European Railway Agency

2012

RAILWAY SAFETY PERFORMANCE IN THE EUROPEAN UNION

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CONTENTS

LIST OF ABBREVIATIONS

ATM	automatic train protection
CSI	common safety indicator
CSM CA	common safety method for conformity assessment
CST	common safety target
CT	Channel Tunnel
ERA	European Railway Agency
ERADIS	European Railway Agency Database of Interoperability and Safety
ERAIL	European railway accident information links
IM	infrastructure manager
KPI	key performance indicator
NIB	national investigation body
NRV	national reference value
NSA	national safety authority
RISC	Railway Interoperability and Safety Committee
RSD	railway safety directive
RU	railway undertaking
SMS	safety management system
VPC	value of preventing a casualty
WTP	willingness to pay

FOREWORD

This is the fifth annual report by the European Railway Agency (ERA) on the development of railway safety in the European Union. The societal impact of accidents, in terms of fatalities and injuries continues to diminish; however, progress for some accident types is less positive over recent years. From the reported data, 2010 was the safest year on EU railways for both passengers and staff since 2006. Only one major railway accident (with more than five fatalities) occurred in 2010, but there were a number of accidents resulting in extensive material damage that in less fortunate circumstances might have led to numerous casualties. Similarly, the number of recorded accident precursors remains considerable, a potential warning signal for the railway undertakings for performing efficient monitoring and for identifying potential and root causes.

Thanks to the concerted effort of all national safety authorities (NSAs) and the ERA, the first fully harmonised set of railway safety data for all EU countries can be published. Working towards better quality data remains a never-ending task that the Agency continues to give priority to.

The annual assessment of common safety targets (CSTs) and of the national reference values unveiled possible deterioration of railway safety performance in a small number of countries. However, a closer look confirms that in most cases, the possible underperformance might be a reflection of a poor data quality in the past, together with limits of the method when the calculated outcomes are close to zero. A new set of CSTs was prepared by the Agency during 2011, in line with Commission Decision 2009/460/EC. The new targets will be used when assessing the safety performance of Member States over the next three years.

The number of safety certificates issued to railway undertakings for international operation remains limited, showing a slow progress in the creation of the common railway safety system in the EU. The Agency has now put in place a migration strategy paving the way towards a single certificate. This would eventually require even more cross-border cooperation between NSAs.

The Agency has now completed all major tasks required in the railway safety directive and in the Agency regulation. All the common safety methods are now about to be put into place and the ERA is now entering a new phase in respect to its daily activities. It is notably preparing two new activities that aim at assisting the national bodies in carrying out their daily tasks; both the NSAs and the national investigation bodies (NIBs) are cooperating in these new ventures. The first activity is the programme for the cross-audit of NSAs; and the second concerns the voluntary assessment of NIBs. We hope that both activities will provide a basis for further improvements in the daily processes managed by national bodies. From 2006 onwards, the Member States have been establishing the national bodies, which are currently attaining the first level of organisational maturity; now is certainly the right time to assess and to seek to improve their processes.

Last, but not least, in order to enhance communication and mutual understanding between all actors concerned with the regulation of railway safety, the Agency is proposing to reinforce the coordination between NSAs, NIBs and the sector organizations in a joined structure with the aim to enable those with rail safety responsibilities to share knowledge and coordinate actions using the evidence and analysis. It aims to enable those with rail safety responsibilities to share knowledge and coordinate actions using the evidence and analyses.

THIERRY BREYNE / Head of Safety Unit

SUMMARY

Railways are one of the safest modes of transport in the European Union and the safety performance continued to improve in 2010. Overall, Member States reported 2 401 significant railway accidents with 2 492 casualties. The total number of significant accidents fell in 2010; however no improvement was registered for the number of collisions and derailments.

According to the common safety indicators (CSIs) data provided by the national safety authorities (NSAs) to the European Railway Agency (ERA), 1 256 people were killed and a further 1 236 seriously injured in 2010. While the number of fatalities is by far the lowest figure recorded since 2006, the number of serious injuries saw a slight increase in 2010. Among the 1 256 fatalities reported, 60 % (750) were third-party victims: **unauthorised persons** on railway premises. Single fatality accidents, such as unauthorised persons being hit by rolling stock in motion or level-crossing accidents, form the major part of the fatalities. Train collisions, derailments and fires cause less than 3 % of the fatalities.

The number of **level-crossing accidents** constitutes a substantial share of the total number of accidents. Member States reported that 359 level-crossing users were killed and 327 were seriously injured in a total of 619 accidents occurring on more than 120 000 level crossings in the EU. Level-crossing accidents represent a quarter of all railway accidents, but their number has decreased substantially since 2006. In 2010, Member States reported a total of 54 **accidents involving dangerous goods**. In 37 of them, the transported dangerous goods were released as a result of the accident.

The total number of **passengers killed** for the period from 2008 to 2010 is 188, a small figure compared to the total number of 4 120 persons killed on the railways over the same period of time. Passenger and employee fatalities make up 5 % of all persons killed on European railways, suicides excluded. Over 60 % of fatalities and 40 % of serious injuries happened to persons crossing or walking along tracks in unauthorised places; these numbers have not decreased over time.

The majority of fatalities on the EU railways are **suicides**; these are counted separately to other railway fatalities. The knowledge about reporting practices points to persisting difficulties in determining whether the killed person was a suicide or not, therefore this data needs to be interpreted with caution. Over 2 743 suicides were recorded in 2010; more than 50 per week on average.

After a 2 % drop in 2009, the **traffic performance** in terms of train-kilometres has stagnated in 2010; 4 019 million train-km were recorded on the EU railway network. Passenger-kilometres account for 80 % of the total train-kilometres in the EU; this number decreased slightly to 397 billion km in 2010.

The national investigation bodies (NIBs) have notified the Agency of 221 investigations of accidents and incidents that occurred during 2011. This means that less than 10 % of significant accidents are investigated by NIBs. This may not be sufficient to obtain clear insight into the underlying causes of different types of accidents.

INTRODUCTION

Background

Railway transport is one of the safest forms of travel. Even so, it is essential to maintain and improve the current level of safety for the benefit of European citizens. The continuous opening of the railway market in Europe brings a challenge to public authorities and railway operators to ensure rail travel remains a safe and attractive mode of transport for passengers and freight customers.

The European Railway Agency (ERA) is a cornerstone of the EU strategy for railway safety. It supports national safety authorities (NSAs) and national investigation bodies (NIBs) in their tasks and provides evidence for policy actions at EU level. It assures coordination of activities such as monitoring, evaluation and developing legislation.

The monitoring of safety performance is one of the key tasks of the ERA. The ERA collects, processes, and analyses different sets of data so that it can support conclusions and recommendations on actions to be taken. In this way the ERA facilitates evidence-based policy-making at the EU level.

By continuously monitoring and analysing safety performance the ERA provides the assurance that the ultimate objective of maintaining and improving safety where reasonably practicable can be achieved also at EU level.

Scope

The report *Railway safety performance in the European Union* summarises information on the development of railway safety in Europe. The primary purpose is to provide safety intelligence and information on risks to EU policy-making bodies, NSAs and NIBs, and to the general public. The report reviews the performance levels achieved during 2010 across a number of topic areas. It includes basic statistical analyses on a wide range of safety performance indicators and highlights significant findings.

The report is based on the common safety indicators (CSIs) data reported to the ERA by 15 November 2011. Any changes after that date have not been taken into account. Information presented on serious accidents and their investigations is based on reports available to the ERA by the end of 2011. Any event occurring after that day is not covered by this report.

This report covers the railways in 25 of the 27 EU Member States; Cyprus and Malta do not have railway systems that are covered by EU legislation. These 25 Member States are referred to as 'EU', or 'EU countries' in the report.

The Channel Tunnel (CT) is a separate reporting entity, so that relevant data are given separately to the French and UK data. The data are also reported by Norway. Therefore, there were a total of 27 reporting entities in 2010; we have used the term 'Europe' for this complete group in the report.

Content

European legislation requires Member States to report to the ERA on significant accidents and serious accidents occurring on their territory. The NSAs must report all significant accidents. The NIBs must investigate all serious accidents, notify the ERA of these investigations and, when closed, send the investigation report to the ERA. The term significant accident covers a wider range of events than serious accidents. The legislation provides the following definitions for these two groups of accident:

Significant accident	Serious accident
Directive 2004/49/EC, Commission Directive 2009/149/EC and Regulation (EC) No 91/2003	**Directive 2004/49/EC**
'significant accident' means **any accident** involving at least one rail vehicle in motion, resulting in at least one killed or seriously injured person, or in **significant damage** to stock, track, other installations or environment, or extensive disruptions to traffic. Accidents in workshops, warehouses and depots are excluded ([1]). Significant damage is damage that is equivalent to EUR 150 000 or more.	'serious accident' means any **train collision** or **derailment of trains**, resulting in the death of at least one person or serious injuries to five or more persons or extensive damage to rolling stock, the infrastructure or the environment, **and any other similar accident** with an **obvious impact** on railway safety regulation or the management of safety; 'extensive damage' means damage that can immediately be assessed by the investigating body to cost at least EUR 2 million in total ([2]).
Reporting of CSIs by NSAs	**Accident investigation by NIBs**
Each year the safety authority shall publish an annual report concerning its activities in the preceding year and send it to the Agency by 30 September at the latest. The report shall contain information on: (a) the development of railway safety, including an aggregation at Member State level of the CSIs laid down in Annex I ([3])	Within one week after the decision to open an investigation the investigating body shall inform the Agency thereof. The investigating body shall send the Agency a copy of the final report normally not later than 12 months after the date of the occurrence ([4]).

Table 1 _ Accidents reported to the ERA according to the EU legislation

Reporting on serious and significant accidents in 2011 (EU countries)

Each year, the NIBs notify the Agency that they have opened about 200 investigations into serious accidents and other accidents and incidents. The NSAs report about 3 000 significant accidents a year (Table 2). Among those occurrences investigated by the NIB, only one fifth of investigated occurrences were serious accidents as referred to in Article 19(1) of the railway safety directive (RSD). This means that one serious accident is investigated by an NIB out of 75 significant accidents reported by NSAs under the CSIs. As the railway undertakings (RUs) and infrastructure managers (IMs) should normally investigate all serious accidents as part of their safety management systems (SMSs) those accidents which have not been investigated by the NIBs, will be included in the investigations made by railway operators. Some NIBs also investigate accidents and incidents other than those for which investigation is mandatory according to the RSD, in accordance with Article 21(6) of the RSD and their national legislation.

	National safety authorities		National investigation bodies
Year of reporting	**Significant accidents**	**Precursors**	**Notifications of opened investigations**
2009	3 027	9 561	187
2010	2 401	15 202	224
2011	n.a.		253

Table 2 _ Number of events reported to the ERA in the period 2009–2011 (EU-27)

([1]) Appendix to Annex I to the Directive 2004/49/EC, Article 1.1.

([2]) Article 3(l) of the Directive 2004/49/EC.

([3]) Article 18 of the Directive 2004/49/EC.

([4]) Article 24 of the Directive 2004/49/EC.

Reporting of accident statistics and indicators by NSAs

Data on safety performance collected at EU level are known as common safety indicators (CSIs). The CSIs to be reported to the ERA were laid down and defined in Annex I to the RSD in 2004. In 2010, for the first time, the NSA had to report using the CSI definitions provided in the revised Annex I to the RSD published on 27 November 2009 ([5]). As a consequence, the 2010 CSI data represents the first fully harmonised set of CSIs, as the use of national definitions was no longer permitted. Member States are also required to report accident data to Eurostat, but this practice will be abandoned from 2013 when the ERA will become the sole collection point for railway safety data at the EU level.

The fifth annual set of data for the CSIs was largely reported on time and with less effort for correction than in previous years. As a new reporting interface, ERAIL, was put in place by the ERA in 2011, less effort was necessary to correct data than in previous years. Now, each country is responsible for the quality of the reported data; the system provides support by identifying inconsistencies in reported values in comparison with previous years and by giving immediate feedback to the NSA. Thus, possible errors in the data can be checked before submitting the dataset to the Agency.

The introduction of the new Annex I has brought more consistency in the CSI data reported by Member States. Indeed, some countries possibly aligned their national reporting practice with the revised Annex I requirements only in 2010. The application of the new Annex I also means that a brand new set of CSIs became available in 2010. This set includes statistics on dangerous goods accidents, types of level-crossings and aggregated traffic performance data.

Data quality continues to improve so that this year it has again been possible to update some data reported in previous years; the CSI tables in the annex to this report replace the previously published tables. We have also observed that the collection of CSI data can be more complicated in those countries where there are a large number of railway undertakings (RUs). It might be more difficult for the NSAs in these countries to assure the quality of data provided by the RUs and infrastructure managers (IMs).

The Agency has also been working together with the Member States on improving the common understanding of the CSI definitions. At the end of 2010, the Agency published the revised *Guidance on CSI data reporting*; this was the result of the work done by the Safety Performance Working Party and the dedicated task force.

([5]) Directive 2009/149/EC.

Reporting of serious accidents and accident investigations by NIBs

The RSD requires the Member States to set up an independent accident investigation body that shall notify the Agency of any investigations opened, and shall submit the full investigation report to the ERA when the investigation is closed. In 2011, the NIBs notified the ERA of 253 opened investigations and submitted 289 investigation reports. The information is available on the ERA's public database ERADIS *(http://pdb.era.europa.eu)*.

When deciding whether to investigate an occurrence or not, the NIB must first verify whether the occurrence meets the criteria for a serious accident, given in Article 19(1) of the RSD. If it does, it will be investigated. If it does not, the NIB should assess whether the occurrence would fall under the criteria given in Article 19(2) — an accident or incident which under slightly different conditions might have led to serious accidents. The NIB should then decide whether to investigate or not — here national requirements may also need to be considered.

In spring 2011, the Agency published the *Guidance on the decision to investigate accidents and incidents Articles 3(l), 19 and 21(6)* ([6]). This guidance is a reference manual for accident investigation bodies and other parties directly or indirectly concerned with the decision to investigate accidents and incidents, and provides examples to facilitate a common approach to investigating accidents throughout Europe. The guidance aims to help NIBs to take the correct decision on whether to investigate or not. Currently, there are still discrepancies between countries as regards the decision to investigate a given occurrence or not.

In 2012, an integrated and comprehensive guidance on investigation will be developed in a concerted joint effort by NIBs and the Agency. Similarly the process of reporting of serious accident and incident investigations shows wide variations between countries. This is one of the reasons why the Agency is currently working together with the NIBs to develop an assessment programme to promote harmonised approaches and good investigation practice across the EU.

Annual safety reports

The NSAs should have sent their annual safety report together with the CSI dataset to the Agency by the end of September 2011. Only half of the NSAs managed to submit their report on time, although, by mid-October, the CSI data for 2010 had been submitted by all countries.

The NIBs are also required to send an annual report to the ERA by the end of September 2011. However, the Agency had only received half of the 2011 annual reports by that date. The reports showed a large variation in the number of investigations opened by NIBs, during 2010; the numbers ranged from 0 to more than 15 per NIB, and similarly the number of recommendations issued following the investigation varied, ranging from 0 to 17 per investigation. This may partly be a result of variation in the size of national railway systems and consequently traffic performance, and partly because of differences in national investigation practices and arrangements. Half of the NIBs did not submit their annual report by the deadline of 30 September. The Agency is planning an assessment exercise in 2012 to provide feedback to NIBs on the quality and timeliness of their reports.

([6]) *Guidance on the decision to investigate accidents and incidents — Articles 3(l), 19 and 21(6)* (ERA/GUI/04/2010/SAF-EN).

RAILWAY SAFETY PERFORMANCE

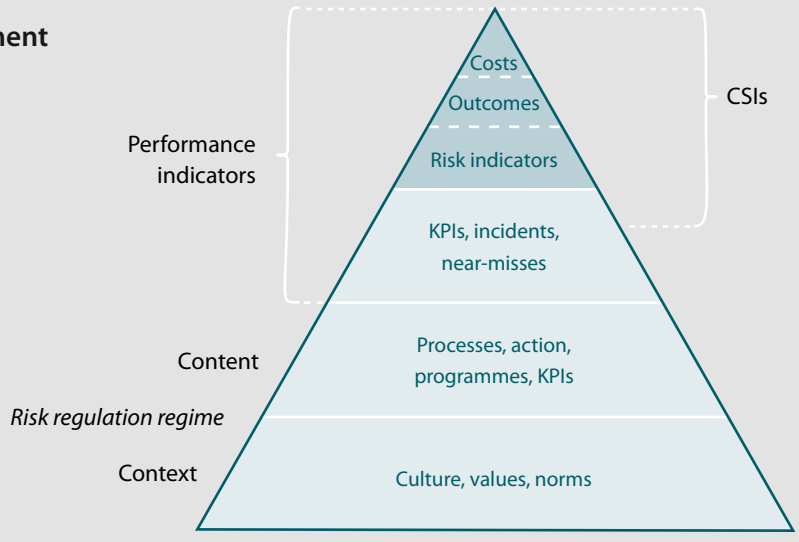
Introduction

The level of safety can be measured and assessed in various ways. The most obvious indicators are the number of railway accidents and the resulting casualties. A comprehensive set of risk indicators where the outcomes are standardised by exposure such as train-kilometres allows for the identification of under-performance, i.e. increased risk, which may require remedial action. Outcomes and risk indicators provide an initial impression about the extent of the safety problem, but their usefulness as indicators for safety management and evidence-based policy-making is limited (Figure 1).

They do not directly point to the underlying problems, so the measures taken on the basis of data about outcomes may not be well-targeted and cost-effective. Additional indicators have therefore been under development to provide supplementary information for assessing and managing railway safety, as they can provide insight into safety management by the national authorities, such as supervision and authorisation.

CSIs do not provide full picture of the adequacy of the operational arrangements put in place through the SMSs, which show adverse safety outcomes. Use or frequency of emergency braking (as applied by the train driver) might be used as a key performance indicator (KPI), rather than a CSI.

Figure 1 _ Pyramidal model for railway safety management



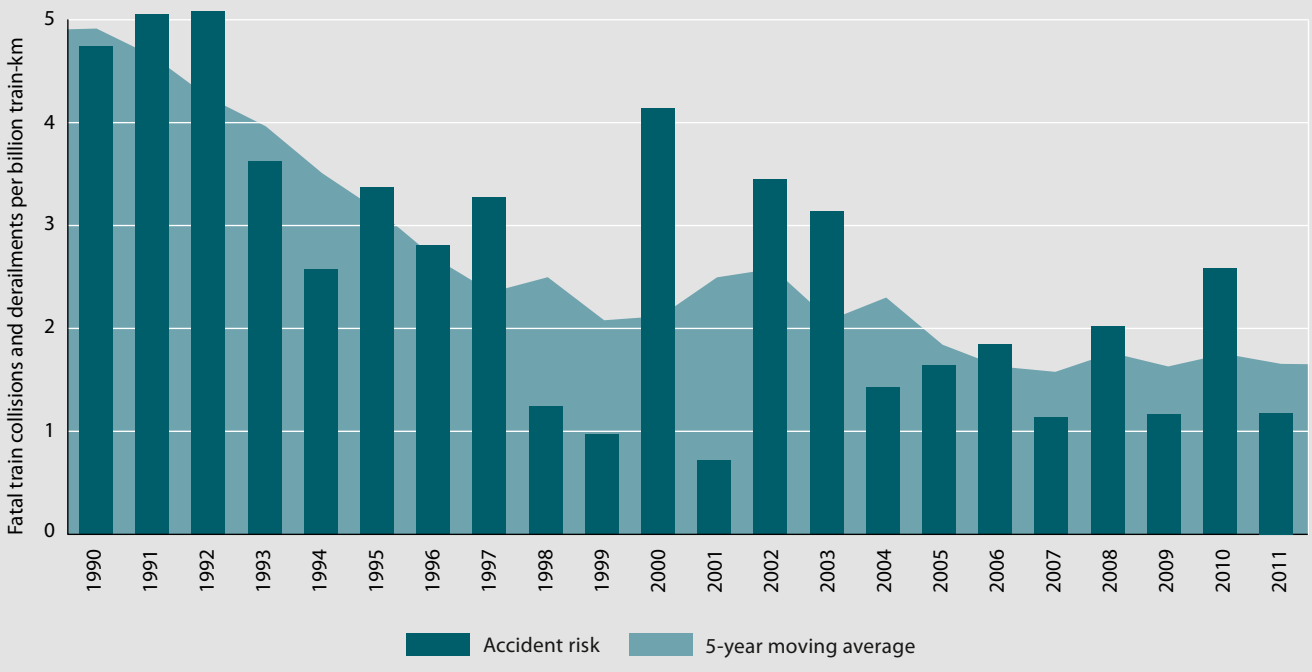
The development of railway safety indicators at EU level has been underway since early 2000. The railway safety directive (2004/49/EC) introduced the first indicators, so called CSIs that focus on safety outcomes and provide the basis for risk measurement. Member States continued to use their national definitions to report these indicators during the first four years of reporting; now, since 2010, the harmonised definitions of CSIs in Commission Directive 2009/149/EC must be applied.

Not all safety performance indicators are covered by the CSIs; so new indicators may be introduced in the future. Similarly, there is no common approach towards the measurement of a risk regulation regime at Member State level. Indicators reflecting corresponding levels of the pyramid may be subject to future development. Not all of them are traditional quantitative indicators such as CSIs or KPIs. They may lead to a new approach to the assessment of railway safety management systems at both Member State and EU levels.

Historical development of railway safety

The overall level of railway safety in Europe, as measured by fatal train collisions and derailments per billion train-kilometres, has gradually improved since 1990, though there is considerable scatter from year to year. The estimated overall trend is a reduction in the accident rate of 6 % per year ([7]). This gives a fall of 70 % from 1990 to 2011 (Figure 2). The estimated underlying average number of fatal train accidents per year in Europe was about 18 in 1990 and 6 in 2011. Despite a positive long-term trend in the risk of fatal train collisions and derailments over the past two decades, the data in Figure 2 suggests that the progress has been slowing down, in particular since 2004.

Figure 2 _ Fatal train collisions and derailments per billion train-kilometres in 1990–2011 for the EU-27, Switzerland and Norway ([8])



The number of fatalities in railway accidents has seen a distinct, downward trend for all categories of accidents, except level-crossing accidents. This can be partly explained by the continuous increase in road traffic across Europe, as contributing to the likelihood of a level-crossing collision. The current programmes to remove or upgrade level-crossings might not be extensive enough to compensate for the increased risk of a level crossing collision.

([7]) A. W. Evans (2011), 'Fatal train accidents on Europe's railways: 1980–2009', *Accident Analysis and Prevention* 43(1), 391–401.

([8]) Figure courtesy of Andrew W. Evans (Imperial College and University College London), based on own database of fatal train accidents and collisions and on the train-km data from the UIC, Eurostat and the ERA.

Development in major railway accidents with five or more fatalities

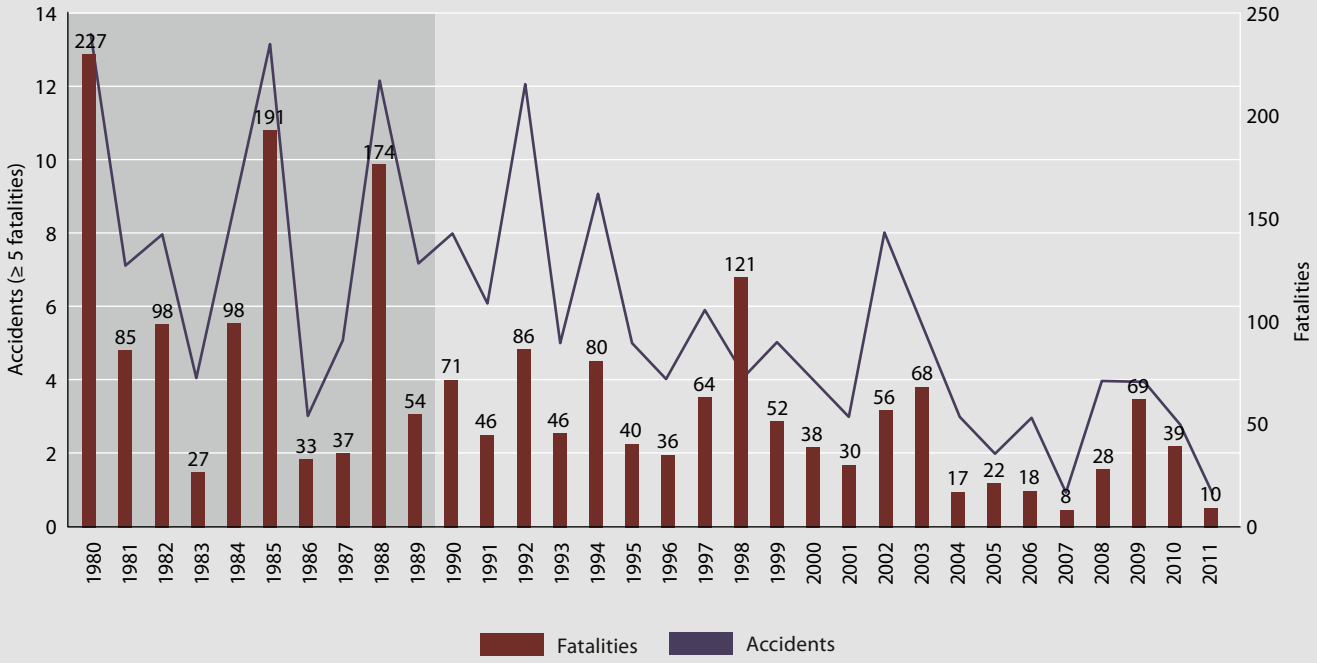
Major accidents with passenger fatalities rarely escape the attention of the media and the public, so data on these may be more complete. During the year 2011, the Agency has improved with the help of Member States the historical archive of railway accidents from 1980 to 2009, but the data for the 1980s may not yet be complete.

