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Safety Database Activity Report 2008

- Significant Accidents 2007

- Benchmarking and Appendixes

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Foreword

This document provides information on significant railway accidents registered in 2007 in the context of the Safety Data Base (SDB) activity. Railway safety experts will find an annual summary of railway accidents in Europe based on individual UIC member companies' results, international benchmarking with trend analysis as well as information on the ongoing implementation of CSIs driven by ERA.

It is important to note that whereas the CSI(s) apply to Member States, the figures in this report refer to railway company performances.

Readers used to accessing the SDB directly are advised to be aware that records in a live database are constantly updated and consequently the results can change slightly over time. The 2007 and 2006 results presented here reflect the SDB updated as of 24 October 2008.

Section I of the document follows on from the executive summary; it gives a short explanation of the criteria adopted to enable analysis of railway companies' performances and presents global statistics. There are event types, causes, location of accidents, injured parties etc. represented collectively, and displayed in matrix format. The relationship between occurrences in accidents enables attention to be concentrated on specific focus areas. In addition to 2007 detailed results, cumulative data from a subset of 11 among the main railway companies from west Europe which were chosen on account of their homogeneous declaration of accidents in the years from 2001 to 2007 shows the trends of accidents and fatalities.

Section II shows indicators values and their probabilistic distribution. The indicators reported are a subset of those introduced by the European Safety Directive. They allow the railway companies in the sample to benchmark and enable other railway companies to evaluate their position in relation to those examined.

The methodology of analysis proposed in the 2007 report as Section III has been suppressed.

The Appendixes give the key accident definitions currently in force in Europe, a summary of the activity undertaken at the UIC and by the SDB team in cooperation with the ERA.

UIC recommends that all members supply complete unambiguous declaration of the accidents and critical events to the database, as it will enhance the quality and accuracy of the UIC analysis. Moreover, the use of the SDB as a common source of information to generate UIC International Railway Statistics table A91, EUROSTAT tables H1 to H4 and to calculate a large part of the values of the CSI as required by the Safety Directive Annex I, would avoid discrepancies between the different publications produced in Europe.

Executive Summary of significant accidents in 2007

In 2007 the Safety database collected accidents and critical events from the main railway companies in 21 European countries including Norway and Switzerland, plus EUROTUNNEL. This year NRIC, the Infrastructure Manager from Bulgaria, joined the SDB declaring all the significant accidents which have occurred on its network since 2001. Unfortunately, MAV has interrupted its accident declaration in the end of August 2007 and has been therefore excluded from this report. Finally, data items for years preceding 2007 should expose minor differences from previously published yearly reports because of recalculations with the exclusion of MAV and the inclusion of NRIC.

The total number of significant accidents reported in 2007 was 2272. 64 passenger and 32 staff fatalities were recorded, out of a total of 2483 victims (seriously injured + killed) for a total of more than 4000 million km of train movements on the network.

The number of "serious accidents" (as defined by Directive 2004/49/EC) in the data collected is 227. For these accidents Member States shall ensure that an investigation is carried out by the investigating body and make the results of the investigations public (see Appendix: Accident definitions currently in force in Europe).

Years	Significant accidents	Serious accidents	Number of Fatalities / 100 significant accidents			All victims / 100 significant accidents	Significant accidents / Million of train Km movement	Fatalities / Million of train Km movement
			Passengers	Staff	Other			
2007	**2272**	**227**	**2.8**	**1.4**	**55**	**109.3**	**0.57**	**0.34**
2006	2327	205	1.8	1.5	50.6	101.7	0.59	0.32

The accident data indicates an increase in the number of passenger victims of accidents and confirms a higher number of third-party victims rather than passengers or staff. In the year 2007, the rate of victims per significant accident was 1.09 (see the table above for comparison with 2006). 3 passengers, 14 staff members and 55 third parties died per 100 significant accidents (see Charts 1 & 3).

The total rate of victims is 0.6 persons per million train kilometres. The value decreases to less than 0.02 persons per million train kilometres for passenger fatalities (see Tables 2 and 4 and Chart 2).

Number of collective accidents: derailments and train collisions have reduced. Most of the accidents are individual accidents: 73% against 25% collective accidents (they were respectively 67% and 30% in 2006). The breakdown of accidents by type is reported in table 1 below.

Accidents to persons caused by rolling stock in motion, with the exception of suicides, increased by 5 %, they represent 63.8% of the total of accidents. Level crossing (LC) accidents, quite the same average as in 2006, represent 27.3% of the total of accidents. In 2007 these 2 types of accidents caused 62 of a total of 64 passenger fatalities, 25 of a total of 32 staff fatalities and 1232 of a total of 1251 third-party fatalities.

Collisions between trains (1%) and derailments (3.3%) make up 4.3 % of the total. They constituted 6.2% in 2006 and 7% in 2005.

- Most victims in collisions between trains were staff (7 of a total of 12 victims of collisions between trains). No passengers died as a consequence of this type of accident.
- Out of a total of 76 derailments, the most serious was the only one located at a switch. This accident caused the death of 1 passenger and 12 people (11 passengers and 1 staff member) seriously injured.

Train collisions with an obstacle other than at level crossings represent 2.9% of the total of accidents (they were 4.2% in 2006). No passengers died as a consequence of this type of accident.

The remaining 1.6% of accidents are of other types: electrocutions, fires in rolling stock and dangerous goods accidents. There were no passenger or staff deaths as a result these "other" types of accidents.

Table 1 Breakdown and rate of types of significant accidents in 2007 according to different definitions.

Accidents	Types of accidents as defined in UIC – SDB		Additional information from UIC -SDB		Types of accidents as defined in Safety Directive	
Collective accidents **25,40%**	**3,3%**	Derailments of trains			**3,3%**	Derailments of trains
	1,0%	Train collision with another train			**3,9%**	Collisions of trains, including collisions with obstacles within the clearance gauge
	21%	Train collision with an obstacle	**2,9%**	Train collision with an obstacle not at level crossings		
			18,1%	Train collision with an obstacle at level crossings	**27,3%**	Level-crossing accidents, including accidents involving pedestrians at level-crossings,
Individual accidents **73,02%**	**65,9%**	Individual hit by a train	**9,2%**	Individual hit by a train at level crossings		
			56,7%	Individual hit by a train not at level crossings	**63,8%**	Accidents to persons caused by rolling stock in motion, with the exception of suicides.
	7,1%	Individual falling from a train				
Other types of accidents **1,58%**	**0,6%**	Fire in rolling stock			**0,6%**	Fire in rolling stock
	0,9%	Electrocution by overhead line or third rail			**1,0%**	Other types of accidents
	0,1%	Accident involving dangerous goods				
100%	100%				100%	

First level of cause analysis identifies that of a total of 2483 victims recorded in 2007, the actions of third parties resulted as a cause of the accident for 1909 victims and human factors were the cause of 520 victims. There were also accidents attributable to the Rolling Stock (1 victim), Operation and Traffic Management (1 victim), Infrastructure (18 victims) and Control-Command & Signalling (2 victims) sub-systems.

Breakdowns of victims (fatalities and serious injuries) by type of accidents are shown in Charts 1 to 4.

Details on causes of accidents are illustrated in Tables 5 and 6.

Table 2 — Trend of accidents and rates since 2001 given as cumulative data from 11 railways and 2006 - 2007 values for 20 railway companies. Source UIC Safety Database.

Years:	11 railway companies					20 railway companies	
	Average from 2001 to 2003	2004	2005	2006	**2007**	2006	**2007**
Number of serious injury accidents	966	797	821	871	831	2093	2130
Serious injury accidents per million km of train movements	**0,35**	0,28	0,27	0,29	**0,27**	**0,53**	**0,53**
Number of fatalities	512	494	495	524	528	1254	1347
Fatalities per million km of train movements	0,18	**0,18**	**0,16**	0,17	**0,17**	**0,32**	**0,34**
Number of significant accidents	1105	880	924	1080	948	2327	2272
Significant accidents per million km of train movements	**0,40**	0,31	0,31	0,36	**0,31**	**0,59**	**0,57**
Number of victims	1040	1104	1192	985	936	2367	2483
Victims per million km of train movements	0,37	0,39	**0,40**	0,33	**0,30**	**0,60**	**0,62**
Number km of million train movements:	2794,744	2815,159	3012,915	3024,64	3084,3	3951,53	4011,9

Please, refer to table 4 for the list of the considered 11 and 20 railway companies. Data in the grey cells has been collected manually

Table 2.1 — Number of accidents and victims in 2007. Data from 20 railway companies from UIC Safety Database.

			Fatalities			Serious injuries			Victims
		Number of accidents	Passengers	Staff	Other	Passengers	Staff	Other	All
At station	Collisions with an obstacle	24	0	1	2	0	7	3	**13**
	Collisions between trains	18	0	2	0	4	5	0	**11**
	LC accidents	89	1	0	63	0	3	48	**115**
	Derailments	32	0	0	0	0	2	0	**2**
	Hit by a train	564	31	9	286	50	22	195	**593**
	Falling from a train	118	12	2	8	73	5	19	**119**
	Other cases	17	0	0	7	0	0	3	**10**
	TOTAL at station:	**862**	**44**	**14**	**366**	**127**	**44**	**268**	**863**
In open line	Collisions with an obstacle	42	0	1	4	1	8	11	**25**
	Collisions between trains	5	0	0	0	1	0	0	**8**
	LC accidents	481	1	2	306	16	15	369	**702**
	Derailments	44	2	3	0	13	1	0	**19**
	Hit by a train	720	2	11	514	3	7	211	**748**
	Falling from a train	42	14	1	4	19	1	7	**46**
	Other cases	17	0	0	6	0	0	2	**8**
	TOTAL in open line:	**1351**	**19**	**18**	**834**	**53**	**32**	**600**	**1556**
	In other locations:	**59**	1	0	51	2	1	9	**64**
	TOTAL:	**2272**	**64**	**32**	**1251**	**182**	**77**	**877**	**2483**

SECTION I

LEVEL 1 - DISCUSSION POINTS

The accidents recorded in 2007 confirm the evidence from previous years that the interaction of the rail system with its external environment results in more victims than the failure of the internal safety management of the rail system itself. Members of the public still constitute a very large proportion of fatalities. The proportion is 93% others, 5% passengers and 2% employees (see Chart 2.1).

The first level analysis based on significant accidents reported by 20 railway companies in 2007 indicates that 84% of total accidents are represented by level crossing accidents and individuals hit by a train not at level crossings. This value has increased by 6.5% from the 2006 results. Level crossings and persons hit by trains resulted in 89.6% of the total number of victims. For these two types of accidents, third parties, other than passengers and staff represented 96.4% of all victims. In this respect there is a need for wider community responsibility to be taken in the development of solutions to combat such types of accidents.

Breakdown of accidents by location confirms the 2006 results with a slight increase of accidents at switch and crossings (S&C) from 6% to 7.1%. There were 162 accidents at S&C that resulted in a total of 152 victims (77 killed and 75 serious injured persons).

THIRD PARTIES INVOLVED IN ACCIDENTS

Rail is certainly one of the safest modes of transport, however, it results in a greater source of danger for road vehicle users, pedestrians at level crossings and trespassers (who, irrespective of national laws and rail regulations, interact with this transport mode) than for passengers and staff members.

The two main areas in which a significant proportion of third party fatalities occurred are level crossings (27.3% of total accidents) and persons hit by trains (56.7% of total accidents). These accidents represent the highest risk of incurring victims for railways in Europe. Level crossing accidents in particular cause significant numbers of fatalities and hours of traffic disruption.

LC ACCIDENTS

The new railway lines, recently put in service in Europe, have been built avoiding at grade rail/road interfaces. The renewal or the upgrade of the existing lines has been achieved by suppressing the most of level crossings. Whereas, on the one hand, constant attention has been paid to the number of level crossings being reduced by IM(s) over the last two decades, on the other hand, the growth of both road traffic and rail capacity on the existing conventional lines has increased the potential risk and the severity of the consequences of accidents at rail/road interfaces.

Years	Level Crossings Significant accidents	Rate of total accidents	Number of Fatalities / 100 significant level crossing accidents			LC victims / 100 significant accidents	LC Significant accidents / Million of train Km movement	LC Fatalities / Million of train Km movement
			Passengers	Staff	Other			
2007	**621**	**27,3**	**0,3**	**0,3**	**67**	**141,7**	**0.15**	**0.10**
2006	638	27,4	0,2	0,5	52	121,3	0.16	0.08

Results from the accidents data collection demonstrate in the last years a decreasing number of level crossings accidents and an increasing number of victims. In 2007 for the same set of 20 European networks there were 621 level crossing accidents compared to 638 in 2006. The total number of victims was 880 compared to 774 in 2006. In 2007 level crossing accidents represented 27.3% of the total of accidents and 35.4% of the total number of victims (see the table above).

Of a total of 421 persons killed in level crossings accidents 1 passenger and 63 third persons died as a consequence of accidents at stations; 1 passenger, 2 staff members and 306 third persons died as a consequence of accidents in open line and 1 staff member died as a consequence of an accident in an other location (see Table 2.1, Chart 3 and Chart 4).

The Safety Interfaces Team, on behalf of the Safety Platform, in its working document "Level crossings today and tomorrow" has concluded that the development of a cross-sector strategy for level crossing risk is necessary and a European Level Crossing Strategy is the way that Europe should be moving.

The Safety Interfaces Team, on behalf of the Safety Platform, in its working document "Level crossings today and tomorrow" has concluded that the development of a cross-sector strategy for level crossing risk is necessary and a European Level Crossing Strategy is the way that Europe should be moving. While economical reasons presently exclude the possibility of obtaining a total grade separation of road and rail traffic, the development of an agreed regional strategy for Europe would facilitate the attribution of roles and responsibilities and the definition of these actions and assignments to be undertaken.

The 10th World Level Crossing Conference held on 24 - 27 June 2008 at UIC in Paris demonstrated that the greatest number of ALL accidents involving rail are caused by third parties and that very often these are at the interface between road and rail. Despite this, society labels most fatal accidents at level crossings as a rail problem. This imbalance needs to be rectified by setting up a coalition of the "willing". There are numerous stakeholders who can work together to improve crossing safety. These include: media, governmental parties (regulators, highways and planning authorities), law enforcement authorities (police, etc.), road vehicle and driver licensing authorities, motoring associations, manufacturers and commercial operators of road vehicles, other manufacturers (GPS developers, etc.), insurers, road users and pedestrians.

