UIC Safety Report 2015

# Significant Accidents 2014 Public Report

SESSION

Department of fundamental values

Safety Unit

October 2015





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# <image>

# UIC Safety Report **2015**

Significant Accidents occurred in Europe during the year 2014

Public Report

## UIC Safety Report 2015

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#### Foreword

For over 10 years, the International Union of Railways (UIC) has collected and analysed data on significant accidents and incidents. Since 2006, tables and graphs of comparable data provided by 21 UIC members have established a benchmark and allowed trends and developments in railway safety to be identified.

Statistical analysis of "significant" accidents in recent years has shown that overall, the positive trend in Europe continues. The many safety-related initiatives taken by the railways are bearing fruit amongst the 22 members of the UIC Safety Database.



Closer examination of the "**Train collisions and derailments**" data shows that the one-off spike in 2013 was a reversal of the prevailing trend, and the data for 2014 show a return to the positive trend of previous years.



The "Train collisions and derailments" graph shows that the number of victims has fallen to a much lower level, and that the high number of victims in 2013 is thus to be seen as a one-off.

<u>Train collisions and</u> <u>derailments:</u> numbers of events and victims One new feature of this year's report is the **Global Safety Index (GSI)**. The GSI reflects more than the number of events: each accident is weighted according to type of accident, number and category of victims, and responsibility. This allows the overall safety trend to be depicted without being excessively influenced by isolated, infrequent major events. Further information can be found on page 1.17 of the report.

The second part of the report covers "**Time series and trends 2006-2014**". This measures the number of railway accidents and their consequences over a longer period, and analyses them in-depth. One immediate stand-out result is that the number of victims has fallen by 33% since 2006, with 2014 the best year since records began.

A further aspect I wish to mention is the analysis of the causes of accidents. Some 75 % of accidents are caused by "third parties" (mostly level crossing users and people trespassing on the track). Here, society as a whole must pull in the same direction in order to improve matters.

I believe this year's Safety Database Report 2015 will supply you with valuable information for your railway's daily business, and with food for thought regarding improvements in safety levels, both at your own railway and across Europe. I wish all the railways every success in improving railway safety going forward.

Peter Kleinschuster Chairman of the Safety Platform



# Part 1

# General safety indicators

## Part 1 - General Safety Indicators

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| Years | Significant<br>accidents | Nu<br>per 100 | mber of fatalit<br>) significant ac | ies<br>cidents | All victims<br>per 100<br>significant | Significant<br>accidents<br>per million | Fatalities<br>per million |
|-------|--------------------------|---------------|-------------------------------------|----------------|---------------------------------------|---|---------------------------|
|       |                          | Passengers    | Staff                               | 3rd parties    | accidents                             | '<br>train-km                           | train-km                  |
| 2014  | 1 830                    | 0,3           | 1,0                                 | 48,4           | 89,3                                  | 0,44                                    | 0,22                      |
| 2013  | 1 877                    | 5,1           | 1,4                                 | 50,6           | 108,5                                 | 0,46                                    | 0,26                      |
| 2012  | 1 929                    | 1,7           | 2,3                                 | 48,9           | 102,2                                 | 0,47                                    | 0,25                      |
| 2011  | 2 009                    | 1,6           | 1,4                                 | 51,5           | 98,9                                  | 0,49                                    | 0,27                      |
| 2010  | 2 134                    | 1,9           | 1,8                                 | 50,5           | 107,5                                 | 0,53                                    | 0,29                      |
| 2009  | 2 220                    | 1,2           | 1,1                                 | 58,4           | 103,6                                 | 0,55                                    | 0,34                      |

#### 1.01 Summary of accidents and their human consequences

"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. Suicides and accidents in workshops, warehouses and depots are excluded.



> 2% decrease in significant accidents declared for the year 2014.

> Lowest rate of accidents and fatalities per million train-kilometre in the 6-year period.