Figure 3 is based on data from the historical archive of railway accidents maintained by the Agency; it shows the number of major accidents and resulting fatalities for the 32 years 1980–2011. It includes not only the train collisions and derailments with five or more fatalities (as shown in Figure 1), but also the major level-crossing accidents, train fires, and accidents involving groups of persons struck by rolling stock in motion.

The trend in the major accident rate per billion train-kilometres is strongly downward over the period 1990-2011, but somewhat less steep if taken back to 1980–2011. Therefore it is possible that the rate of improvement was less good in the 1980s.

Figure 3 shows that there were on average eight major railway accidents each year during the 1990s, this figure has now come down to five accidents per year in the 2000s. There were only three major accidents with five or more fatalities in Europe in 2010 and one in 2011.

Figure 3 _ Railway accidents with five or more fatalities (1980–2011) ([9])



([9]) All EU countries, Norway and Switzerland, excluding Romania for the period 1980–89. Accidents on railway mainlines not covered by the RSD are also included.

Significant accidents

Around 3 000 significant accidents occur each year on the railways of the EU Member States. Accidents to persons caused by rolling stock in motion and level-crossing accidents constitute more than three quarters of the total number of accidents, excluding suicides. The number of significant accidents per accident type in the period 2008–10 is shown in Figure 4. For all types of accident, the reported number of accidents in 2010 was lower than in the two preceding years and a distinct downward trend over the period 2008–10 can be observed.

In 2010, a total of 2 401 significant accidents were reported by Member States, a significant drop of 20 % compared to the previous year. However, the real decrease may not be so great, because both Poland and Belgium have changed their reporting practices since 2010, leading to a lower count in several categories of accidents. Leaving out the two countries that have changed their reporting practice, the decrease in railway accidents in Europe was only 6 % between 2009 and 2010 (Table 3).

For the first time, the number of reported **collisions** fell below 100, to 99. Again, however, this decrease disappears when the data for Belgium are excluded as their reporting practice has changed. Most of the reported events are collisions between a train running into an object within the clearance gauge, but their exact proportion is not known. The number of collisions between trains, which is generally the more serious type of collision, remains relatively low.

Similarly, the reported number of **train derailments** dropped significantly in 2010, from 174 to 95. However, again, this decrease is probably the result of the change in reporting practice in both Belgium and Poland (Table 3). Excluding these two countries from the analysis, the data shows a rise in the number of derailments between 2009 and 2010. Furthermore, when excluding countries that reported changes in reporting procedure over the longer period of 2008–10, the risk of derailment (per train-kilometre) was relatively high in Greece, Slovakia and Estonia over the above period of time.

In summary, on average a **derailment** or a **collision** is reported at least every second day in the EU, causing significant disruptions to railway operations. The registered decrease could partly be attributed to the change in reporting practice in Belgium and Poland. The reported number of **level-crossing accidents** decreased in 2010, but the real yearly change is probably close to zero. Altogether 619 level-crossing accidents were reported in 2010.

The Member States reported 1 420 accidents to persons caused by **rolling stock in motion** in 2010. The risk of this type of accident is relatively high in the three Baltic countries and in some east European countries (Romania, Slovakia). In these countries the risk of this type of accident in 2010 was more than one accident per million train-kilometres in 2010.

The **number of fires in rolling stock** decreased for the fourth year in a row and reached an historically low level in 2010: 23 fires in rolling stock were reported by just eight Member States.

A wide range of accidents, not included within the specific types of accidents, are included in the category of **other accidents**. The 145 cases reported in 2010 include collisions and derailments of shunting rolling stock/maintenance machines, dangerous goods released during transport, objects projected by the running train, and electrocution in connection with the rolling stock in motion; the category other accidents is the third largest group of accidents.

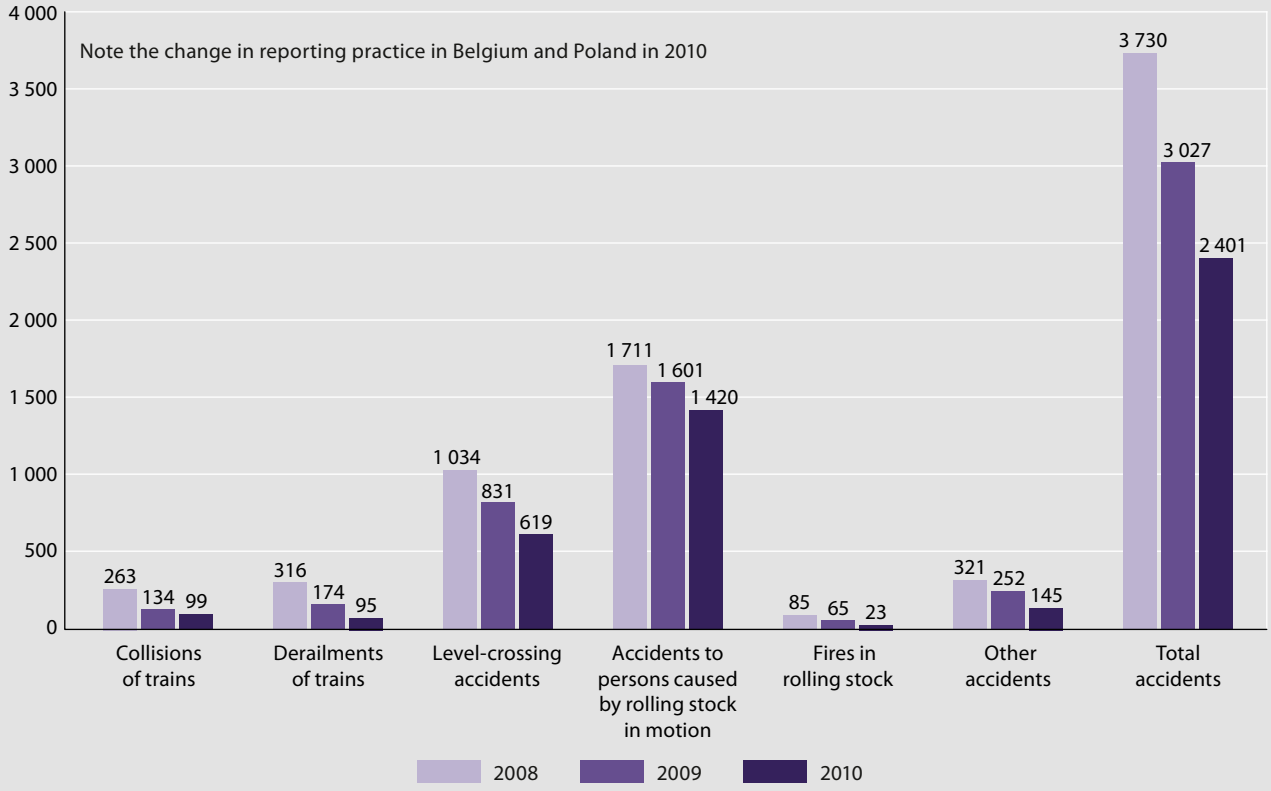
Even when considering the recent changes in reporting practice that have taken place in a number of countries, it can be seen that there has been a slight reduction in the number of rail accidents in Europe over the past five years. Vigilance is necessary as the pace of reduction was lower than in the preceding years.

Accident types	Year	EU-27	Change	BE	PL	EU-27 – (BE + PL)	Change
Collisions of trains	2009	134		34	18	82	
	2010	99	– 26 %	5	4	90	+ 10 %
Derailments of trains	2009	174		41	63	70	
	2010	95	– 45 %	2	17	76	+ 9 %
Level-crossing accidents	2009	831		31	288	512	
	2010	619	– 26 %	17	86	516	+ 1 %
Total No of accidents	**2009**	**3 027**		**146**	**843**	**2 038**	
	2010	**2 401**	**– 21 %**	**40**	**449**	**1 912**	**– 6 %**

Table 3 _ The number of different types of accidents for the EU-27 and a selection of countries (2009–2010)

When a railway accident involves dangerous goods, whether transported or not, it must be reported under a separate category of accidents: **accidents involving dangerous goods**. Depending on the type and consequences, an accident involving dangerous goods may also be reported in duplicate as a significant accident. In 2010, Member States reported a total of 54 **accidents involving dangerous goods**; in 37 of these the transported dangerous goods were released during the accident.

Figure 4 _ Reported number of significant accidents per accident category (2008–2010)



Fatalities and serious injuries

In parallel with the decrease in railway accidents, the total number of casualties, excluding suicides, has fallen steadily in recent years. There were 1 256 fatalities reported for the year 2010, a 10 % decrease from the previous year. The number of fatalities seems to be decreasing in line with the decrease in the number of significant accidents.

However, the number of passenger casualties (fatalities and serious injuries) was the highest in four years; a total of 416 cases were reported: 62 fatalities and 354 serious injuries. This increase is partly the result of one single occurrence, the major accident in Belgium on 15 September 2010 that led to 18 fatalities and 83 serious injuries.

Over the past four years, for each 10 persons killed, Member States reported some 11 seriously injured persons. The year 2009 was an exception, with 25 people injured per 20 people killed. Is not possible to identify why the seriousness of accidents was relatively low in 2009, but this seems to have been driven by significant decreases in the number of seriously injured persons across several countries.

Figure 5 shows the number of fatalities in different categories of persons over the period 2008–10. With 750 recorded fatalities in 2010, unauthorised persons represent 60 % of all persons killed on railway premises, but their share of fatalities has been slightly decreasing since 2008. The number of level-crossing fatalities of 359 in 2010 is by far the lowest ever recorded on EU railways. This figure represents 29 % of railway fatalities, but only 1.2 % of road-user fatalities. Level-crossing safety might therefore be perceived as a marginal problem by the road sector, while it is a key problem for the railway — also because of its impact on railway operation.

Figure 5 _ Number of fatalities per victim category (2008–2010)

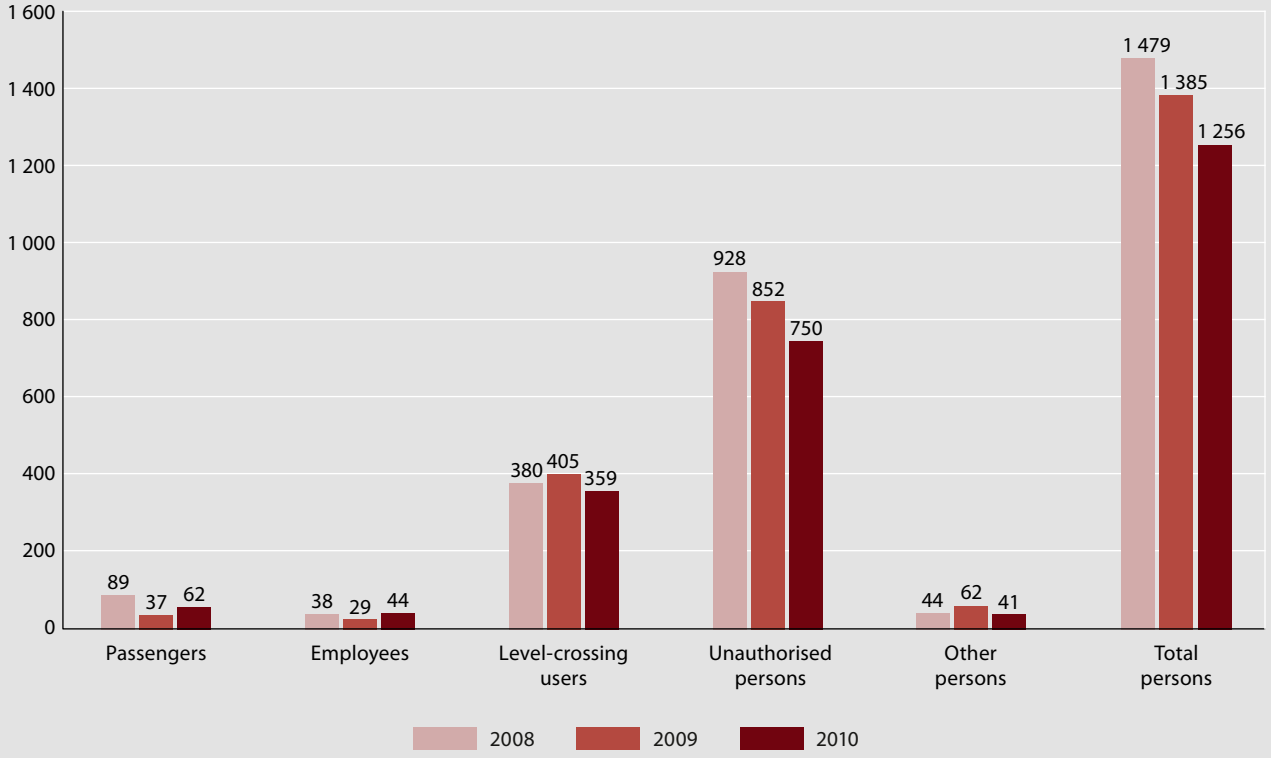
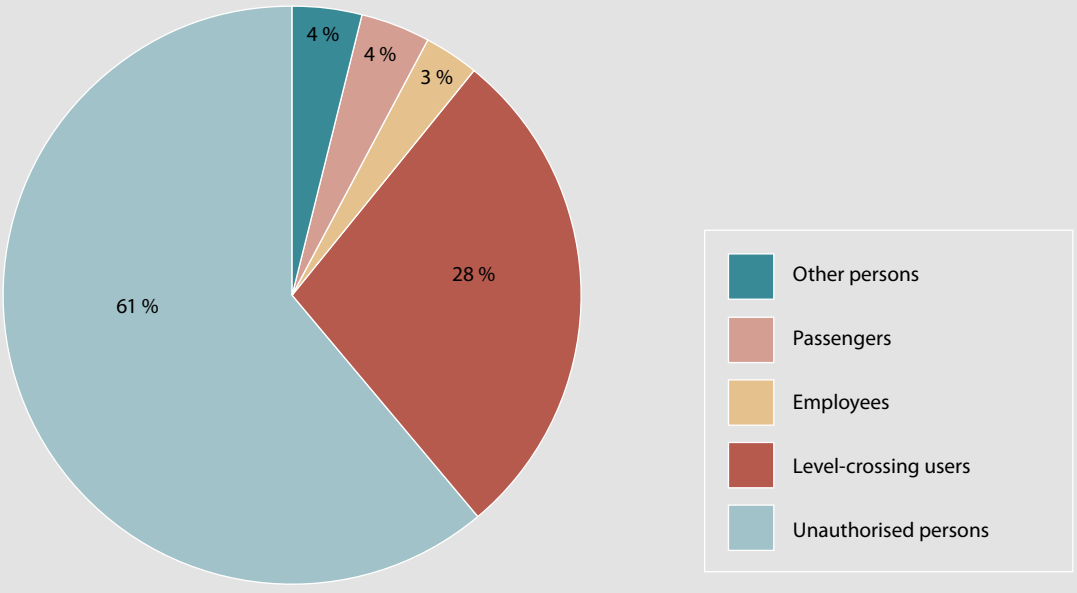


Figure 6 clearly shows that the majority of fatalities are unauthorised persons. Level-crossing accidents account for 28 % of fatalities, whereas passenger fatalities make up less than 5 % of the total number of deaths on railways.

Over and above the number of fatalities, a large number of persons are seriously injured each year on the railways. In 2010, 1 236 persons were seriously injured, an increase of 126 over 2009 when an unexpectedly low number of serious injuries were reported (Figure 6).

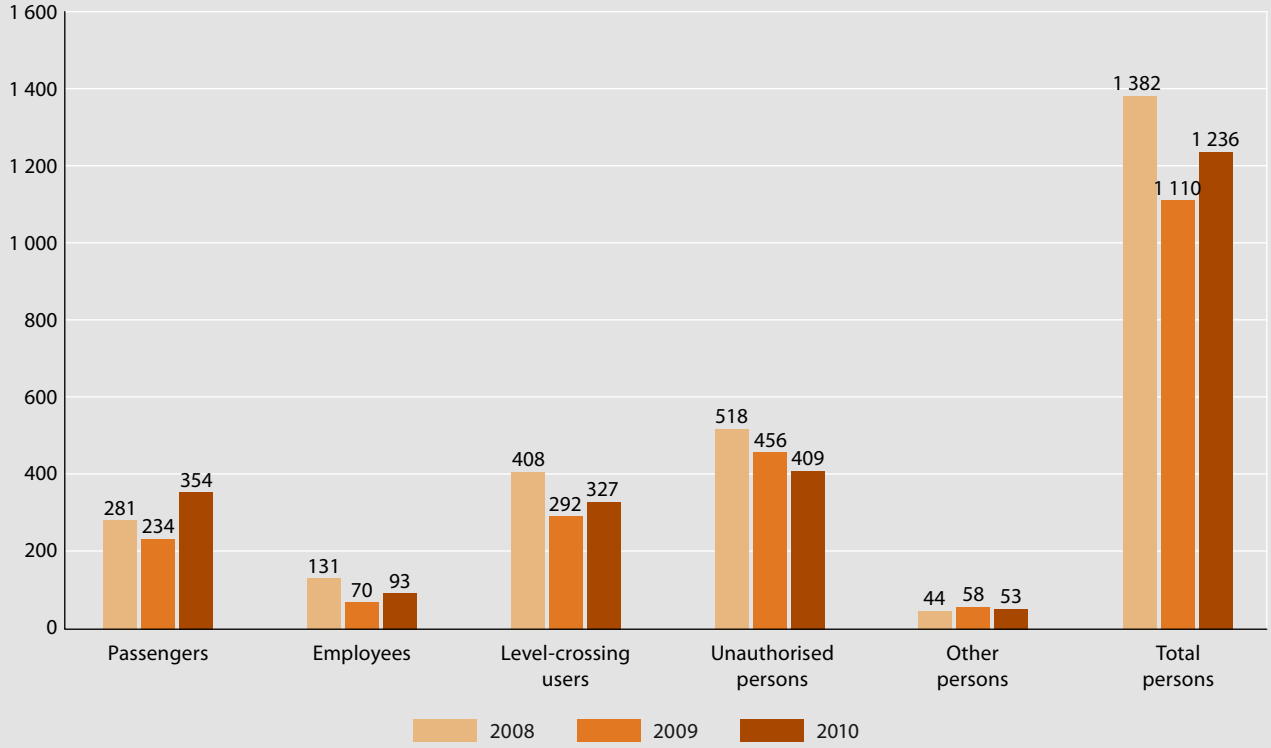
Figure 6 _ Fatalities per victim category (2008–2010)



The number of seriously injured passengers is large, 354 in 2010; this accounts for 21 % of all seriously injured persons. Seriously injured unauthorised persons is the largest category, this accounts for one third of all seriously injured persons while unauthorised persons account for 61 % of people killed on the EU railways.

The numbers of injured passengers and unauthorised persons reported for the period 2008–10 show large variations beyond what might be expected from natural fluctuation (Figure 7). As in previous years, a number of NSAs have reported changes in their reporting procedures or the definitions used for data collection.

Figure 7 _ Number of serious injuries per victim category (2008–2010)



The decrease in the number of casualties (fatalities and serious injuries) in recent years is promising, but the development in passenger casualties should be closely monitored to identify whether the numbers reported in 2010 only reflect a natural variation in data or whether they indicate a reversion of the positive downward trend registered in previous years.

Suicides

Suicides are reported separately from accident fatalities. They represent two thirds of all fatalities and, together with the unauthorised person fatalities, constitute 87 % of all fatalities occurring within the railway system.

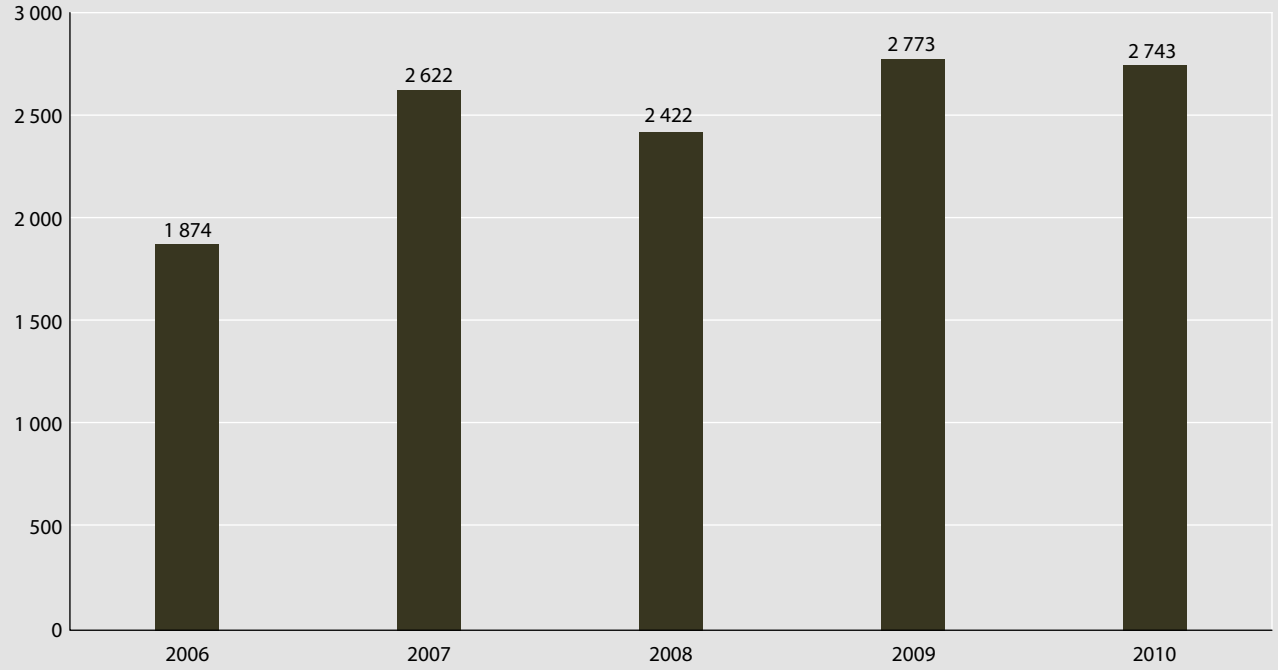
In 2010, more than 50 suicides were recorded on the EU railways on average each week, totalling 2 743, close to the record number in 2009. Although no trend can be derived from the available data, this is the second highest number of suicides reported to the Agency since 2006 (Figure 8).

The review of methods employed by Member States for establishing whether a fatality is a suicide or not showed that a majority of countries use the Ovenstone criteria ([10]); a method recommended by the Agency. However, there are some countries where suicide events are not scrutinised by independent authorities.

The societal impact of suicides on railways remains considerable. The consequences are not only trauma for all parties involved, but also significant costs incurred by delays, deployment of rescue services, police investigations, etc. There are now innovative prevention measures available beside the traditional ones, such as fencing in urban areas and camera surveillance in strategic places.

([10]) Ovenstone criteria include a set of specific conditions that standing alone point to a suicide case.

Figure 8 _ Suicide fatalities (2006–2010)



Precursors to accidents

As accidents on railways are rare, the monitoring of less serious events occurring on railways is an essential tool in a proactive SMS. 'Precursors to accidents' are indicators of incidents that under other circumstances could have led to an accident. The indicators reported to the Agency are: broken rails, track buckles, signals passed at danger, wrong-side signalling failures, broken wheels and broken axles (Figure 9). Over the period 2008–10, EU countries reported as many as 38 500 precursors to accidents; this is a ratio of more than four precursors to one significant accident. However, if we discard accidents to persons caused by rolling stock in motion, the ratio between the precursors and accidents rises to 10:1. This unveils the great potential benefit in analysing precursors in the proactive monitoring of railway safety. Until 2010, the reporting of precursors suffered from methodological differences between countries. The 2010 figures should provide a satisfactory description of the reality on EU railways, as Member States have applied common definitions that are sufficiently precise and easy to apply.

Signals passed at danger incidents lead to a wide range of situations such as near-misses, longer braking distances and collisions. When a line is equipped with specialised technical safety equipment, the train is automatically brought to a standstill if a signal at danger is passed; this significantly reduces the risk of serious consequences. More than 7 000 signal passed at danger incidents were reported in 2010. Excluding Poland from the EU dataset, because they notified the Agency about a change in reporting, a relatively stable series of data showing a slight decrease in the number of signals passed at danger since 2008 can be seen.

The **broken rail** incidents are sensitive to the weather conditions and may not fully reflect the quality of safety management system of IMs. More than 5 500 broken rail incidents were reported in 2010, exactly the same number as two years before, in 2008. Three countries in Europe each reported more than 500 broken rails for the year 2010: Hungary (734), Germany (599) and Romania (591).

