel are incurred during shunting operations. Between three and 10 shunting-related injuries per year have been reported in recent years. Of the seven cases of shunting-related injuries reported in 2014, three were serious. On 17 January in Pietarsaari, a shunting supervisor who was operating a radio-controlled shunter fell off the moving vehicle. The wheels of the engine ran over the shunting supervisor's arm, severing his hand. Another shunting supervisor was injured when he fell off a shunter in Ylämylly on 26 August. The third serious shunting-related injury of the year took place in Joensuu on 7 May, when a shunting instructor injured his hand while coupling wagons. Minor injuries are typically incurred in shunting operations during collisions, derailments and falls.

Depending on the classification system, between 10 and 20 different kinds of shunting operations are performed on railways. Examples include sorting items of rolling stock into complete train sets or the reverse, taking consists to where they are needed for train traffic, moving wagons by up to 10 metres for the purpose of uncoupling, operating on shunting tracks, radio-controlled shunting operations, operating in degraded conditions, and moving wagons for the purpose of loading and maintenance.

Radio-controlled shunting between stations can be seen as displacing train traffic, as nothing prevents shunters from operating as trains between stations where radio-controlled shunting is being performed. When a train operates between stations under the guise of shunting, no

train driver is needed, as a shunting supervisor with radio control qualifications can take care of everything.

The broad definition of shunting is designed to enable the concept to be interpreted differently in different situations. Sometimes shunting encroaches on train traffic, at others the definition is narrowed down to enable personnel with no shunting qualifications to perform shunting operations. Safety concerns may arise due to broadening or limiting the definition of shunting, if traffic control and drivers of rolling stock cannot agree on what rules to observe or if drivers and shunters fail to do their jobs properly.

Following amendments to Trafi's regulation on rail traffic safety training programmes (TRAFI/3883/03.04.02.00/2015), training courses for drivers and shunters can be tailored more and more flexibly to different needs. Due to the possibility of tailoring training programmes, there may be less need to stretch the definition of the concept of shunting in the future.

Safety in track maintenance

The challenge of combining track work and train traffic continues to be one of the greatest problems in terms of rail safety in Finland.

In response to accidents relating to track work and the several incidents that occurred in 2013, the Safety Investigation Authority conducted an investigation focusing on the safety issues associated with track work, which was completed towards the end of 2014 (*Safety Investigation Authority, R2013-02*). According to the Safety Investigation Authority's report, the most typical dangers encountered during track work, such as damage caused to the track by machinery and derailments, often stem from shortcomings in workers' skills and competencies as well as from poor planning and preparation. Tight schedules tend to lead to inadequate preparation. Confusion over track work permits and work site boundaries is often caused by inadequate training and planning. Cases where track work is carried out without the appropriate permit can be explained by shortcomings in workers' skills and competencies, but also worryingly by flagrant disregard for safety. As the risk of being caught carrying out unauthorised track work is low, contractors may be tempted to undertake works without a permit in the hope of saving time and money.

One of the key reasons for the persistent problems in safety related to track work is the transition sparked by the opening of railway maintenance to competition. The opening up of the market caused the number of maintenance operators to multiply. As responsibility for maintenance is now divided between multiple operators, a culture has emerged in which more and more emphasis is given to economic factors, sometimes at the expense of safety. Operators competing for contracts were able to react to the opportunities presented by the change more quickly than the parties responsible for rail safety, and the latter parties have failed to adapt their supervisory practices and their emphasis on safety considerations when awarding contracts in the new situation.

The number of incidents relating to track work was high again in 2014. The following are a few examples of incidents that occurred in connection with track work in 2014. On 16 March 2014 in Mommila, a freight train entered a section of track where track work was being carried out. The incident was caused by confusion over when the works would be finished. On 20 March 2014 in Leppävaara, an IC train was routed to a platform where maintenance work was being carried out at the time. The reason for the change of route was an unsecured track work site on the other track. On 1 October 2014 in Saakoski, an excavator involved in track work crossed the work site perimeter due to an internal miscommunication. The

excavator caused an insulated section of the track to short-circuit, as a result of which an approaching train had to stop at the next main signal. On 7 May 2014 in Helsinki, a team of engineers was working at a set of points without anyone having been assigned to lookout duty. The last member of the team left the tracks when an approaching train, which was forced to brake suddenly, was just 20 metres away.

On 29 April 2014 between Uusikaupunki and Mynämäki, a freight train and an excavator were close to colliding due to confusion over when track work in the area would be finished. The driver of the freight train was able to bring the train to a halt and prevent the collision thanks to good visibility. On 18 February 2014 in Kouvola, a train collided with a welding unit. The driver of an engineering train had left the welding unit between the points too close to the rails. The unit was first hit by a shunter, causing it to turn so that it lay even closer to the rails. The engine of the freight train that arrived on the scene next collided with the unit, knocking over the oxygen cylinders. The oxygen cylinders as well as the points mechanism were damaged in the collision.

On 4 June 2015 between Rovaniemi and Kemijärvi, a track work vehicle rear-ended another at a track work site. The driver of the engineering train that rear-ended the excavator in front was seriously injured in the collision, as a result of which the incident was categorised as a significant accident.

The Finnish Transport Agency has made several changes to track work procedures to improve safety. Track maintenance safety instructions have been updated and the traffic control manual has been revised on the basis of past incidents. Parties involved in incidents have been invited to safety discussions, and the underlying causes of incidents have been studied in order to learn from mistakes. Efforts have also been made to develop track maintenance training courses in cooperation with educational institutions in order to improve the competencies of maintenance personnel. The safety issues associated with track maintenance are complex and it is still too early to speculate on how these measures will affect safety.

Level crossing safety

Measured in terms of the number of accidents and the number of fatalities resulting from accidents, level crossing accidents remain the most common type of rail transport accident in Finland after trespasser fatalities. Every level crossing accident causes disruptions in rail transport. From the perspective of rail transport, derailments resulting from level crossing accidents pose the greatest risk of a serious accident.

Two people died in Finland as a result of level crossing accidents in both 2013 and 2014. There were a total of 32 level crossing accidents in 2014. The number of level crossing accidents has been dropping steadily since the beginning of the 21st century. The number of fatalities has also decreased slightly. Level crossing accidents have numbered 44 per year on average in the last 10 years and 35 per year in the last five years. These figures therefore also support the notion that the rate of occurrence of level crossing accidents is decreasing.