#### 1.02 Types of accidents according to UIC-SDB and EU definitions

| Тур<br>і          | es of accidents<br>as defined<br>in UIC – SDB | Ade  | ditional information<br>from UIC -SDB      | Types of accidents<br>as defined<br>in Safety Directive |  |  |
|-------------------|---|--|--|---|--|--|
| 7,0%              | I   | Derailment   | t of trains                                | 7,0%  | Derailment of trains   |  |
| 2,1%              | Train c                                       | collision wit  | th another train                           | 0.0%  | Collisions including collisions with   |  |
| 22.20/            | Train collision                               | 7,8%   | Train collision with an obstacle not at LC | 9,9%  | gauge  |  |
| 23,3%             | with an obstacle                              | 15,5%  | Train collision with an obstacle at LC     | 23.3%   | LC accidents, including accidents  |  |
| 67.2%             | Individual hit                                | dividual hit<br>a train<br>54,5% Individual hit by a train at LC<br>Individual hit by a train not<br>at LC |  | 20,070  | involving pedestrians at LC<br>Accidents to persons caused by<br>rolling stock in motion, with the<br>exception of suicides. |  |
| 02,376            | by a train                                    |  |  | 58.0%   |  |  |
| 3,5%              | Indiv   | idual fallin   | idual falling from a train                 |   |  |  |
| 0,9%              |   | Fire in roll   | ling stock                                 | 0,9%  | Fire in rolling stock  |  |
| 0,2% Electrocutio |   | on by overl  | head line or third rail                    | 0.0%  |  |  |
| 0,7%              | 0,7% Accident                                 |  | involving dangerous goods                  |   | Other types of accidents   |  |

> 62% of accidents involved individuals hit by a train.

- > Collision with an obstacle was the second most common accident (a quarter of all accidents).
- > Accidents at level crossings accounted for 23% of all significant accidents.
- > Drop of electrocutions and increase of accidents involving dangerous goods.
- Accidents at level crossings are divided in the UIC database between collisions with an obstacle at LC and individuals hit by a train at LC.

#### 1.03 Main causes of accidents

| 2014               | Causes at<br>first level            | Causes at<br>second level              |       |
|--------------------|-------------------------------------|--|-------|
|                    |                                     | Trespassing                            | 49,5% |
|                    | THIRD PARTIES                       | Vehicle (LC accident)                  | 15,2% |
| EXTERNAL<br>CAUSES |                                     | Pedestrian (LC accident)               | 7,8%  |
|                    | 77 79/                              | Pedestrian on public railway area      | 3,6%  |
|                    | 11,170                              | Other or not specified                 | 1,6%  |
| 81,1%              | WEATHER &<br>ENVIRONMENT            | Environment                            | 2,6%  |
|                    | 3,5%                                | Weather                                | 0,9%  |
|                    |                                     | Tracks and structures                  | 1,8%  |
|                    | IN RASTROCTORES                     | Energy system                          | 1,1%  |
|                    | 3,9%                                | Other or not specified                 | 1,0%  |
|                    | ROLLING STOCK                       | Running gear                           | 1,3%  |
|                    | 3,0%                                | Other or not specified                 | 1,7%  |
| CAUSES             |                                     | Track and switch maintenance staff     | 0,9%  |
|                    | (Railway staff &<br>subcontractors) | Traffic operating and signalling staff | 1,7%  |
|                    |                                     | Train drivers                          | 2,0%  |
|                    | 8,5%                                | Other or not specified                 | 3,9%  |
| 18 5%              | RAILWAY USERS                       | Passengers                             | 2,6%  |
| 10,370             | 3,0%                                | Other or not specified                 | 0,4%  |
| CAUSES NOT IDE     | NTIFIED                             |  | 0,4%  |

- > More than 80% of accidents had external causes.
- > Split of causes stable in percentage compared to 2013.
- > Internal causes relate to both the infrastructure manager and railway undertakings.