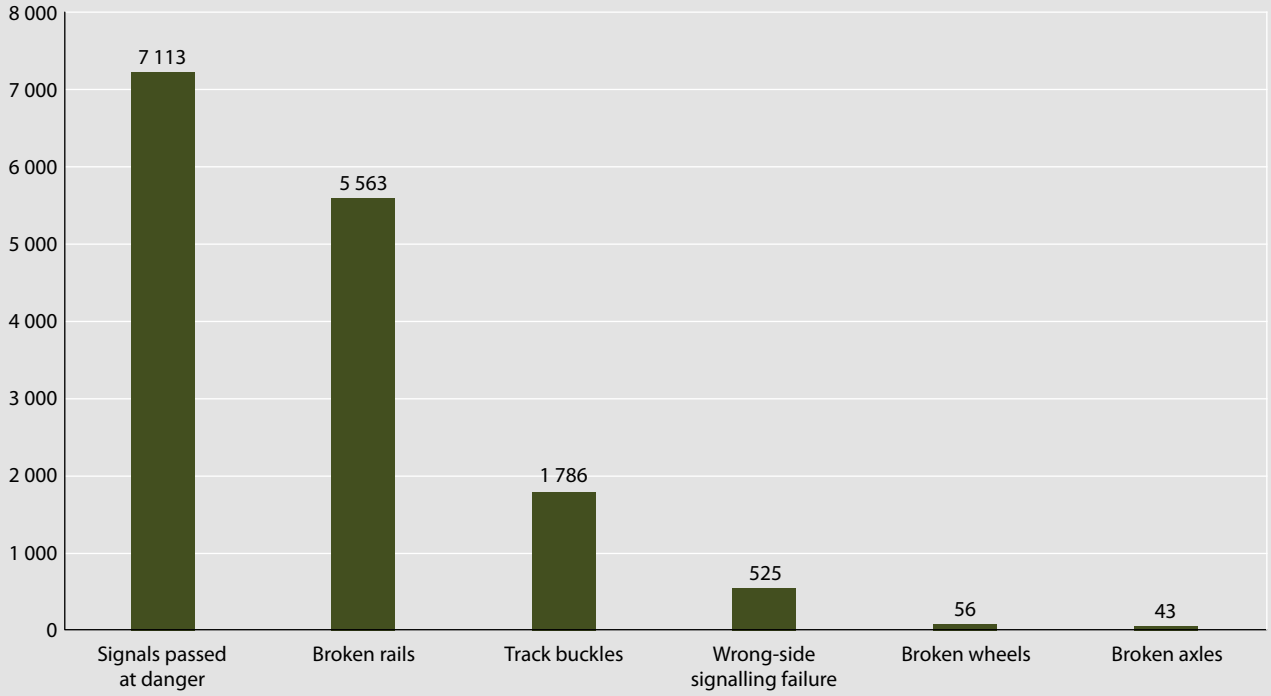
All **track buckles** that result in a reduction of speed on the concerned railway line have to be reported by IMs. In 2010, 1 775 track buckles were reported by Member States, the highest number for the last three years. Track buckles are much more common in the southern EU countries. Italy and Spain together reported 1 079 events in 2010, while all the Scandinavian countries together reported only 97 events. This reflects different climatic conditions for railway operations across Europe.

A total of 525 **wrong-side signalling failures** were reported in 2010, a comparable number to the 514 failures in 2009. A review of reporting practice in Member States has shown that most countries include all types of technical-based failures in this category, whereas some countries may have also included other specific types of incidents. In both 2009 and 2010, half of the total wrong-side signalling failures were reported by France. Ten countries did not report any wrong-side signalling failures, raising some doubts about the consistency in reporting these precursors.

The reported number of **broken wheels and axles** (99 incidents in 2010) was relatively low if we consider that all cracks leading to the suppression of service are counted. However, cracks in wheels and axles remain one of most serious incidents, with the potential to lead to major accidents.

In general, the 2010 data on precursors give sound evidence about the extent of safety problems at the EU level, but taken alone they cannot be seen as conclusive. The data to be reported for year 2011 should provide the basis for validation and further analysis. If reporting of disproportionally high or extremely low numbers of certain incidents by several countries continues to occur, we may need to take remedial action in the future. It is indeed essential for both Member States and the ERA to obtain a correct picture of any trends in the frequency of precursors, given the learning potential to be gained from the periodic analysis of these precursors.

Figure 9 _ Reported number of precursors in 2010



Accident costs

The data on the cost of accidents show a wide variation over time and between countries. It is also evident that Member States continue to have problems in establishing reporting regimes for this set of CSIs.

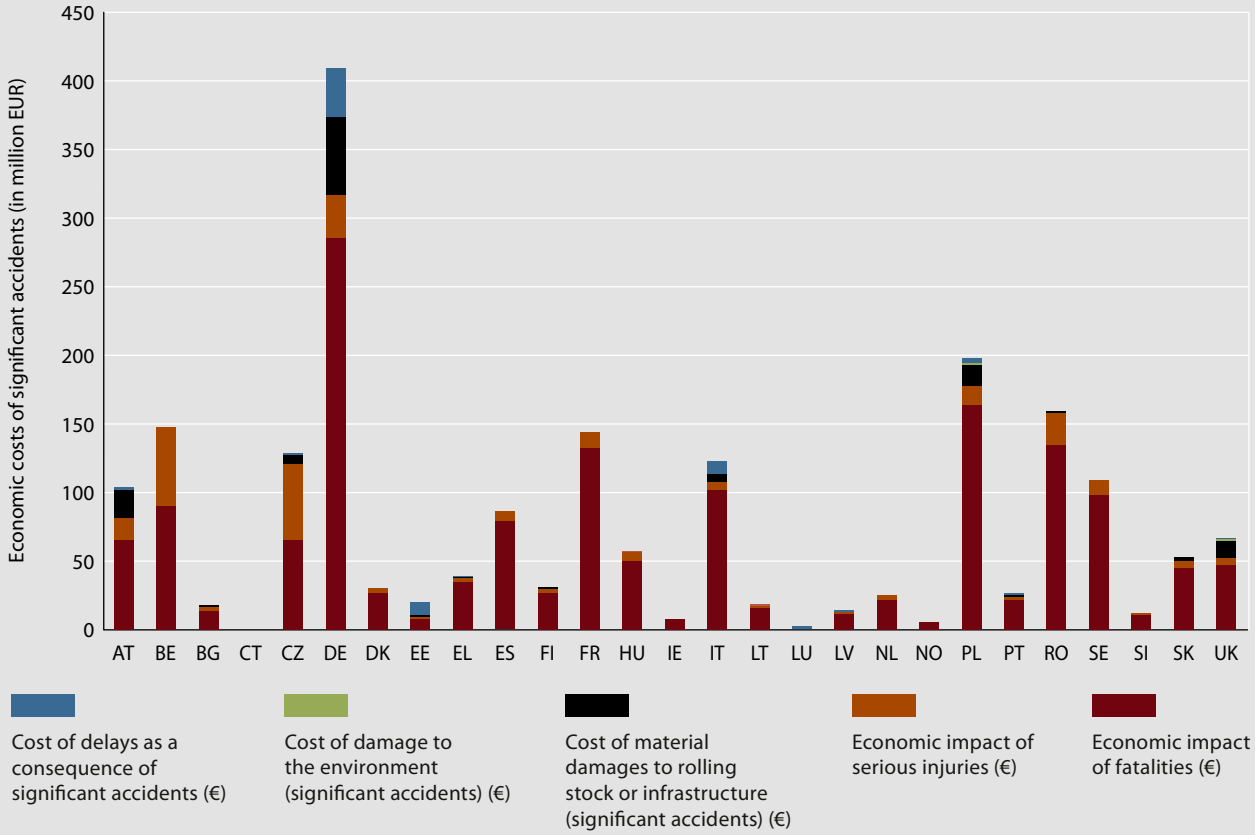
The revised Annex I to the RSD requires the NSAs to use the willingness-to-pay approach based on estimates of the value for preventing a casualty (VPC) ([11]). They can either estimate a national value or use the reference values given in the revised guidance on CSI data reporting ([12]). However, as Member States may still choose to report accident costs for either all accidents or significant accidents, this can lead to a slightly distorted picture. The revised guidance on reporting CSI data recommends Member States to limit the reporting of accident costs to significant accidents.

In 2010, it was possible for the first time to estimate the economic costs of significant railway accidents for all EU countries. As national values are often estimated on the basis of the reference values recommended by the ERA, they do not necessarily reflect the estimation done at the national level.

([11]) The value of preventing a casualty (VPC) is composed of: 1. Value of safety per se: willingness to pay (WTP) values based on stated preference studies carried out in the Member State for which they are applied. 2. Direct and indirect economic costs: cost values appraised in the Member State, composed of: medical and rehabilitation cost; legal court cost, cost for police, private crash investigations, the emergency service and administrative costs of insurance; production losses: value to society of goods and services that could have been produced by the person if the accident had not occurred.

([12]) *Implementation guidance for CSIs, Annex 1 of Directive 2004/49/EC as amended by Directive 149/2009/EC* (ERA/GUI/12-2011) (http://www.era.europa.eu/).

Figure 10 _ Economic impact of significant accidents in 2010 (in million EUR)



The economic impact of significant accidents in 2010 is shown in Figure 10. It has five components: Costs of fatalities, cost of injuries, costs of material damage, costs of damage to the environment and costs of delays. While the first two components are a priori available for all countries, the number of countries providing information on the costs of damage to infrastructure (17), to environment (4) and delays (12) is limited. This is also shown in Figure 10.

By adding together the costs of fatalities and of serious injuries, we obtain a value exceeding EUR 1.6 billion, which gives a broad idea of the overall economic burden of rail casualties in 2010.

Table 4 demonstrates the current problems in the collection of economic indicators. There are still far too many countries that have not supplied data for certain indicators such as the cost of damage to the environment, or the percentage of work passengers among all train passengers — a baseline value needed to estimate the costs of delays of passenger trains and freight trains. For most indicators, each country may report data, either for all accidents, or only for significant accidents, but several Member States provided numbers for both categories of accidents.

While most countries were able to estimate the economic impact of accidents, fatalities and serious injuries, reporting on the indicators of costs for damage (material, environment) was considerably lower. Many countries also have difficulties to establish the share of work passengers ([13]) among all passengers.

Infrastructure

Three CSIs concern railway infrastructure, the first is a measure of the coverage of automatic train protection (ATP) systems on the lines (Figure 11); the second is the number of level crossings (Figure 12), normalised by the length of the network expressed in line kilometres; and the third gives information on the type of protection at level crossings (Figure 13).

ATP ([14]) is widely considered to be the most effective railway safety measure that infrastructure managers can implement to reduce the risk of collisions on mainline railways ([15]). A relatively high density of train protection is typical in countries with high traffic density such as the Netherlands, Italy and Germany. This can be seen in Figure 11.

([13]) Work passengers are those passengers travelling in connection with their professional activities, excluding commuting passengers.

([14]) Automatic train protection (ATP) means a system that enforces obedience to signals and speed restrictions by speed supervision, including automatic stop at signals. Systems where track signalling information is substituted and/or supplemented by cab signalling are included. The part of the definition relating to 'automatic stop at signals' is intended to include also automatic stops at conflict points between clearance gauges.

([15]) Interfleet (2011). *Investigating the links between historic accident rate reduction and the underlying changes*, Report prepared for ERA in 2011. Report will be available on ERA website in early 2012.

Economic indicators (CSIs)	Number of countries ([16]) reporting CSIs for…		
	Significant / all accidents	Significant accidents	All accidents
Economic impact of accidents	27	26	12
Economic impact of fatalities	27		
National value of preventing fatality	8		
Economic impact of serious injuries	27		
National value of preventing serious injury	7		
Cost of material damage to rolling stock or infrastructure	23	17	11
Cost of damage to the environment	5	4	2
Cost of delays for all trains	16	12	9
Cost of delays for passenger trains	5		
Minutes of delays of passenger trains	17	14	9
Average percentage of work passengers per year	10		
Passenger train km	27		
Passenger km	27		
National value of time for a work assenger of a train (an hour) (€)	5		
National value of time for a non-work passenger of a train (an hour) (€)	5		
Cost of delays for freight trains	8		
Minutes of delays of freight trains	14	11	9
Freight train-km	27		
Freight train tonne-km	24		
National value of time for a tonne freight (an hour) (€)	5		

Table 4 _ Number of European countries submitting required economic CSIs in 2010 (EU-27 and Norway)

The percentage of tracks equipped with an ATP system has seen a slight increase of some 2 % from 2009 to 2010 ([17]). This was largely driven by progress in ATP implementation achieved by Germany, France and Austria.

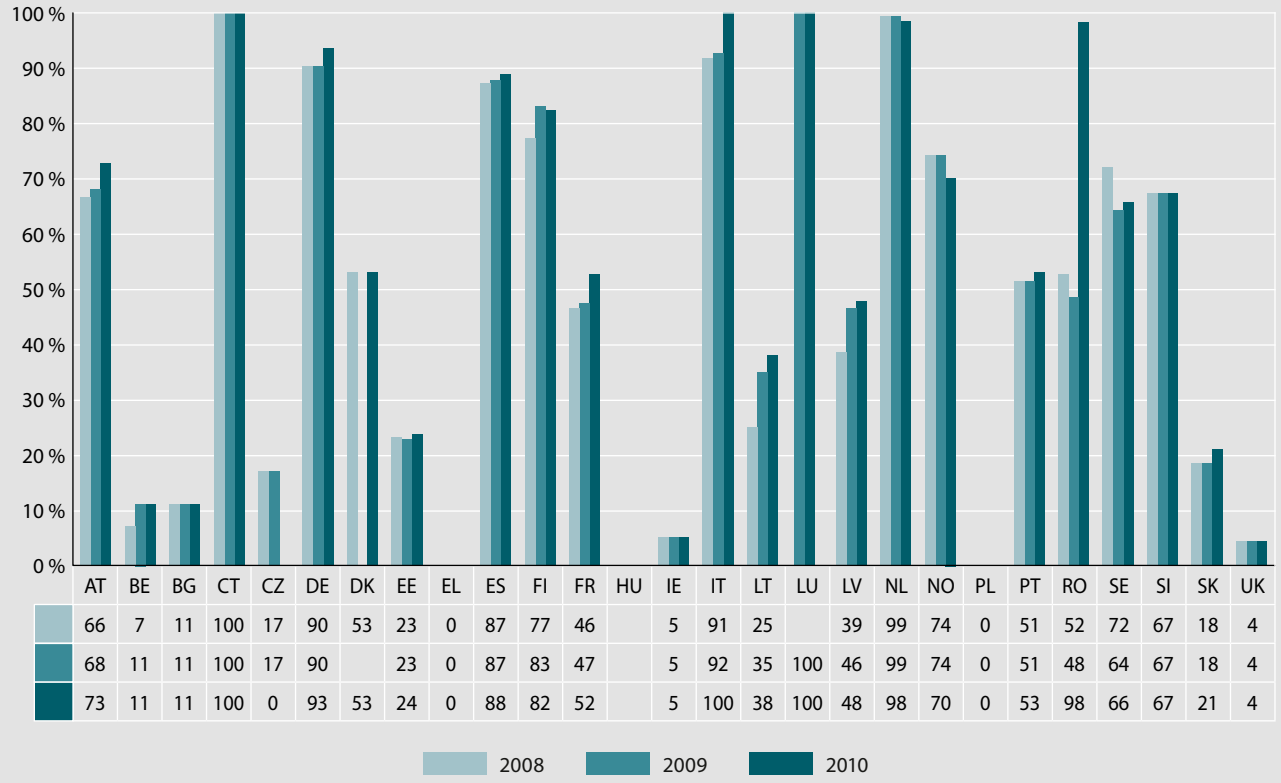
There are more than 123 000 **level crossings** in the EU. On average, there are five level crossings per 10 line-km in the EU; only 29 % of them are active level crossings with user-side protection ([18]). Sweden, Austria, the Czech Republic, the Netherlands and Norway have the highest density of level crossings in terms of level crossings per line-kilometre. Of these, the Netherlands has the highest ratio of active level crossings to all level crossings. A low ratio of active level crossings to all level crossings is typical for the less densely populated countries (Figure 12). Spain has the lowest average number of level crossings per line-kilometre: there is one level crossing per 5 line-km. Separate statistics on the number of active and passive level crossings were not available for Denmark, Hungary and Slovakia in 2010.

([16]) Countries include the Channel Tunnel (CT) as a separate reporting entity, so the total number of reporting entities is 27.

([17]) Estimation for a set of 19 countries for which the data is available for all three years, excluding Italy and Romania.

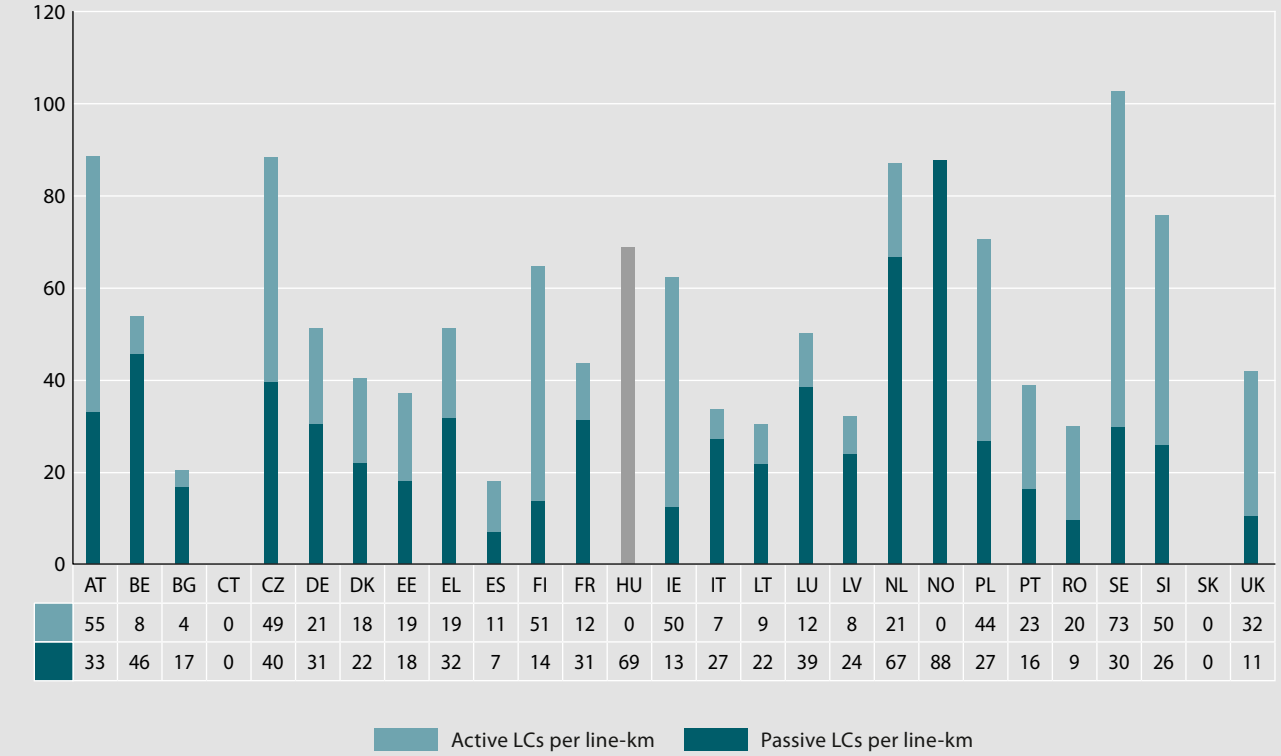
([18]) Protection is typically provided by arm barriers.

Figure 11 _ Percentage of tracks equipped with automatic train protection (2008–2010)



	AT	BE	BG	CT	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	NL	NO	PL	PT	RO	SE	SI	SK	UK
2008	66	7	11	100	17	90	53	23	0	87	77	46		5	91	25		39	99	74	0	51	52	72	67	18	4
2009	68	11	11	100	17	90		23	0	87	83	47		5	92	35	100	46	99	74	0	51	48	64	67	18	4
2010	73	11	11	100	0	93	53	24	0	88	82	52		5	100	38	100	48	98	70	0	53	98	66	67	21	4

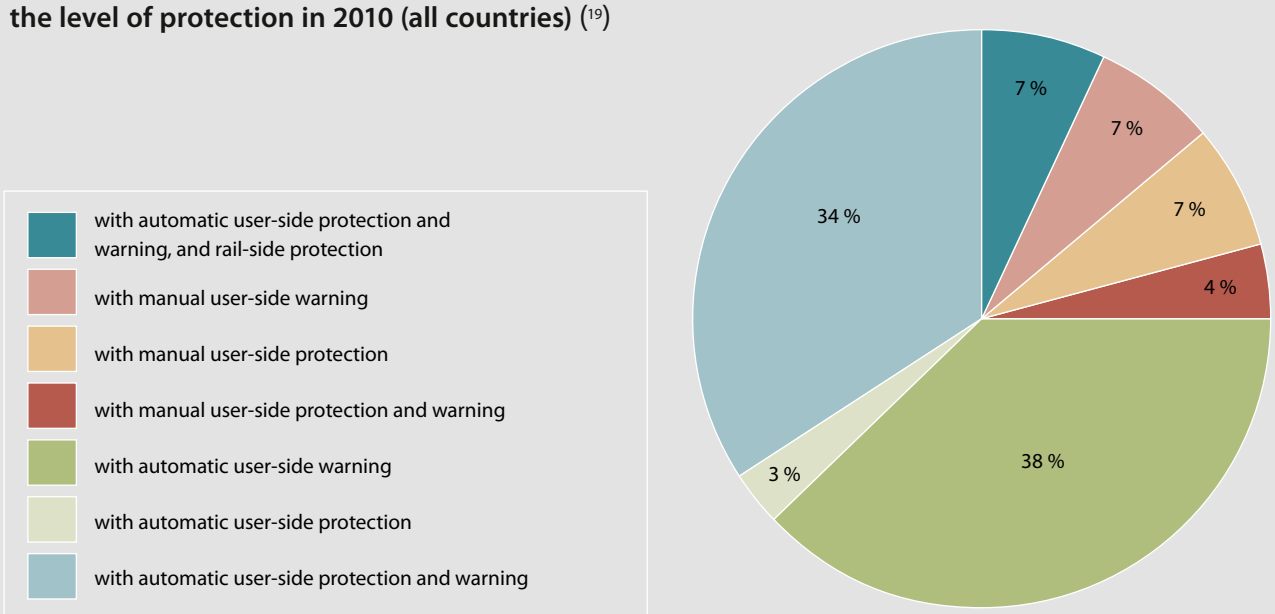
Figure 12 _ Number of active and passive level crossings per 10 line-km in 2010



	AT	BE	BG	CT	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	NL	NO	PL	PT	RO	SE	SI	SK	UK
Active LCs per line-km	55	8	4	0	49	21	18	19	19	11	51	12	0	50	7	9	12	8	21	0	44	23	20	73	50	0	32
Passive LCs per line-km	33	46	17	0	40	31	22	18	32	7	14	31	69	13	27	22	39	24	67	88	27	16	9	30	26	0	11

For the first time, detailed statistics are available on the type of protection assured by active level crossings at European level. In Figure 13 the data for 24 countries ([19]) show that level crossings with automatic user-side warning (typically flashing lights) are the most common type of active crossings (38 %), closely followed by the level crossings with automatic user-side protection and warning (barriers with lights) (34 %).

Figure 13 _ Breakdown of active level crossings according to the level of protection in 2010 (all countries) ([19])



Traffic volumes

There are two measures of rail traffic performance that are available for statistical purposes: the number of train-kilometres, shown in Figure 14, and the number of passenger-kilometres, shown in Figure 16. After a 3 % drop in 2009, the number of train-kilometres further decreased by 1 % in 2010. At the same time, the number of passenger-kilometres reported in 2010 is similar to that of 2009: slightly more than 400 billion passenger-km. The average number of passengers per train was about 123 in Europe in 2010; i.e. the ratio of number of passenger-kilometres to passenger train-kilometres.

Germany is the country with the highest number of **train-kilometres**, accounting alone for one quarter of all train-kilometres in the EU. Nine other countries registered more than 100 million train-km in 2010 (Figure 14). The three highest year-to-year reductions in train-kilometres were registered in Greece (14 %), Latvia (11 %) and the UK (9 %). In Belgium and Estonia, although the number of train-kilometres reported in 2010 increased significantly, these values are mainly the result of changes in reporting procedures in both countries.