ACCIDENTS TO PERSONS CAUSED BY ROLLING STOCK IN MOTION AND ACCIDENTS AT STATIONS

Accidents and victims to persons caused by rolling stock in motion have increased. In 2007 they represented 63.8% of total accidents and 1512 victims compared to 58.7% of total accidents and 1410 victims registered in 2006 for the same group of 20 railways.

Passenger victims of accidents in stations represent the majority of passenger victims, 44 of a total of 64 passenger fatalities and 127 of a total of 182 passengers seriously injured.

Last April 2008 the SDB team proposed a project named CAPAS (**C**ut down **A**ccidents to **P**assengers **A**t **S**tation) to the first SIAFI session. SIAFI Europe (in French Session d' Information sur les Activités Ferroviaires Internationales) is a yearly UIC international training programme organised into two sessions that allow young railway managers to gain awareness of the latest developments and guidelines. At the same time it offers an ideal platform for exchanging experiences, ideas and best practices.

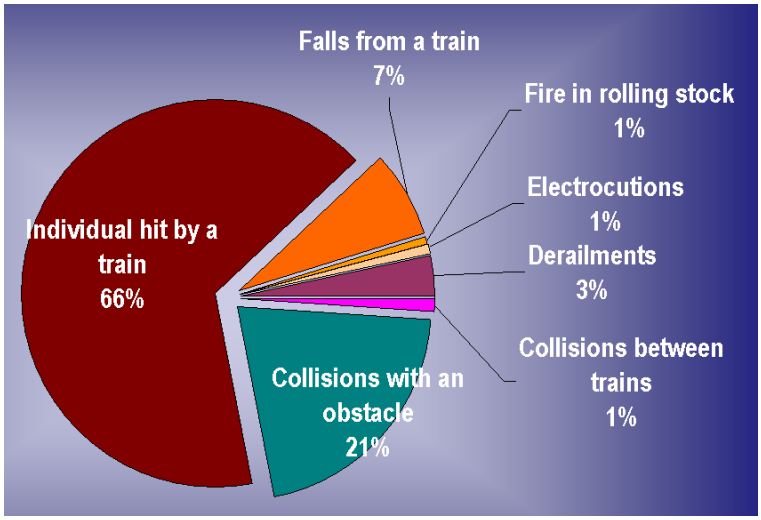
Looking at particular types of accidents (e.g. fall from a moving train, person hit by a train) from the infrastructure manager's side, the project aimed to investigate the risk for passengers at station and point out the best solutions to decrease it profitably.

Readers can find in the Appendix II information and a few solutions to better protect passengers at stations presented in the September second session of the SIAFI by a group of 7 young railway managers from Italy, Latvia, Lithuania, Poland and Serbia.

LEVEL 1 - GENERAL REPORT ON SIGNIFICANT ACCIDENTS 2007

The total number of significant accidents registered in 2007 for 20 European UIC member railway companies is 2272. These 20 companies produced 4011 million of train movements.

Chart 1 — UIC - SBD Report on significant accidents from 2007-01-01 to 2007-12-31. Breakdown of accidents by type for 20 European railways.



Accidents by type

Collisions with an obstacle include collisions at level crossings.

Individual hit by a train including pedestrians at level crossings.

For level crossings accidents refer to chart 3.

Rounded values:	Victims / accident	Fatalities / accident	Serious injuries / accident
Passengers	0,11	0,03	0,08
Staff	0,05	0,01	0,03
Others	0,94	0,55	0,39
Total:	1,09	0,59	0,50

	Accidents		Victims	
Type of accidents	Number	[%]	Fatalities	Serious injuries
- Train collision with another train	23	1,0%	2	10
- Train collision with an obstacle (including at LC)	478	21,0%	274	413
- Individual hit by a train (including at LC)	1498	65,9%	1 011	566
- Individual falling from a train	161	7,1%	42	124
- Fire in rolling stock	14	0,6%	0	0
- Electrocution by overhead line or third rail	20	1,0%	13	7
- Derailment	76	3,3%	5	16
- Accident involving dangerous goods (with release)	2	0,1%	0	0
Total:	**2272**	**100%**	**1347**	**1136**

Summary results

- Comparison with 2006 results shows that the number of significant accidents is decreasing. The rate of victims for passengers and staff members remains quite constant and is increasing (+7%) for other categories of persons involved.
- No passengers died as a consequence of collisions between trains (see Chart 2).
- No passengers or members of staff were killed as a result of fire in rolling stock or electrocution by overhead lines or third rails (see Chart 2).
- The number of electrocutions is decreasing (20 victims in 2007 compared to 28 in 2006).

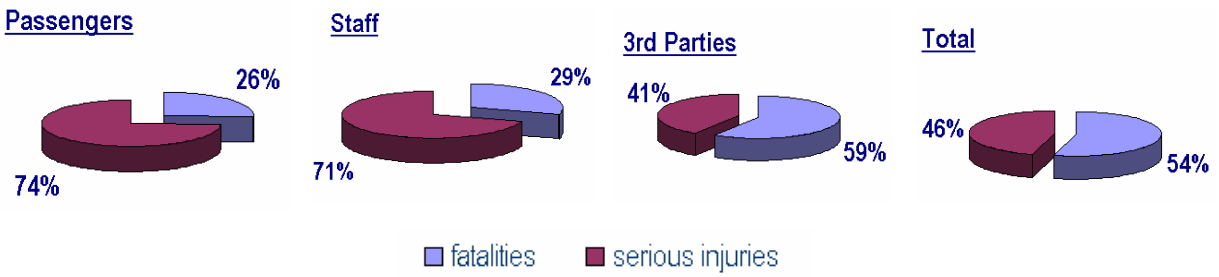
– The 14 accidents of fire in rolling stock and the 2 accidents of dangerous goods with dangerous goods release had no human consequences.

Chart 2 UIC - SBD Report on significant accidents from 2007-01-01 to 2007-12-31. Fatalities and serious injuries

	Fatalities			Serious injuries		
Type of accidents	P	S	O	P	S	O
- Train collision with another train	0	2	0	5	5	0
- Train collision with an obstacle (including at LC)	1	4	269	17	33	363
- Individual hit by a train (including at LC)	34	20	957	55	29	482
- Individual falling from a train	27	3	12	92	6	26
- Fire in rolling stock	0	0	0	0	0	0
- Electrocution by overhead line or third rail	0	0	13	0	1	6
- Derailment	2	3	0	13	3	0
- Accident involving dangerous goods (with release)	0	0	0	0	0	0
Total:	**64**	**32**	**1 251**	**182**	**77**	**877**

(1) P = passengers; S = staff; O = others

Chart 2.1 UIC – SBD Public safety



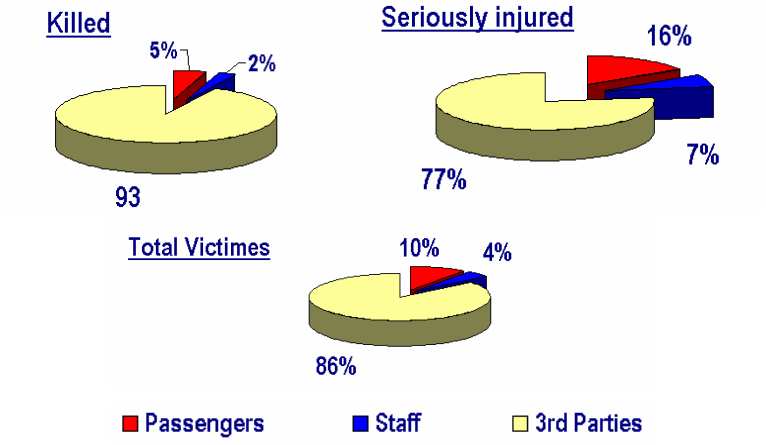
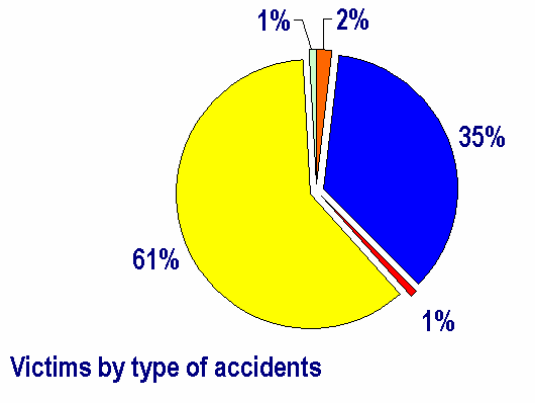


Chart 3 — UIC - SBD Report on significant accidents from 2007-01-01 to 2007-12-31. Breakdown of victims by type of accidents for 20 European railways.



Victims by type of accidents

	Rate of: Fatalities	Serious injuries	Victims
Passengers	5%	16%	10%
Staff	2%	7%	4%
Others	93%	77%	86%

Type of accidents	Accidents Number	[%]	Victims Fatalities	Serious injuries
- Collisions	89	3,9%	10	40
- Level Crossings	621	27,3%	421	459
- Derailments	76	3,3%	5	16
- Persons & RS in motion (in this hit by train: 1289 or 56.7%)	1450	63,8%	898	614
- Fire	14	0,6%	0	0
- Others	22	1,0%	13	7
Total:	**2272**	**100%**	**1 347**	**1136**

Summary results

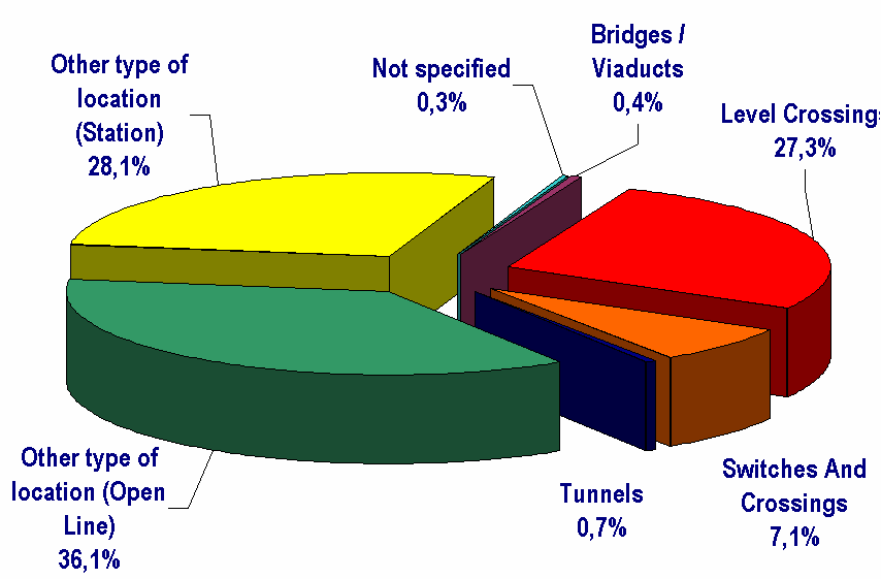
- The most frequent type of accident is that of a person hit by a train. Excluding the accidents to pedestrians at level crossings there were 1289 accidents to persons hit by a train, they caused a total of 1346 victims – i.e. more than 54% of the total number of victims in all railway accidents (52% in 2006). This type of accident was already the most frequent and also caused the most victims in previous years.
- In a total of 720 cases of accidents to persons hit by a train in open line there were 748 victims (527 persons were killed and 221 were seriously injured – see Table 2.1).
- As was the case in previous years, most passenger fatalities or serious injuries occurred as a result of passengers falling from trains or being hit by trains (see also Chart 6).
- There were 621 level crossing accidents. This figure represents 27.3% of all accidents; it was 27.4% in 2006.
- Of a total of 880 victims involved in level crossing accidents, 231 were pedestrians hit by a train when crossing the track. Pedestrians killed in level crossings accidents represented almost 37% of the total fatalities recorded for this type of accident. They represented 39% in 2006.

Chart 4	UIC - SBD Report on significant accidents from 2006-01-01 to 2006-12-31. Fatalities and serious injuries according to EUROSTAT definitions.

	Type of accidents			Seriously injured		
	P	S	O	P	S	O
- Collisions	0	4	6	6	20	14
- Level Crossings	2	2	417	16	18	425
- Derailments	2	3	0	13	3	0
- Persons & RS in motion	60	23	815	147	35	432
- Dangerous goods Total	0	0	0	0	0	0
- Fire	0	0	0	0	0	0
- Others	0	0	13	0	1	6
Total:	***64***	***32***	***1 251***	***182***	***77***	***877***

(1) P = passengers; S = staff; O = others

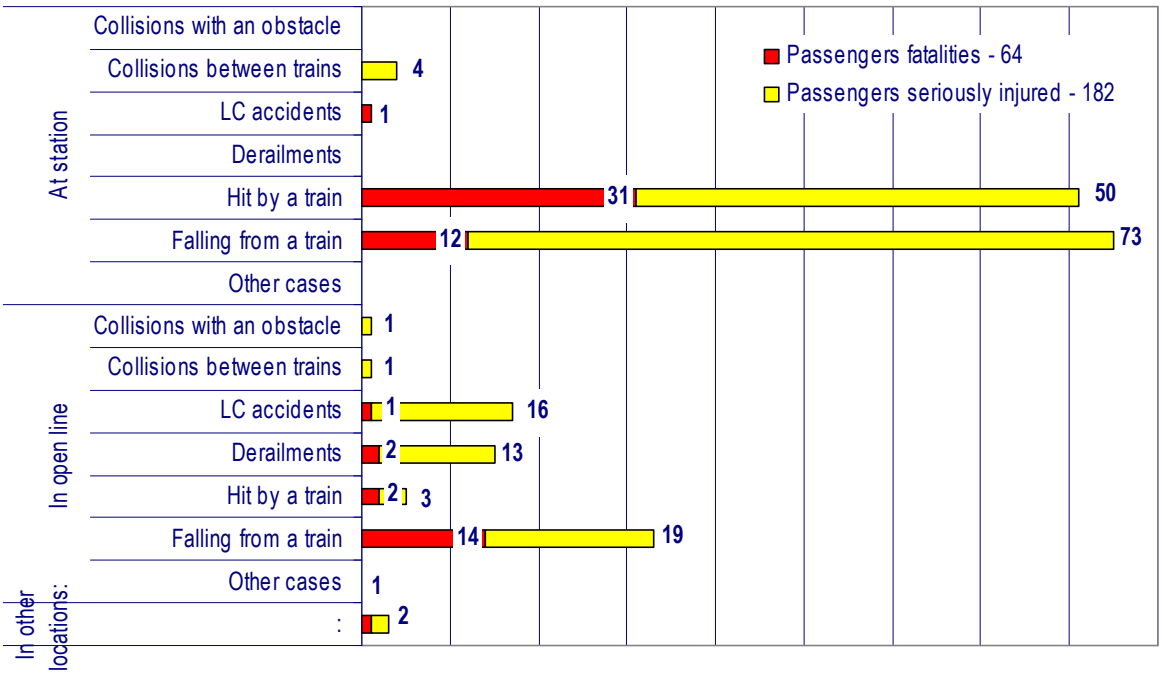
Chart 5	UIC - SBD Report on significant accidents from 2007-01-01 to 2007-12-31 Breakdown of accidents for all participant railways by type of location



Summary results

- Accidents which occurred at switches and crossings were of all types except fires in rolling stock and electrocutions. They resulted in 152 victims (see also Table 6).
- Of a total of 162 accidents which occurred on switches and crossings, 10 were collisions (of which 7 were collisions between trains), 35 were derailments, and 96 were persons hit by trains, 21 cases related to persons falling from trains.
- The most serious derailment occurred when crossing a switch in Great Britain where on 23 February 2007 at 20:12 in Lambrigg Ground Frame the Virgin West Coast Ltd. high speed train 1S83 1715 from Euston to Glasgow Central derailed over a switch resulting in 1 passenger fatality, 11 passengers and 1 staff member seriously injured. (Details on this accident are recorded in the SDB under the event code 23823).