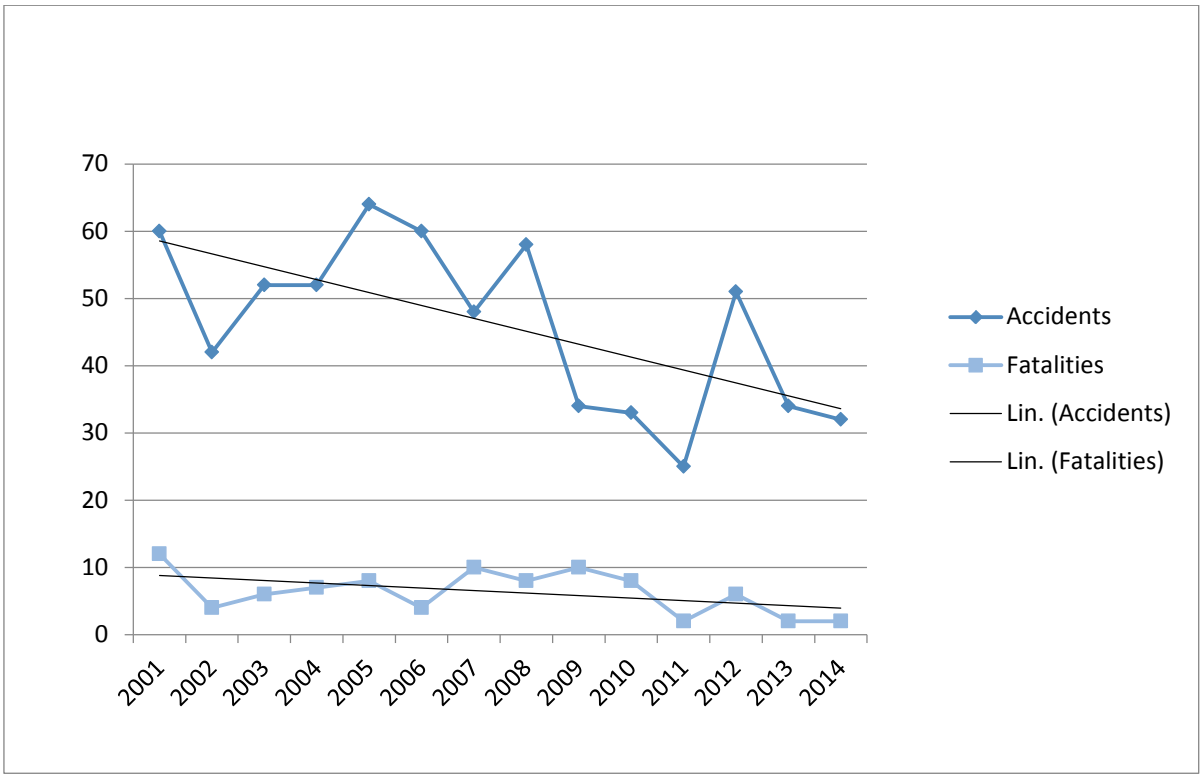


Figure 6. Level crossing accidents and fatalities in 2001-2014.

Between approximately 50 and 100 level crossings are eliminated across the state-owned rail network every year. From the safety perspective, the problem is that priority is given to eliminating level crossings in order to increase the maximum speed of a track during the course of general track improvements, rather than to eliminating the most dangerous level crossings. Cost-effective ways of improving the safety of the remaining level crossings are being explored on a continuous basis.

In order to explore different ways of improving safety and their impacts, Trafi and the Finnish Transport Agency have commissioned a report that categorises the proposed measures and lays out a description of each measure. The report was one of the starting points for the Expert Group on Safety at Level Crossings of the United Nations Economic Commission for Europe (UNECE), which strives to identify best practices for improving the safety of level crossings. The Expert Group is a collaborative body of road and rail transport representatives.

Non-technological ways of improving the safety of level crossings are also being explored. Examples include improving maintenance, disseminating information on the correct use of level crossings, identifying solutions that promote the correct use of level crossings, and supervision.

There were 3,505 level crossings in Finland at the end of 2013 and 3,384 at the end of 2014. Despite many level crossings having been eliminated, Finland still has more level crossings than other EU countries on average. The EU average is approximately five level crossings per 10 kilometres of track (one every two kilometres), while Finland has approximately six level crossings per 10 kilometres of track (one every 1.7 kilometres).

A considerably higher percentage of level crossings in Finland (approximately 80%) have no warning systems than the EU average (approximately 47%). This is due to many of Finland's level crossings being located in forest or farmland and along other little-used roads. Efforts are being made to improve the safety of these kinds of level crossings by

finding solutions that are considerably cheaper than half barriers and warning lights to warn road users of approaching trains, especially in areas where there is no electricity. The rapid development of solar panels and wind turbines has enabled the introduction of less complex warning systems.

Fatalities and serious injuries in railway accidents

Six people died in railway accidents in Finland in 2014. This figure does not include suicides. The number of fatalities has remained the same for the last three years. In 2007–2011, the number of fatalities varied between five and 21. Differentiating between deliberate and accidental railway fatalities is challenging, and some of the variation in the number of fatalities over the years may be explained by uncertainties in classification. The number of fatalities resulting from railway accidents has decreased steadily since the 1970s, when the annual figures sometimes exceeded one hundred. Back in the 1970s, dozens of people each year died using level crossings and trespassing on the railway. The number of fatalities of all kinds has dropped substantially in the 2010s.

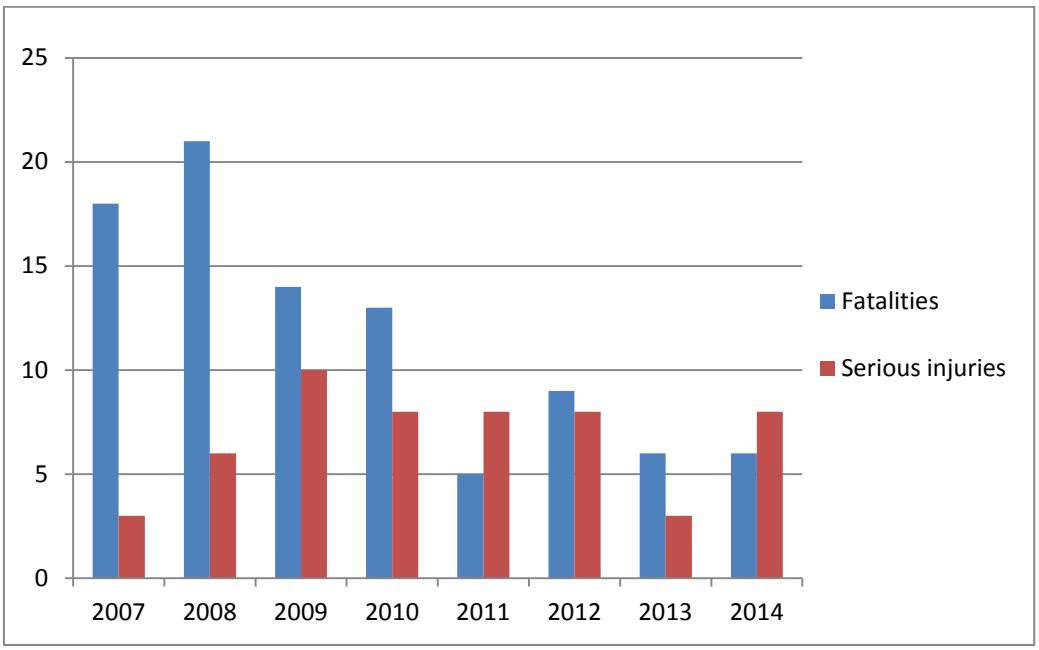


Figure 7. Fatalities and serious injuries in railway accidents in 2007-2014

Of the fatalities reported in 2014, two were involved in level crossing accidents and four were trespassers on the railway. In 2007–2014, almost all fatalities resulting from railway accidents involved either level crossing users (49) or trespassers on the railway (37). No railway employees have died in railway accidents after 2011 and no rail passengers have died after 2006.

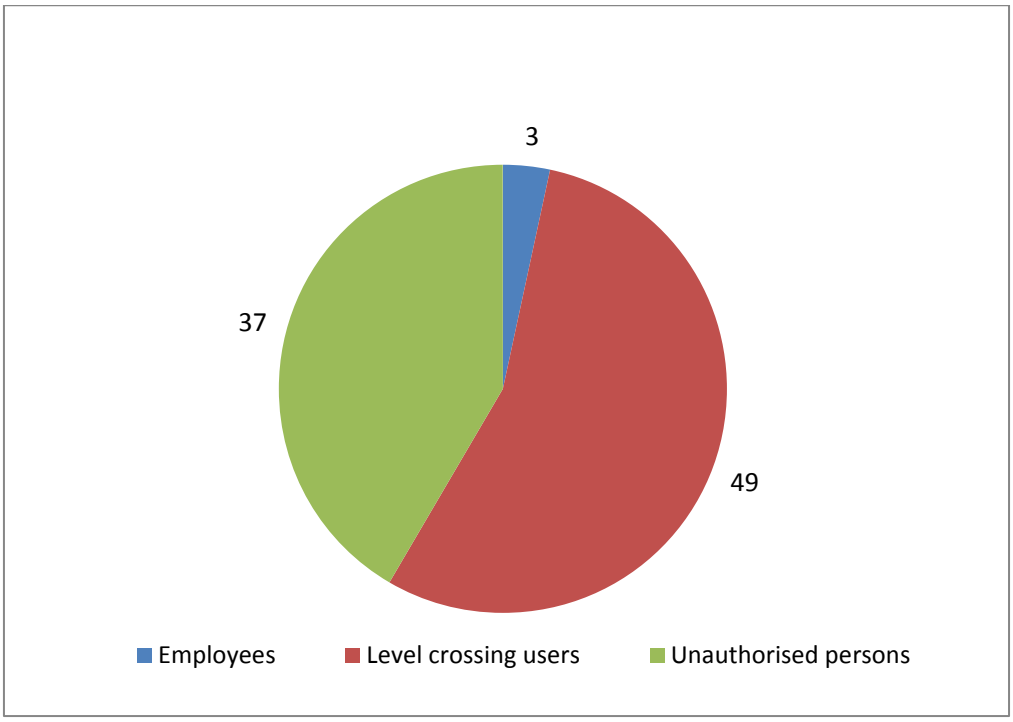


Figure 8. Fatalities in railway accidents by category in 2007-2014.