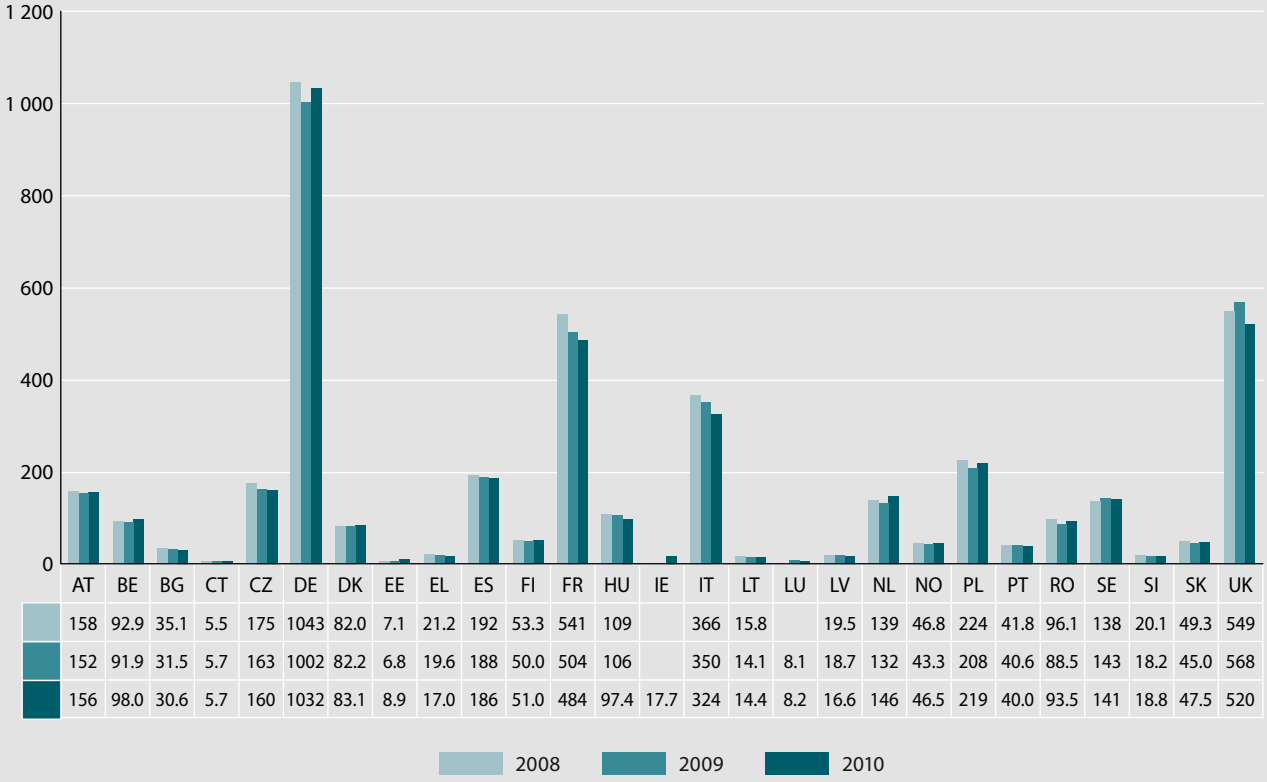
For the first time, the figures for passenger train-kilometres and freight train kilometres are available separately. These show that passenger trains accounted for 80 % of all train-kilometres (783 million) and freight trains for one fifth of all train-kilometres in 2010. The share of passenger train-kilometres exceeded 90 % in Denmark, Greece, Ireland, the UK and the Netherlands (Figure 15). Only in Latvia and Lithuania did freight train-kilometres exceed the number of passenger train-kilometres in 2010.

Four countries with the highest passenger volumes (Germany, France, Italy and the UK) together account for two thirds of all **passenger-kilometres** ([20]). A slight upward trend over the past four years can be observed in Austria, Belgium, Denmark, Germany, the Netherlands, Norway, Sweden, Slovakia and the UK.

([19]) EU-27 countries plus Norway excluding Denmark, Hungary and Slovakia.

([20]) The exact value for 2009 is 67 % (excluding the Channel Tunnel).

Figure 14 _ Number of million train-kilometres (2008–2010)



	AT	BE	BG	CT	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	NL	NO	PL	PT	RO	SE	SI	SK	UK
2008	158	92.9	35.1	5.5	175	1043	82.0	7.1	21.2	192	53.3	541	109		366	15.8		19.5	139	46.8	224	41.8	96.1	138	20.1	49.3	549
2009	152	91.9	31.5	5.7	163	1002	82.2	6.8	19.6	188	50.0	504	106		350	14.1	8.1	18.7	132	43.3	208	40.6	88.5	143	18.2	45.0	568
2010	156	98.0	30.6	5.7	160	1032	83.1	8.9	17.0	186	51.0	484	97.4	17.7	324	14.4	8.2	16.6	146	46.5	219	40.0	93.5	141	18.8	47.5	520

Figure 15 _ Percentage of passenger train-kilometres among all train-kilometres in 2010 in all countries

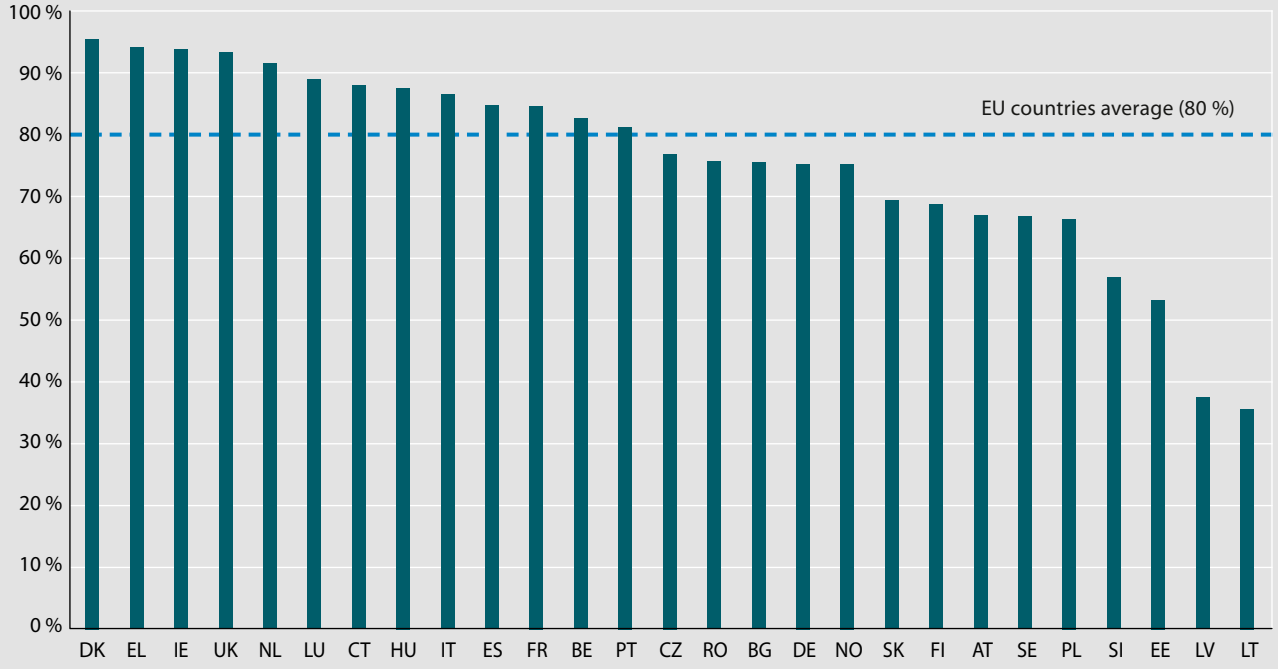
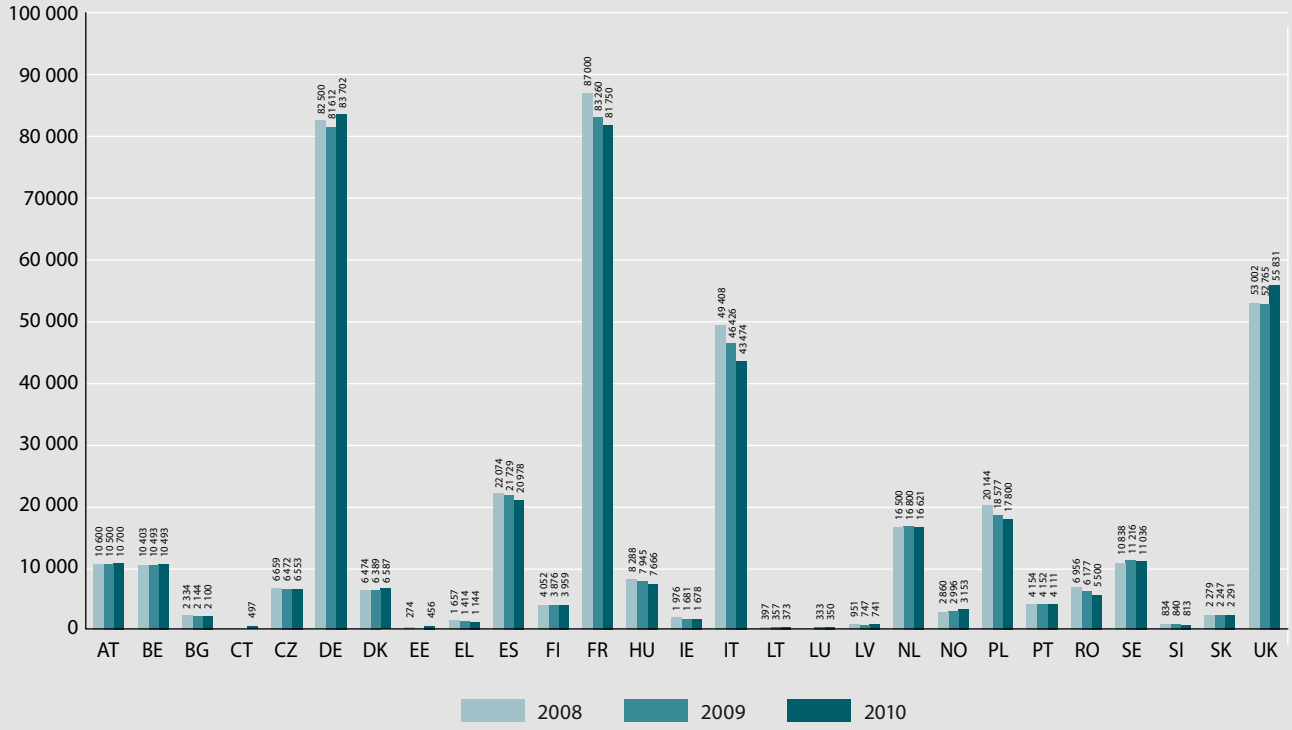


Figure 16 _ Number of million passenger-kilometres (2008–2010)



Common safety targets

Common safety targets (CSTs) are quantitative tools intended to monitor whether the current safety levels of the railways in the Member States are at least maintained. In the long term, they could also be helpful in reducing the current differences in railway safety performance. Railway transport is the only mode of transport for which the framework of targets has been prescribed by European legislation. The CSTs are the EU-wide maximum risk values, the national reference values (NRVs) are the maximum risk levels set for individual Member States. The risks are measured by the number of weighted fatalities ([21]) per train-kilometre. There are risk categories for passengers, employees, level-crossing users, unauthorised persons on railway premises, 'others' and as applied to society as a whole.

Annual assessment of the achievement (first set of CSTs)

In 2011 the Agency carried out a second assessment of the achievement of the first set of CSTs and NRVs. The assessment was based on a four-year time series (2006–09) of data on railway accidents that were delivered to Eurostat by Member States according to Annex H to Regulation (EC) No 2003/91 on rail transport statistics. The assessment was made for six risk categories of CSTs and NRVs using the method set by Commission Decision 2009/460/EC ([22]).

The risk category 'others' was excluded from the assessment (as in the first assessment) because of reliability problems with the data. Bulgaria was not included in the assessment because of insufficient data. The results show acceptable railway safety performance in the six risk categories in all countries except Romania, Lithuania and Slovakia. However, as the data for these countries was significantly less reliable than the data provided by the other Member States, the Agency has advised that no specific, regulatory action should be taken by the Commission.

([21]) Weighted fatalities and serious injuries are the normalised measure of railway safety outcome. One seriously injured person is considered as 0.1 fatalities and added to the number of fatalities in the given year.

([22]) Commission Decision 2009/460/EC on a common safety method for assessment of achievement of safety targets.

Risk category			CST1 value (× E-06)	CST2 value (× E-06)
CSTs based on Eurostat data for			2004–07	2004–09
Risk to passengers	...per train-km	CST 1.1	0.25	0.17
	...per passenger-km	CST 1.2	0.00201	0.00165
Risk to employees		CST 2	0.0779	0.0779
Risk to level-crossing users		CST 3.1	0.743	0.710
		CST 3.2	n.a.	n.a.
Risk to 'others'		CST 4	0.0185	0.0145
Risk to unauthorised persons on railway premises		CST 5	2.03	2.05
Risk to the whole society		CST 6	2.51	2.59

Table 5 _ Values of the second set of CSTs for different risk categories

Establishment of the second set of CSTs

As required by the RSD, the Agency shall prepare a recommendation on a second set of CSTs and NRVs. The CSTs and NRVs of the second set are based on the six-year time series of data, from 2004 to 2009, that were delivered to Eurostat by Member States. The second set of CSTs and NRVs was calculated with the same method, defined in the CSM on the assessment of the achievement of CSTs. The revisions made by the countries to Eurostat data were taken into account. Compared with the first set of CSTs and NRVs, the only difference is the extension of the period for which data was used for calculations. The calculation method, the data source and the risk categories are the same as in the first set. The values for the second set of CSTs are shown together with the values of the first set in Table 5.

In general, there were no major changes between the values of the first and second sets of CSTs. For passengers, level-crossing users and 'others', the CSTs established in the second set are somewhat lower than in the first set. The risk levels in these three categories are significantly lower than in the risk category of unauthorised persons on railway premises (mostly trespassers), which in turn strongly influence the risk level for the whole society.

Figure 17 _ CST and NRVs (risks caused) for the passenger - CST 1.1 (second set based on 2004–2009 data)

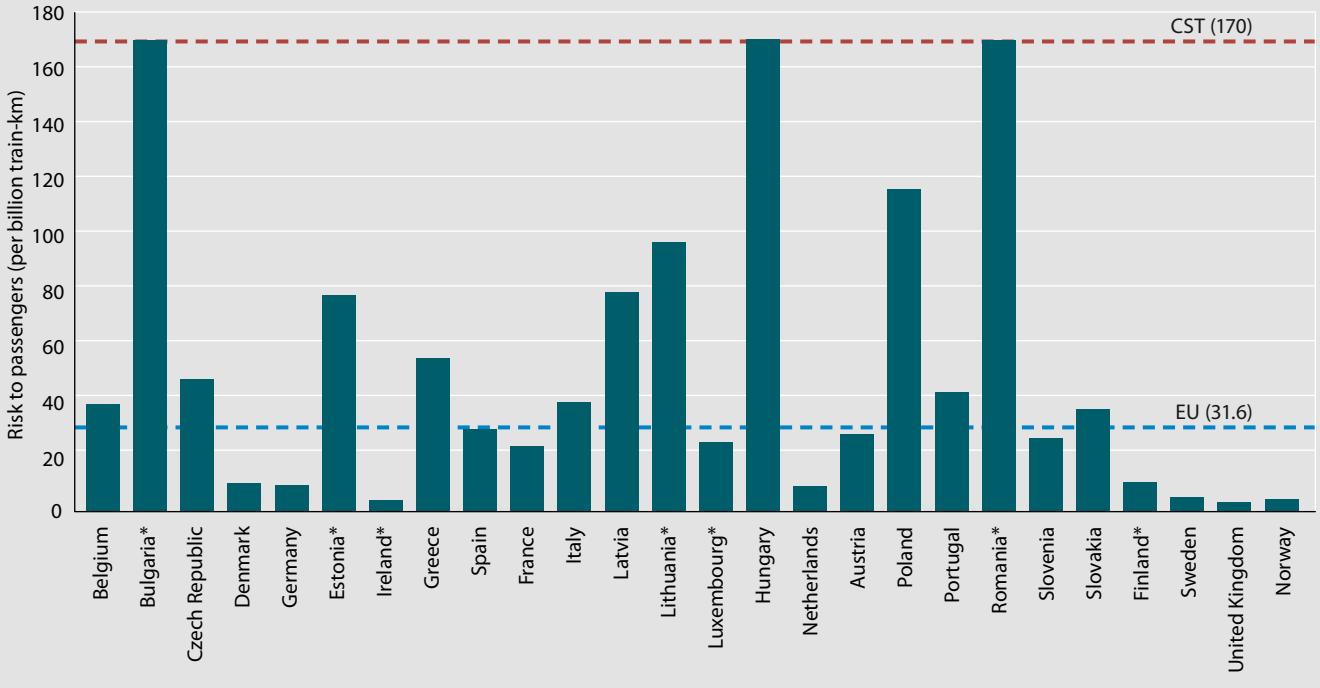
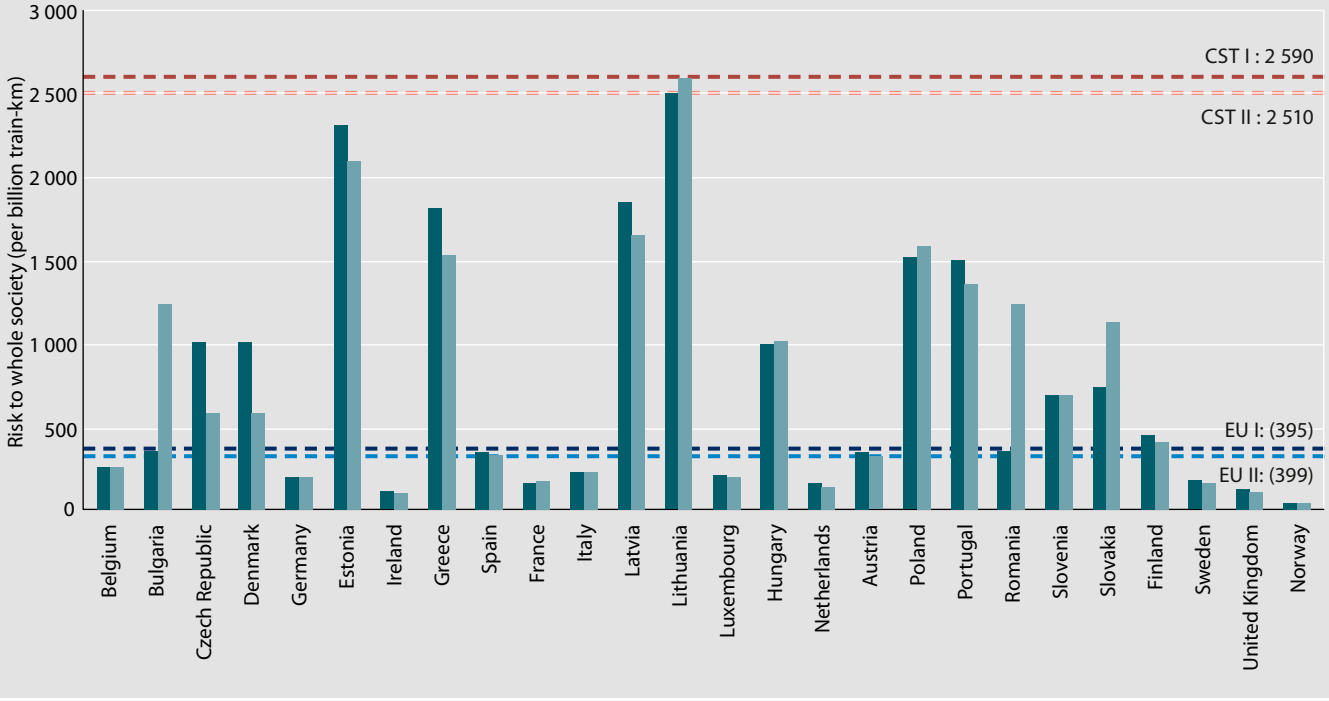


Figure 18 _ CST and NRVs (risks caused) for the whole society by railway accidents - CST 6 (second set based on 2004–2009 data)



There is no change in risk level as prescribed by the CSTs for employees. For unauthorised persons on railway premises the CST determined in the second set is slightly higher than in the first set.

The changes in the values of the CSTs for specific risk categories suggest that the gap between the safest and least safe country is narrowing; however, the improvement in data quality may also have influenced this result. The higher value of the second set of CSTs for the whole society was 2.59 weighted fatalities per million train-kilometres compared with the 2.51 in the first set, which suggests that at this time conclusive statements should not be drawn from this development.

Figure 17 shows the values of the second set of NRVs for train passengers. Big discrepancies exist between countries, which partly reflect the data quality. For those countries with no passenger fatalities during three consecutive years, the values of the neighbouring country were used instead. These countries (with no passenger fatalities) are marked with an asterisk (*) in the figure.

Figure 18 shows the values of the first and second set of CSTs and NRVs in the category of whole society for all European countries. In 17 out of 26 countries, the value of the NRVs in the second set is lower compared with the first set, indicating slight improvements in safety since 2007. For Romania and Bulgaria, the significant increase in NRVs could, at least partly, be attributed to the changes in data reporting procedures. The variation in NRVs remains large, despite a slight decrease when compared to the first set.

It should be reminded that any use of the NRVs as a benchmarking tool to compare the safety performance of countries should be made with caution because of the prevailing limitations of the data, even if the data quality has improved somewhat.

From 2012 onwards, the assessment of the achievement of the CSTs and NRVs will be carried out annually. By mid-2015 a revised set of CSTs will be developed, building on the experience gained from the first and second sets of CSTs. This new set will be based solely on the CSI data collected by the Agency and will no longer be reliant on Eurostat railway statistics. The CSM on the assessment of the achievement of safety targets (including the calculation method) will also be revised.

In coming years, the Agency will therefore revise the current assessment method, as it has shown limitations when assessing risk levels in countries where the number of victims in separate categories is (close to) zero in several consecutive years. There are several ways to overcome these methodological limitations, such as the use of statistical modelling or the use of incident data. The proposal for the revision of the assessment method will be delivered in 2015 together with the revised set of CSTs.

ACCIDENT INVESTIGATION

The independent investigation of accidents is the primary responsibility of the NIBs as described in the RSD. NIBs must report the investigation of serious railway accidents to the Agency ([23]). Each accident is reported to Agency twice: as a notification of the opening of an investigation; and when the final report is sent to the ERA. Both records are available in the Agency's public database of safety documents, ERADIS.

The Agency receives notifications for a majority of the serious accidents investigated, although, the notification of their occurrence is not always sent within one week after the decision to investigate. The compliance of Member States with the requirements for the notification and submission of final reports has been improving over time. In 2011, around one third of notifications to investigate were in fact submitted within one week after the occurrence of the accident. As the Agency does not yet systematically receive information on the starting date of the investigations, the date of the accident occurrence is used as a reference. It should be noted that the time between the occurrence and the decision to investigate can, in certain cases, be longer than a week.

The average number of days between the accident occurrence and the notification to investigate to the Agency has been decreasing over time: 91 days and in 2008; 38 days in 2011.

The final investigation reports should be made public as soon as possible, and normally not later than one year after the date of the occurrence. The average number of months before the final report is submitted to the Agency has also been decreasing over time; from more than 17 months for accidents occurring in 2007 to around 11 months for accidents occurring in 2010.

For some 5 % of notified accidents, the Agency had not received the final investigation report by the end of 2011. Some Member States report that this is due to a lack of resources. The average number of days between the accident occurrence and the submission of the final report was 342 days for accidents that occurred in 2010. Table 6 summarises the progress in timely reporting that has been achieved by NIBs.

Year of occurrence	2008	2009	2010	2011
Average number of days between occurrence and notification of decision to investigate ([24])	91	60	48	38
Average number of days between occurrence and submission of the final investigation report ([25])	460	402	342	205

Table 6 _ Average time span between occurrence and accident notification and between occurrence and the submission of the final investigation report to the Agency (in days) for the years 2008–2011

([23]) 'Within one week after the decision to open an investigation the investigation body shall inform the Agency thereof. The investigation body shall send the Agency a copy of the final investigation report.' (Art. 24(1,2) RSD (49/2004/EC).

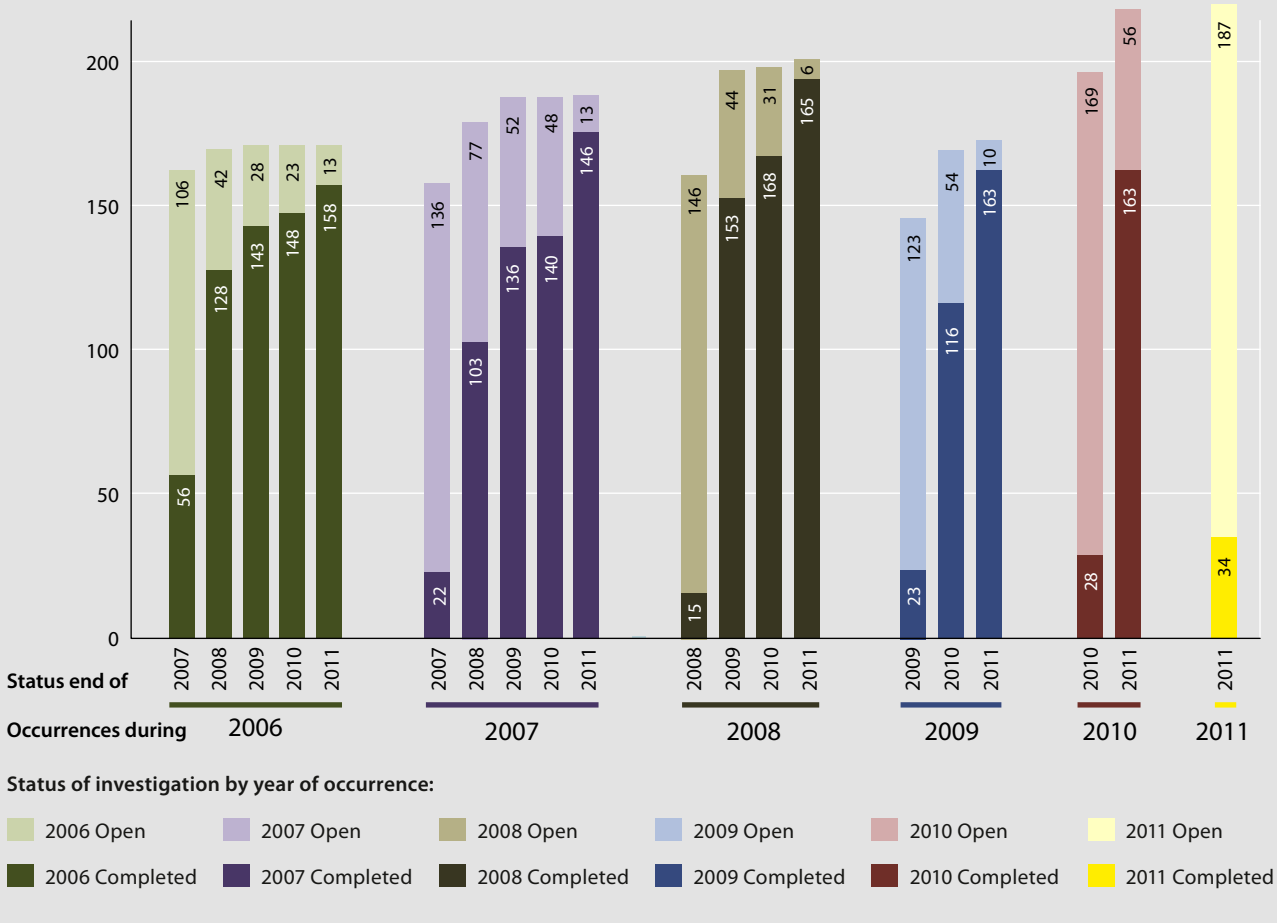
([24]) Figures have changed since the previous report due to the submissions of notifications for occurrences of 2008–10 during 2011.