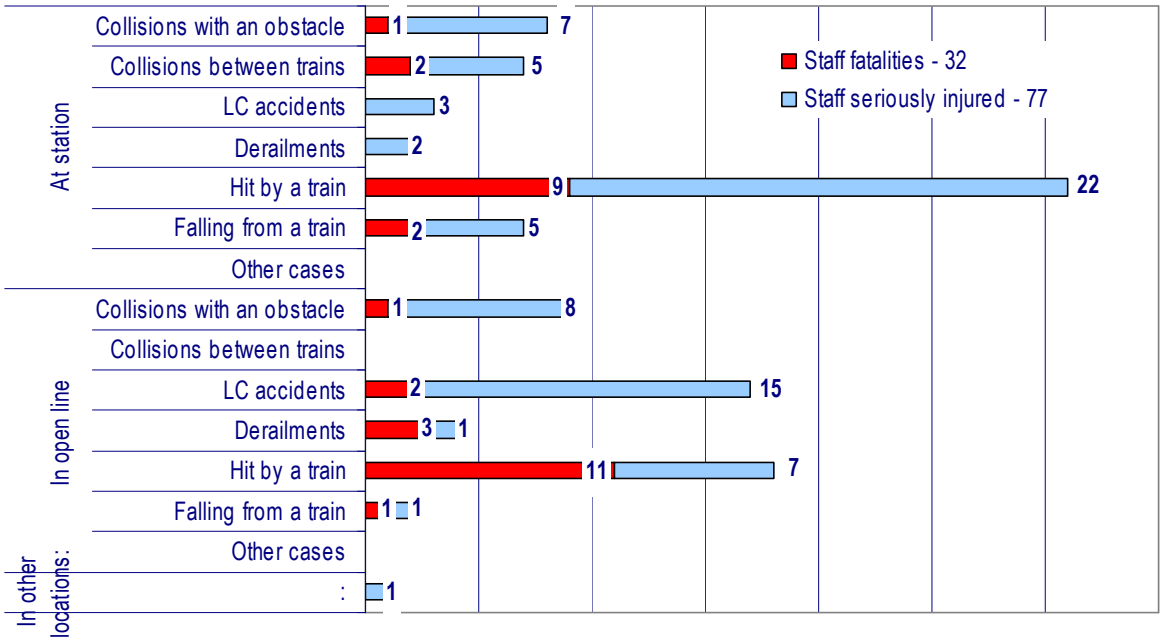
Chart 6 — UIC - SBD Report on significant accidents from 2007-01-01 to 2007-12-31
Total number of passengers who were victims of accidents by type of location.



Summary results

- Most of the passenger fatalities occurred in stations as a result of individual accidents (hit by a train or falling from a train).
- Of a total of 64 passengers killed and 182 seriously injured, 26 were killed and 92 seriously injured falling from trains and 33 were killed and 53 seriously injured being hit by trains.
- Accidents to individuals hit by trains and to persons falling from trains are responsible for more than 92% of passenger fatalities. These individual accidents are the most severe for passengers and the number of passenger victims of these accidents has increased.
- In the case of passenger victims of falls from trains, the second level causes indicates passengers' lack of attention more than poor communication between train crews and passengers as the cause of the accidents. It also highlights possible errors in the attribution of the cause to third parties instead of to human factors.
- The number of accidents with individuals falling from a train involving third parties that were sleeping in wagons and coaches has reduced to a few units in 2007. They were almost 10% of the total falls in 2006.

Chart 7 — UIC - SBD Report on significant accidents from 2007-01-01 to 2007-12-31
Total number of staff who were victims of accidents by type of location.



Summary results

- The number of staff members who were the victims of accidents has continued to decrease in relation to previous years values. 2007 data slightly improved 2006 results. 1,4 staff member was killed per 100 significant accidents compared to 1,5 staff members in 2006.
- Of a total of 109 staff members victims of accidents 58 staff members were injured or killed in accidents in stations and 50 in accidents in open lines.
- As was the case in 2006, most staff member deaths occurred in open line accidents, whereas most serious injuries to staff members were incurred in accidents at stations.
- Most staff fatalities and serious injuries continue to be as a result of individual accidents particularly staff being hit by a train.
- 2 staff members died and 5 were seriously injured in collisions between trains.
- ADIF, EUROTUNNEL, CFL and JBV recorded no deaths or serious injuries to their staff members (see Tables 8 and 9).

Total number of "other" people who were victims of accidents by type of location is shown in Table 2.1.

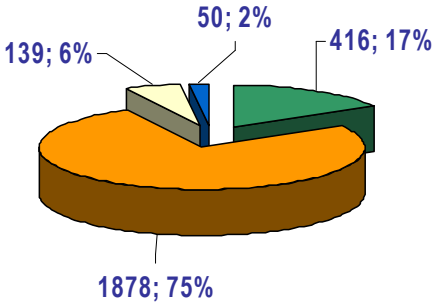
LEVEL 1 - CAUSES OF ACCIDENTS

Table 5	UIC – SBD: First level analysis from UIC Safety Database – 2007 data Causes of accidents.			
Simplest type of cause definition	Basic cause definition from UIC-SDB	More detailed information from UIC-SDB second level causes	Number of significant accidents	
INTERNAL CAUSES **26,0%**	RAILWAY SUB-SYSTEMS **2,7%**	Infrastructure (track & structures)	0,88%	20
		Energy	0,04%	1
		Control-command signalling	0,13%	3
		Operations & traffic management	0,04%	1
		Rolling stock	1,63%	37
	HUMAN FACTORS **23,2%**	Track and track contractors staff	0,70%	16
		Control-command, traffic operating and switching staff	0,79%	18
		Train driver and train crew	1,28%	29
		Other human factor in RU(s)	0,18%	4
		Passengers and freight company customers	**9,82%**	**223**
		Other users	**4,80%**	**109**
		Not specified	**5,68%**	**129**
EXTERNAL CAUSES **72,7%**	WEATHER & ENVIRONMENT **0,9%**	Weather	0,26%	6
		Environment	0,57%	13
		Not specified	0,04%	1
	THIRD PARTIES **71,8%**	Non-compliance with national laws & regulations	**22,36%**	**508**
		Objects on the gauge	0,70%	16
		Trespass (intrusion)	**42,52%**	**966**
		Other or vandalism	0,88%	20
		Not specified	**5,37%**	**122**
1% CAUSES NOT IDENTIFIED				30
100%	100%		Total:	**2272**

Summary results

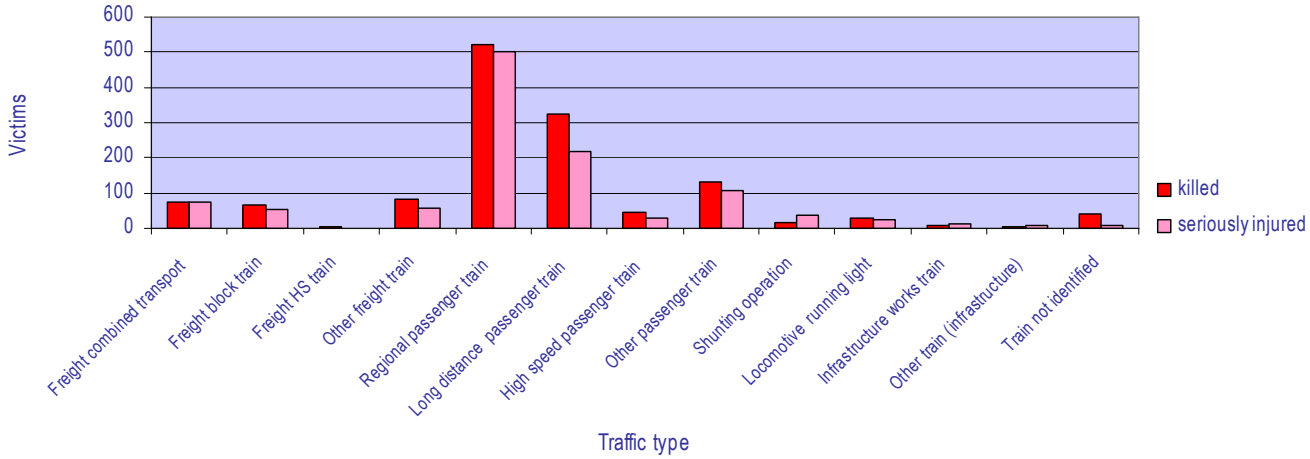
- Almost 73% of the accidents were caused by external factors and 26% of the accidents were related to internal causes.
- The quality of the cause's declaration from SDB correspondents is improving. Second level causes have not been specified in 11% of cases against 32% in 2006.
- Number of accidents with causes related to human factors is increasing. They represent 89% of the accidents, the causes of which are related to the railway system itself.
- Accidents caused by trespassers seem to be increasing. They represent 42.5% of all accidents compared to 30% in 2006.
- At least 22% of accidents were due to third parties not respecting the national laws/regulations.
- Almost 15% of accidents were caused by railway customers and other railway users.

Chart 8 — UIC - SBD Report on significant accidents from 2007-01-01 to 2007-12-31
Breakdown of victims by type of traffic involved



Number of Victims

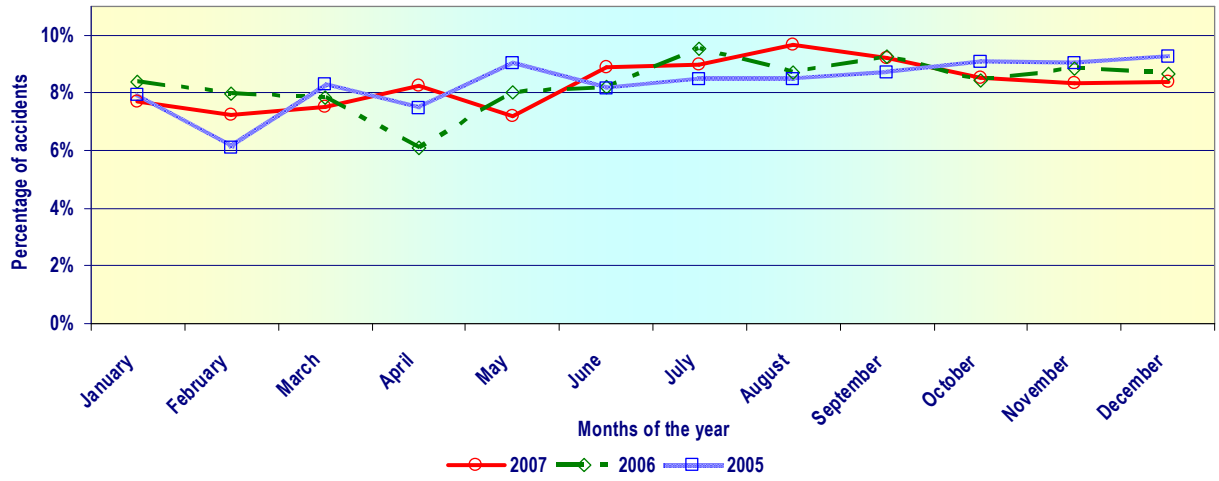
Type of accident	Freight trains	Passenger trains	Light running locomotives, Shunting operation, infrastructure works train and other infrastructure train	Train not identified
Collision	7	26	17	0
Derailment	0	18	3	0
Level-crossing accidents	149	681	48	2
Accidents to persons caused by rolling stock in motion	257	1151	71	33
Fires in rolling stock	0	0	0	0
Other accidents (all electrocutions)	3	2	0	15
TOTAL victims:	**416**	**1878**	**139**	**50**

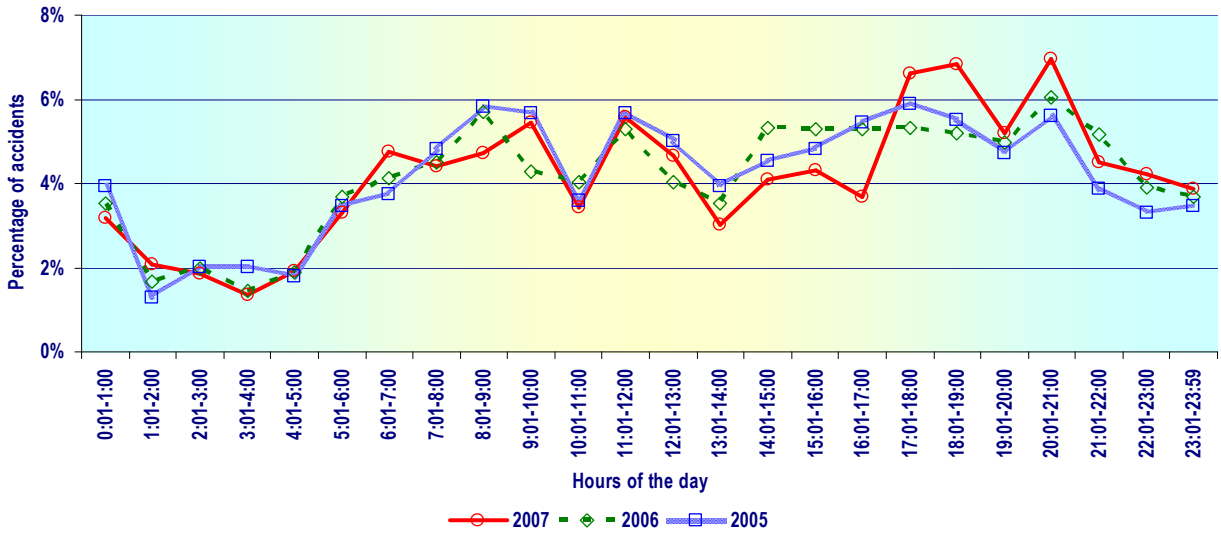


Summary results

- Neither derailments nor fire in rolling stock have been registered for freight trains.
- Of a total of 2272 significant accidents in 2007, 434 involved freight trains.
- The previous years results are confirmed: most of the victims were linked to regional passenger traffic. Further work still needs to be carried out to verify if the high number of victims in regional passenger traffic is proportional to the higher percentage of trains or if differences in regulations and or in rolling stock are at cause.
- Cases of train not identified are mainly associated with persons struck by a train.