Eight people were seriously injured in railway accidents in 2014. Just under seven cases of serious injuries on average have been reported per year in 2007–2013. The majority of people who have sustained serious injuries in railway accidents in recent years have been level crossing users and trespassers. The year 2014 differed from previous years in the sense that serious injuries were also sustained by people who were not level crossing users or trespassers. Of the cases of serious injuries reported, four were railway employees, two were level crossing users, one was a passenger and one was classified as 'other'. The passenger who sustained serious injuries was attempting to jump onto a moving train and fell between the platform and the train. The case classified as 'other' involved an individual who was taking photographs at the edge of a platform being hit by a train that was pulling into the station.

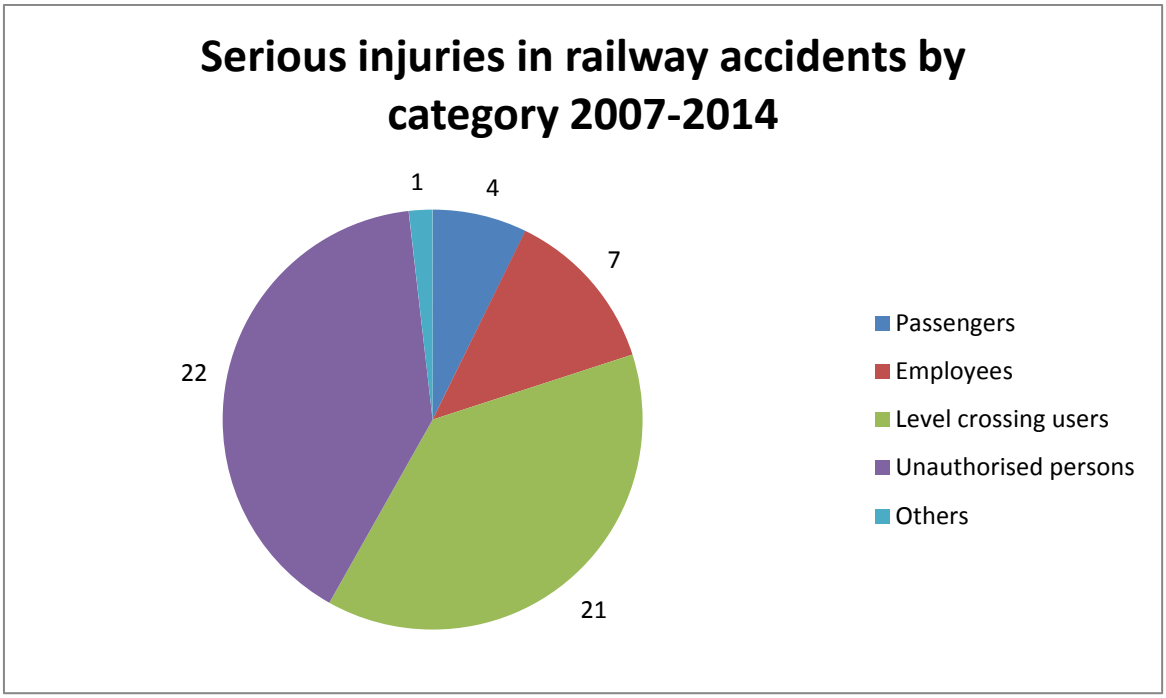


Figure 9. Serious injuries in railway accidents by category 2007-2014

A total of 64 people committed suicide by jumping in front of a train in Finland in 2014. The number of these kinds of suicides has varied between 44 and 64 per year in 2005–2013. Despite continuous improvements in other areas of rail safety, efforts to reduce the number of suicides have not been successful. The number of suicides in general has been clearly decreasing in Finland since the beginning of the 1990s, but the number of people committing suicide by jumping in front of a train appears to remain the same year after year.

C.2 Results of safety recommendations

Table 1 – Implementation of safety measures triggered by safety recommendations

Safety recommendation	Safety measure	Status of implementation
S347 The Finnish Transport Agency should allocate sufficient resources to developing procedures that enable incidents relating to rail safety to be addressed meticulously, systematically and quickly.	The Finnish Transport Agency will draw up incident reports of all serious incidents. The Finnish Transport Agency will adopt an incident management system during 2015.	In progress
S346 The Finnish Transport Agency should increase its efforts to monitor compliance with track work safety regulations by allocating sufficient resources to supervision.	The Finnish Transport Agency will establish a procedure for safety coordinator training during 2015.	In progress
S345 The Finnish Transport Agency should ensure that enough time is set aside in track work contracts for planning and agreeing on responsibilities before the works are due to begin.		In progress
S344 The Finnish Transport Agency should ensure that all track work contracts specify detailed financial consequences for contractors, for both compliance and non-compliance with safety regulations.	Penalty and bonus practices will be examined during 2015.	In progress
S343 The Finnish Transport Agency should ensure that the person responsible for track work pays enough attention to traffic safety and develops better tools for track work supervisors, which enable them to ensure safety.	Safety instructions have been revised to specify a maximum number of workers per team/supervisor, and requirements relating to the use of GPS will be introduced in the future.	In progress
S342 The Finnish Transport Agency should lay down stricter minimum requirements for track work safety training.	New training materials and examinations have been drawn up.	Completed
S341 As the infrastructure manager, the Finnish Transport Agency should create a clearly defined turnout maintenance training programme and create a system for continuous monitoring of the competence of personnel engaged in turnout maintenance and adjustment.	A learning environment will be built in Kouvola (due for completion in the summer of 2016), where track work personnel can attend training courses and gain the related qualifications.	Completed
S340 The Finnish Transport Agency should modify the switch motors on the YV60-300-	The product development phase was completed in 2014.	Completed

1:9 turnouts used on the main lines that allow trailing point movements so that vibrations caused by rolling stock cannot dislodge the facing point locks.	Equipment will be upgraded on critical routes first. All equipment will have been upgraded in seven years' time.	
S339 The Finnish Transport Agency should establish a system to ensure that the reason and justification for issuing a critical command are always recorded. The purpose of the justification is to demonstrate that the use of the command does not cause an actual malfunction in the system.	A procedure for using critical commands will be laid down in the incident management system.	In progress
S338 The Finnish Transport Agency should create a sys-tem and methods for analys-ing the error logs of safety equipment in order to ensure that recurring safety-critical faults are detected.	A procedure for recording safety device error logs will be laid down in the incident management system.	In progress
S337 Trafi should ensure that concrete instructions are issued for the planned risk assessment measures, that the employees carrying out the assessments are trained in their use, and that the implementation of risk measures is supervised.	Risk management has been incorporated in audits.	Completed
S336 The Finnish Transport Agency should ensure that the traffic restriction notification is also used when rolling stock is stored on tracks in traffic use.	Track maintenance safety instructions have been revised to this end.	Completed
S335 The Finnish Transport Agency should explore best practices for resetting axle counters after track work, and enter these practices in the railway traffic control manual.	An investigation has been conducted to this end, and the findings will be incorporated in the new version of the rail traffic control manual this year.	In progress