([25]) Figures concern only submitted reports and will change when all missing reports of occurrences for 2008–11 have been submitted to the Agency (see Figure 19 for open and completed investigations).

Accidents and incidents have been reported to the Agency since 2006. Each year the Agency has received notifications of at least 150 occurrences investigated by NIBs. Around 15 % of the final investigation reports reached the Agency by the end of the year in which the accident occurred. The majority of final reports are submitted to the Agency within the year following the occurrence of the accident. For example, for occurrences in 2010, 28 were closed and the report submitted to the Agency by the end of 2010. During 2011, the final investigation report was delivered for 163 out of the 219 occurrences in 2010 (red bars in Figure 19). By the end of 2011, 34 out of 221 investigations opened during the year were closed, i.e. 15 % of investigations; this is similar to previous years.

During 2011, the ERA has been working closely with the NIBs to complete the delivery of investigation reports to the ERADIS database. This has led to a number of investigations that were opened in 2006–09 being closed.

Figure 19 _ Overview of reporting of accidents and incidents by NIBs to the ERA



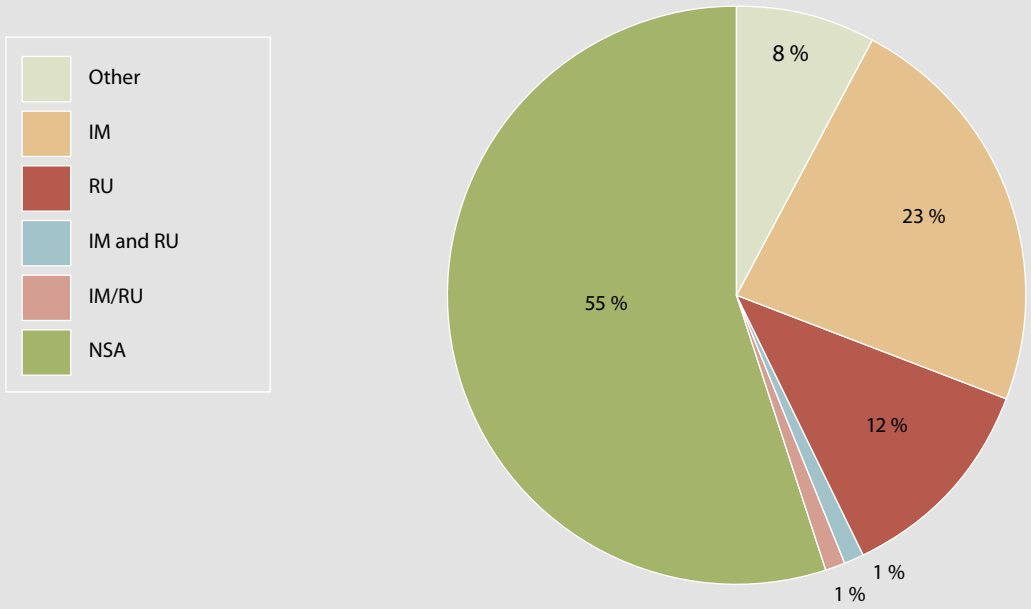
Recommendations from investigation reports

In the words of the railway safety directive, the purpose of a safety recommendation is to improve the safety of the rail system, both at national and European level. The role of the NIB is to investigate accidents and incidents; the safety recommendation is a key instrument to transform the lessons learned into measures to improve safety. The role of the NSA is to ensure that the NIB's recommendations are acted upon; in most cases the IM and RU (the end implementers) are responsible for implementing the necessary measures.

In 2011, the ERA took a closer look at the safety recommendations in the investigation reports. The aim was to obtain an overview on how the NIBs apply this instrument; in particular, what is the basis and content of the recommendations. We considered a total of 380 recommendations from 122 investigation reports on serious accidents, submitted to the ERADIS database between mid-2009 and the end of 2010.

The RSD requires the recommendations to be addressed to the NSA; however, some NIBs also address their recommendations to specific organisations, such as IMs or RUs. The analysis showed that just over half of the recommendations (53 %) were addressed to the NSA (as foreseen in the RSD), while 36 % were addressed directly to RUs and/or IMs (Figure 20). Recommendations were also addressed to other bodies, such as the police, a local municipality or manufacturers (8 %). Of concern was the finding that for 3 % of the recommendations, no addressee could be identified.

Figure 20 _ Addressee of recommendations



The end implementers of the recommendations were in most cases the RU or the IM (79 % together) and, for only 7 % of cases, the NSA together with the RU and IM. For 12 % of the recommendations, the end implementer was another entity.

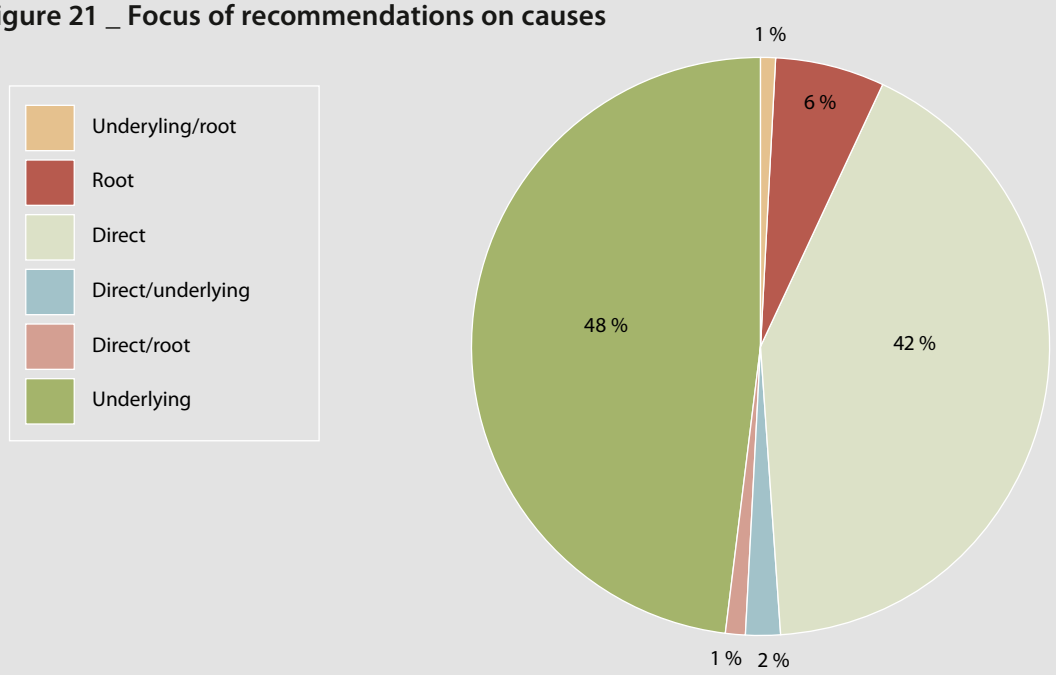
A number of NIBs continue to issue the recommendations directly to the end implementer; in most cases this is the RU or the IM. Because of this, the NSA is frequently unaware of the recommendations and cannot monitor their implementation. When the recommendations are addressed to the NSA, it is then in a position to carry out an analysis of the feasibility and cost-effectiveness of possible measures and enforce the implementation of the recommendations in a non-discriminatory way. It is therefore essential that the recommendations are addressed to the NSA.

Figure 21 looks at the focus of the recommendations in relation to the three levels of causes as described in the RSD: direct, underlying and root causes. Here it can be seen that the majority of recommendations were focused on either the direct causes (42 %) or the underlying causes (48 %). Only 18 recommendations (6 %) targeted the root causes of an accident.

Almost half of the recommendations focusing on the causes of the accident, dealt with the direct causes. This may reflect insufficient depth of analysis in some accident investigations and/or a lack of expertise and resources for comprehensive accident investigations. In order to improve the safety of the railway system, investigations need to look deeper into the underlying and root causes to mitigate the hazards at the source.

About two thirds of the recommendations specified remedial solutions — these ranged from specific measures that should be introduced or adapted to technical improvements as well as specific changes to rules and procedures; one third of the recommendation focused on the risks identified in the investigation (35 %).

Figure 21 _ Focus of recommendations on causes



As a consequence, most recommendations focus on a specific solution instead of addressing the risks that must be managed. It is the responsibility of the NSA together with the end implementer — generally the RU and/or IM — to ensure that effective mitigation measures for the problems and risks identified in the investigation are put in place. Recommendations addressing risks are more effective in enabling the wider lessons to be learnt and so promote proactive safety management.

To summarise, some NIBs still address the recommendations directly to the IMs or RUs and this hinders the NSAs from performing their tasks of supervision and control of the measures to be taken. There is a need to improve accident investigation methods and processes and to look beyond the immediate and direct causes of the accidents. The Agency will continue to support and work together with the NIBs to develop investigation techniques, to facilitate training and to assess the processes put in place by the national investigating bodies.

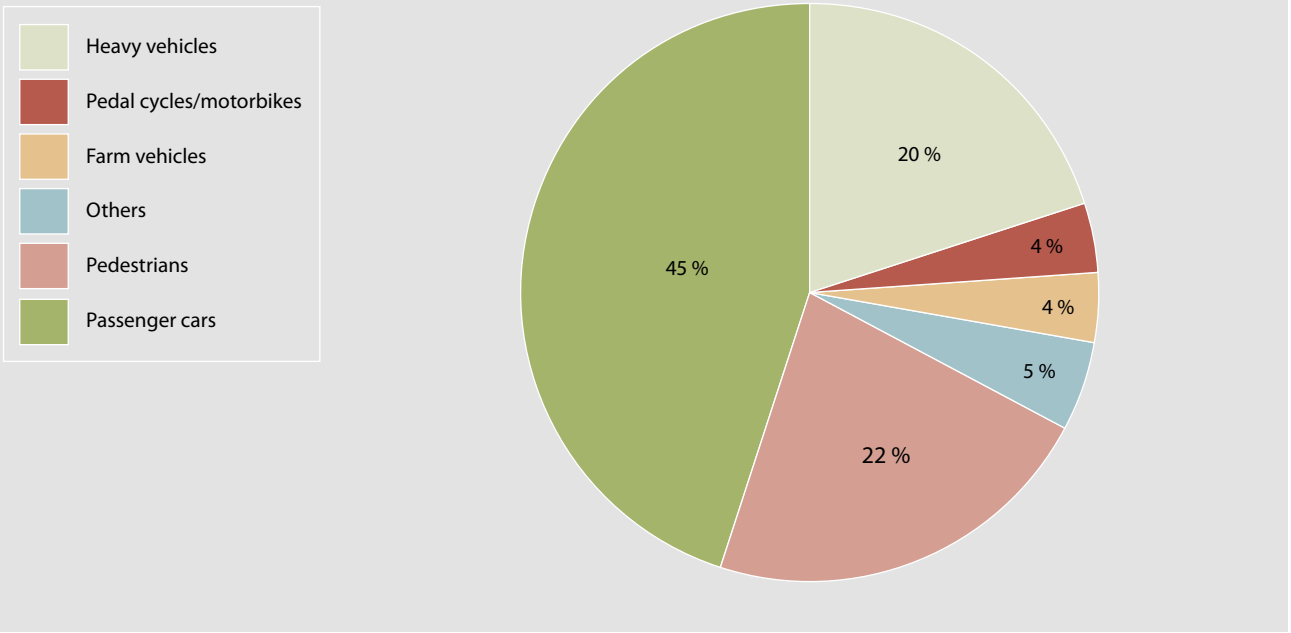
Level-crossing accidents investigation reports analysis

Level-crossing (LC) accidents account for 24 % of all events investigated by NIBs and notified to ERA. The ERA has analysed 185 investigation reports on LC accidents available in the ERADIS database on 1 September 2011.

Articles 19(2) and 21(6) of the railway safety directive (RSD) allow the Member States to designate in the national legislation which types of events, in addition to serious accidents, should be investigated by their investigating body. Therefore not all NIBs must investigate level-crossing accidents. Some 90 % of all LC accident investigations in the EU have been carried out by eight Member States: the Czech Republic, Denmark, Estonia, France, Finland, Hungary, Spain and the UK.

The detailed evaluation of the available investigation reports shows that the legal basis for the investigations of LC accidents differs between the NIBs: 35 % of investigations are based on Article 21 (6) of the RSD (particularly in Estonia and Spain), 26 % on Article 19(1) (mainly in Denmark, Finland, Poland and the UK) and 34 % on Article 19(2). The remaining 5 % of investigations are carried out according to other national rules and regulations.

Figure 22 _ Types of the LC user involved in accidents investigated by NIBs



In cases we examined, the occupants of passenger cars represent the highest proportion (45 %) of LC users involved in LC accidents, followed by heavy-duty-vehicle users (21 %). Taken together they account for two thirds of road users involved in LC accidents. The proportion of pedestrians involved in LC accidents is also considerable: 21 %. Figure 22 gives a detailed breakdown of road users involved in LC accidents.

Slightly more than half (55 %) of LC accidents occurred on active ([26]) level crossings typically protected with barriers (most of these were LC accidents in Spain and France), while the remaining 45 % occurred on passive ([27]) level crossings. At EU level, active level crossings constitute slightly more than half (52 %) of all level crossings; however, as active protection is usually provided on level crossings with a higher level of risk, it follows that the risk exposure is probably greater for active level crossings.

([26]) 'active level crossing' means a level crossing where the crossing users are protected from or warned of the approaching train by the activation of devices when it is unsafe for the user to traverse the crossing (*source*: Commission Directive 2009/149/EC).

([27]) 'passive level crossing' means a level crossing without any form of warning system and/or protection activated when it is unsafe for the user to traverse the crossing (*source*: Commission Directive 2009/149/EC).

In almost all of the reports on LC accidents that we analysed, the direct causes had been identified (96 %); one third of the reports gave the underlying causes and 10 % indicated the root causes. Most of the direct causes were related to the behaviour of the level-crossing users; in 16 % of the reports the sole cause was attributed to the level-crossing users and there was no further information on the causes of the accident. The main reasons given for LC users for entering the pathway of the train were: distraction, e.g. using a mobile phone, controlling domestic animals, manoeuvring the vehicle, responding to passengers; weather conditions, e.g. vision impaired by sunlight or fog; driver's physiological state, e.g. medical conditions, misuse of drugs or alcohol; obstructions, e.g. vehicle stationary or vehicle stuck between the tracks.

Very often, the underlying causes were related to the technical equipment or the layout of the level crossing. Some underlying causes pointed to insufficiencies in the maintenance of or the technical state of the LC. The root causes were found in the organisation of the work of the RU or IM, safety management systems and the framework of rules and regulations.

A total of 338 recommendations were issued in the 185 reports analysed, almost one third (92) of which were issued by the UK NIB (RAIB). One third of the reports (34 %) did not contain any specific recommendations. One third of recommendations were solely concerned with the level crossing, on which the accident occurred.

Major accidents in 2011

Accidents in which people die usually attract the attention of the media; this raises awareness of both the authorities and the public about the potential vulnerability of the railway transport system. In the following section we summarise some of the serious rail accidents that occurred and were reported to the ERA in 2011. We have included these accidents because of the seriousness of the outcomes and their relevance for EU legislation. The accidents are listed in order of occurrence.

Only a short summary of the information available is presented. More information about these and other accidents can be found in the Agency's database ERADIS *(http://pdb.era.europa.eu)*.

Event: *Trains collision*
Date, time: *29 January 2011, 22:30*
Location: *Hordorf, Germany*
Outcomes: *10 fatalities, 23 injured persons*

On 29 January 2011, 10 people were killed in a frontal collision of a freight train and a regional passenger train on a single track line between Magdeburg and Halberstadt. The investigation established that the freight train had passed a stop signal and entered the section of track allocated to the oncoming regional train with 32 people on board. This section of the line was not equipped with an automatic train protection system. At the time of the accident it was reported that visibility was poor, because of heavy fog.

The investigation body concluded that the direct cause was related to human performance; however, it was not possible to determine exactly why the freight train had passed the signal at danger.

Eight passengers, the driver and the guard of the passenger train died; 23 people were injured, including the freight train driver.

Image 1 _ Collision of trains in Hordorf. Source: German NIB.

On impact with the freight train, the passenger train was thrust from the tracks and completely destroyed. The freight train did not derail, but the front (of two) locomotive was badly damaged.

The investigation body has issued two safety recommendations: the installation of automatic train protection equipment on all lines; and the introduction of additional, transitional measures to reduce the likelihood and the consequences of a signal passed at danger until full implementation has been achieved.

Event: *Trains collision*
Date, time: *2 February 2011, 8:22*
Location: *Vodňany, Czech Republic*
Outcomes: *1 fatality, 7 serious and 8 slight injuries*

A regional passenger train departed from Vodňany station and collided with a freight train on the open line near the station. One bogie of the passenger train derailed. The investigation showed that the driver of the passenger train left the station without receiving permission to depart. Both train driver and traffic controller (dispatcher) had not followed the prescribed procedure, so the passenger train entered onto an occupied line. The line Čížčenice–Volary is not equipped with an automatic train control system.

Image 2 _ Collision of trains in Vodňany. Source: Czech NIB.

The passenger train was travelling at a speed of 47 km/h at the time of the collision; at the same time the freight train was reversing backwards along the line. Despite a relatively low impact speed and only minor exterior damage to both trains, 16 passengers were injured by dislodged interior objects. Human performance has played a primary role in three serious accidents and one accident on this line between the years 2004 and 2011 (including this accident).

Event: *Freight trains collision*
Date, time: *12 February 2011, 04:02*
Location: *Nokia, Finland*
Outcomes: *1 staff fatality*

A rear-end collision between two freight trains occurred in the early morning between the stations of Siuro and Suoniemi on the main Tampere to Kokemäki line. The first freight train was on route to the port of Mäntyluoto and had stopped because of a technical failure. A second freight train, coming to assist the first one, collided with the last wagon of the stopped train. The driver of the assisting train was killed on impact. Both the locomotive of the assisting train and the two last wagons of the stopped train were badly damaged. Traffic on the line was suspended for 14 hours.

Analysis of the recorded data showed that the train driver had started emergency braking five seconds before the collision, from a speed of 46 km/h. At impact the speed of the train was 43 km/h. The maximum permitted speed of the assisting train was 50 km/h.

Image 3 _ Collision of freight trains close to Nokia. Source: Finnish NIB.

According to the preliminary results the rear-end collision was caused by incorrect information about the position of the stopped train. This led the driver of the assisting train to approach at too high a speed. The driver of the assisting train was not able to prevent the collision after observing the stopped train because of darkness and track geometry. To prevent similar accidents, the Safety Investigation Authority recommended the systematic use of GPS devices, equipping of rear ends of wagons with reflectors and limiting the speed of assisting trains to 35 km/h. As normal practice, group calls to all trains should be made in emergency situations.

Event: *Level-crossing accident*
Date, time: *28 May 2011, 17:30*
Location: *Lębork–Godętowo, Poland*
Outcomes: *2 fatalities, 15 serious injuries*

A level-crossing accident involving a semi-trailer truck, fully loaded with bricks occurred at an active level crossing equipped with red light signals. The truck entered the level crossing despite activated level crossing signals – red lights flashing. As a result of the collision, four coaches of the passenger express train travelling from Katowice to Gdynia derailed. The speed of the train was 110 km/h, well below the maximum permitted speed of 120 km/h. Visibility and weather condition were good. The railway line is a one-track line.

Image 4 _ LC accident on Lębork – Godętowo line. Source: Polish NIB.

Two people were killed and 14 seriously injured on board the passenger train. The truck driver was also seriously injured. The underlying causes are still being investigated by the railway commission under direct supervision of the NIB Poland. Several safety recommendations have already been issued, including equipping the level crossing with semi-barriers.

Event: *Fire in rolling stock in motion*
Date, time: *16 June 2011, 10:07*
Location: *Hallingskeid, Norway*
Outcomes: *No casualties, damage of EUR 25 million*

A passenger train from Bergen to Oslo drove into a snow tunnel that was on fire. The train had lost power just before entering Hallingskeid station; the driver noticed the fire at the east end of the snow tunnel and stopped the train before reaching the fire. However, because of the loss of power, it was not possible to back the train out of the tunnel. All passengers were evacuated, and no-one was injured. Material damages were considerable as both the train and the railway infrastructure were completely destroyed. The estimated damage is approximately EUR 25 million.

Image 5 _ Fire in rolling stock in Hallingskeid. Source: Norwegian NIB.

The investigation is still in progress.

A preliminary report was published on 6 July 2011; it included a safety recommendation addressed to the Norwegian NSA concerning preparedness for rescue work. The final report including safety recommendations will be released within 12 months of the accident date.

Event: *Runaway freight wagons*
Date, time: *26 July 2011, 22:10*
Location: *Strzelce Krajenskie Wshód, Poland*
Outcomes: *3 fatalities*

During the unloading of freight wagons at an unloading platform, seven gondola-type freight wagons used for coal transportation became detached and ran uncontrolled downhill towards Strzelce Krajenskie station, some 2 km away. The set of wagons derailed at the switch and hit the station building. Two occupants of the apartment located on the first floor of the building were killed. Additionally, one person walking along the platform at that time was killed as the wagons derailed.

Image 6 _ Runaway at Strzelce Krajenskie Wschód. Source: Polish NIB.

The building hit by the train was so badly damaged structurally that it is no longer habitable.

Event: *Train derailment*
Date, time: *12 August 2011, 16:15*
Location: *Baby, Poland*
Outcomes: *2 fatalities, 18 serious injuries*

An intercity train was travelling on the line Warszawa–Katowice when the locomotive and four wagons derailed. The accident is under investigation by the Polish NIB (Polish State Commission on Railway Accident Investigation). The initial investigation has found that the speed of the train was about 115 km/h. The speed limit at that section of the line was 40 km/h as the train should change from the left track to the right (normal) track through a switch at the end of a construction area. The left track was in use as the right track was closed because of the reconstruction work on a bridge. The reasons for the high speed of the train are under investigation.

Image 7 _ Train derailment near Baby station. Source: Polish NIB.

The accident occurred on a main line which is only equipped with a limited train protection safety system that does not automatically stop a train exceeding the speed limit.

Event: *Level-crossing accident*
Date, time: *12 October 2011, 17:17*
Location: *Saint-Médard sur Ille, France*
Outcomes: *3 fatalities, 5 serious injuries*

A regional passenger train hit a truck on a level crossing situated near Saint-Médard sur Ille station, close to Rennes. The semi-trailer truck was blocked on the level crossing between the barriers. The train was travelling at a speed of about 110 km/h; the driver applied the brakes at the last moment so that the speed of the train was only slightly lower on impact. All casualties were train passengers.

The line is double track and there are no side tracks at the station. The level crossing has a particular geometric design which may not be best adapted to the heavy-duty vehicle traffic.

Image 8 _ Level-crossing accident at Saint-Médard sur Ille station. Source: French NIB.

A similar accident occurred at the same place in 2007 and was investigated by the French NIB who recommended that some improvements be made to the geometry of the road. Unfortunately, these improvements had not yet been carried out.

Investigation of major accidents occurring in 2010

In this section we give an update on some major accidents that we reported on last year. We have included these occurrences either because of the significant consequences of the accident or because they have had a major impact on safety regulations. The accidents are listed in order of occurrence.

Closed investigations of 2010 major accidents

Event	Level-crossing accident
Date, time and location	15 April 2010, 11:32, Chintulovo, Bulgaria
Outcomes	2 fatalities, 1 serious injury
Investigation closed	May 2010
Final report	*http://pdb.era.europa.eu/safety_docs/naib/view.aspx?id=1839*
Main causes	Third party: level crossing user.

Event	Train derailment + consequent collision with obstacle
Date, time and location	28 June 2010, 16:43, Ustí nad Labem, Czech Republic
Outcomes	1 fatality, 7 serious injuries
Investigation closed	28 June 2011
Final report	*http://pdb.era.europa.eu/safety_docs/naib/view.aspx?id=2408*
Main causes	Train driven at speed above the permitted limit. The driver was not fit to drive according to the requirements in force.