Chart 9 — UIC - SBD Report on significant accidents.
Monthly and daily accident distributions for the years 2005, 2006 and 2007





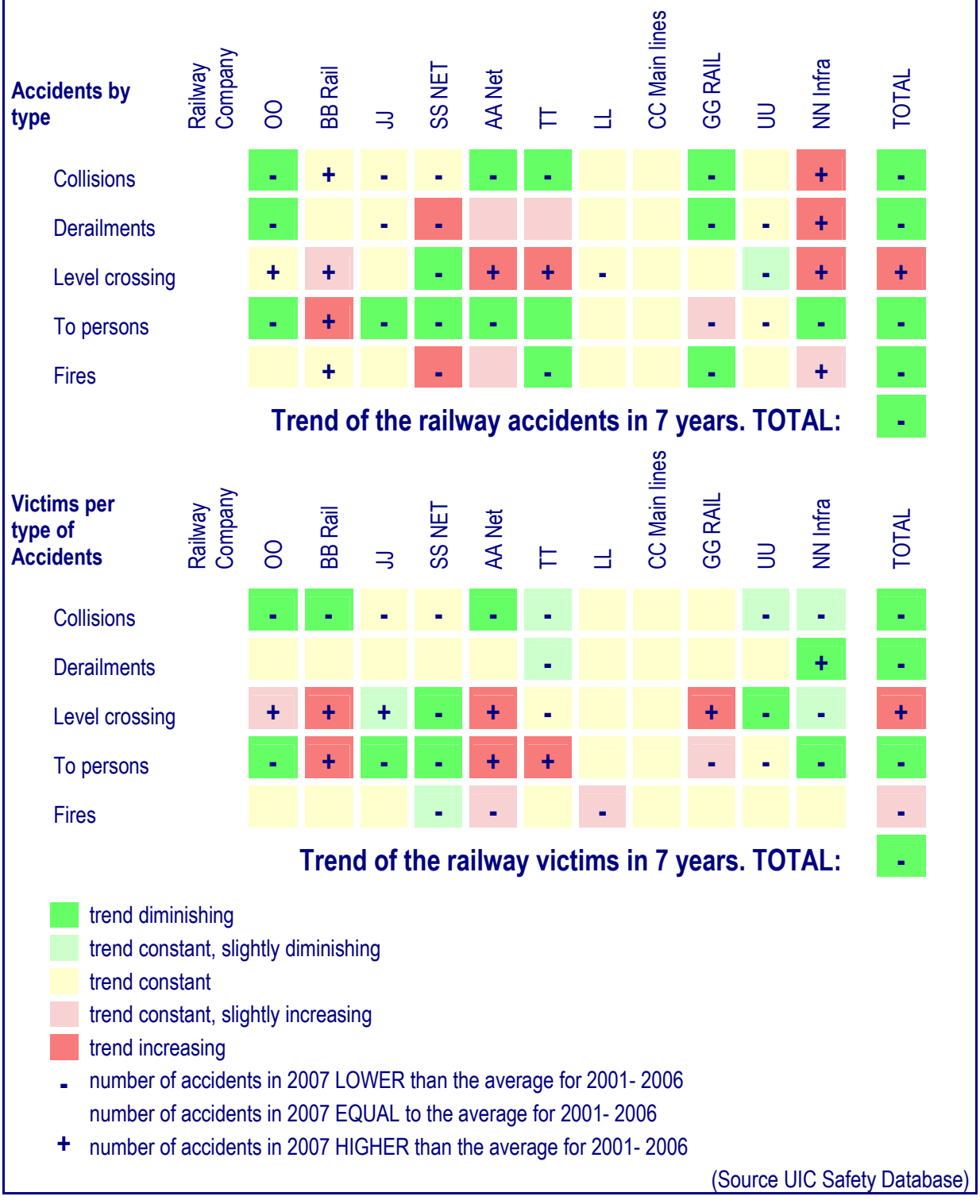
Summary results

- The annual variation in the number of accidents shows small differences from month to month. A greater number of accidents were registered between June and September. Intermediate low points and peaks seem do not respect any particular law of occurrence. The lowest number of monthly incidents was recorded in May. (It was recorded in April for the year 2006 and in February in 2005).
- The daily variation confirms the previous year's results, peaks between 11:00 and 12:00, between 17:00 and 19:00 and between 20:00 and 21:00. The period with the lowest accident rate is from 23:00 to 05:00.

SECTION II

LEVEL 2 - TRENDS

Chart 10 — Trend of the number of accidents and trend of the number of victims for eleven IM in the period 2001 – 2007.



(Source UIC Safety Database)

Summary results for 11 European railway companies

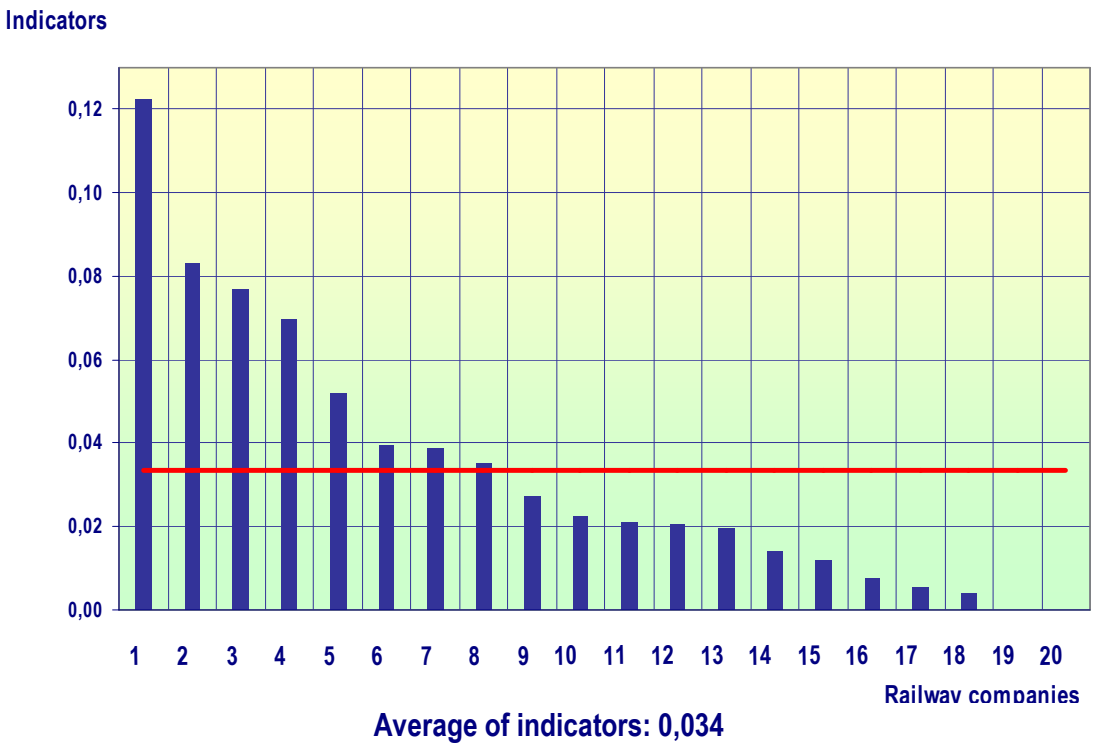
- Trend of accidents from 2001 to 2007 is diminishing.
- Total number of accidents in 2007 was lower than the average value of the past 6 years.
- Trend of victims of accidents from 2001 to 2007 is diminishing.
- Total number of victims in 2007 was lower than the average value of the past 6 years.
- Trend of level crossing accidents and trends of victims for this type of accident from 2001 to 2007 is increasing.
- Total number of level crossing accidents and total number of victims for this type of accident were higher than the average value of the past 6 years.

LEVEL 2 - BENCHMARKING

The benchmarking proposed here is based on the indicators of significant accidents and victims recorded in the SDB in 2007. Each infrastructure manager in the sample can evaluate their performances in relation to the others.

In Charts 11 to 21, the quoted axes represent the values of the indicator (number of accidents of the same type divided by million km of train movements). In the case of distribution of values (Charts 13 and 14), the quoted axis, normally the 'y' axis, (point on the curve that corresponds to a given indicator) represents the probability of the community of railways not exceeding the specific value of the indicator.

Chart 11	Indicator 1, 1, 1 - Significant accidents - Number of collisions of trains, including collisions with obstacle within the clearance gauge in 2007 related to the total number of million km of train movements.

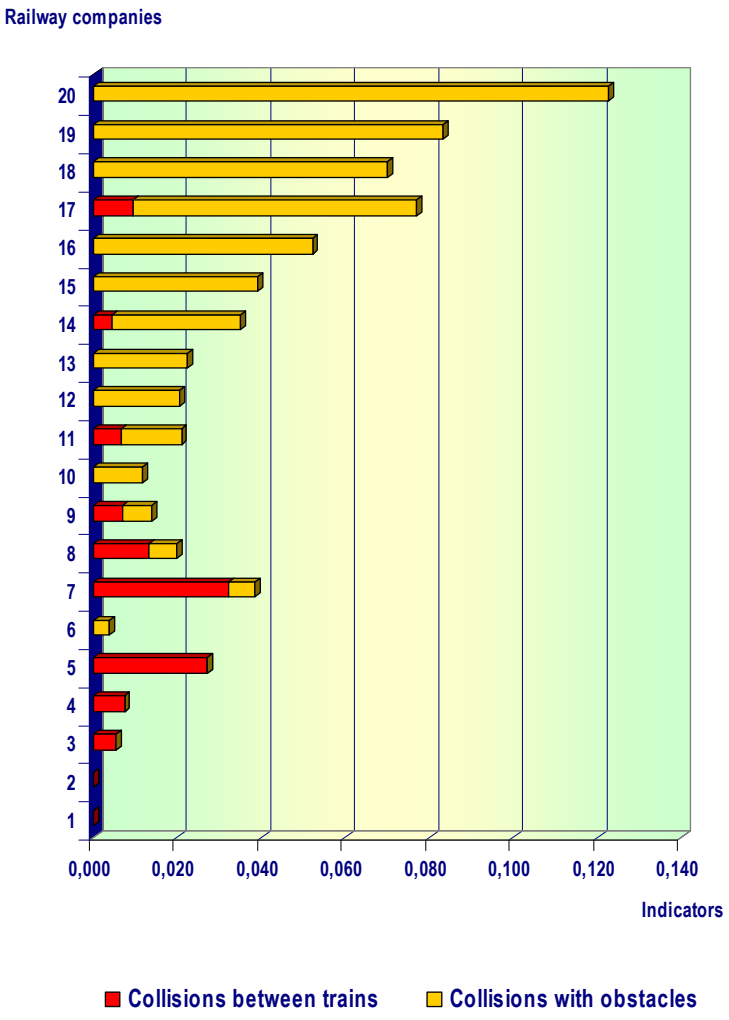


Summary results

- Collisions are very rare. The average frequency is 3.4 collisions for every 100 million Km of train movements.
- This type of accident seems correctly interpreted by all the railway companies participating in the data gathering.
- Two more useful indicators should be obtained by splitting collisions into “train collision with another train” and “train collision with an obstacle”. The set of indicator values for collisions between trains shows the smallest values (see Chart 12).

Chart 12	Indicators 1,1,1a: Number of collisions between trains and 1,1,1b: Number of trains collisions with an obstacle within the clearance gauge in 2007 related to the total number of million km of train movements.