C.3 Measures implemented not in relation to safety recommendations

Table 2 – Safety measures adopted by railway operators and infrastructure managers not triggered by safety recommendations

Area of concern/Description of trigger	**Safety measure introduced**
Risk of shunting workers falling off wagons	Changes to the design of wagons' steps and handrails and revisions to shunting guidelines
Problems caused by the RAILI radio network in shunting communications	Introduction of the VIRVE radio network for shunting operations
Need to improve safety by formulating efficient local-level procedures and improving cooperation between different parties	Promoting the 'Better occupational safety at rail yards' project
Need to ensure that safety incidents are investigated together with operators	Improving communication during the course of damage and accident investigations in cooperation with VR Group
Need to process incidents more efficiently, determine what action needs to be taken and implement changes more efficiently	Setting up a rail safety team at the Finnish Transport Agency

Increased number of faults in the RAILI network	Promoting the transition of railway communications from the RAILI network to the VIRVE network
Need to improve workers' competence and the quality and safety of the Finnish Transport Agency's technical track maintenance operations	Increasing track maintenance personnel's competencies
Risk of the background of signals being mistaken for a dark (unlit) signal	Substituting yellow paint for the current black background of combined signals
Risk of incorrect operation of signalling equipment	Changes to the design of the rectifier diode coupling of signalling equipment relays

D. Supervision

D.1 Strategy and plans

Priorities can be set with different perspective. In general items involving passenger traffic or dangerous goods have the highest priority and items for normal shunting at a private yard have the lowest. Priorities with this kind of perspective follow much the priorities of capacity allocation. On the other hand, priorities and thereby targets are mainly based on organisation profiles and analysis of incidents. The profiles look at the performance of a certificate/authorisation holder's SMS and thereby assessing the risks of the management and operation of that organisation whereas the analysis of incidents evaluates different phenomena and their risks. Based on this information priorities and targets are set.

Sources of information and main inputs used for defining the supervision strategy and plan are organisation profiles, meetings, interviews, self-assessment, analysis reports, supervision action (audit, inspection), other documentation including applications for change in the SMS, letters, etc. and other external sources.

As revision of supervision plan there were some ad hoc items added to the plan during the reporting year.

D.2 Human resources

In 2014, Trafi had three full-time employees in railway supervision. They conducted 15 audits and 9 follow-up audits. There were two auditors in each audit. Audits took full working day and follow-up audits took half a working day. Supervisors used one working day on average for preparing and winding up each audit. Likewise they used a half working day for preparing and winding up the follow-up audits. The total working hours used for auditing was about 564 hours, or 282 hours per auditor.

The supervisors conducted also 2 audits on ECM-certifications. The audits took three days preparations and winding up included. The total working hours used for ECM audits was about 96 hours, or 48 hours per auditor.

The supervisors conducted 15 inspections, about one working day each, of various areas of the railway system. Half of these were conducted by the supervisors together and half individually. Each inspection day usually required an additional day for preparation and winding up. Therefore, the inspections took a total of about 350 hours, or 175 hours per supervisor.

In all, the supervisors spent about third of their working hours on audits and inspections. In addition to the full-time supervisors, certain other Trafi employees participated in the audits and inspections. However, their contribution was significantly smaller in terms of working hours, and was not taken into account here.

D.3 Competence

Trafi has a system named Sympa for competence management of the agency's entire personnel. Sympa contains employees' qualification and competence data, information on critical competences in each function, information on each employee's competence goals and personal development plans. Sympa allows the compilation of an overview of competence throughout the organisation and of competence development needs. The system can be used to assist in personnel turnover situations, temporary resource shortages and job rotations.

D.4 Decision-making

On one hand a decision-making criteria is the performance, on the other hand risks. Based on the targets and priorities it was decided whom or what to supervise and what kind of action was needed (mostly audits, inspections or discussions).

There were no complaints submitted by RU's or IM's on Trafi's decisions concerning supervision activities.

D.5 Coordination and cooperation

There were no supervision arrangements or agreements with other NSA's during the reporting year.

D.6 Findings from measures taken

Main findings from evaluation of measures taken by RUs and IMs to remedy non-compliances were vigil changes in the SMS and enforcement of the SMS in the organisation.

E. Certification and authorisation

E.1 Guidance

Instructions for applying for safety authorisations and certificates are available on the Trafi website. The instructions discuss the practical details of applying for a safety authorisation or certificate and also safety management systems. The website also contains a document intended to clarify the requirements of decrees 1158/2010 and 1169/2010 for each evaluation criterion.

E.2 Contacts with other NSAs

So far, no foreign operators have applied for a safety certificate in Finland, and no Finnish operators have applied for one abroad. Therefore, there were no contacts with other NSAs concerning this matter in 2014.

E.3 Procedural issues

Safety authorisations were issued to 15 infrastructure managers in 2014. By mid-June 2015, safety authorisations had been issued to 77 infrastructure managers altogether. There are still a few dozen infrastructure managers who have not applied for safety authorisation. In most cases where an infrastructure manager has not applied for safety authorisation, the reason is either that the infrastructure manager is unaware of the requirement or that the infrastructure has not been in use for a while and its future is uncertain. Trafi has strived to contact infrastructure managers who do not yet have safety authorisation and to disseminate information on the subject.

One of the challenges related to safety authorisations is that Trafi does not have a comprehensive list of private siding managers in Finland. The challenge therefore lies in finding out which operators have not yet applied for safety authorisation.

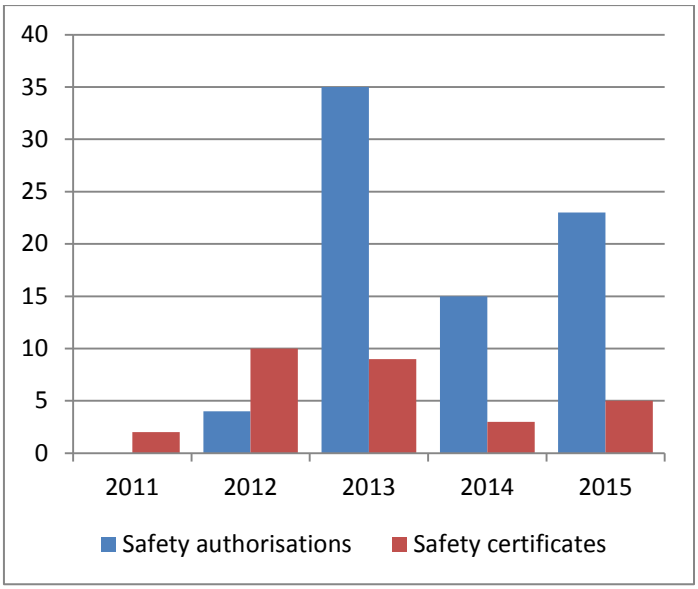
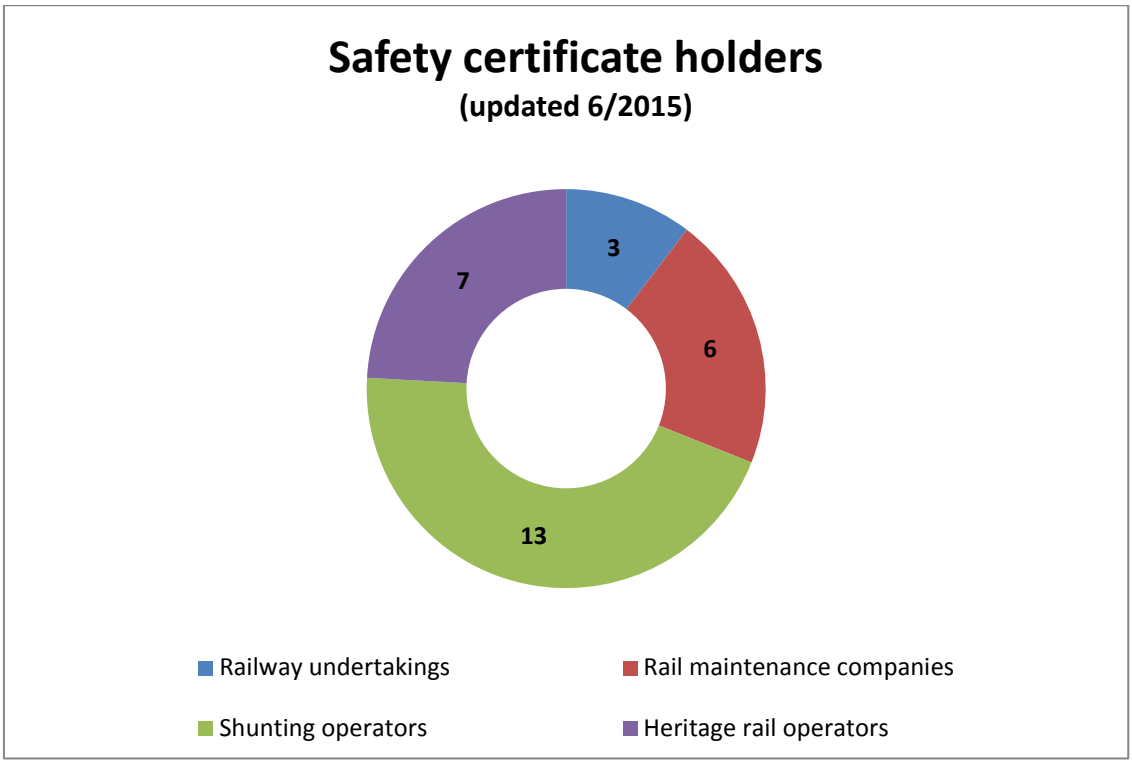