Event	Derailment of a freight train
Date, time and location	16 June 2010, 03:07, Braz, Austria
Outcomes	1 serious injury, damage estimated at EUR 6.5 million
Investigation closed	9 March 2011
Final report	*http://pdb.era.europa.eu/safety_docs/naib/view.aspx?id=2436*
Main causes	Technical fault in braking valve.

Event	Accident to unauthorised persons
Date, time and location	23 June 2010, 23:23, Platja de Castelldefels, Spain
Outcomes	12 fatalities, 10 serious injuries
Investigation closed	31 January 2011
Final report	*http://pdb.era.europa.eu/safety_docs/naib/view.aspx?id=2184*
Main causes	The victims crossed the tracks at an unauthorised place, unaware of the approach of the train.

Event	Trains collision
Date, time and location	13 July 2010, 9:12, Kępice-Korzybie, Poland
Outcomes	13 serious injuries, considerable material damage
Investigation closed	5 July 2011
Final report	*http://pdb.era.europa.eu/safety_docs/naib/view.aspx?id=2387*
Main causes	SPAD leading to departure from the station without authorisation. Several procedures were not followed.

Event	Freight train collision and fire
Date, time and location	8 November 2010, 05:30, Białystok, Poland
Outcomes	No personal injuries, considerable material damage
Investigation closed	December 2011
Final report	*http://pdb.era.europa.eu/safety_docs/naib/view.aspx?id=2637*
Main causes	Operational procedures were not followed.

Event	Train collision
Date, time and location	25 July 2010, 23:30, Stavoren, Netherlands
Outcomes	No injury, considerable damage
Investigation closed	September 2010
Final report	*https://pdb.era.europa.eu/safety_docs/naib/view.aspx?id=2575*
Main causes	Failure to obey the stop signal (ATP and driver failures).

Open investigations of 2010 major accidents

The Agency has not yet received the final reports on the investigations of several major accidents that occurred in 2010 and were listed in the previous year report. By the end of 2011, the investigations into the following accidents were still open: Head-on trains collision at Buizingen (BE) with 18 fatalities and the train collision at Spišská Nová Ves (SK) with three fatalities. Similarly, the investigation of the railway accident in Viareggio (IT) that occurred in 2009 and led to the death of 32 persons has not yet been concluded (by the end of 2011). The Agency is aware of the complex nature of these cases; however, we are concerned about the length of time required to finalise these investigations.

MANAGING SAFETY

Introduction

The RSD foresees a number of concrete instruments for effective railway safety management. They include EU regulatory framework, safety certification and safety assessment.

Safety regulation

In several Member States, the safety regulatory framework is still undergoing significant development. The evaluation of the national measures transposing the RSD in the Member States that the Agency is carrying out is at an advanced stage. Some of the major remarks relate to the setting-up and independence of the NSAs and NIBs, the development of the safety management system, the Part A and Part B safety certificates and the investigation of accidents, including the follow-up of investigation recommendations. While these findings are quite serious, it is important to keep in mind that some Member States have not yet completed their notifications of national legislation, which were the basis for the evaluation.

The transparency and availability of the national safety rules used by the RUs operating on the railway network is a prerequisite for opening the market without creating safety barriers. The RSD requires Member States to notify the Commission of new and amended national safety rules ([28]). The Agency evaluates these notifications in the Commission's public database, NOTIF-IT. The Commission monitors the introduction of new national rules in order to prevent new barriers to market opening.

The long-term objective of the railway safety directive is the gradual reduction of national rules in order to move towards a more harmonised European approach to safety.

As a considerable number of common requirements have now been enacted at EU level, it is timely to review and clarify the scope that remains for national safety rules in the Member States. Also, as substantiated by Agency reports and feedback from the sector, there is a need to increase transparency in how national safety rules are established, published and made available. These two issues are being considered by the Task Force on National Safety Rules set up under the auspices of the Railway Interoperability and Safety Committee (RISC) in December 2010. The Task Force will develop guidance with examples of good practice by the end of 2012.

([28]) Article 8(4) of the RSD.

Safety certification

The RSD requires RUs to hold a safety certificate issued by the NSA to access the railway infrastructure. Similarly, IMs must obtain a safety authorisation from the NSA to manage and operate a rail infrastructure in a Member State. The NSA assesses the conformity of the SMS of RUs and IMs applying for safety certification or safety authorisation against the requirements set out in the Commission Regulation (EU) 1158/2010 and Commission Regulation (EU) 1169/2010. For the RUs, this leads to a Part A safety certificate, which is valid throughout the EU. However, the RUs will also need to obtain Part B certificates for each Member State in which they operate as this certificate relates to specific requirements for safe operation on the relevant network.

A total of 609 safety certificates (Parts A and B together), issued in accordance with the RSD had been validated by the ERA and given the status 'active' in the ERADIS database by the end of November 2011. This figure includes all new, renewed, updated or amended (but not revoked) safety certificates.

Figure 23 shows the number of safety certificates issued by NSAs in the Member States. The NSAs in Romania, the Czech Republic and Poland have issued the most certificates, while in some countries with relatively high levels of train-kilometres, fewer certificates have been issued. For all Member States, safety certificates issued under Directive 2001/14/EC must have been replaced by 1 January 2011 with safety certificates issued according to the RSD and Commission Regulation (EC) No 653/2007. Figure 23 already may help to provide a picture of the size of the railway market within the EU.

It is also evident that there is an imbalance between the number of Part A safety certificates issued compared with the number of Part B safety certificates. In some Member States, more Part B certificates have been issued than Part A certificates. Unless the railway undertaking is operating across borders, then the number of Part A certificates issued should be the same as the number of Part B certificates. Possibly this is the result of a misinterpretation of the RSD; in some Member States, Part B certificates may have been issued for specific lines or even a part of a line rather than for the 'relevant network'. In some cases, Member States have not notified the ERA of the number of Part B certificates issued, because they are unaware of the change in reporting brought in by Commission Regulation (EC) No 653/2007. This may present problems on the accuracy and comprehensiveness of the safety certification data in the ERADIS database, which is an important tool for the monitoring of railway safety and access to the market for railway undertakings within the EU.

Figure 23 _ Number of validated safety certificates Parts A and B per Member State (28 November 2011)

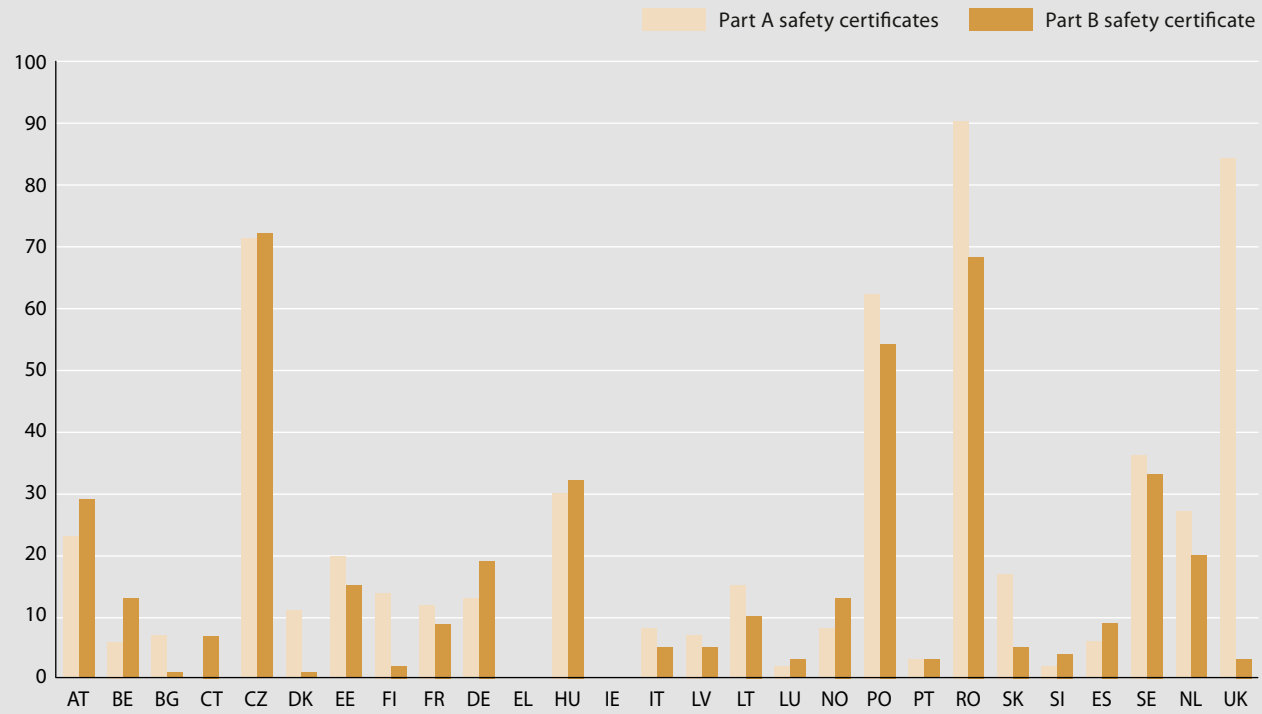
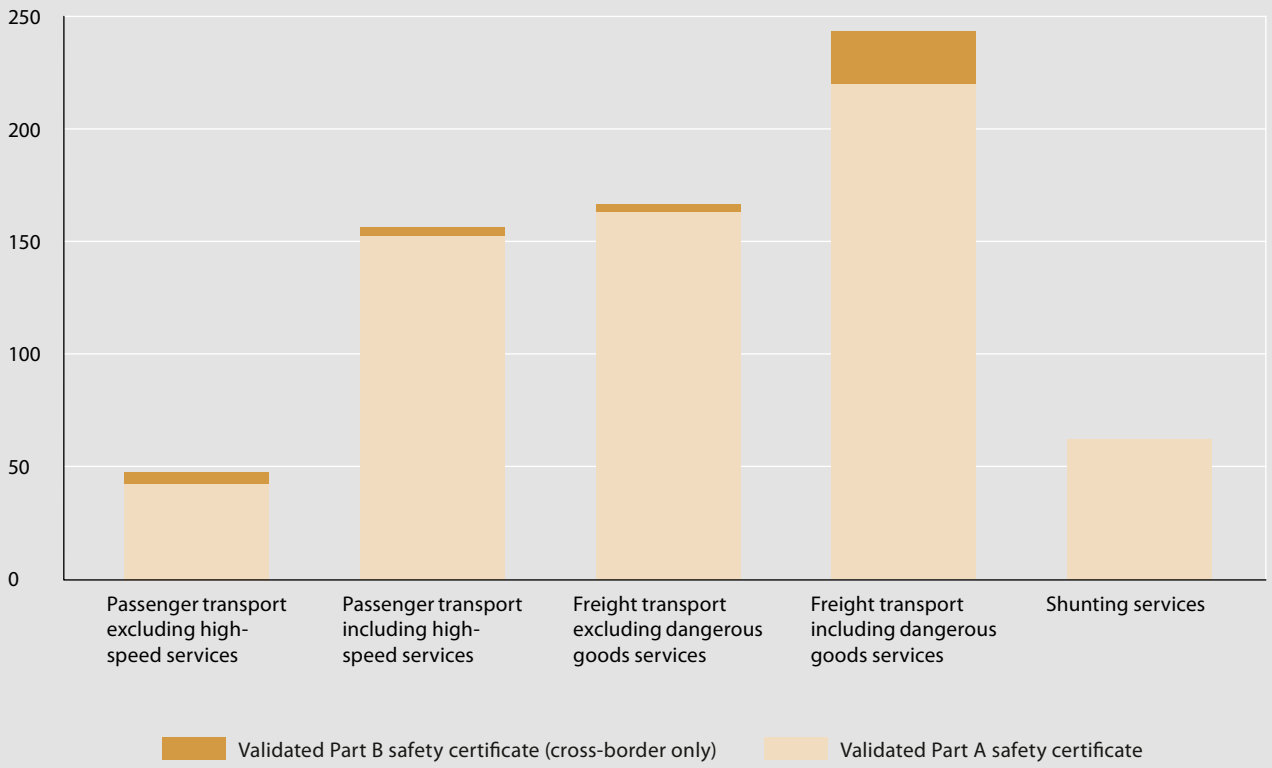


Figure 24 _ Number of validated safety certificates Parts A and B, international operations only, per type of service (28 November 2011)



Freight transport (both including and excluding dangerous goods) and passenger transport (excluding high-speed services) are the main services delivered by the railway undertakings within the EU. Figure 24 shows that the major trend is in the international transport of dangerous goods. Shunting services are limited to domestic use.

The relatively low number of Part B safety certificates issued for international passenger operators do not appear to accurately reflect the actual number of such operators. Part B safety certificates issued to date to RUs delivering international passenger transport services (other from where their respective Part A was obtained) are granted by the following Member States: Austria for RTS Rail Transport Service GmbH and DB Regio AG; France and Belgium for Eurostar International Ltd; Germany for Salzburg AG; Norway for SJ AB; Spain for SNCF; and the Netherlands for DB Regio NRW GmbH and Rurtalbahn Benelux BV.

LOOKING FORWARD

In 2011, safety performance on the EU railways continued to improve. However, changes to reporting procedures in some Member States make it difficult to draw definitive conclusions on safety developments. In 2012, it will be possible to verify whether the developments are stable and that safety is improving. During 2012, there will also be a second assessment of the achievement of the second set of CSTs, which will enable the Agency to validate the findings presented in this report.

The ERA will finalise the development of measures required by the RSD and the Agency regulation ([29]). This will lead to a change in the role of the Agency: the future focus of our work will be on making the existing regulatory framework function better. We have already started to work towards this objective by setting up the NSA cross-audit programme, the planned assessments of the NIBs, the development of guidance and a training programme for accident investigators, the evaluation of the national transpositions of the European directives — the railway safety directive and the interoperability directive (2008/57/EC) — and the evaluation of the notification of national safety rules. Now the Agency and in particular the Safety Unit will progress step by step from the developmental phase towards a monitoring, disseminating and coordinating role.

In 2012, the Agency will continue its work with developing and monitoring the implementation of safety management systems in the sector organisations. The effective implementation of SMSs is the key to safe and responsible operation in a changing and open market. The Agency will work closely with the sector organisations to collect information on the implementation of SMSs and to determine how we can support the development of a safety culture to maintain and improve railway safety, for example through the Agency seminars organised in the Member States on SMSs and on the common safety method for conformity assessment.

The Agency will continue to contribute to the Instrument for Pre-Accession (IPA) project, where we provide technical assistance to candidate and potential candidate countries in the western Balkans and Turkey in order to prepare them for active participation in the Agency's activities, once their respective transport policy chapters have been closed.

([29]) Regulation (EC) No 881/2004 of the European Parliament and of the Council of 29 April 2004 establishing a European railway agency (OJ L 220, 21.6.2004, p. 3).

ANNEX 1 _ COMMON SAFETY INDICATORS

Content

Legend

- Natural variation
- Natural variation due to a single accident
- Change of definition or reporting procedureUnauthorised persons
- Unknown reason for variation
- Further detailed explanation available

Table 1 _ Fatalities by category of person

ID	Victim types - fatalities	Years	AT	BE	BG	CT	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	NL	NO	PL	PT	RO	SE	SI	SK	UK	Total	Total EU
PK00	Passengers	2007	1	9	2	0	0	3	0	0	0	13	0	9	14	0	5	0		0	0	0	9	1	0	0	0	1	3	70	70
		2008	2	2	12	0	13	1	0	0	1	5	0	10	10	0	4	0		0	1	0	8	3	15	0	0	2	0	89	89
		2009	1	2	1	0	1	3	0	0	0	2	0	7	0	0	5	0	0	1	0	0	8	0	4	0	0	2	0	37	37
		2010	0	18	0	0	2	0	0	0	1	15	0	2	3	0	7	0	0	0	0	0	7	1	4	2	0	0	0	62	62
SK00	Employees	2007	3	3	1	0	1	9	0	1	0	0	1	2	3	0	3	0		1	0	0	3	5	0	0	0	0	2	38	38
		2008	2	1	1	0	4	8	0	0	2	1	0	2	1	0	5	2		2	0	0	1	1	4	0	0	0	1	38	38
		2009	0	1	1	0	0	4	1	2	1	0	1	1	1	0	5	1	1	1	1	0	1	1	3	0	1	0	1	29	29
		2010	0	1	2	0	5	8	0	1	0	3	1	1	2	0	5	0	0	0	0	0	6	1	4	2	0	2	0	44	44
LK00	Level-crossing users	2007	33	19	5	0	23	67	5	6	5	19	10	38	26	1	16	6		4	19	0	81	20	55	9	9	15	13	504	504
		2008	17	10	4	0	24	50	3	1	6	15	8	38	42	1	6	6		6	18	0	39	15	38	4	4	11	14	380	380
		2009	12	8	4	0	21	41	3	3	13	16	11	36	28	0	5	8	1	2	13	2	72	17	40	6	7	25	13	407	405
		2010	13	9	8	0	34	44	4	2	12	9	8	29	30	2	11	5	0	5	8	3	54	11	35	7	6	9	4	362	359
UK00	Unauthorised persons	2007	14	7	19	0	1	88	3	0	13	33	7	20	35	1	44	30		21	1	2	260	32	131	14	8	40	33	857	855
		2008	18	8	27	0	3	78	8	7	8	23	13	40	62	2	49	32		15	1	1	260	23	151	9	9	41	41	929	928
		2009	19	5	22	0	4	103	11	5	8	13	2	31	63	1	36	24	0	8	0	3	284	14	103	13	3	44	36	855	852
		2010	17	5	6	0	6	80	6	9	16	10	4	37	47	1	48	26	0	13	0	3	216	9	96	31	7	44	16	753	750
OK00	Other persons	2007	1	0	0	0	0	13	0	7	0	0	0	13	2	0	0	0		2	0	0	4	0	0	0	0	1	7	50	50
		2008	0	0	0	0	0	27	1	0	0	2	0	4	0	0	0	0		6	0	0	0	0	0	0	0	2	2	44	44
		2009	2	0	0	0	0	19	0	0	0	0	0	1	0	0	30	0	1	5	0	1	0	0	0	0	0	1	3	63	62
		2010	0	11	0	0	1	14	0	0	0	0	0	0	0	0	0	0	0	4	2	3	0	0	0	0	1	3	5	44	41
TK00	Total persons	2007	52	38	27	0	25	180	8	14	18	65	18	82	80	2	68	36		28	20	2	357	58	186	23	17	57	58	1 519	1 517
		2008	39	21	44	0	44	164	12	8	17	46	21	94	115	3	64	40		29	20	1	308	42	208	13	13	56	58	1 480	1 479
		2009	34	16	28	0	26	170	15	10	22	31	14	76	92	1	81	33	3	17	14	6	365	32	150	19	11	72	53	1 391	1 385
		2010	30	44	16	0	48	146	10	12	29	37	13	69	82	3	71	31	0	22	10	9	283	22	139	42	14	58	25	1 265	1 256
R01	No of train-km (million)	2007	155.0	103.6	36.0	6.5	152.9	1 048.7	78.7	7.6	19.9	185.6	52.6	529.5	114.0	16.8	370.0	15.0		18.6	140.0	47.4	223.0	41.0	96.3	134.3	19.2	51.0	521.3	4 184	4 137
		2008	158.4	92.9	35.1	5.5	175.0	1 043.5	82.0	7.1	21.2	192.8	53.3	541.0	109.0		366.9	15.8		19.5	139.0	46.8	224.4	41.8	96.1	138.2	20.1	49.3	549.1	4 224	4 177
		2009	152.3	91.9	31.5	5.7	163.2	1 002.9	82.2	6.8	19.6	188.1	50.0	504.0	106.3		350.5	14.1	8.1	18.7	132.0	43.3	208.6	40.6	88.5	143.1	18.2	45.0	568.6	4 084	4 040
		2010	156.1	98.0	30.6	5.7	160.2	1 032.0	83.1	8.9	17.0	186.7	51.0	484.8	97.4	17.7	324.0	14.1	8.2	16.6	146.2	46.5	219.1	40.0	93.5	141.3	18.8	47.5	520.0	4 065	4 019
R02	No of passenger-km (million)	2007	9 149	9 932	2 423	1	6 907	79 100	6 353	274	1 930	20 584	3 778	78 740	10 080	2 007	49 090	409		983	16 400	2 860	19 374	3 990	6 724	10 296	812	2 148	50 474	394 817	391 958
		2008	10 600	10 403	2 334		6 659	82 500	6 474	274	1 657	22 074	4 052	87 000	8 288	1 976	49 408	397		951	16 500	2 860	20 144	4 154	6 956	10 838	834	2 279	53 002	412 613	409 753
		2009	10 500	10 493	2 144		6 472	81 612	6 389	232	1 414	21 729	3 876	83 260	7 945	1 681	46 426	357	333	747	16 800	2 996	18 577	4 152	6 177	11 216	840	2 247	52 765	401 379	398 383
		2010	10 700	10 493	2 100	497	6 553	83 702	6 587	456	1 144	20 978	3 959	81 750	7 666	1 678	43 474	373	350	741	16 621	3 153	17 800	4 111	5 500	11 036	813	2 291	55 831	400 355	397 202

Table 2 _ Serious injuries by category of person

ID	Victim types - Serious injuries	Years	AT	BE	BG	CT	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	NL	NO	PL	PT	RO	SE	SI	SK	UK	Total	Total EU
PS00	Passengers	2007	8	41	6	0	18	20	3	0	5	11	0	10	37	0	10	0		1	2	1	67	5	6	1	1	4	13	270	269
		2008	6	36	8	1	40	30	3	0	9	3	0	14	28	0	5	0		2	0	1	44	6	26	3	11	5	1	282	281
		2009	9	10	10	1	9	13	5	0	0	2	0	14	43	1	35	0	0	2	1	1	49	4	20	2	2	0	2	235	234
		2010	4	171	0	0	14	8	1	0	3	14	0	12	29	0	6	0	0	0	5	0	35	3	14	10	1	17	7	354	354
SS00	Employees	2007	9	27	2	0	0	25	1	0	2	2	0	5	3	0	5	0		0	1	1	9	2	3	3	6	2	3	111	110
		2008	12	28	2	0	4	33	2	0	2	1	3	4	1	0	4	1		2	1	0	5	2	7	1	10	1	5	131	131
		2009	9	1	0	0	2	18	2	0	3	0	0	3	0	0	7	0	0	2	1	1	9	2	2	4	2	0	3	71	70
		2010	14	4	1	0	3	18	0	0	3	2	0	4	1	0	5	0	0	0	0	0	10	2	12	5	0	3	6	93	93
LS00	Level-crossing users	2007	34	25	8	0	41	55	2	13	22	4	2	7	27	0	4	7		4	7	2	107	8	69	8	15	13	1	485	483
		2008	23	16	6	0	42	32	2	0	12	2	1	14	16	0	8	4		7	5	0	113	10	74	1	0	15	5	408	408
		2009	27	6	1	0	33	22	0	1	16	4	3	22	11	0	0	3	0	4	4	0	50	5	50	7	7	14	2	292	292
		2010	23	4	9	0	45	32	4	10	8	3	3	17	22	0	3	2	0	5	1	1	52	3	65	5	7	2	2	328	327
US00	Unauthorised persons	2007	5	4	17	0	42	34	5	0	7	9	1	12	25	1	21	6		10	0	1	93	18	106	2	8	17	7	451	450
		2008	12	2	22	0	52	38	2	5	6	13	2	6	15	0	21	8		15	0	0	111	20	126	1	20	15	6	518	518
		2009	9	1	11	0	48	39	7	6	3	5	7	21	30	0	16	9	0	1	0	1	89	7	115	2	3	20	7	457	456
		2010	8	1	12	0	45	29	3	0	6	8	5	11	18	0	18	13	0	7	3	0	91	8	91	5	4	17	6	409	409
OS00	Other persons	2007	4	1	0	0	0	23	0	6	0	0	0	12	0	1	0	0		2	0	0	0	1	1	0	0	0	7	58	58
		2008	0	1	0	0	1	23	0	0	0	0	0	2	0	1	0	0		5	0	0	4	1	0	0	0	2	4	44	44
		2009	6	0	0	0	0	26	1	0	0	1	0	1	0	0	13	0	0	3	3	1	2	0	0	0	0	1	1	59	58
		2010	0	6	0	0	0	29	0	4	0	0	0	2	0	0	0	0	0	3	1	4	0	0	0	0	0	6	2	57	53
TS00	Total persons	2007	60	98	33	0	101	157	11	19	36	26	3	46	92	2	40	13		17	10	5	276	34	185	14	30	36	31	1 375	1 370
		2008	53	83	38	1	139	156	9	5	29	19	6	40	60	1	38	13		31	6	1	277	39	233	6	41	38	21	1 383	1 382
		2009	60	18	22	1	92	118	15	7	22	12	10	61	84	1	71	12	0	12	9	4	199	18	187	15	14	35	15	1 114	1 110
		2010	49	186	22	0	107	116	8	14	20	27	8	46	70	0	32	15	0	15	10	5	188	16	182	25	12	45	23	1 241	1 236
R01	No of train-km (million)	2007	155.00	103.59	36.03	6.53	152.89	1 048.70	78.70	7.55	19.91	185.57	52.58	529.54	114.00	16.83	370.00	14.99		18.58	140.00	47.39	223.03	40.98	96.26	134.35	19.16	51.00	521.29	4 184	4 137
		2008	158.40	92.90	35.08	5.54	174.96	1 043.50	82.00	7.13	21.16	192.76	53.26	541.00	109.00		366.86	15.82		19.53	139.00	46.84	224.36	41.76	96.15	138.19	20.10	49.33	549.07	4 224	4 177
		2009	152.30	91.87	31.49	5.65	163.19	1 002.92	82.15	6.82	19.61	188.13	50.02	504.00	106.29		350.55	14.05	8.06	18.73	132.00	43.28	208.64	40.58	88.50	143.09	18.21	44.96	568.57	4 084	4 040
		2010	156.10	98.00	30.64	5.71	160.20	1 032.00	83.08	8.93	16.96	186.71	51.00	484.76	97.40	17.69	323.96	14.13	8.16	16.63	146.23	46.47	219.06	40.00	93.52	141.33	18.84	47.54	520.02	4 065	4 019
R02	No of passenger-km (million)	2007	9 149	9 932	2 423	1	6 907	79 100	6 353	274	1 930	20 584	3 778	78 740	10 080	2 007	49 090	409		983	16 400	2 860	19 374	3 990	6 724	10 296	812	2 148	50 474	394 817	391 958
		2008	10 600	10 403	2 334		6 659	82 500	6 474	274	1 657	22 074	4 052	87 000	8 288	1 976	49 408	397		951	16 500	2 860	20 144	4 154	6 956	10 838	834	2 279	53 002	412 613	409 753
		2009	10 500	10 493	2 144		6 472	81 612	6 389	232	1 414	21 729	3 876	83 260	7 945	1 681	46 426	357	333	747	16 800	2 996	18 577	4 152	6 177	11 216	840	2 247	52 765	401 379	398 383
		2010	10 700	10 493	2 100	497	6 553	83 702	6 587	456	1 144	20 978	3 959	81 750	7 666	1 678	43 474	373	350	741	16 621	3 153	17 800	4 111	5 500	11 036	813	2 291	55 831	400 355	397 202