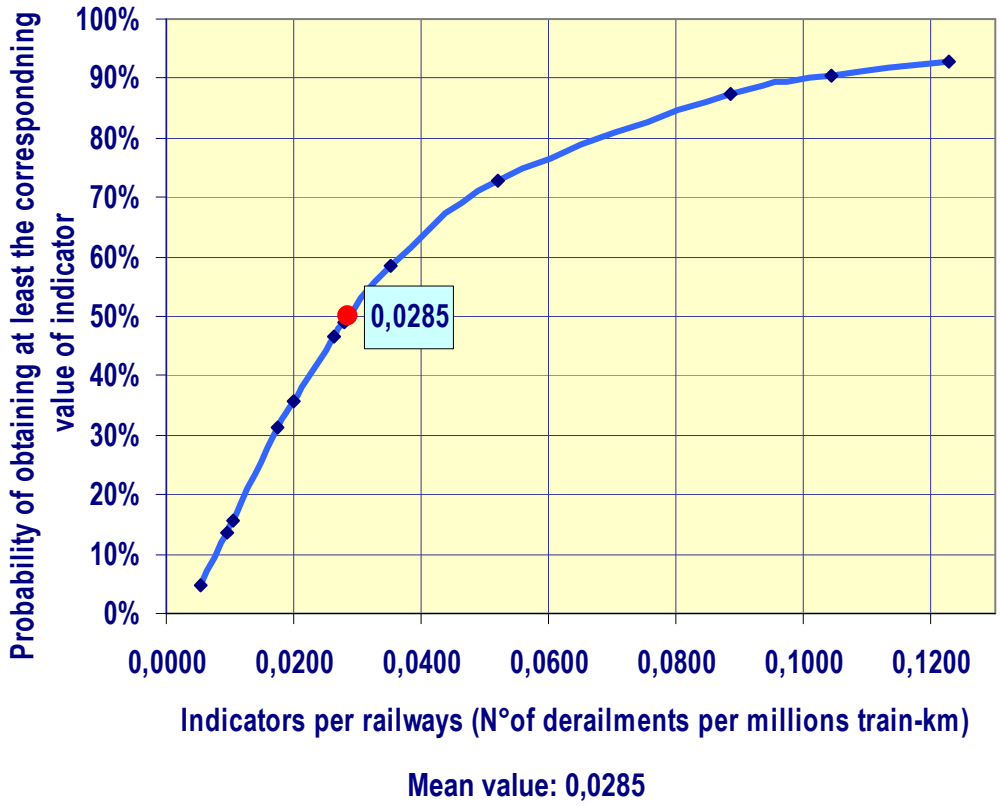
	1,1,1a	1,1,1b
	0,000	0,123
	0,000	0,083
	0,000	0,070
	0,010	0,067
	0,000	0,052
	0,000	0,039
	0,004	0,031
	0,000	0,022
	0,000	0,020
	0,007	0,014
	0,000	0,012
	0,007	0,007
	0,013	0,007
	0,032	0,006
	0,000	0,004
	0,027	0,000
	0,007	0,000
	0,005	0,000
	0,000	0,000
	0,000	0,000
Average of indicators:	**0,006**	**0,028**



Summary results

- Collisions between trains are extremely rare. The average of their frequency is of 6 collisions for 1000 million Km of train movements.
- No passengers died as consequence of collisions in 2007.

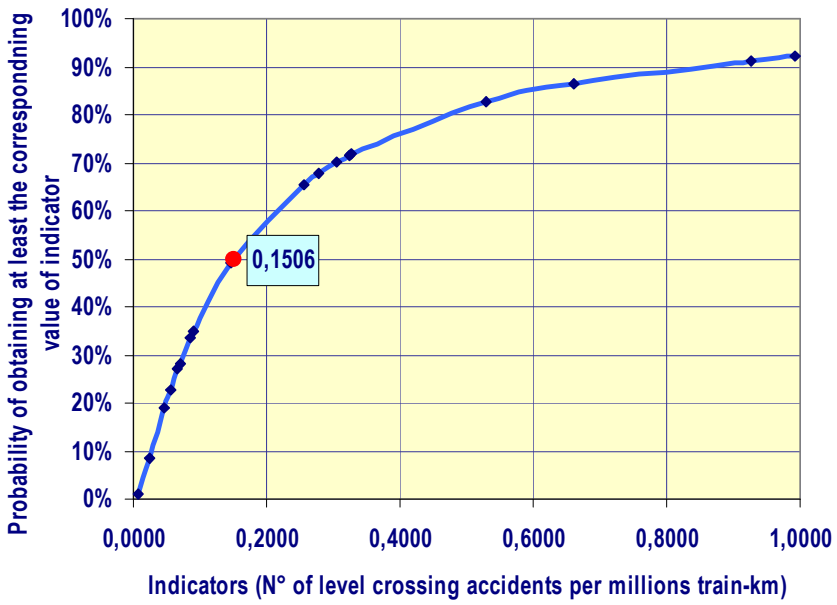
Chart 13	Indicator 1,1,2 - Significant accidents - Number of derailments in 2007 related to the total number of million km of train movements.



Summary results

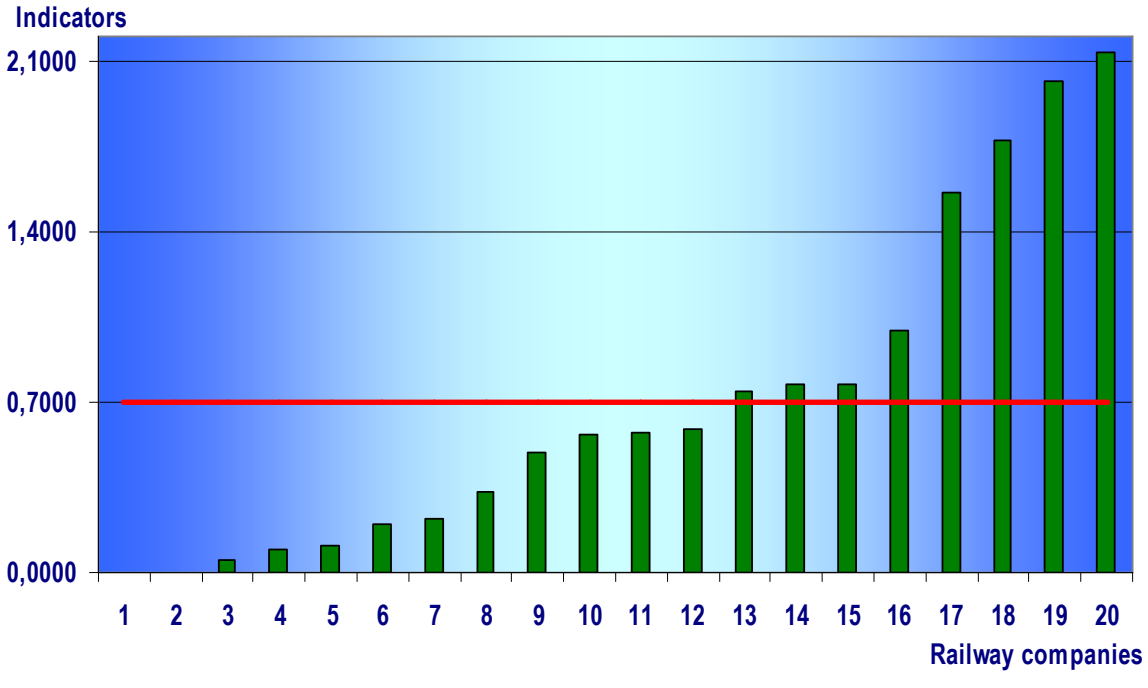
- The chart may be useful for benchmarking. Railway companies should enter their indicator in the abscissas axis and evaluate their position in relation to the other railways considered in the sample.
- Train derailments are very rare in Europe. The mean value of the distribution of these events indicates less than 3 derailments per 100 million Km of train movements. Railway performances indicate as poorer, results of more than 1 derailment per 10 million Km of train movements.
- With the exception of CFL and EUROTUNNEL that had no significant accidents, CFR, JBV, Prorail, RFF, SBB-CFF-FFS and ZSR did not declare in 2007 derailments 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 (see Appendix I: definitions from Commission Regulation (EC) N° 1192/2003).

Chart 14 — Indicator 1, 1, 3 - Significant accidents - Number of level crossing accidents, including accidents involving pedestrians at level crossing in 2007 related to the total number of million km of train movements.



Mean value: 0,1506

Chart 15 — Indicator of level crossings significant accidents, including accidents involving pedestrians at level crossing in 2007 related to the total number of level crossings multiplied by 100.



Average of indicators: 0,7

Summary results

- The sample in Chart 14 may be used for benchmarking. Railway companies should enter their indicator in the abscissas axis and evaluate their position in relation to the other railways considered in the sample.
- Cases of a few level crossings accidents per 100 million Km of train movements should be considered as an excellent performance. These results are from an appropriate combination of users' behaviour, chosen technology and adopted regulation to prevent accidents.
- Poorer performances are registered for more than 5 significant level crossings accidents per 10 million Km of train movements.
- The sample in Chart 15 shows the number of accidents for 100 level crossings in the different European network. A total of 621 level crossings accidents (621 individuals hit by a train at level crossings plus 412 collisions at level crossings) were related to a total of 109 973 level crossings. That gives a rate of 5 accidents for 1000 level crossings. The average of the indicators related to the number of level crossings gives an average of 7 accidents per 1000 level crossings. This second figure is most appropriate to be considered as a reference value of the community because it takes into account the performances obtained by each individual network.
- Chart 16 shows the values of the indicators in Chart 14 (number of level crossing accidents, including accidents involving pedestrians at level crossing in 2007 relating to the total number of million km of train movements) as the sum of indicators of level crossing accidents for individuals hit by a train and indicators of level crossing accidents for collisions with an obstacle.
- Further investigations should highlight differences in the installed technologies and/or in the operational rules between the railway companies but also different behaviours of the level crossings users and different road traffic regimes.

Chart 16 Indicators 1,1,3a: Number of level crossing accidents - individuals hit by a train and 1,1,3b: Number of level crossing accidents - collisions with an obstacle relating to the total number of million km of train movements in 2007.

	1,1,3a	1,1,3b
	0,104	0,887
	0,408	0,520
	0,180	0,350
	0,319	0,343
	0,033	0,291
	0,020	0,286
	0,020	0,235
	0,056	0,222
	0,154	0,173
	0,017	0,072
	0,023	0,047
	0,000	0,047
	0,022	0,045
	0,119	0,028
	0,059	0,027
	0,038	0,018
	0,020	0,004
	0,006	0,000
	0,000	0,000
	0,000	0,000
Average of indicators:	**0,078**	**0,18**

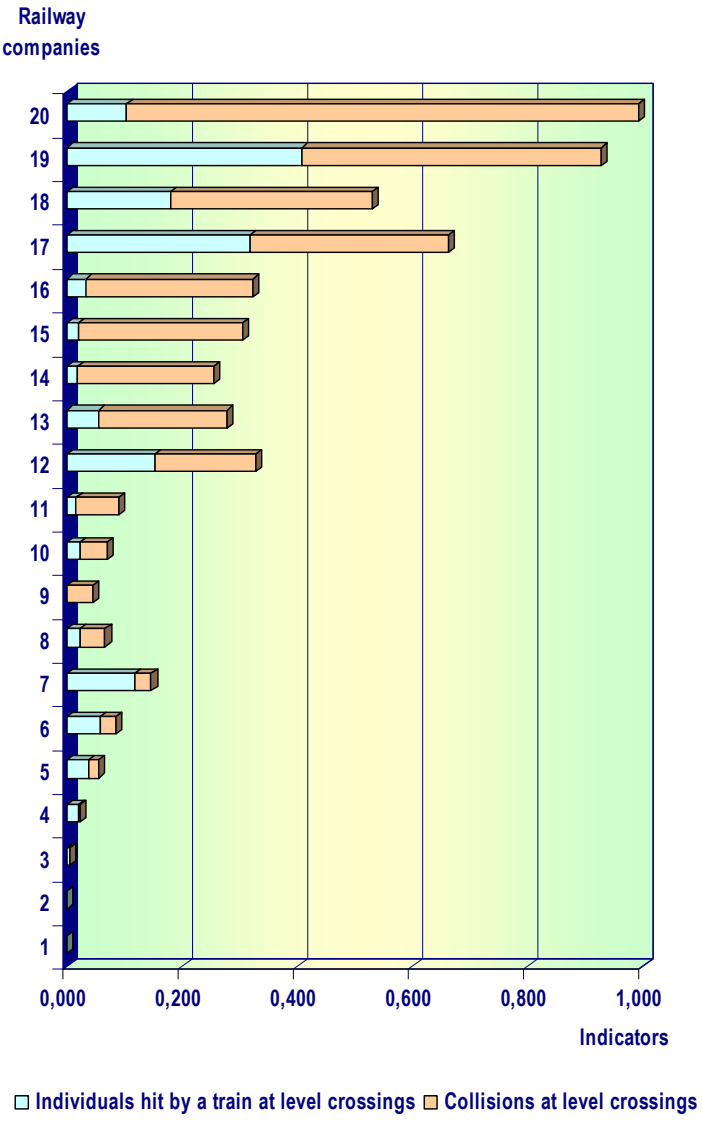
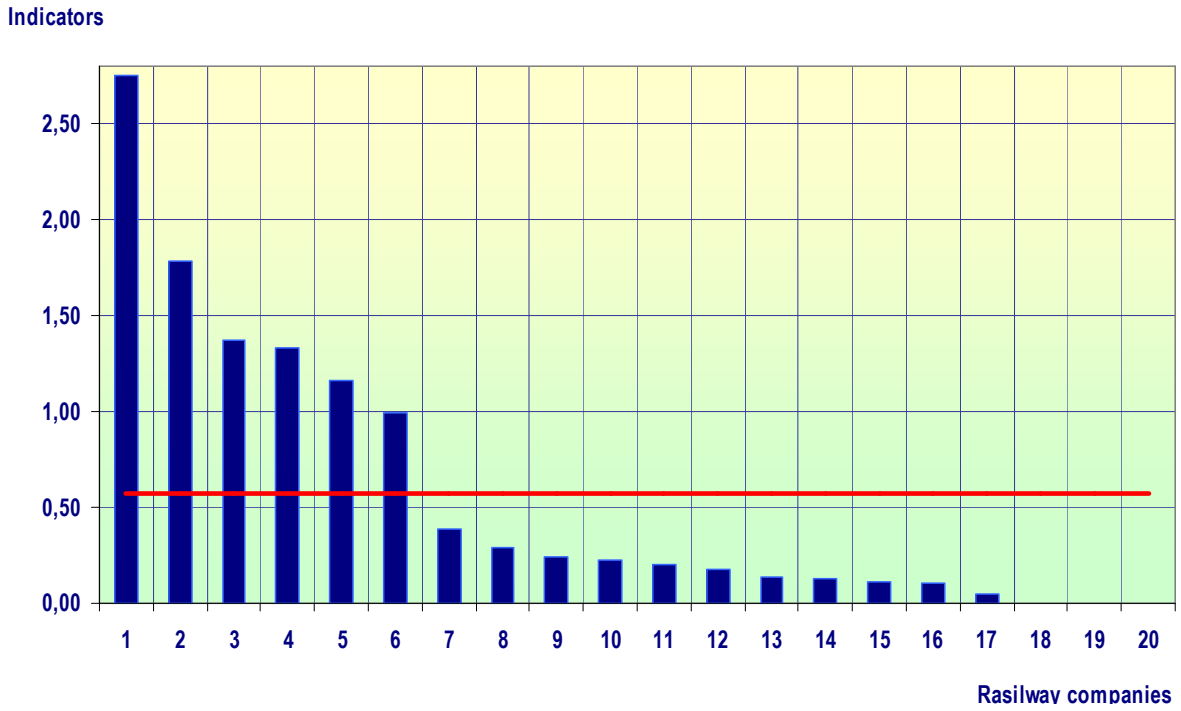
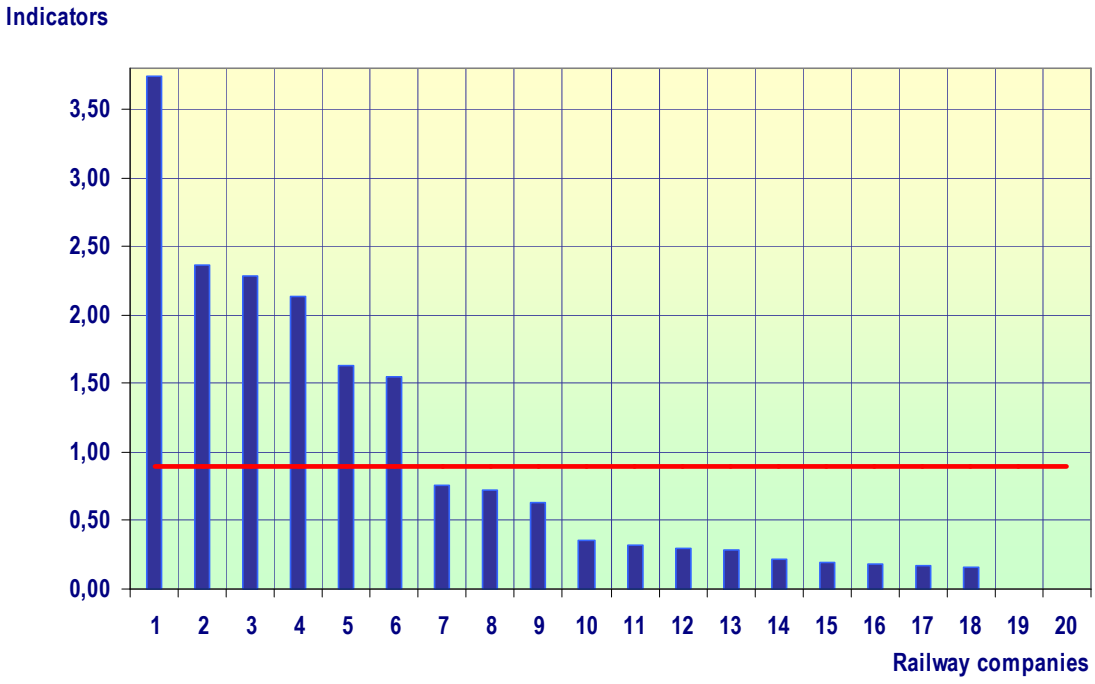