Figure 10. Granted safety certificates and safety authorisations by year (updated 6/2015)

In 2014, Trafi issued safety certificates to three shunting operators. By June 2015, safety certificates had been issued to a total of 29 rail transport operators. The majority of safety certificate holders are shunting or heritage railway operators.



Safety certificate holders (updated 6/2015)

In most cases, infrastructure managers and rail transport operators have to be asked once or twice to supplement their safety authorisation or certificate application. In many cases, additional information is needed regarding descriptions of risk management and maintenance procedures and, in the case of infrastructure managers, traffic control arrangements.

There is a great deal of variation in the quality of safety authorisation and certificate applications, particularly with regard to descriptions of safety management systems. Describing the safety management system in the detail required by the application process frequently presents a significant challenge, particularly to smaller operators. Several rounds of revisions are often needed in the application process, due to poorly prepared applications.

In Finland, several individual private siding managers can apply for safety authorisation through a joint application. In order to save time and money, even very different kinds of private siding managers jointly apply for safety authorisation. The problem frequently presented by these applications is that they attempt to describe the procedures of different types of operators as part of a single safety management system, which leads to the description not actually corresponding to the procedures of any of the operators in practice.

Similarly to previous years, there were minor disagreements with some safety authorisation and certification applicants about the interpretation of requirements related to the safety management system, but these were resolved through discussions.

E.4 Feedback

Representatives of Trafi and of the companies applying for a safety authorisation or certificate are in regular contact, and the application process is interactive. Feedback is given and received at these meetings. Operators are also requested to respond to the annual Trafi client satisfaction survey. Feedback that only concerns applying for a safety authorisation or certificate is not systematically collected from applicants.

An appeal against any Trafi decision may be filed at the Helsinki Administrative Court.

F. Changes in legislation

F.1 Railway Safety Directive

Issues related to the header are presented in table 1 of annex B.

F.2 Changes in legislation and regulation

Issues related to the header are presented below and in the table 2 of annex B.

The Railway Act has been repeatedly amended in recent years due, for example, to the need to harmonise domestic and EU laws and regulations. The amendments have also sought to resolve certain discrepancies in the application of the law. A more comprehensively revised version of the Railway Act (1172/2013), which was mainly drawn up in 2013, entered into force at the beginning of 2014. Further amendments (515/2014) were introduced to provisions relating to authorisations for placing in service, inspections conducted by notified bodies as well as rail transport communications and records in the summer of 2014.

Efforts to lighten regulation (in areas such as transport operations and safety devices) continued in 2014, with the launch of a comprehensive review of railway competence regulations, which will involve examining whether the regulations are still up to date and whether there is scope for improving and lightening regulation. Work to this end is being continued in cooperation with the Ministry of Transport and Communications. Smaller amendments will also be introduced to the Qualifications Act: A reference to the new Police Act (872/2011) was added to Section 48, which concerns controls, with effect from the beginning of 2014, and a bill (HE 230/2015) concerning amendments to Section 57, which concerns appeals, is being reviewed at the moment.

A total of 10 railway regulations were also issued in 2014, most of which were revisions to earlier provisions transposing EU interoperability regulations into national law. Trafi's regulation concerning rail transport operators' and infrastructure managers' safety reports (TRAFI/19402/03.04.02.00/2014 of 18 December 2014) was also updated to reflect the changes introduced to Annex 1 of the Railway Safety Directive (2004/49/EC).

G. Application of the CSM on risk evaluation and assessment

G.1 NSA experience

More risk assessments were carried out pursuant to the Common Safety Method in 2014 than in previous years. All projects that required authorisation for placing in service from Trafi were subject to a full risk assessment as laid down in the Regulation.

The majority of applications for authorisations for placing infrastructure in service come from the Finnish Transport Agency, which is the infrastructure manager of the state-owned rail network, and the rest are from private siding managers. The Finnish Transport Agency has several years of experience of evaluating risks in accordance with the Regulation. Not all infrastructure projects on private sidings require authorisation for placing in service, which is why private siding managers have less experience of the risk management procedures laid down in the Regulation. A few more projects that were at an advanced stage of development on the date of entry into force of the Risk Management Regulation were given authorisations

for placing infrastructure in service in 2014. These projects were therefore exempt from the risk assessment requirement laid down in the Regulation. The percentage of projects at an advanced stage of development was considerably higher in previous years.

Risk assessments pursuant to the Common Safety Method have been carried out appropriately and their quality has improved with experience. A consultant is often called in to assist in the risk assessment process. Independent assessment bodies have been used where appropriate.

Operators applying for authorisation for placing rolling stock in service are required to append a risk assessment report, pursuant to the Regulation, to their application if the proposed change is significant. In most cases involving modifications, the proposed changes have been deemed insignificant and no risk assessment pursuant to the Regulation has been necessary. Whenever an application for authorisation for placing in service has related to new rolling stock, risk assessments have been carried out in accordance with the Regulation, using independent assessment bodies.

G.2 Feedback from stakeholders

Rail transport operators and infrastructure managers are asked to share their experiences of the application of the Common Safety Method in their annual safety reports.

The majority of Finland's railway operators have not applied the risk assessment procedure laid down in the Common Safety Method, as they operate on a small scale and no significant changes have taken place in their operations. Some operators have begun to apply the risk assessment principles of the Common Safety Method and have introduced a hazard record despite no significant changes taking place in their operations. Others, such as infrastructure managers who operate in the chemical industry, have been applying risk management principles that are consistent with the Common Safety Method for years.

Smaller operators have found the application of the Risk Management Regulation relatively useful but labour-intensive. Small enterprises consider the effort required to apply the Regulation unreasonable relative to the scope of their operations. The need to learn new procedures whenever the Risk Management Regulation is revised is also seen as increasing the amount of work required.

The Finnish Transport Agency, which is the infrastructure manager of the state-owned rail network, has applied the risk management procedure laid down in the Regulation to dozens of projects and has the most experience of applying the Regulation in Finland. From the perspective of the Finnish Transport Agency, the most significant step forward in the application of the Regulation in recent times was the incorporation of the Regulation's requirements into the development of the Finnish Transport Agency's incident management system, so that risks can now be managed via the incident management system. The incident management system allows information on risks recorded in hazard records to be disseminated to a wide audience.

No risk assessments pursuant to the Regulation were performed with regard to the train traffic operations of the railway undertaking VR in 2014, and VR has little experience of applying the Regulation.