Table 3 _ Fatalities by type of accident and victim category 2010

ID	Accident types	Victim types - fatalities	AT	BE	BG	CT	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	NL	NO	PL	PT	RO	SE	SI	SK	UK	Total	Total EU
TK01	Collisions of trains	Total	0	19	0	0	1	0	0	1	1	2	0	0	1	1	0	0	0	0	0	3	0	0	3	1	0	3	0	36	33
PK01		Passengers	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	19	19
SK01		Employees	0	1	0	0	0	0	0	1	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	6	6
LK01		Level-crossing users	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
UK01		Unauthorised persons	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	4	4
OK01		Other persons	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	2	0	6	3
TK02	Derailments of trains	Total	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
PK02		Passengers	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
SK02		Employees	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
LK02		Level-crossing users	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UK02		Unauthorised persons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OK02		Other persons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TK03	Level-crossing accidents	Total	13	18	9	0	34	45	4	2	12	10	8	27	30	0	11	5	0	5	8	3	55	11	35	7	10	9	4	375	372
PK03		Passengers	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
SK03		Employees	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3	3
LK03		Level-crossing users	13	9	8	0	34	44	4	2	12	9	8	27	30	0	11	5	0	5	8	3	54	11	35	7	6	9	4	358	355
UK03		Unauthorised persons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	4
OK03		Other persons	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	9
TK04	Accidents to persons caused by rolling stock in motion	Total	15	7	7	0	12	101	6	9	15	25	5	37	49	2	60	26	0	17	2	3	228	11	97	34	3	46	21	817	835
PK04		Passengers	0	0	0	0	2	0	0	0	0	14	0	2	3	0	7	0	0	0	0	0	7	1	4	1	0	0	0	41	41
SK04		Employees	0	0	1	0	4	7	0	0	0	1	1	0	0	0	5	0	0	0	0	0	5	1	1	2	0	1	0	29	29
LK04		Level-crossing users	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
UK04		Unauthorised persons	15	5	6	0	6	80	6	9	15	10	4	34	46	1	48	26	0	13	0	3	216	9	92	31	3	44	16	722	735
OK04		Other persons	0	2	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	4	2	0	0	0	0	0	0	1	5	23	28
TK05	Fires in rolling stock	Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	2
PK05		Passengers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SK05		Employees	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
LK05		Level-crossing users	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
UK05		Unauthorised persons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OK05		Other persons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TK06	Other accidents	Total	2	0	0	0	0	0	0	0	0	0	0	4	2	0	0	0	0	0	0	0	0	0	3	0	1	0	0	12	12
PK06		Passengers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SK06		Employees	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	4	4
LK06		Level-crossing users	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UK06		Unauthorised persons	2	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	7	7
OK06		Other persons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1

Table 4 _ Serious injuries by type of accident and victim category 2010

ID	Accident types	Victim types - fatalities	AT	BE	BG	CT	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	NL	NO	PL	PT	RO	SE	SI	SK	UK	Total	Total EU
TS01	Collisions of trains	Total	3	171	0	0	1	4	0	0	2	1	0	1	1	0	1	0	0	0	0	4	13	0	14	9	0	15	0	240	236
PS01		Passengers	2	169	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	8	0	11	0	203	203
SS01		Employees	1	2	0	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	4	0	8	1	0	3	0	23	23
LS01		Level-crossing users	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
US01		Unauthorised persons	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	8	8
OS01		Other persons	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	1	0	6	2
TS02	Derailments of trains	Total	2	0	0	0	9	1	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	18
PS02		Passengers	0	0	0	0	8	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	11
SS02		Employees	2	0	0	0	1	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	7
LS02		Level-crossing users	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
US02		Unauthorised persons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OS02		Other persons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TS03	Level-crossing accidents	Total	23	8	10	0	45	37	4	10	8	6	3	19	22	0	4	2	0	5	1	1	56	3	65	6	11	6	6	361	360
PS03		Passengers	0	0	0	0	0	1	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	8	8
SS03		Employees	0	0	1	0	0	4	0	0	0	1	0	0	0	0	1	0	0	0	0	0	4	0	0	1	0	0	1	13	13
LS03		Level-crossing users	23	4	9	0	45	32	4	10	8	3	3	17	22	0	3	2	0	5	1	1	52	3	65	5	7	2	2	328	327
US03		Unauthorised persons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	4
OS03		Other persons	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	8	8
TS04	Accidents to persons caused by rolling stock in motion	Total	14	6	12	0	52	68	4	4	4	20	5	25	47	0	25	13	0	10	6	0	118	13	93	9	1	24	14	573	587
PS04		Passengers	2	2	0	0	5	4	1	0	0	12	0	10	29	0	6	0	0	0	2	0	26	3	12	2	1	6	4	123	127
SS04		Employees	5	1	0	0	2	7	0	0	0	0	0	2	0	0	1	0	0	0	0	0	1	2	2	2	0	0	2	25	27
LS04		Level-crossing users	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
US04		Unauthorised persons	7	1	12	0	45	29	3	0	4	8	5	11	18	0	18	13	0	7	3	0	91	8	79	5	0	17	6	384	390
OS04		Other persons	0	2	0	0	0	28	0	4	0	0	0	2	0	0	0	0	0	3	1	0	0	0	0	0	0	1	2	41	43
TS05	Fires in rolling stock	Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2
PS05		Passengers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2
SS05		Employees	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LS05		Level-crossing users	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
US05		Unauthorised persons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OS05		Other persons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TS06	Other accidents	Total	7	1	0	0	0	6	0	0	0	0	0	1	0	0	2	0	0	0	3	0	1	0	8	1	0	0	3	30	33
PS06		Passengers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3	3
SS06		Employees	6	1	0	0	0	6	0	0	0	0	0	1	0	0	2	0	0	0	0	0	1	0	2	1	0	0	3	20	23
LS06		Level-crossing users	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
US06		Unauthorised persons	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	7	7
OS06		Other persons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 5 _ Total and relative number of suicides

ID	Category	Year	AT	BE	BG	CT	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	NL	NO	PL	PT	RO	SE	SI	SK	UK	Total	Total EU
N07	Total No of suicides	2007	113	94	39	0	150	706	32	0	4	188	54	344	111	5	138	0		10	193	8	28	52	24	78	14	48	197	2 630	2 622
		2008	93		27	0	160	714	24	1	1	174	52	289	111	7	137	0		9	164	7	29	50	29	71	20	58	202	2 429	2 422
		2009	101	69	19	0	185	875	32	0	3	163	62	337	139	2	111	2	4	10	197	8	25	69	25	67	10	56	210	2 781	2 773
		2010	90	84	18	0	198	899	23	0	2	124	44	328	121	6	109	4	3	13	201	7	47	51	23	68	15	48	224	2 750	2 743
N17	Relative to train-km, No of suicides	2007	0.729	0.907	1.082	0.000	0.981	0.673	0.407	0.000	0.201	1.013	1.027	0.650	0.974	0.297	0.373	0.000		0.538	1.379	0.169	0.126	1.269	0.249	0.581	0.731	0.941	0.378		
		2008	0.587		0.770	0.000	0.914	0.684	0.293	0.140	0.047	0.903	0.976	0.534	1.018		0.373	0.000		0.461	1.180	0.149	0.129	1.197	0.302	0.514	0.995	1.176	0.368		
		2009	0.663	0.751	0.603	0.000	1.134	0.872	0.390	0.000	0.153	0.866	1.240	0.669	1.308		0.317	0.142	0.496	0.534	1.492	0.185	0.120	1.700	0.282	0.468	0.549	1.246	0.369		
		2010	0.577	0.857	0.588		1.236	0.871	0.277	0.000	0.118	0.664	0.863	0.677	1.242	0.339	0.336	0.283	0.368	0.782	1.375	0.151	0.215	1.275	0.246	0.481	0.796	1.010	0.431		
R01	Train-km	2007	155.0	103.6	36.0	6.5	152.9	1 048.7	78.7	7.6	19.9	185.6	52.6	529.5	114.0	16.8	370.0	15.0		18.6	140.0	47.4	223.0	41.0	96.3	134.3	19.2	51.0	521.3	4 184	4 137
		2008	158.4	92.9	35.1	5.5	175.0	1 043.5	82.0	7.1	21.2	192.8	53.3	541.0	109.0		366.9	15.8		19.5	139.0	46.8	224.4	41.8	96.1	138.2	20.1	49.3	549.1	4 224	4 177
		2009	152.3	91.9	31.5	5.7	163.2	1 002.9	82.2	6.8	19.6	188.1	50.0	504.0	106.3		350.5	14.1	8.1	18.7	132.0	43.3	208.6	40.6	88.5	143.1	18.2	45.0	568.6	4 084	4 040
		2010	156.1	98.0	30.6	5.7	160.2	1 032.0	83.1	8.9	17.0	186.7	51.0	484.8	97.4	17.7	324.0	14.1	8.2	16.6	146.2	46.5	219.1	40.0	93.5	141.3	18.8	47.5	520.0	4 065	4 019

Table 6 _ Dangerous goods accidents in 2010

ID	Category	Year	AT	BE	BG	CT	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	NL	NO	PL	PT	RO	SE	SI	SK	UK	Total	Total EU
N18	Total No of accidents involving at least one railway vehicle transporting dangerous goods	2010	0	2	0	0	0	4	2	0	0	1	0	0	0	0	5	3	0	2	0	0	32	1	2	0	0	0	0	54	54
N19	No of accidents involving at least one railway vehicle transporting dangerous goods in which dangerous goods are NOT released	2010	0	0	0	0	0	2	1	0	0	1	0		0	0	0	3	0	0	0	0	8	1	1	0	0	0	0	17	17
N20	No of accidents involving at least one railway vehicle transporting dangerous goods in which dangerous goods ARE released	2010	0	2	0	0	0	2	1	0	0	0	0		0	0	5	0	0	2	0	0	24	0	1	0	0	0	0	37	37

Table 7 _ Number of accidents by type of accident

ID	Accident types	Year	AT	BE	BG	CT	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	NL	NO	PL	PT	RO	SE	SI	SK	UK	Total	Total EU
N01	Collisions of trains	2007	4	77	3	0	3	15	0	0	3	4	0	85	5	0	4	6		0	4	4	6	3	0	1	0	14	12	253	249
		2008	3	94	3	0	5	13	0	0	1	4	0	97	1	0	2	1		1	2	6	8	0	0	4	4	12	8	269	263
		2009	5	34	3	0	5	16	1	0	2	1	0	7	0	1	7	4	0	1	2	6	18	0	2	1	1	6	17	140	134
		2010	3	5	2	0	3	13	1	1	4	2	0	15	1	0	2	0	1	1	5	9	4	2	10	3	0	13	8	108	99
N02	Derailments of trains	2007	3	17	1	0	3	7	0	1	8	12	0	68	7	0	10	27		0	0	0	132	3	0	11	5	11	20	346	346
		2008	7	21	0	0	2	12	0	2	2	15	1	97	1	1	10	1		0	1	3	105	3	1	14	0	6	14	319	316
		2009	1	41	0	0	3	7	0	0	2	7	2	14	1	0	6	1	0	0	2	3	63	1	1	7	0	3	12	177	174
		2010	2	2	1	0	3	19	1	0	2	7	1	14	1	0	3	1	0	0	3	4	17	3	0	7	0	2	6	99	95
N03	Level-crossing accidents	2007	55	76	10	0	48	97	7	33	22	19	11	115	54	2	23	13		9	26	2	325	27	91	14	32	71	14	1 196	1 194
		2008	36	56	9	0	53	76	5	12	17	18	9	115	44	1	16	19		10	21	0	278	20	86	6	41	63	23	1 034	1 034
		2009	36	31	5	0	42	64	2	7	26	19	12	49	39	1	7	14	5	8	13	2	288	15	57	13	11	51	16	833	831
		2010	33	17	10	0	57	73	9	17	16	11	9	36	42	2	15	6	2	10	9	3	86	14	58	14	16	50	7	622	619
N04	Accidents to persons caused by rolling stock in motion	2007	27	30	42	0	59	184	10	14	20	63	9	77	92	2	85	36		37	3	2	418	56	245	20	19	63	61	1 674	1 672
		2008	35	25	52	1	72	193	13	12	19	43	14	57	79	3	83	42		45	1	2	397	49	314	13	14	78	57	1 713	1 711
		2009	37	34	40	1	62	201	21	12	11	22	10	64	136	2	83	33	2	19	4	4	400	27	235	20	2	74	49	1 605	1 601
		2010	29	15	20	0	61	166	10	13	17	24	10	64	96	1	80	37	0	27	5	3	341	22	190	38	4	116	34	1 423	1 420
N05	Fires in rolling stock	2007	1	17	0	0	1	3	0	1	0	0	1	37	3	0	5	1		0	0	1	7	0	0	4	0	22	3	107	106
		2008	0	24	1	1	1	6	0	0	1	0	0	24	0	0	2	5		0	0	3	9	0	0	3	0	8	0	88	85
		2009	1	6	0	0	1	4	0	0	0	0	0	16	1	0	9	3	0	0	0	1	3	0	0	1	0	14	6	66	65
		2010	0	0	0	1	0	2	0	0	0	0	0	6	0	0	0	0	0	0	1	1	0	0	2	0	0	9	2	24	23
N06	Other accidents	2007	14	0	0	0	1	14	4	0	0	0	0	31	1	1	3	0		5	0	3	88	4	34	6	5	41	0	255	252
		2008	16	0	0	0	0	29	4	0	0	0	3	63	30	0	3	0		5	1	0	92	1	10	6	6	50	2	321	321
		2009	8	0	0	0	0	18	5	0	1	2	2	21	3	1	7	0	0	2	1	0	71	0	9	4	5	88	4	252	252
		2010	12	1	6	0	1	24	1	0	0	1	3	20	2	0	3	0	0	3	1	0	1	1	11	7	1	41	5	145	145
N00	Total No accidents	2007	104	217	56	0	115	320	21	49	53	98	21	413	162	5	130	83		51	33	12	976	93	370	56	61	222	110	3 831	3 819
		2008	97	220	65	2	133	329	22	26	40	80	27	453	155	5	116	68		61	26	14	889	73	411	46	65	217	104	3 744	3 730
		2009	88	146	48	1	113	310	29	19	42	51	26	171	180	5	119	55	7		22	16	843	43	304	46	19	236	104	3 043	3 027
		2010	79	40	39	1	125	297	22	31	39	45	23	155	142	3	103	44	3	41	24	20	449	42	271	69	21	231	62	2 421	2 401
R01	No of train-km (million)	2007	155	104	36	7	153	1 049	79	8	20	186	53	530	114	17	370	15		19	140	47	223	41	96	134	19	51	521	4 184	4 137
		2008	158	93	35	6	175	1 044	82	7	21	193	53	541	109		367	16		20	139	47	224	42	96	138	20	49	549	4 224	4 177
		2009	152	92	31	6	163	1 003	82	7	20	188	50	504	106		351	14	8	19	132	43	209	41	89	143	18	45	569	4 084	4 040
		2010	156	98	31	6	160	1 032	83	9	17	187	51	485	97	18	324	14	8	17	146	46	219	40	94	141	19	48	520	4 065	4 019

Table 8 _ Number of precursors to accidents

ID	Precursors to accidents	Year	AT	BE	BG	CT	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	NL	NO	PL	PT	RO	SE	SI	SK	UK	Total	Total EU
I01	Broken rails	2007		98	92	13	21	407	32	7	269	54	21	323	654	1	430	62		5	31	10	2 484	39	319	187	57	5	192	5 813	5 803
		2008		281	67	8	4	536	14	7	223	70	19	309	716	3	84	1		4	31	36	2 396	33	380	218	79	10	170	5 699	5 663
		2009		30	185	3	15	591	40	16	172	103	25	294	10	4	404	1	12	10	58	44	1 506	35	414	235	94	15	146	4 462	4 418
		2010	211	67	69	15	5	599	49	9	143	97	50	379	734	5	368	4	1	7	111	101	1 461	50	591	62	114	165	197	5 664	5 563
I02	Trackbuckles	2007		0	25	0	0	68	6	0		171	7	177	4	1	3 113	40		1	13	14	17	40	3	102	11	2	5	3 820	3 806
		2008		0	10	0	0	40	8	0	110	218	3	194	8	0	41	0		3	8	17	19	37	0	87	16	0	16	835	818
		2009		0	6	0	0	38	2	111	89	415	1	163	0	3	677	0	7	4	9	37	22	44	3	115	8	1	28	1 783	1 746
		2010	172	5	1	0	0	71	4	0	44	506	14	160	8	0	573	1	1	0	14	11	23	56	0	68	16	9	29	1 786	1 775
I03	Wrong-side signalling failures	2007	7	1	10	0	0	0	193	0	0	5		277	0	1	0	245		0		0	0	0	0	6		6	550	1 301	1 301
		2008	3	1	13	0	0	0	119	0	0	6	2	277	8	2	2	39		0	18	1	52	0	0	12		2	901	1 458	1 457
		2009	0	2	0	0	0	0	43	75	0	4	0	287	0	2	0	44	2	0	18	0	21	0	0	9	0	1	6	514	514
		2010	4	2	0	0	0	0	61	23	0	6	0	321	0	0	1	0	3	1	17	2	16	1	1	1	0	57	10	527	525
I04	Signals passed at danger	2007	12	81	15	5	26	727	568	2	1	93	22	112	12	31	15	60		2	275	73	4 013	20	425	217	16	79	324	7 226	7 153
		2008	16	97	12	3	26	760	510	2	1	111	30	124	8	22	20	3		5	240	70	2 653	24	396	275	15	75	316	5 814	5 744
		2009	20	75	3	4	39	355	531	1	5	94	20	133	7	17	15	7	1	4	214	105	13	12	432	362	12	75	260	2 816	2 711
		2010	11	104	0	3	78	352	484	0	1	87	35	112	10	14	10	2	4	6	169	116	4 377	6	571	341	10	22	304	7 229	7 113
I05	Broken wheels	2007	2	1	17	0	0	6	22	0	1	0		2	0	0	0	0		9	0	39	66	0	2	2	0	1	0	170	131
		2008	0	1	13	0	0	1	7	0	1	0	0	0	0	0	0	1		2	0	6	57	0	0	1	0	0	0	90	84
		2009	0	0	0	0	1	2	14	0	0	0	0	0	1	0	1	9	0	1	0	0	105	0	0	0	0	0	0	134	134
		2010	0	0	1	0	2	4	13	0	1	0	0	2	1	0	5	0	0	0	0	5	23	0	0	4	0	0	0	61	56
I06	Broken Axles	2007	3	0	29	0	0	4	8	0	0	0		0	1	0	1	28		1	0	0	22	1	2	3	0	0	0	103	103
		2008	3	0	7	0	0	9	9	0	0	0	0	1	0	1	2	0		0	1	2	67	0	2	1	0	0	0	105	103
		2009	1	0	0	1	0	1	12	0	0	1	0	2	0	0	4	0	0	0	1	3	12	0	1	2	0	0	0	41	38
		2010	0	0	29	0	1	4		0	0	0	0	1	1	0	1	0	0	0	0	0	3	1	0	1	0	0	1	43	43
R01	No of train-km (million)	2007	155.0	103.6	36.0	6.5	152.9	1 048.7	78.7	7.6	19.9	185.6	52.6	529.5	114.0	16.8	370.0	15.0		18.6	140.0	47.4	223.0	41.0	96.3	134.3	19.2	51.0	521.3	4 184	4 137
		2008	158.4	92.9	35.1	5.5	175.0	1 043.5	82.0	7.1	21.2	192.8	53.3	541.0	109.0		366.9	15.8		19.5	139.0	46.8	224.4	41.8	96.1	138.2	20.1	49.3	549.1	4 224	4 177
		2009	152.3	91.9	31.5	5.7	163.2	1 002.9	82.2	6.8	19.6	188.1	50.0	504.0	106.3		350.5	14.1	8.1	18.7	132.0	43.3	208.6	40.6	88.5	143.1	18.2	45.0	568.6	4 084	4 040
		2010	156.1	98.0	30.6	5.7	160.2	1 032.0	83.1	8.9	17.0	186.7	51.0	484.8	97.4	17.7	324.0	14.1	8.2	16.6	146.2	46.5	219.1	40.0	93.5	141.3	18.8	47.5	520.0	4 065	4 019

Table 9 _ Economic impact of accidents

ID	Category	Year	AT	BE	BG	CT	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	NL	NO	PL	PT	RO	SE	SI	SK	UK	Total	Total EU
C00	Economic impact of ALL accidents (million €)	2007	0	0	0.67	0	3.84	0	13.74	0	2.12		35.32	0	0	0.11	0	18.54		0.34	0	6.38	5.37	60.25	0.58	79.53	0	1.99	189.68	418	412
		2008	0	0	0.63	130	10.08	0	23.60	0.18	2.19	0	42.24	0	0	0.80	0	20.58		3.55	0.09	6.98	2.86	47.70	1.54	55.49	0.30	2.81	129.26	481	474
		2009		39.49	0.69	0.23	0.30	0	47.30	7.11	32.67	0	29.82		0	18.80	127.24	20.82	8.16	0.79	54.53	0	221.06	32.34	0.68	59.50	13.69	2.12	232.71	950	950
		2010								20.05		96.79			58.07			17.77		13.64	74.86	9.73	231.51		159.54	183.82	13.25		204.49	1 084	1 074
C10	Economic impact of significant accidents ONLY (million €)	2007		0	0.02							101.62	0.67			0.01														102	102
		2008		0	0		0.06					0	0.79				0	1.30		0.18		0.15				0.40			0.24	3	3
		2009	89.88	0.43	0.02				43.60		30.69	0	0.60	161.17			0.36	1.48		0.04	0.41		1.06		0.01	0.42	0.75		107.60	439	439
		2010	103.34	147.58	16.95	0	128.45	409.50	29.73	19.72	38.09	85.93	30.61	144.80	57.22	7.59	123.05	17.70	1.22	13.35	24.95	5.80	197.44	26.32	158.98	109.15	11.62	52.31	66.46	2 028	2 022
C01	Economic impact of fatalities (million €)	2007			0	0	0.01		12.02	0		96.83	34.57					17.89		0		0	0.16	54.96	0	43.31	0	0	129.93	390	390
		2008			0	0	0.52		21.81	0			40.73					19.88		0.01	0.04	0	0.01	40.54	0	31.20		0	114.45	269	269
		2009	72.43	34.08	0	0	0.03		38.76	6.36	27.14		27.29	144.92			114.36	19.22	8.16	0.01	29.97	0	183.30	30.07	0	39.93	11.74	0	98.86	887	887
		2010	66.05	89.87	13.68	0	93.21	285.41	27.05	8.00	34.59	78.81	27.51	132.47	50.51	7.59	101.55	16.46	0	11.52	22.03	5.38	163.18	21.20	134.69	98.26	10.45	45.03	47.32	1 592	1 586
C02	Economic impact of serious injuries (million €)	2007			0	0	0.01		1.72	0		4.79	0.75					0.59		0		0.28	0.02	4.31		7.41	0	0	6.94	27	27
		2008			0	0	0.10		1.79	0			1.51					0.59		0	0	0.28	0.06	5.03		2.68		0	4.07	16	16
		2009	17.45	5.24	0	0.23	0.08		4.80	0.59	3.55		2.53	16.24			12.88	0.63	0	0	2.56	0	13.63	2.26	0	5.86	1.95	0	3.10	94	94
		2010	14.73	57.71	2.54	0	28.17	31.32	2.68	1.23	3.12	7.12	2.25	12.33	5.78	0	5.88	1.10	0	1.05	2.92	0.42	14.78	2.06	23.84	10.90	1.17	4.78	5.11	243	243
C03	Cost of material damages to rolling stock or infrastructure (all accidents) (million €)	2007			0.57	0	3.72			0	1.93				0	0.11		0.06		0.34		3.00	5.10		0.32	24.78	0	1.89	44.41	86	86
		2008			0.63	60	9.41			0.15	0.62					0.80		0.12		3.34	0.02	3.60	2.67	0.75	1.49		0.30	2.64	6.23	93	93
		2009		0.18	0.55	0	0.18		3.75	0.12	1.97					12.70		0.97		0.77	22.00	0	24.13	0	0.64			2.12		70	70
		2010				0			0	0.78		7.09			1.78			0.04		0.04	49.90	3.00	40.06		0.95	74.60	1.12	0		179	179
C07	Cost of damage to the environment (all accidents) (million €)	2007																												0	0
		2008																												0	0
		2009																												0	0
		2010				0			0	0					0			0		0		0.93	1.59		0	0		0		3	2
C04	Cost of delays as a consequence of all accidents (million €)	2007			0.10	0	0.10			0	0.19	0						0		0		3.10	0.09	0.98	0.26	4.04	0	0.10	8.40	17	14
		2008				70	0.05			0.03	1.57							0		0.19	0.02	3.10	0.11	1.38	0.05	2.10		0.17	4.51	83	80
		2009	0	0	0.14	0	0.01		0	0.05	0		0	0		6.10	0	0	0	0.01	0	0	0	0	0.03		0	0	130.75	137	137
		2010	0		0	0		0	0	10.03	0	3.77	0	0	0	0	0	0.17	0	1.03	0	0	11.90	0	0.07	0.07	0.51	0	152.06	180	180
C13	Cost of material damages to rolling stock or infrastructure (significant accidents) (million €)	2007			0.02											0.01														0	0
		2008					0.05											0.01		0.17		0.08							0.01	0	0
		2009		0	0.02				0.05									0.07		0.04	0.17		0.12		0.01		0		5.42	6	6
		2010	21.60		0.73	0	6.67	57.76		0.76	0.30		0.86		0.93		6.38	0.04	1.08	0.03			14.54	2.24	0.45		0	2.50	12.77	130	130
C17	Cost of damage to the environment (significant accidents) (million €)	2007																												0	0
		2008																												0	0
		2009																												0	0
		2010	0.62			0	0.14			0			0		0	0	0	0	0	0			1.59	0	0		0	0	0.79	3	3
C14	Cost of delays as a consequence of significant accidents (million €)	2007			0							0																		0	0
		2008					0											0		0.01		0.07				0.02			0.01	0	0
		2009	0	0	0				0		0		0	0			0	0		0	0		0		0		0		0.22	0	0
		2010	0.34		0	0	0.26	35.01	0	9.72	0.08	0	0	0	0	0	9.25	0.10	0.14	0.74	0	0	3.36	0.81	0	0	0	0	0.47	60	60