Chart 17 Indicator 1, 1, 4 - Significant accidents - Number of accidents to persons caused by rolling stock in motion, with exception of suicides in 2007 related to the total number of million km of train movements.



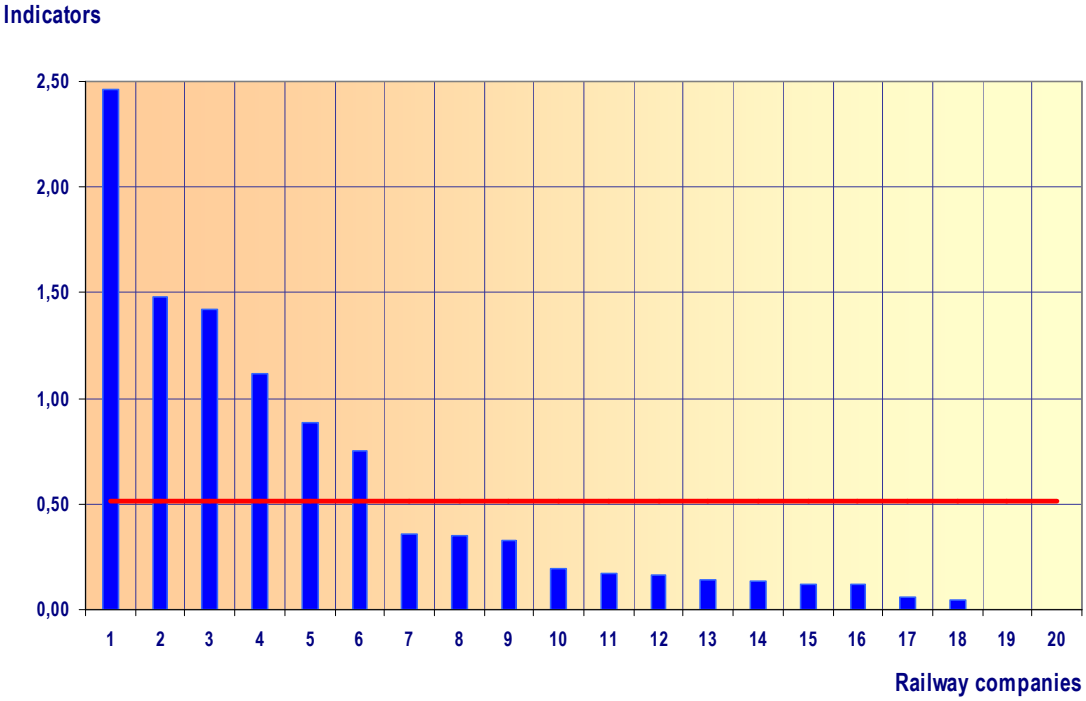
Average of indicators: 0,573

Chart 18 Indicator - Significant accidents - Number of all accidents in 2007 related to the total number of million km of train movements.



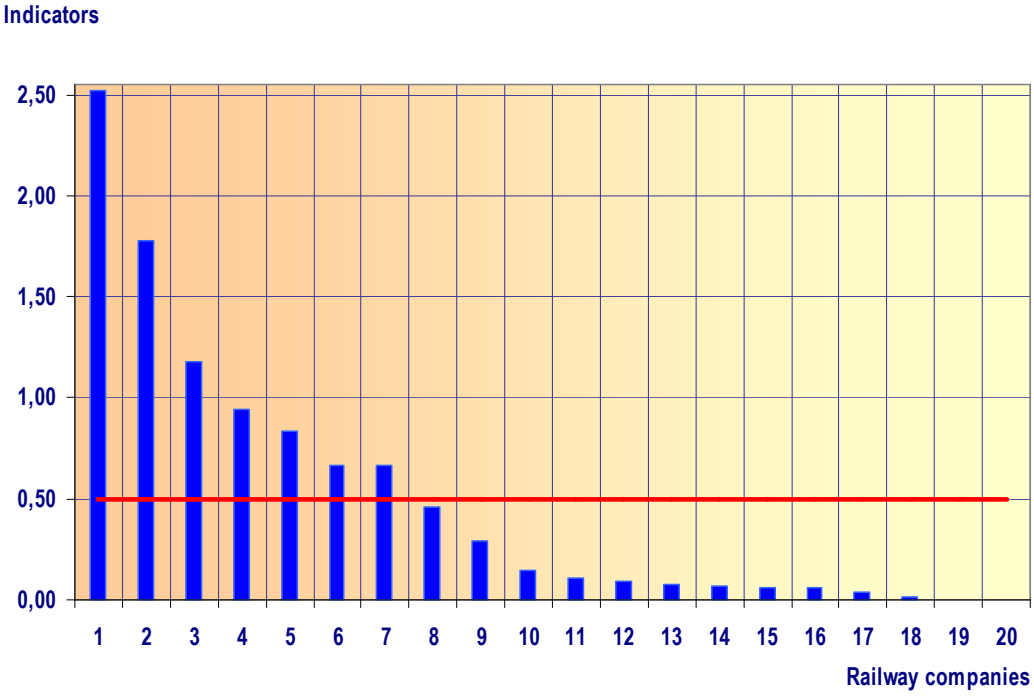
Average of indicators: 0,9

Chart 19 Indicator - Significant accidents - Number of fatalities in 2007 related to the total number of million km of train movements.



Average of indicators: 0, 515

Chart 20 Indicator - Significant accidents - Number of serious injury in 2007 related to the total number of million km of train movements.



Average of indicators: 0,5

Chart 21

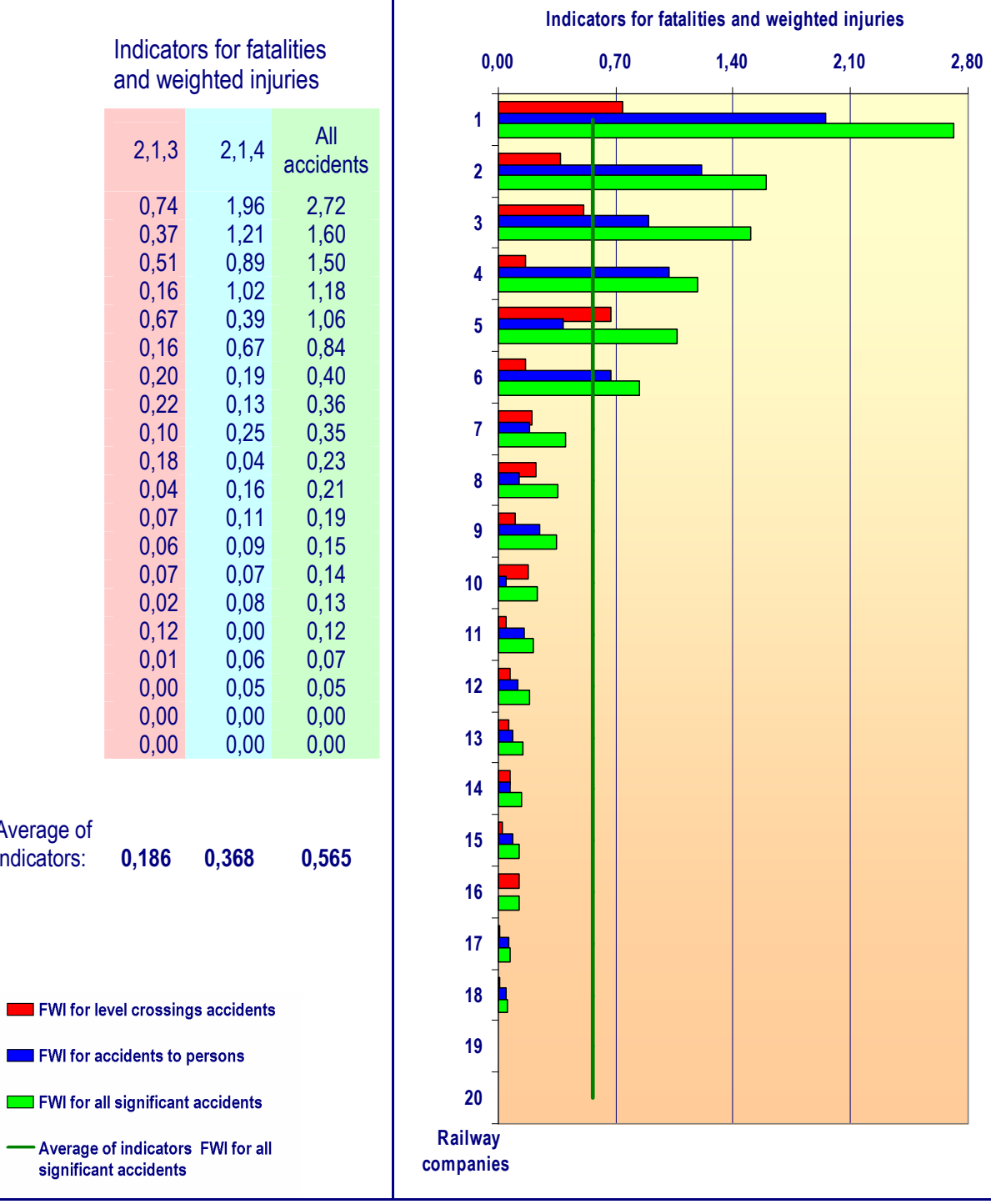
Indicators – Fatalities and weighted injuries (FWI) registered in 2007 related to the total number of million km of train movements.

2,1,3 FWI in level crossing accidents, including accidents involving pedestrians at level crossing;

2,1,4 FWI in accidents to persons caused by rolling stock in motion, with exception of suicides

Indicators for fatalities and weighted injuries

	2,1,3	2,1,4	All accidents
1	0,74	1,96	2,72
2	0,37	1,21	1,60
3	0,51	0,89	1,50
4	0,16	1,02	1,18
5	0,67	0,39	1,06
6	0,16	0,67	0,84
7	0,20	0,19	0,40
8	0,22	0,13	0,36
9	0,10	0,25	0,35
10	0,18	0,04	0,23
11	0,04	0,16	0,21
12	0,07	0,11	0,19
13	0,06	0,09	0,15
14	0,07	0,07	0,14
15	0,02	0,08	0,13
16	0,12	0,00	0,12
17	0,01	0,06	0,07
18	0,00	0,05	0,05
19	0,00	0,00	0,00
20	0,00	0,00	0,00
Average of indicators:	**0,186**	**0,368**	**0,565**



Appendix I

ACCIDENT DEFINITIONS CURRENTLY IN FORCE IN EUROPE

Please note that this chapter is entirely repeated from the 2007 Annual Report.

At present there are at least four definitions of "railway accidents" which have legal force in Europe:

2 definitions from Directive 2004/49/EC of 29 April 2004 (Railway Safety Directive):

(1) **"accident"** means an unwanted or unintended sudden event or a specific chain of such events which have harmful consequences; accidents are divided into the following categories: collisions, derailments, level-crossing accidents, accidents to persons caused by rolling stock in motion, fires and others;

(4) **"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 definitions from Commission Regulation (EC) N° 1192/2003:

(2) **"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. **Notes from the European Office of Statistics (EUROSTAT) specify the following factors:** significant damage over €150K and extensive disruptions to traffic with tracks blocked for more than 6 hours.