G.3 Revision of NSRs to take into account the EC regulation on CSM on risk evaluations and assessment

No changes relating to the risk assessment procedure laid down in the Common Safety Method were introduced to national regulations in 2014.

H. Derogations regarding ECM certification scheme

ECM certificates have been issued to two operators in Finland: VR Group Ltd and Teräspyörä Oy.

VR Group Ltd has applied for a derogation from the ECM procedure pursuant to Article 14a(8) of the Railway Safety Directive with regard to Russian rolling stock. The application is still pending. No ECM has been assigned pursuant to the Directive to items of Russian rolling stock while they operate in Finland; instead VR Group Ltd inspects the condition of incoming rolling stock at the border in accordance with a bilateral transport agreement concluded between Finland and Russia. All incoming rolling stock is inspected at the border visually and, if necessary, technologically to ensure that the rolling stock is in sufficiently good condition to operate in Finland until its next scheduled maintenance service. As a railway undertaking, VR Group Ltd is responsible for the condition of any Russian rolling stock that it agrees to transport on Finland’s territory. To be granted the derogation, VR Group still needs to prove that the system works in practice.

Annex A. Common Safety Indicators

CSI Data Charts

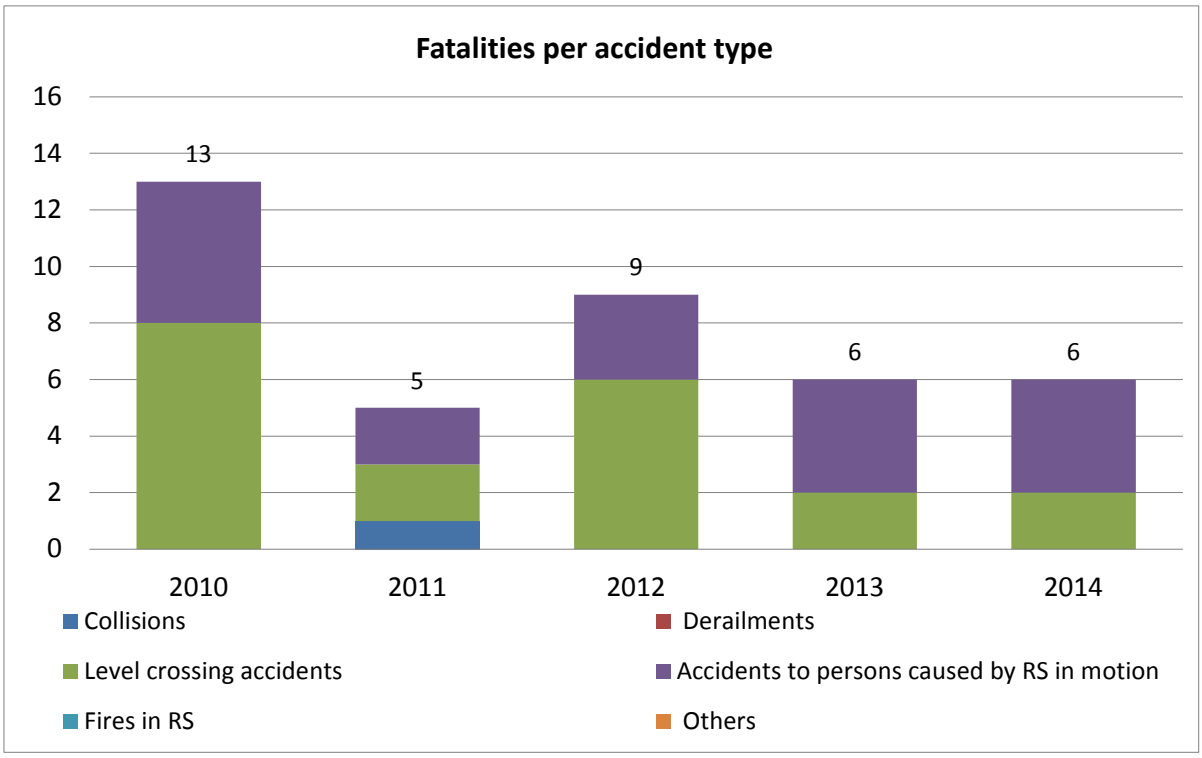


Figure A.1 Fatalities in railway accidents by accident type 2010–2014.