Table 10 _ Technical safety of infrastructure and its implementation

ID	Category	Year	AT	BE	BG	CT	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	NL	NO	PL	PT	RO	SE	SI	SK	UK	Total	Total EU
T01	% of track with ATP in operation	2007		8	14	100	17	88	53	24	0	87	75	59		5	90	25		44	99	70	0	51	50	66	54	15	4		
		2008	66	7	11	100	17	90	53	23	0	87	77	46		5	91	25		39	99	74	0	51	52	72	67	18	4		
		2009	68	11	11	100	17	90		23	0	87	83	47		5	92	35	100	46	99	74	0	51	48	64	67	18	4		
		2010	73	11	11	100	0	93	53	24	0	88	82	52		5	100	38	100	48	98	70	0	53	98	66	67	21	4		
T02	% of train-km using operational ATP	2007			20	100				95	0		97	79		14	63	61			100	90	0	90		93		0	3		
		2008		4	21	100				68	0		98			13	72	59			100	90	0	90		96		0	3		
		2009		4	21	100				73	0	96	99			12	79	66	99		99	90	0	90		93		0	3		
		2010	86	4	21	100	0			69	0	97	99			12	93	86	99	48	100	90	0	90	100	97		0	3		
T03	Total No of level-crossings	2007	6 776	2 180	820	0	8 628	19 011	1 449	328	1 265	0	4 334	14 651	5 972	1 126	7 350	531		660	2 720	3 761	14 219	1 266	5 625	10 572	944	2 307	7 456	123 951	120 190
		2008	6 713	2 110	0	0	8 551	18 051	1 563	329	1 265	2 699	4 218	18 507	5 910	1 095	7 643	523		641	2 700	3 987	14 255	1 229	5 784	11 352	959	2 265	6 680	129 029	125 042
		2009	0	1 913	819	0	8 523	17 508	0	329	0	2 613	4 061	0	5 910	1 069	7 585	530	142	634	2 659	3 656	14 163	1 191	5 181	11 371	941	2 220	6 802	99 820	96 164
		2010	5 142	1 902	815	0	8 491	17 393	1 467	335	1 305	2 522	3 833	18 364	5 956	1 050	5 683	538	138	613	2 628	3 611	14 126	1 107	5 169	11 370	932	0	6 647	121 137	117 526
T04	Total No of level-crossings per track-km	2007	0.83	0.35	0.16	0.00	0.75	0.56	0.39	0.15	0.41	0.00	0.41	0.49	0.56	0.53	0.40	0.24		0.15	0.41	0.92	0.50	0.36	0.28	0.70	0.43	0.50	0.24		
		2008	0.82	0.34	0.00	0.00	0.74	0.35	0.41	0.15	0.41	0.15	0.40	0.40	0.56	0.52	0.30	0.24		0.14	0.40	0.98	0.50	0.35	0.28	0.71	0.44	0.49	0.21		
		2009	0.00	0.30	0.16	0.00	0.74	0.34	0.00	0.15	0.00	0.15	0.46	0.00	0.56	0.50	0.29	0.24	0.34	0.19	0.39		0.49	0.34		0.74	0.43	0.48	0.22		
		2010	0.64	0.30	0.16	0.00	0.73	0.27		0.15	0.43	0.13	0.43	0.44	0.56	0.48	0.23	0.25	0.22	0.18	0.38	0.83	0.49	0.31	0.26	0.74	0.43	0.00	0.21		
R03	No of track-km	2007	8 154	6 215	5 119	159	11 554	33 897	3 720	2 200	3 060	17 885	8 816	29 973	10 577	2 110	18 195	2 181		4 353	6 700	4 080	28 499	3 528	20 385	15 198	2 192	4 648	31 515	284 912	280 832
		2008	8 197	6 282	5 116	159	11 554	51 851	3 800	2 133	3 062	17 960	8 848	45 951	10 577	2 110	25 720	2 180		4 731	6 700	4 080	28 673	3 528	20 348	16 075	2 192	4 638	31 534	327 997	323 917
		2009	8 154	6 426	5 154	159	11 554	51 780	3 687	2 166	3 070	17 972	8 847	46 007	10 577	2 141	26 174	2 182	422	3 396	6 868		28 836	3 528		15 349	2 187	4 638	31 571	302 845	302 845
		2010	8 049	6 344	5 154	159	11 554	63 839		2 167	3 070	18 967	8 862	42 039	10 577	2 165	24 370	2 148	614	3 395	6 830	4 341	28 743	3 531	20 171	15 347	2 187	4 638	31 631	330 892	326 551

Table 11 _ Level-crossings by type

ID	Level-crossing types	Year	AT	BE	BG	CT	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	NL	NO	PL	PT	RO	SE	SI	SK	UK	Total	Total EU
T06	Active LCs	2010	1 935	1 611	669	0	3 818	10 313	800	164	817	971	817	13 110	5 956	212	4 583	384	106	458	2 006	3 611	5 388	464	1 632	3 334	317	0	1 660	65 136	61 525
T07	with automatic user-side warning	2010	797	218	0	0	2 324	999	800	135	2	472	90	13 110	0	3	60	306	3	346	70	1	1 249	35	871	918	29		288	23 126	23 125
T08	with automatic user-side protection	2010	0	0	131	0	0	1 051		0	0	0	0		0	2	4	9	0	0	116	119	0	0	0	31	0		0	1 463	1 344
T09	with automatic user-side protection and warning	2010	878	1 297	0	0	1 072	6 269		29	0	0	727		2 820	12	4 218	10	82	86	1 501		362	340	218	2 280	256		494	22 951	22 951
T10	with automatic user-side protection and warning, and rail-side protection	2010	29	0	354	0	0	1 100		0	767	480	0		0	191	294	15	0	0	3	349	395	0	0	19	0		55	4 051	3 702
T11	with manual user-side warning	2010	223	71	0	0	0	325		0	0	0	0		0	0	0	33	18	20	297	3 142	56	2	0	62	0		0	4 249	1 107
T12	with manual user-side protection	2010	8	0	184	0	422	436		0	0	2	0		0	4	3	6	2	3			1 806	70	533	5	0		419	3 903	3 903
T13	with manual user-side protection and warning	2010	0	25	0	0	0	133		0	48	17	0		3 136	0	4	5	1	3	19		1 520	17	10	19	32		404	5 393	5 393
T14	Passive LCs	2010	3 207	291	146	0	4 673	7 080	667	171	488	1 551	3 016	5 254	0	838	1 100	154	32	155	622	0	8 738	643	3 537	8 036	615		4 987	56 001	56 001

Table 12 _ Management of safety — number of audits planned and conducted

ID	Category	Year	AT	BE	BG	CT	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	NL	NO	PL	PT	RO	SE	SI	SK	UK	Total	Total EU
A01	Total No of accomplished audits	2007		0	3 215	25	290		36	249		755	43	44	21	13	2 157	27		1 853	20	66	0	6		188		0	189	9 197	9 131
		2008	109	0	3 196	24	263		32	83	0	777	33	50		21	2 158	29		265	20	72	0	1		156	4	1	47	7 341	7 269
		2009	220		2 941	19	410			84	0	1 365	26		41	18	2 431	27	317	5	5	86	0	10		164		1		8 170	8 084
		2010	381	1	0	35	628			81	0	1 127	18		29	20	2 223	30	409	6	35	60	1	7	285	187	1	1	912	6 477	6 417
A02	Accomplished audits as % of required / planned audits	2007				85	100		100	100		100	67	100	77	100	56	100		98	100	74	0	100		97		0	98	1 551	1 477
		2008	96	0		59	100		100	94	0	100	97	100		100	83	100		100	100	95	0	100		88	100	100	100	1 813	1 718
		2009	92			76	100			95	0	100	93	100	100	90	85	96		100	100	77	0	100	0	74		100		1 578	1 501
		2010	89	100	0	92	97			97	0	91	90		71	100	80	100	77	100	97	75	100	100	97	87	100	100	88	2 029	2 029

Table 13 _ Traffic and infrastructure data

ID	Reference data	Year	AT	BE	BG	CT	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	NL	NO	PL	PT	RO	SE	SI	SK	UK	Total	Total EU
R01	Total No of train-km	2007	155.0	103.6	36.0	6.5	152.9	1 048.7	78.7	7.6	19.9	185.6	52.6	529.5	114.0	16.8	370.0	15.0		18.6	140.0	47.4	223.0	41.0	96.3	134.3	19.2	51.0	521.3	4 184	4 137
		2008	158.4	92.9	35.1	5.5	175.0	1 043.5	82.0	7.1	21.2	192.8	53.3	541.0	109.0		366.9	15.8		19.5	139.0	46.8	224.4	41.8	96.1	138.2	20.1	49.3	549.1	4 224	4 177
		2009	152.3	91.9	31.5	5.7	163.2	1 002.9	82.2	6.8	19.6	188.1	50.0	504.0	106.3		350.5	14.1	8.1	18.7	132.0	43.3	208.6	40.6	88.5	143.1	18.2	45.0	568.6	4 084	4 040
		2010	156.1	98.0	30.6	5.7	160.2	1 032.0	83.1	8.9	17.0	186.7	51.0	484.8	97.4	17.7	324.0	14.1	8.2	16.6	146.2	46.5	219.1	40.0	93.5	141.3	18.8	47.5	520.0	4 065	4 019
R02	No of passenger-km	2007	9 149	9 932	2 423	1	6 907	79 100	6 353	274	1 930	20 584	3 778	78 740	10 080	2 007	49 090	409		983	16 400	2 860	19 374	3 990	6 724	10 296	812	2 148	50 474	394 817	391 958
		2008	10 600	10 403	2 334		6 659	82 500	6 474	274	1 657	22 074	4 052	87 000	8 288	1 976	49 408	397		951	16 500	2 860	20 144	4 154	6 956	10 838	834	2 279	53 002	412 613	409 753
		2009	10 500	10 493	2 144		6 472	81 612	6 389	232	1 414	21 729	3 876	83 260	7 945	1 681	46 426	357	333	747	16 800	2 996	18 577	4 152	6 177	11 216	840	2 247	52 765	401 379	398 383
		2010	10 700	10 493	2 100	497	6 553	83 702	6 587	456	1 144	20 978	3 959	81 750	7 666	1 678	43 474	373	350	741	16 621	3 153	17 800	4 111	5 500	11 036	813	2 291	55 831	400 355	397 202
R05	No of passenger-train km	2007										145.1																		145	145
		2008										155.4																		155	155
		2009										160.5															11.7		531.6	704	704
		2010	104.7	81.0	23.1	1.0	123.3	777.0	79.4	4.8	16.0	158.2	35.0	410.0	85.3	16.6	280.3	5.0	7.3	6.2	134.0	35.0	145.6	32.5	70.7	94.4	10.7	33.0	485.3	3 256	3 221
R06	No of freight-train km	2007										37.4																		37	37
		2008										34.4																		34	34
		2009										25.1															6.5		37.0	69	69
		2010	44.7	16.0	6.5	0.1	36.9	255.0	3.7	4.2	1.0	25.8	16.0	74.7	12.2	0.3	43.6	8.9	0.9	10.4	12.0	8.7	73.4	7.5	22.8	40.6	8.1	14.5	34.7	783	775
R04	No of other-train-km	2007										3.0																		3	3
		2008										2.9																		3	3
		2009										2.5																		3	3
		2010	6.7	1.0	1.0	4.5	0.0	0.0		0.0	0.0	2.7	0.0		0.0	0.8	0.0	0.2		0.0	0.2	2.8		0.0		6.3	0.0	0.0	0.0	26	23
R07	No of freight-tonne-km	2007																												0	0
		2008																												0	0
		2009																									2 668		21 168	23 837	23 837
		2010	22 438		7	61	34 024	107 300	2 667	13 694	393		33 091	32 706		92	19 564	13 451	717	17 179	6 385	3 894	48 953	2 842	11 412	23 464	3 283	18	18 532	416 168	412 274
R08	No of line-km (double track lines are to be counted ONCE)	2007																												0	0
		2008																												0	0
		2009																									1 228		15 975	17 203	17 203
		2010	5 807	3 540	3 973	108	9 628	33 803	3 613	900	2 552	13 853	5 919	42 039	8 657	1 683	16 794	1 768	275	1 897	3 016	4 114	20 045	2 842	17 263	11 066	1 228	3 622	15 777	235 782	231 668
R03	No of track-km (double track lines are to be counted TWICE)	2007	8 154	6 215	5 119	159	11 554	33 897	3 720	2 200	3 060	17 885	8 816	29 973	10 577	2 110	18 195	2 181		4 353	6 700	4 080	28 499	3 528	20 385	15 198	2 192	4 648	31 515	284 912	280 832
		2008	8 197	6 282	5 116	159	11 554	51 851	3 800	2 133	3 062	17 960	8 848	45 951	10 577	2 110	25 720	2 180		4 731	6 700	4 080	28 673	3 528	20 348	16 075	2 192	4 638	31 534	327 997	323 917
		2009	8 154	6 426	5 154	159	11 554	51 780	3 687	2 166	3 070	17 972	8 847	46 007	10 577	2 141	26 174	2 182	422	3 396	6 868		28 836	3 528		15 349	2 187	4 638	31 571	302 845	302 845
		2010	8 049	6 344	5 154	159	11 554	63 839		2 167	3 070	18 967	8 862	42 039	10 577	2 165	24 370	2 148	614	3 395	6 830	4 341	28 743	3 531	20 171	15 347	2 187	4 638	31 631	330 892	326 551

Table 14 _ Reference data for economic indicators

ID	Reference data for economic indicators	Year	AT	BE	BG	CT	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	NL	NO	PL	PT	RO	SE	SI	SK	UK	Total	Total EU
R09	% of work passengers	2010						7		30	20	45					35		70	63				1		64	35				
R10	% of non-work passengers	2010		100				93		70	80	55					65		30	37			100	99		36	65	100			
R11	National value of preventing a fatality (thousand €)	2010					1 942					2 130				2 530	1 430					598				2 339	747		1 893		
R12	National value of preventing a serious injury (thousand €)	2010					263					264				320	184					84				436	97				
R13	National value of time for a work passenger of a train (an hour) (€)	2010					56					42										6				7.35	18				
R14	National value of time for a non-work passenger of a train (an hour) (€)	2010					19					14										2				4.97	6				
R15	National value of time for a tonne freight (an hour) (€)	2010					3					2										0				0.12	1				
R16	Fall back value of preventing a fatality (thousand €)	2010	2 202	2 042	855	1 815	857	1 955	2 705	667	1 193	1 445	2 116	1 920	616	2 218	1 613	531	3 559	524	2 203	4 102	577	964	969	2 308	1 086	776	1 714		
R17	Fall back value of preventing a serious injury (thousand €)	2010	301	310	116	244	116	270	335	88	156	179	281	268	83	281	207	73	555	70	292	576	79	129	131	337	142	106	222		
R18	Fall back value of time for a work passenger of a train (an hour) (€)	2010	35.53	34.19	29.58	29.99	24.70	32.79	38.78	24.29	27.70	28.78	34.27	32.89	18.93	31.04	28.90	22.35	58.02	22.34	34.61	42.53	21.76	23.21	33.53	37.39	26.90	31.16	27.41		
R19	Fall back value of time for a non-work passenger of a train (an hour) (€)	2010	11.84	11.40	9.86	10.00	8.23	10.93	12.93	8.10	9.23	9.59	11.42	10.96	6.31	10.35	9.63	7.45	19.34	7.45	11.54	14.18	7.25	7.74	11.18	12.46	8.97	10.39	9.14		
R20	Fall back value of time for a tonne freight (an hour) (€)	2010	1.73	1.68	1.82	1.46	1.45	1.61	1.83	1.48	1.50	1.51	1.67	1.62	1.15	1.49	1.47	1.39	2.59	1.39	1.71	2.04	1.32	1.27	2.06	1.79	1.47	1.94	1.32		

ANNEX 2 _ LIST OF NATIONAL SAFETY AUTHORITIES AND NATIONAL INVESTIGATION BODIES

Code	Country	National safety authority	National investigation body
BE	Belgium	Federale Overheidsdienst Mobiliteit en Vervoer Directoraat-generaal vervoerte Land Service Public federal Mobilité et Transports Direction générale Transport terrestre *http://www.mobilit.fgov.be*	Federale Overheidsdienst Mobiliteit en Vervoer Onderzoeksorgaanvoor Ongevallen en Incidenten op het Spoor Service Public federal Mobilité et Transports Organisme d'enquête sur les accidents et les incidents ferroviaires *http://www.mobilit.fgov.be/*
BG	Bulgaria	Ministry of Transport – Railway Administration Executive Agency *www.iaja.government.bg*	Ministry of Transport – Railway Accident Investigation Unit *http://www.mtitc.government.bg*
CZ	Czech Republic	Drážní Úřad (DU) – Rail Authority *http://www.ducr.cz*	Drážní inspekce (DI) – Rail Safety Inspection Office *http://www.dicr.cz/*
DK	Denmark	Trafikstyrelsen *http://www.trafikstyrelsen.dk*	Havarikommissonen for Civil Luftfart og Jernbane *http://www.havarikommissionen.dk*
DE	Germany	Eisenbahn-Bundesamt (EBA) *http://www.eba.bund.de*	Bundesministerium für Verkehr, Bau und Stadtentwicklung Eisenbahn-Unfalluntersuchungsstelle *http://www.bmvbs.de*
EE	Estonia	Tehnilise Järelevalve Amet *http://www.tja.ee*	Ohutusjuurdluse Keskus (OJK) – Safety Investigation Bureau *http://www.ojk.ee*
IE	Ireland	Railway Safety Commission *http://www.rsc.ie*	Railway Accident Investigation Unit *http://www.raiu.ie*
EL	Greece	Hellenic Ministry of Infrastructure, Transport and Networks Department of Railway Safety *http://www.yme.gr*	Hellenic Ministry of Infrastructure, Transport and Networks Committee for Accident Investigation *http://www.yme.gr*
ES	Spain	Dirección General de Infraestructuras Ferroviarias *http://www.fomento.es*	Ministerio de Fomento Comision de Investigación de Accidentes ferroviarios *http://www.fomento.es*
FR	France	Établissement public de sécurité ferroviaire (EPSF) *http://www.securite-ferroviaire.fr*	Bureau d'Enquêtes sur les Accidents de Transport Terrestre *http://www.bea-tt.equipement.gouv.fr*

Code	Country	National safety authority	National investigation body
IT	Italy	Agenzia Nazionale per la Sicurezza delle Ferrovie *http://www.ansf.it*	Railway Safety Commission *http://www.mit.gov.it*
LV	Latvia	Valsts dzelzceļa tehniskā inspekcija – State Railway Technical Inspectorate *http://www.vdzti.gov.lv*	Transporta nelaimes gadījumu un incidentu izmeklēšanas birojs – Transport Accident and Incident Investigation Bureau (TAIIB) *http://www.taiib.gov.lv*
LT	Lithuania	Valstybinė geležinkelio inspekcija State Railway Inspectorate *http://www.vgi.lt*	Katastrofų tyrimųvadovas National Investigation Body *http://www.sumin.lt*
LU	Luxembourg	Ministère du Développement durable et des Infrastructures Administration des Chemins de Fer (ACF) *http://www.gouvernement.lu*	Administration des Enquêtes Techniques *http://www.mt.public.lu/transports/AET/*
HU	Hungary	Nemzeti Közlekedési Hatóság – National Transport Authority *http://www.nkh.gov.hu*	Közlekedésbiztonsági Szervezet – Transportation Safety Bureau *http://www.kbsz.hu*
NL	Netherlands	Inspectie Leefomgeving en Transport (ILT) *http://www.ilent.nl*	The Dutch Safety Board *http://www.safetyboard.nl*
AT	Austria	Bundesministerium für Verkehr, Innovation und Technologie Oberste Eisenbahnbehörde *http://www.bmvit.gv.at*	Bundesanstalt für Verkehr (VERSA) Unfalluntersuchungstelle des Bundes, Fachbereich Schiene *http://versa.bmvit.gv.at*
PL	Poland	Urząd Transportu Kolejowego *http://www.utk.gov.pl*	Państwowa Komisja Badania Wypadków Kolejowych (NIB) *http://www.mi.gov.pl*
PT	Portugal	Instituto da Mobilidade e dos Transportes Terrestres *http://www.imtt.pt*	Gabinete de Investigação de Segurança e de AcidentesFerroviários (GISAF) *http://www.iot.gov.pt* (site under construction)
RO	Romania	Autoritatea Feroviară Română (AFER) – Romanian Railway Safety Authority *http://www.afer.ro*	Organismul de Invesigare Feroviar Român (OIFR) – Romanian Railway Investigating Body *http://www.afer.ro*
SI	Slovenia	Javna agencija za železniški promet Republike Slovenije (AŽP) – Public Agency of the Republic of Slovenia for Railway Transport *http://www.azp.si*	Ministry of Transport Railway Accident and Incident Investigation Division *http://www.mzp.gov.si*
SK	Slovakia	Úrad pre reguláciu železničnej dopravy (URZD) – Railway Regulatory Authority *http://www.urzd.sk*	Ministry of Transport Posts and Telecommunication *http://www.telecom.gov.sk*
FI	Finland	Liikenteen turvallisuusvirasto – Finnish Transport Safety Agency (TraFi) *http://www.trafi.fi*	Onnettomuustutkintakeskus – Accident Investigation Board of Finland *http://www.onnettomuustutkinta.fi*

Code	Country	National safety authority	National investigation body
SE	Sweden	Transportstyrelsen – Swedish Transport Agency *http://www.transportstyrelsen.se*	Statens haverikommission *http://www.havkom.se*
UK	United Kingdom	Office of Rail Regulation (ORR) *http://www.rail-reg.gov.uk*	Rail Accident Investigation Branch *http://www.raib.gov.uk/*
NO	Norway	Statens Jernbanetilsyn (SJT) – Norwegian Railway Authority *http://www.sjt.no*	Statens havarikommisjon for Transport – Accident Investigation Board Norway (AIBN) *http://www.aibn.no*
CT	Channel Tunnel	Channel Tunnel Intergovernmental Commission (IGC) Commission intergouvernementale Tunnel sous la Manche *http://www.channeltunneligc.co.uk* Assisted by: Channel Tunnel Safety Authority *ctsa@orr.gsi.gov.uk* Secrétariat général au Tunnel sous la Manche (SGTM) tunnelmanche@equipement.gouv.fr	See the relevant authority or body in France or United Kingdom for the respective part of the Channel Tunnel

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