(3) **"Serious injury accident"** means any accident involving at least one rail vehicle in motion, resulting in at least one killed or seriously injured person. Accidents in workshops, warehouses and depots are excluded.*(Where "person killed" means any person killed immediately or dying within 30 days as a result of an accident, excluding suicides; and "person seriously injured" means any person injured who was hospitalised for more than 24 hours as a result of an accident, excluding attempted suicides)*.

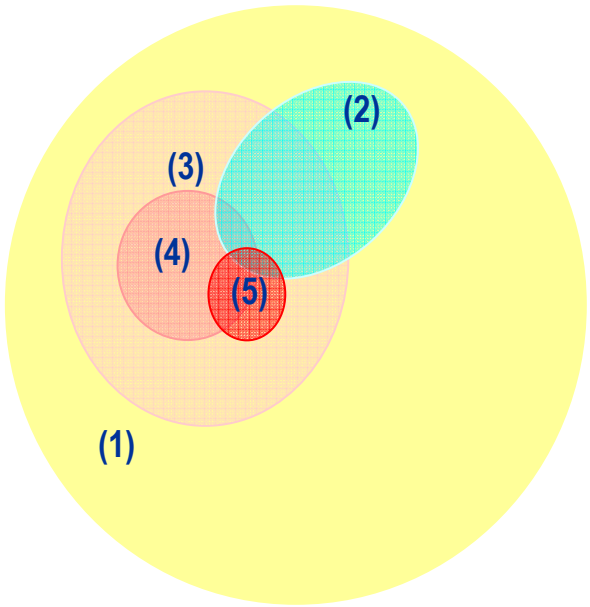
Fig 1 comprises a diagram showing the field of application of and intersection between the four accident definitions.

The UIC Safety Database collates information on railway accidents, critical events, suicides and attempted suicides. UIC SDB accepts declarations based on all the above accident definitions. However, **declaration of "Significant Accidents"** in accordance with the definition given by the Commission Regulation (EC) N° 1192/2003 and the notes from European Office of Statistics **is mandatory.**

Moreover, SDB offers specific reports and analysis for the community or for a single railway based on filtering the data collection according the definitions in force. So, for its own information, an SDB member can declare accidents to the database other than significant accidents without prejudice to its relative position in the international benchmarking where only significant accidents are automatically taken into account for declarations in accordance with Commission Regulation.

The UIC International Railway Statistic – Table A91 collates the total of Significant Accidents in 5 categories and the number of passenger, staff and third parties victims as a result of the accidents.

Fig 1 Domains of the different definitions of accidents



(1) Accidents as defined in the European Railway Safety Directive.
It is not used for any mandatory data collection.

(2) Dangerous goods accidents as in RID/ADR section 1.8.5.
It contains the accidents to take into account to complete EUROSTAT table H2

(3) Significant Accidents as in EC Regulation N° 1192/2003.
It contains the accidents to take into account to complete EUROSTAT table H1 and to calculate the Safety Indicators as defined in the Safety Directive Annex 1.

(4) Serious Injury Accidents in EC Regulation N° 1192/2003
It is used to complete the optional part of EUROSTAT table H1 and tables H2 and H3.

(5) Serious Accidents domain as defined in the European Railway Safety Directive.
It contains those accidents for which Member States shall ensure that an investigation is carried out by the investigating body and the results of the investigations made known to the public.

Finally, SDB must contain at least all the significant accidents and all the dangerous goods accidents declared (one by one or automatically transferred) by the SDB Correspondents plus the number of critical events, suicides and attempted suicides in a defined period.

Table A91 of the UIC International Railway Statistics must contain, for each UIC member, the total number of accidents by type (5 types) and the number of passenger fatalities and injuries for each type of accident, calculated as a total of all significant accidents experienced by each UIC member.

Every year at the end of September, the values necessary to compile Table A91 are extracted by the SDB and transferred to the UIC Committee for International Statistics. Those responsible for statistics within UIC railway member companies can confirm or correct the totals that will be published thereafter in the official statistics Table A91: “Railway Accidents”.

FUTURE DEVELOPMENT OF ACCIDENT DEFINITIONS. DEVELOPMENT OF THE UIC SDB

The European Railway Agency has completed its work on the Safety Directive Annex I revision and has delivered its recommendations to the European Commission. ERA project officers have informed NSA representatives of the timescale for the revision of Annex I completion. The working group on CSIs will endorse the "Guidance for Common Safety Indicators" by the end of 2008 and the formal vote of the RISC (former Article 21 Committee) is expected by February 2009.

ERA proposes the following tasks for the future work of the WG starting from 2009:

a) CSI's data quality assessment

b) Facilitate the improvement of the CSI's data quality and of the consistency between CSIs and EUROSTAT data

c) Feedback exchange on the implementation of Annex I

d) Exchanging experiences on the CSIs data collection process

e) Periodic update of the "Guidance for CSIs"

The railway community considers the definition of "Significant accident" a good reference point for compiling international statistics and benchmarking; nevertheless, there are some pending requests from UIC to the ERA within the framework of the CSIs working group particularly with regard to the breakdown into the different types of accidents, to the utility of the indicators related to precursors to accidents and to the definitions related to the indicators to calculate the economic impact of accidents.

In the case of: "Collisions of trains, including collisions with obstacles within the clearance gauge", UIC has requested that the distinction be made between collisions between trains and collisions with obstacles.

In the case of: "Level-crossing accidents, including accidents involving pedestrians at level-crossings", UIC has requested the distinction be made between collisions with vehicles at level crossings and collisions with pedestrians as well as the different category of victims. UIC would like to have this request adopted in the current revision of Annex I particularly because ERA is proposing to revise the level crossing types in the indicators related to technical safety of infrastructure and its implementation. It has also been requested that they consider the road traffic in the scaling parameters used to calculate the indicators for level crossings.

In the case of: "Indicators related to precursors to accidents", UIC pointed out the need to associate the number of precursors (events) with the number of accidents which occurred as a consequence of the specific precursor (e.g. 120 SPAD with 1 collision and 2 derailments associated with the 120 SPAD).

In the case of the indicators to calculate the economic impact of accidents, UIC is in opposition to the current definition that permits different interpretations. The term "harmful" leads to confusion. These indicators could be discussed for future revision of Annex I. However, for the purposes of the current revision, UIC would prefer that the definition be limited to significant accidents.

The technical and objective reasons for the above requests have been described in "Position Papers" previously produced by the UIC Safety Platform.

A part of the above "pending requests" most of the work done in the contest of the Annex I terms definitions, in which NSA(s) and UIC have actively contributed, is to be retained and integrated into the definitions of terms used by the Safety Database Correspondents.

Here below are reported the definitions for wrong side signalling failure and broken wheel/broken axles as they result from the text of the new Appendix to Annex 1 of Directive 2004/49/EC.

"Wrong side signalling failure" means any failure of a signalling system (either to infrastructure or to rolling stock), resulting in signalling information less restrictive than that demanded.

The following non exhaustive list of events is to be included:

– a green light aspect presented instead of an indication at danger, signal warning to slow down, caution signal announcing a stop signal or a speed restriction signal

– any signal less restrictive than a stop signal that is presented instead of a stop signal

– the presentation failure of a distant signal announcing a stop signal or a speed restriction signal

The following events are to be excluded:

– Malfunctions of the interlocking which do not lead to information less restrictive than a stop; e.g. automatic release of route locking before the train has left the section concerned;

– Malfunctions related to degraded modes.

"'Broken wheels and broken axles" means a break affecting the essential parts of the wheel or the axle and creating a risk of accident (derailment or collision).

The number of broken wheels and broken axles should include:

– cracks having caused an accident

– cracks detected on components in of train-sets in service of a gravity which imposes the exclusion of rolling stock from running

– cracks detected in workshops during maintenance operations, and which prevent authorisation for the rolling stock to run (i.e. a new control scheduled or a speed limitations)

The following cases will not be taken into account:

– rolling stock with cracks excluded from running at the end of their life cycle;

– axles and wheels replaced due to the risk of cracks before a following maintenance check

In 2009, the declaration page of the SDB will be modified to take into account the work done at the ERA level, the decisions taken based on a more accurate classification of the causes of accidents, the ongoing work of the UIC Statistical Committee and other detailed requests from UIC members pointed out at bilateral meetings on SDB activity.

Correspondents declaring accidents will be requested to indicate if the accident refers to at least one moving train or other moving railway vehicles, excluding trains. The first group will be adopted to calculate the CSI that are defined in the SD as number of accidents in relation to train kilometres. The second group of accidents (collisions and derailments involving maintenance vehicles or rolling stock during shunting operations or vehicle runaways, etc.) will permit a cross reference with the category "other accidents" as considered in the Safety Directive as well as with a new table on accidents at work that the Statistical Committee intends to collect from 2009.

Finally, indicators calculated for accidents involving commercial trains highlight the level of service offered to customers both for passengers and freight and enable a benchmark of rail safety in comparison with other transport modes (road, naval and aviation). The second group of accidents enables a benchmarking on the efficiency of the organisation of work and the safety performance of maintenance services

Categories of people involved in the accidents will be extended to 5. Passengers and staff (employees including the staff of contractors) will maintain the original definition while "other" is spread across 3 new categories: level-crossing users, unauthorised persons on railway premises and others.

In the case of accidents at level crossings it will also be necessary to indicate if they occurred at a passive or active level crossing.

"Active Level Crossing" means a level crossing where crossing users are protected from or warned of the approaching train by the activation of devices when it is unsafe for them to cross. "Passive crossing" means a level crossing without any form of warning system and/or protection activated when it is unsafe for the user to cross.

UIC Members have indicated their interest in the service provided by the SDB to understand their own performance in the context of the entire rail community and to assist the Safety Platform and CER/EIM in the development of a rail policy in front of ERA. They are of the opinion that the SDB has the potential to be a very good source of information for benchmarking and they want to pursue this aim focusing more on confidence in the data and improving data quality. Safety Experts would like to carry out a more detailed and robust analysis of the data that will result in better safety knowledge and management.

As safety data quality is a sound basis for analyses, a proposal was put forward at the Infrastructure Forum to extend the SDB software procedures in order to enhance data confidence (completion of database fields, qualitative accident descriptions, associated reports etc) and ensure the best data quality. Unfortunately this item was not discussed as it was decided that this project would be deferred from the 2009 programme due to budgetary considerations. The SDB team is available for further exchanges with the Safety Platform to establish a detailed plan (procedures and software for getting more detailed data) to improve the quality of the information collected.

CAUSE ANALYSIS

SDB collates causes of accidents with the information broken down into three declaration levels.

The first declaration level seeks to determine whether the cause of the accident is internal or external by indicating the sub-system involved or, in the case of third parties, if weather or environment are in question.

In the case of internal causes, the second declaration level seeks to distinguish, within the sub-system involved in the accident, if the accident was caused by human error or a technical problem. It does this by indicating the component or the particular category of person involved (permanent track staff, traffic operating staff, train driver, etc.). In the case of external causes (third parties, weather or environment), the second declaration level seeks to distinguish, if the cause of the accident depends on parallel or crossing infrastructure (pipelines, electrical lines, etc.), trespassing, object in the gauge due to third parties, other types of intrusion (lack of attention, theft or attempted theft, etc.) and vandalism.

The third declaration level enables the cause of the component malfunction to be identified (design/dimension, construction/manufacture, incorrect installation, maintenance, material, etc.) or, in case of human error, to distinguish cases of lack of attention and the influence of alcohol or drugs from bad organisation or lacking / ineffective regulations.

First level of causes analysis for derailments and fire in rolling stocks for accidents wich occurred in 2005 and 2006 highlighted that rolling stocks were respectively the cause of almost 25% and 24% of those accidents. For a better understanding of these causes it has been suggested to expand the number of second level causes associated with the rolling stocks sub-system. SDB Correspondents agreed to increase the second level causes for rolling stock from 8 to 16: 1.Electrical circuit out of order, 2.Open door(s) on passing train, 3.Open parties on freight train, 4.Interoperability vehicle / c-c signalling, 5.Interaction vehicle / infrastructure, 6. Flat wheel, 7.Fault with wheel or axle, 8.Hot boxes, 9.Buffers overriding, 10.Coupling hook broken, 11.Other Locomotive faults, 12.Other Train faults, 13.Missing tail lamp, 14.Brake failure, 15.Running away (not brake failure) and 16.Gauge, shifted load (vehicle defected).

First level of causes analysis for level crossings accidents which occurred in 2005 and 2006 highlighted that third parties were the cause of 89% of those accidents as well as the impossibility of attributing a second level cause to 23% of these cases.. For all accidents caused by third parties in the same period (2005-2006) the associated second level of causes was missing in 32% of cases.

SDB Correspondents agreed on reorganising the second level causes for third parties permitting a choice between: 1.Trespassing, 2. Objects on the gauge, 3.Parallel or crossing infrastructure, 4.Pedestrian (case of LC accident), 5.Vehicle (case of LC accident), 6.Drivers on the track, 7.Taggers, 8.Other Intrusion and 9.Vandalism. According the Safety Directive cases of vandalism will be not taken into account for the calculation of CSI(s). Further details if the cause depends on: 1.Non compliance with national laws and regulations, 2.Lack of attention, 3.Unconsciousness, 4.Theft or attempted theft, 5.Alcohol or drugs and eventually on 5.Lack of regulation against third parties will be set at the third level of cause's declaration.

Finally in the case of vandalism the third level of cause declaration will indicate if the vandalism act has caused: 1.Broken barriers, 2.Side signal out of order, 3.Switch out of order, 4.Conductors out of order, 6.Isolators out of order, 7.Catenary out of order, 8.Other fixed installation out of order and 9.Rolling stock out of order.

SDB Project Team will take the responsibility for translating the existing causes of accidents into the new ones.

Appendix II

This appendix gives a summary of the report presented by the working group infrastructure to the UIC SIAFI course 2008 on the subject: "**C**ut down **A**ccidents among **P**assengers **A**t **S**tations" (CAPAS).