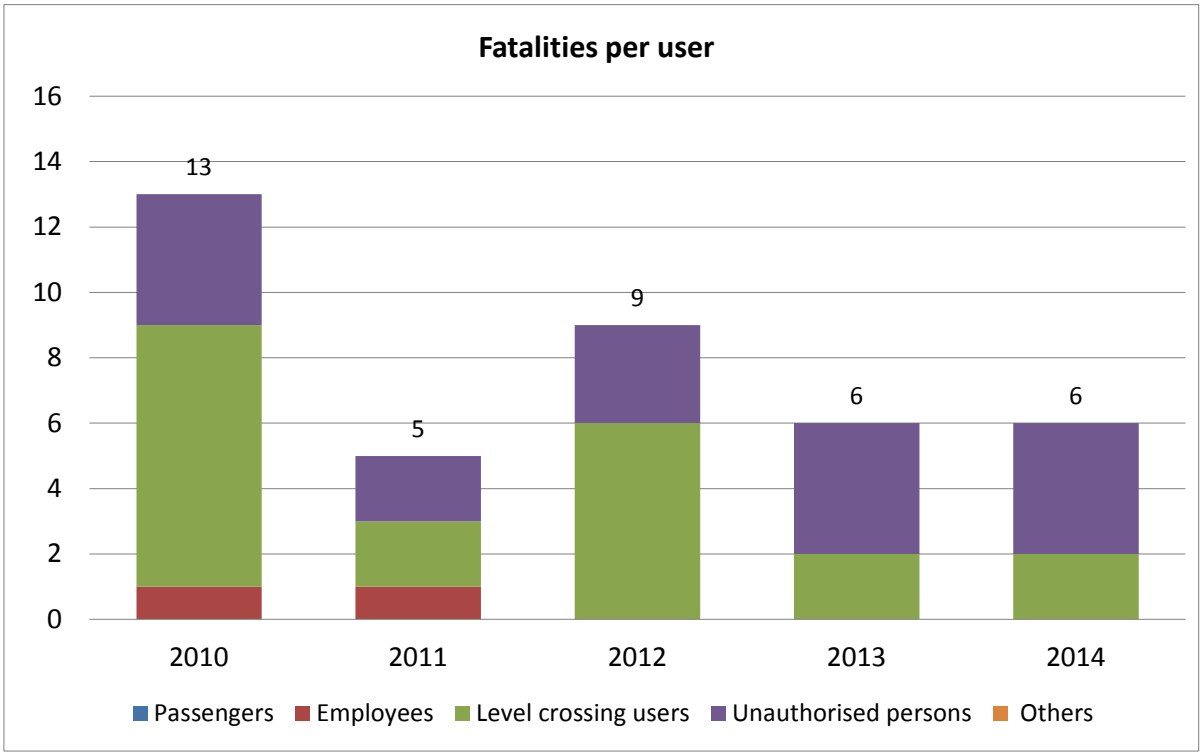


Figure A.2 Fatalities in railway accidents by user group 2010–2014

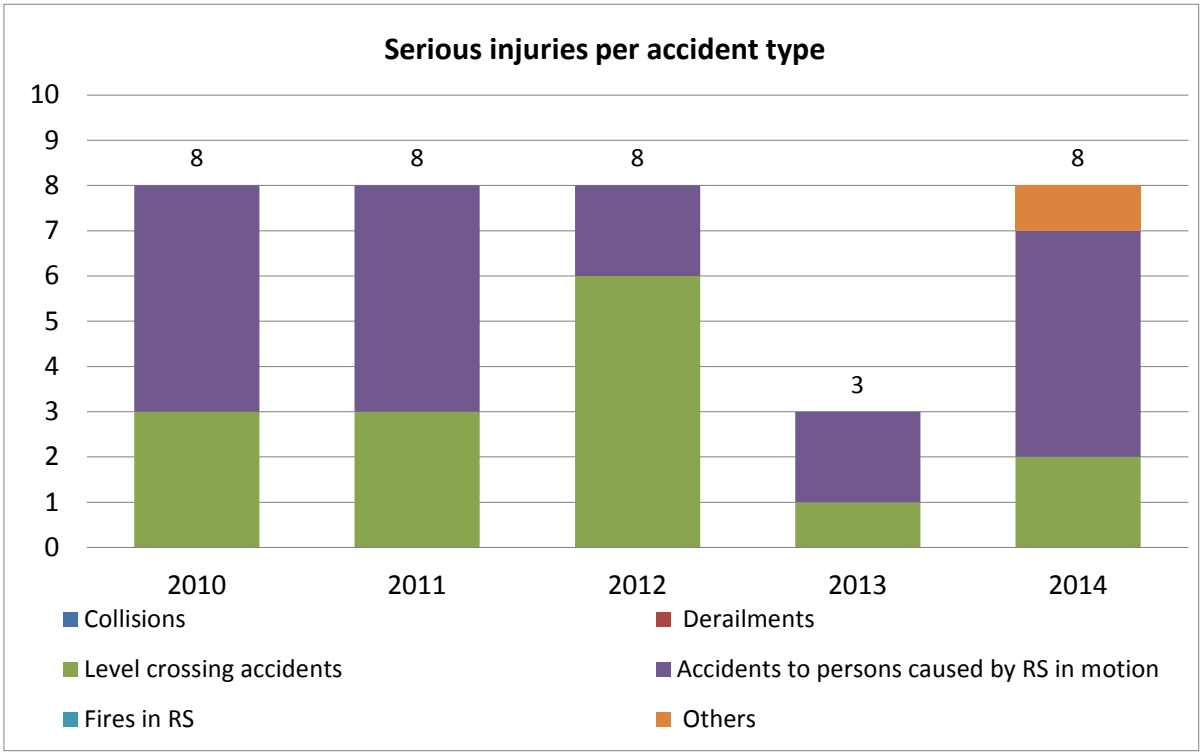


Figure A.3 Serious injuries in railway accidents by accident type 2010–2014

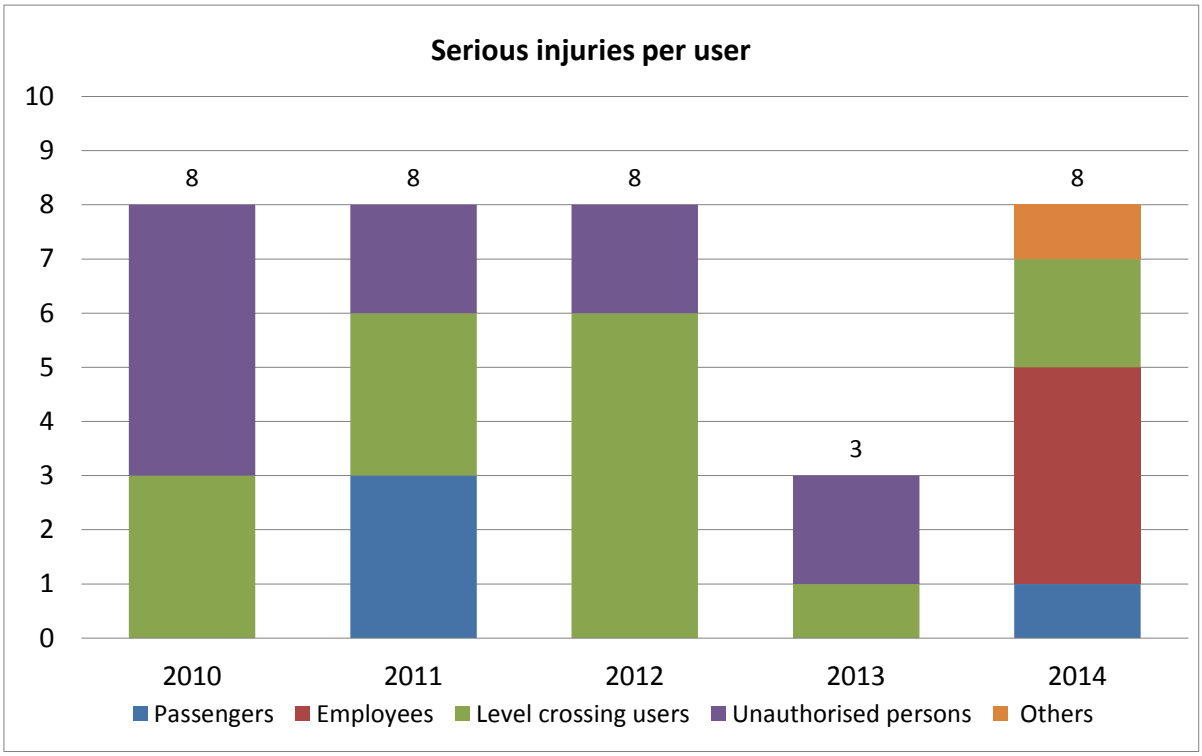


Figure A.4 Serious injuries in railway accidents by user group 2010–2014

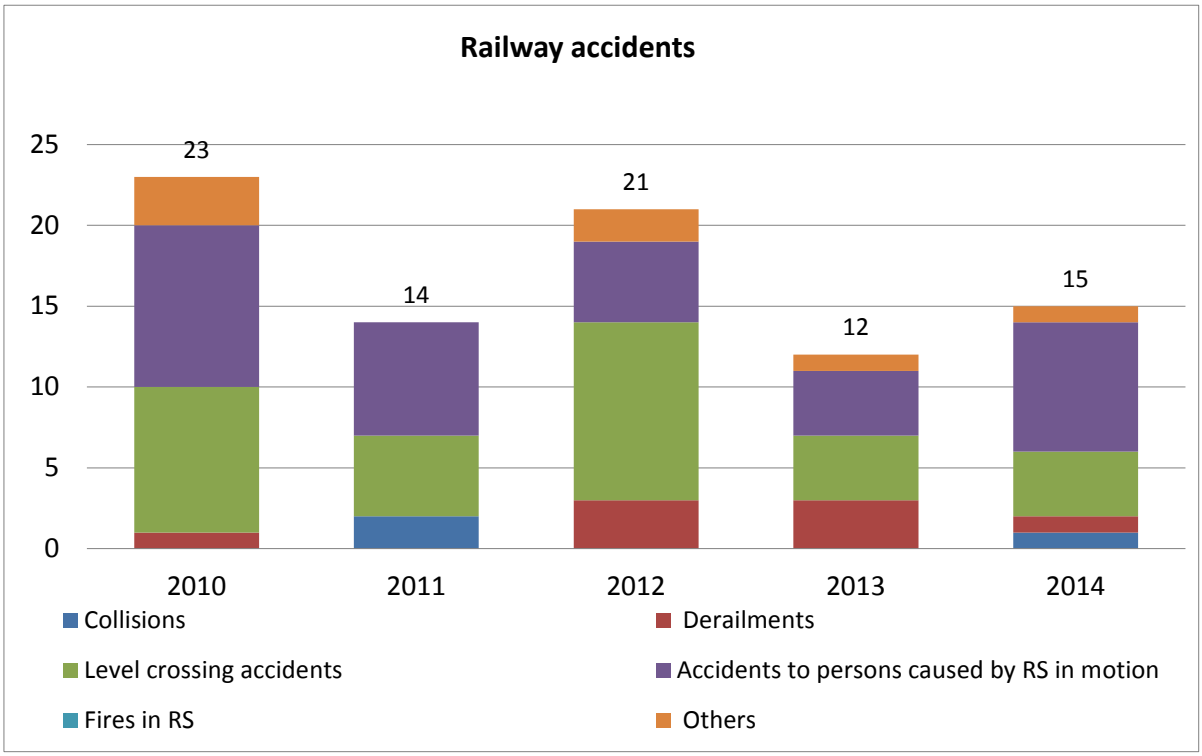


Figure A.5 Significant rail accidents 2010–2014

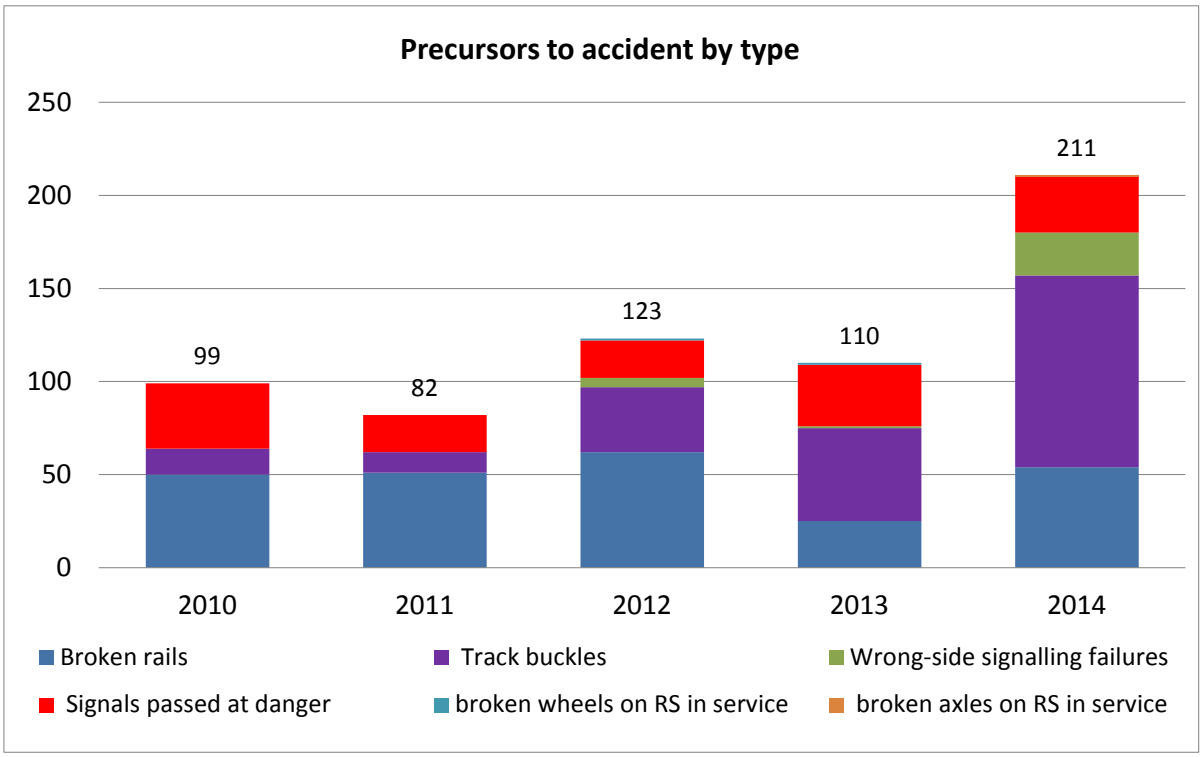


Figure A.6 Precursors to accidents 2010–2014

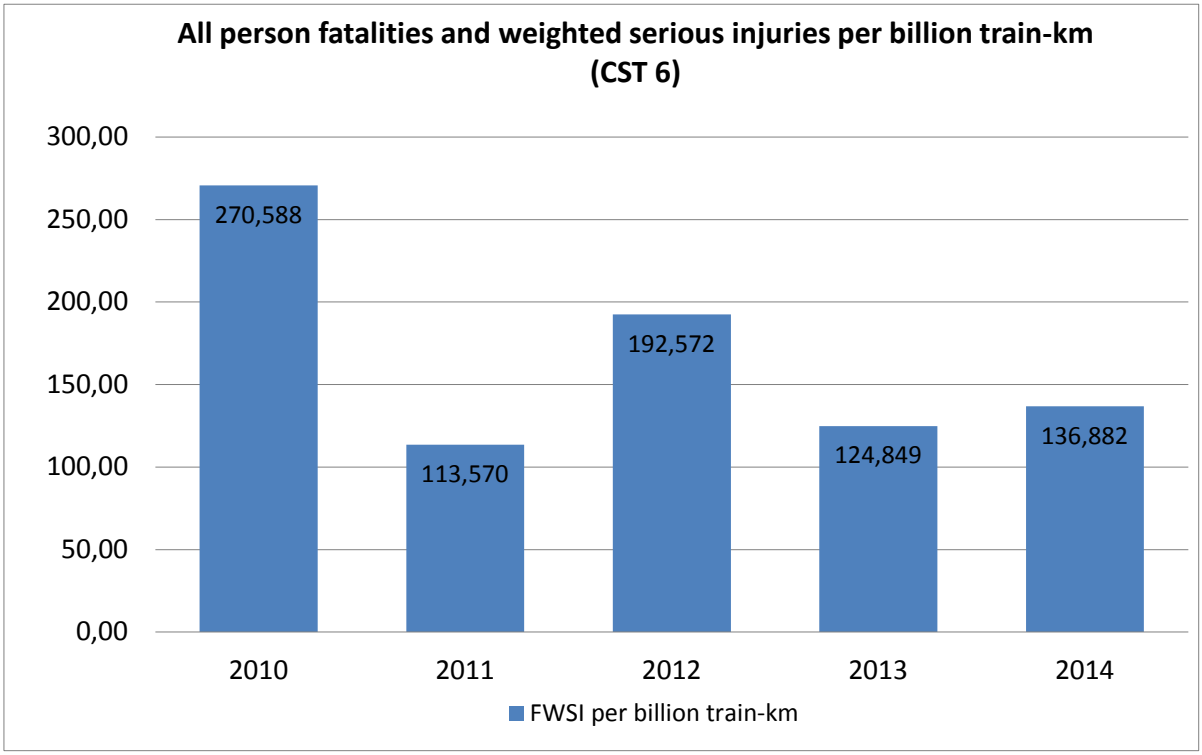


Figure A.7 Number of fatalities and weighted number of serious injuries per billion train-km on railway accidents 2010-2014

Annex B. Changes in legislation

Table 1.

AMENDMENTS TO RSD	Transposed (Y/N)	Legal reference	Date of entry into force
Directive 2008/57/EC	Y	Governmental Decree 1094/2013	1.1.2014
Directive 2008/110/EC	Y	Railway Act 304/2011	15.4.2011
Commission Directive 2009/149/EC	Y	Governmental Decree VNA 1094/2013 NSA Regulation TRAFI/7531/03.04.02.00/2013	1.1.2014 1.12.2013
Directive 2012/34/EU	Not Yet	The Act is at the moment in the Parliament	
Commission Directive 2014/88/EU	Y	Governmental Decree 859/2015 NSA Regulation (TRAFI/19402/03.04.02.00/2014)	30.7.2015 1.1.2015

Table 2.

LEGISLATION AND REGULATION	Legal reference	Date of entry into force	Description of change	Reasons for the change
Concerning the NSA				
Concerning NoBos, DeBos, ABs, third party entities for registration, examination, etc.				
Concerning RUs/IMs/ECMs	Act amending the Railway Act (515/2014), Section 84	1 August 2014	Rail transport communications and records; the section lays down provisions on the right of rail transport operators, infrastructure managers and Trafi to use rail transport records in their internal controls/supervisory work.	Improvements to operators' ability to carry out internal controls
	Rail transport operators' and infrastructure managers' safety reports (TRAFI/19402/03.04.02.00/2014)	1 January 2015	The amendment is designed to improve the collection of safety-related data.	Implementation of Commission Directive 2014/88/EU
	Accessibility of the railway system (TRAFI/8596/03.04.02.00/2014)	1 January 2015	The regulation is designed to improve the safety of level crossings on obstacle-free routes.	Transposition of the remaining provisions of Commission Regulation (EU) No 1300/2014, including specific cases
Implementation of other EU requirements				