PROJECT CAPAS

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FOREWORD

This project was prepared by young managers from Latvia, Poland, Lithuania, Italy and Serbia. It shows the summary of railway accidents at stations in the above countries. This project shows how many passengers were killed or seriously injured at stations and indicates ways of maintaining and improving the overall level of safety across the European network. This presentation includes in particular the breakdown of accidents and some solutions for safety and protection of passengers at stations.

Fig 2	Passengers victims of accidents at stations during the period 2005-2007 from the SIAFI project: "CAPAS"											
Type of accident:	Collisions			Individual hit by a train			Individual falling from a train			**Total**		
Infrastructure Manager	2005	2006	2007	2005	2006	2007	2005	2006	2007	**2005**	**2006**	**2007**
LDZ - Latvia	8	0	0	0	0	1	0	0	0	8	0	1
LG - Lithuania	0	0	0	0	0	0	0	0	0	0	0	0
PKP - Poland	0	0	0	0	0	3	0	52	43	0	52	46
RFI - Italy	30	0	0	4	2	0	10	7	13	44	9	13
ZS - Serbia	0	0	0	1	2	0	10	6	17	11	8	17
Total:	38	0	0	5	4	4	20	65	73	**63**	**69**	**77**

Table in Fig 2 shows the number of passengers who have been victims of accidents at stations, notably collisions, individuals hit by a train and who have fallen from a train. Other cases of accidents at stations and suicides are excluded.

By analysing statistical data, it is clear that the main passenger injuries in some countries participating in the CAPAS project (Italy, Poland and Serbia) have resulted from "Falling from a train". The other categories of accidents - "Collisions" and "Hit by a train" are in the range of 10-15%. According to the statistical data of Italy and Latvia, there were significant accidents with fatalities and seriously injured people involved in collisions in 2005.

It can be summarised that statistical data in each railway company is very specific and there are often large differences in classification methods and approaches. The data record systems also vary in different companies; it is therefore necessary to create a combined data collecting system.

The following chapters are devoted to the risk of passenger injuries and proposed solutions for reducing the number of passenger accidents.

IDENTIFYING SITUATIONS WHERE PASSENGERS ARE EXPOSED TO RISK

There are a number of situations where passengers are exposed to risk at railway stations, simply because the latter link the two together. These types of risk can be divided into 4 categories:

a. While entering/exiting the platform
b. While waiting at the platform
c. During boarding/disembarking
d. While travelling in the train

Less common exposure to risk that passengers may suffer on railway premises such as noise, pollution, etc., are not considered in this chapter.

a. Risks during platform entering/exiting

The necessity to cross the tracks causes exposure to risk during platform access, especially when the platform is of the island type; however, side platforms do not completely reduce exposure to risk. It is obvious that crossing tracks via a multilevel crossing is the safest option, whereas crossing tracks at the same level represents a great danger. Despite this fact, passenger bridges and tunnels are not very common. As a matter of fact, people often cross the tracks in restricted areas. The relatively low height of the platform facilitates entry to the platform from the track.

The exposure to risk is caused by the train being run on the tracks that are being crossed. This is particularly true when there is more than one track, as passengers tend to focus on the train that they plan to catch, sometimes unaware of possible train movements on other tracks. This occurs in particular if people hurry to catch a train or compete for limited seats on board.

Another method used regarding the risk of platform access is the introduction of obstacles that force the passengers to face approaching trains. Such obstacles are the visible sign of an effort to increase safety for passengers.

b. Risks on platforms

Platforms with insufficient dimensions cause a large exposure to risk for passengers disembarking from a train or waiting for a train. It is commonly known that large numbers of people in a small area is particularly dangerous.

When the situation takes place on a railway platform the risk is doubled because of the proximity to the tracks. People may be seriously injured from falling on to the tracks from the platform edge. However, the biggest danger in this case is the moving train as the long braking distance of the railway vehicles makes it impossible to prevent the person from being hit.

Furthermore, the safety zone has to be taken into account i.e. the necessary space a passenger needs to walk along the platform. Along with overcrowded platforms, passing trains may also cause injuries, more specifically their compression waves, as well as objects falling from the train.

c. Risks during boarding/disembarking

Exposure to risk from train doors may arise while passengers are boarding or disembarking because of a difference between the floor levels and a gap between the platform and the train.

Another risk is the jamming of passengers while the doors are closing.

d. Risks inside the train

Train accidents cause very serious threats to passengers. Avoiding train accidents is an ultimate aim for the whole railway sector and a number of measures have been taken to achieve this aim.

The exposure to the risk of fire on trains is minimized by the non-flammable material and avoiding sources for ignition when constructing trains. The risk of a fire starting by itself in a train ignited is therefore low.

Passengers also may cause fire by bringing inflammable material onto the train. It is therefore commonly prohibited to transport any type of dangerous goods in passenger trains.

It should be noted that it is very difficult to ensure that this rule is observed; furthermore passengers are often unaware of the conditions of transport. However, a small number of accidents (fires) caused by dangerous goods transported in passenger trains proves that this issue is linked to the responsibility of passengers and observation of the relevant rules.

Collisions may also lead to the threat of passengers' safety. Since trains lines are used for the sole purpose of running trains, the probability of a collision with other objects is rather low. Collisions with other trains are

avoided by sophisticated fail-safe signalling and braking systems, as well as an elaborated system of regulations to prevent these systems being bypassed.

However, experience shows that unfortunately trains still collide with each other, mostly in situations where the safety systems are not completely available due to construction work, for example.

The only aspect of practical importance is any collision with a heavily loaded truck on a level crossing. However, the problem of safety at level crossings is very complex and not only related to passenger services.

Bad track/vehicle interaction as well as exceeding the permitted speed can cause derailment. Normally this results in passengers falling if they are standing up, causing only smaller injuries. A considerable threat to the passenger's safety occurs only in cases where the train derails completely, colliding with heavy objects (buildings) or falling down an embankment. A fall involving a regularly operating train is more likely to cause an accident among passengers.

1. TECHNICAL MEASURES

In order to choose the best possible option among the solutions presented below for reducing the number of passenger accidents, it is necessary first of all to gather more detailed statistical data from each country with a view to finding out where and why people are injured more frequently and by doing so to identify the aims and tasks we seek to achieve. When choosing the best solution, it is necessary to take into account specific features of the infrastructure and financial capacities in each particular country. Taking into account all the abovementioned we therefore propose the following solutions for improving passenger safety at railway stations:

1.1. Construction of barriers and fences

In order to prevent the possibility of passengers walking on to the track, one method may be to have fenced rail tracks. Stations with low platforms could have fences built between tracks to avoid passengers crossing the tracks in prohibited and unequipped places.

Another technical measure is to build enclosed fences on platforms, when their doors open at the same time as rolling stock doors (preferable for subways).

A further effective device is the introduction of obstacles (for example barriers) that force passengers to face the approaching train. Since both the investment and the operation costs for such barriers are low, this solution has become quite popular.

This was also supported by the fact that such obstacles are a visible sign of an effort to increase safety for people. However, this may not work so well in practice, as these barriers are also ignored after a while.

Another solution has been achieved on lines at stations with more than one track and an island platform that is supervised by local staff. In such cases the people are not allowed to wait on the island platform. Only when a train is approaching can the passengers cross the tracks and enter the platform. During this time, crossing the tracks is allowed, as they are made secure by switching the entry signals to red meaning "danger". However, the main effect is not the physical prevention, but to demonstrate that crossing the tracks is dangerous at that particular moment.

1.2. Construction of multi-level crossings (tunnels, bridges)

It is understood that crossing tracks at the same level is much more dangerous than via a multilevel crossing. The best one from a safety point of view is the provision of multi-level access by footbridges or tunnels. Both tunnels and bridges have specific characteristics, with its advantages and disadvantages. The main advantages of footbridges are the lower construction and operational costs. The main advantage of

tunnels, however, is weather protection. The construction of tunnels under an operated railway line is a complicated task. The final decision – either a same level or multi level solution – has to be made taking into account local conditions and financial possibilities. In any case, level crossings have to be equipped with safety devices.

1.3. Platform construction

The platform can be rather dangerous when passengers are waiting for a train. The safety zone therefore has to be clearly marked (usually white or yellow line) with enough space for passengers to walk along; anti-slip and ribbed surfaces within the safety zone are considered a good idea.

Warning signs must be put in place to prevent passengers from standing outside? the safety zone. It is common practice to cross the tracks not only at the designated areas, but wherever it seems suitable. Low level platforms make it easy for pedestrians to enter the platform from the track. The obvious conclusion is therefore that high level platforms make access from the track more difficult and will force passengers to use bridges, tunnels etc. to reach the platform.

Moreover, ensuring that platforms and train entrances are at the same height level will considerably decrease the risk of stumbling and falling. However, since a small difference between the floor levels remains as well as a gap between platform and train, it can not be completely eliminated. To minimize the vertical and horizontal gap between train and platform it is preferable to construct platforms on straight tracks only.

In the event that it might be possible to raise additional platforms, the priority should be given to the most frequented stations, simply because a larger numbers of passengers will benefit. Equally at large stations the quicker embarking and disembarking period at the elevated platforms may result in passengers spending less time waiting for trains.

1.4. Safe rolling stock

Safe and well equipped rolling stock guarantees the safety of passengers. Anti-slip floor, handrails and handles in all suitable places are a number of measures to be taken to avoid falls. Since passengers standing up are much more exposed to risk, ensuring enough seats can also be mentioned here, especially those dedicated to handicapped, old people or to mothers with children. To minimize the risk in the event that falls cannot be avoided, the inside of the train should not have sharp edges.

Since doors may be blocked as result of a collision, the availability of emergency exits is important. Emergency exits are also helpful in case of derailment, especially if the coach tilts over and stays on one side. Finally, a sufficient number of clearly-marked emergency exits have to be provided, along with easily comprehensible instructions for use.

Exposure to the risk of fire in the train is minimized by the train's non-flammable material. Equipment in every coach with suitable fire extinguishers is obligatory in case of an outbreak of fire. They have to be stored in an easily-accessible way. The storage place has to be marked to make it identifiable even in the conditions of an outbreak of fire. The fire extinguishers have to be checked regularly and replaced when necessary.

1.5. Introducing warning signal systems at stations (optical and acoustical warning)

To warn passengers of an approaching/departing train an extra warning signal system, such as lights, sounds, announcement (on platform and in trains) and on the information screen must be ensured.

1.6. Warning texts, posters for passengers

To remind passengers of risks at railway stations it is useful to put up warning notices, signs and posters for passengers (both on the platforms and leading up to the platforms – in tunnels, station buildings and trains).

1.7. Warning signs for engine drivers

A technical solution for reducing accidents is putting up extra warning signs for engine drivers (for example: “Signal!”, “Attention!” and so on).

1.8. Safety information printed on the reverse side of tickets

The reverse side of ticket can be used also for reminding passengers the main rules of safe behaviour at railway stations. Finally, a well maintained track and signalling system infrastructure will minimize the exposure to risk for passengers when using the railway (both station and line).

2. EDUCATIONAL ACTIVITIES

2.1. Educational work with staff

The human factor cannot be discounted in the work of organisations such as the railway. Only precise and dutiful actions of staff can ensure safe work is generally carried out at railway stations. Railway managers have to pay attention to the professional education of their staff. Varied seminars, learning sessions and training are necessary educational measures to raise the professional level of railway employees.

Engine drivers can be helped a great deal by being supplied with information about particularly unfavourable places (dangerous places, where the number of accidents is comparatively high) and useful examples.

2.2. Information to the public about safe actions on the railway (work with different age groups)

The public can be regularly informed about possible risks, consequences and instructed on safe actions by:

- distributing free brochures;
- broadcasting advertisements, educational broadcasts on TV and radio, as well as by publishing articles in newspapers;
- playing informative recorded texts in trains and at stations;
- placing warning signs;
- printing security information on the reverse side of tickets.

Educational information needs to be oriented towards people of different age groups:

- Children – activities in schools (actors, puppets, games, animated cartoons, children’s cinema, colour yourself!)
- Teenagers
- Youngsters
- Adults – information, discussions with injured passengers, engine drivers, eye witnesses

Equally other *interested people* involving railway experts and well-liked people of different age groups

- Sportsmen
- Politicians, etc.

The final decision on how to minimize the risk of passenger trauma and to carry out proposed recommendations has to be made after detailed statistic data analysis in particular places (each country, region, station). It helps to define unfavourable places, weak points and reasons for passenger accidents.

Tables index and Glossary of terms

TABLES INDEX

GLOSSARY OF TERMS

List of the UIC European Railway Members participating in the Safety Database

Country	Country code	Railway Company	Railway Company name
-	-	Eurotunnel	Eurotunnel
Austria	AT	ÖBB	Österreichische Bundesbahnen
Belgium	BE	Infrabel	Infrabel
Bulgaria	BU	NRIC	National Railways Infrastructure Company
Czech Republic	CZ	CD	Ceské Dráhy
Denmark	DK	DSB	Danske Statsbaner
Finland	FI	RHK	Ratahallintokeskus
France	FR	RFF	Réseau Ferré de France
		SNCF	Société Nationale des Chemins de fer Français
Germany	DE	DB Netz	Deutsche Bahn Netz
Hungary	HU	MAV	Magyar Allamvasutak Rt.
Ireland	IE	CIE	Coras Iompair Eireann
Italy	IT	RFI	Rete Ferroviaria Italiana
Luxembourg	LU	CFL	Société Nationale des Chemins de Fer Luxembourge
Netherlands	NL	ProRail	ProRail
Norway	NO	JBV	Jernbaneverket
Poland	PL	PKP PLK	PKP Polskie Linie Kolejowe
Portugal	PT	REFER	Rede Ferroviária Nacional
Romania	RO	CFR	Compania Nationala de Cai Ferate CFR SA
Slovak Republic	SK	ZSR	Železnice Slovenskej Republiky
Slovenia	SI	SZ	Slovenske Zeleznice
Spain	ES	ADIF	Administrador de Infraestructuras Ferroviarias
Sweden	SE	BV	Banverket
Switzerland	CH	SBB-CFF-FFS	Chemin de Fer Suisse - Schweizerische Bundesbahnen
United Kingdom	UK	Network Rail	Network Rail Limited

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