| ALL RAILWAYS<br>except HZ                      | 2009  | 2010  | 2011  | 2012  | 2013  | 2014  |
|--|-------|-------|-------|-------|-------|-------|
| Number of significant accidents                | 2 220 | 2 089 | 1 970 | 1 890 | 1 844 | 1 797 |
| Significant accidents per million<br>train-km  | 0,64  | 0,60  | 0,56  | 0,54  | 0,53  | 0,51  |
| Number of accidents with victims               | 2 011 | 1 814 | 1 720 | 1 631 | 1 530 | 1 474 |
| Accidents with victims per<br>million train-km | 0,58  | 0,52  | 0,49  | 0,46  | 0,44  | 0,42  |
| Number of victims                              | 2 299 | 2 245 | 1 940 | 1 924 | 2 000 | 1 601 |
| Victims per million train-km                   | 0,66  | 0,65  | 0,55  | 0,54  | 0,57  | 0,45  |
| Number of fatalities                           | 1 348 | 1 129 | 1 069 | 1 008 | 1 054 | 891   |
| Fatalities per million train-km                | 0,39  | 0,32  | 0,30  | 0,29  | 0,30  | 0,25  |
| Number of million train-<br>kilometres         | 3 462 | 3 478 | 3 518 | 3 532 | 3 504 | 3 543 |

#### 1.04 Trend of accidents and rates over the last six years (21 railways)



> This table allows a comparison on a constant perimeter, based on the 21 railways that have provided UIC with data every year since 2009.

#### 1.05 Accidents by type



for comparison: period 2009-2013



|               | Victims per<br>accident | Fatalities per accident | Serious<br>injuries per<br>accident |
|---------------|-------------------------|-------------------------|-------------------------------------|
| Passengers    | 0,047                   | 0,003                   | 0,044                               |
| Staff         | 0,039                   | 0,010                   | 0,028                               |
| Third parties | 0,808                   | 0,484                   | 0,323                               |
| Total         | 0,893                   | 0,497                   | 0,396                               |

Collisions with an obstacle include collisions at LC.
Individual hit by a train include pedestrians at LC.
For LC accidents, refer to table 1.11.

|  | Accid  | ents  | Victi      | ims                 |
|--|--------|-------|------------|---------------------|
| Type of accident - year 2014             | Number | %     | Fatalities | Serious<br>injuries |
| Collision with an obstacle               | 426    | 23,3% | 142        | 250                 |
| Collision between trains                 | 39     | 2,1%  | 1          | 12                  |
| Derailment                               | 128    | 7,0%  | -          | -                   |
| Individual hit by a train                | 1141   | 62,3% | 756        | 401                 |
| Fall from a train                        | 64     | 3,5%  | 9          | 58                  |
| Electrocution                            | 4      | 0,2%  | 2          | 2                   |
| Fire in RS                               | 16     | 0,9%  | -          | 2                   |
| Dangerous goods accidents (no release)   | 10     | 0,5%  | -          | -                   |
| Dangerous goods accidents (with release) | 2      | 0,1%  | -          | -                   |
| Total                                    | 1 830  |       | 910        | 725                 |

#### 1.06 Fatalities and serious injuries by type of accident

| 2014                                     |                 | Fatalities |                  | Serious injuries |       |               |
|--|-----------------|------------|------------------|------------------|-------|---------------|
| Type of accident                         | Passen-<br>gers | Staff      | Third<br>parties | Passen-<br>gers  | Staff | Third parties |
| Collision with an obstacle               | -               | 1          | 141              | 29               | 21    | 200           |
| Collision between trains                 | -               | 1          | -                | 7                | 5     | -             |
| Derailment                               | -               | -          | -                | -                | -     | -             |
| Individual hit by a train                | -               | 15         | 741              | -                | 21    | 380           |
| Fall from a train                        | 5               | 1          | 3                | 45               | 3     | 10            |
| Electrocution                            | -               | 1          | 1                | -                | -     | 2             |
| Fire in rolling stock                    | -               | -          | -                | -                | 2     | -             |
| Dangerous goods accidents (no release)   | -               | -          | -                | -                | -     | -             |
| Dangerous goods accidents (with release) | -               | -          | -                | -                | -     | -             |
| Total                                    | 5               | 19         | 886              | 81               | 52    | 592           |

#### **1.07** Distribution of victims



Reading method: fatalities account for 6% of passenger victims and passengers represent 1% of fatalities.

> Third parties represented 97% of all fatalities and 82% of serious injuries.

Passengers accounted for 5% of all victims (20% in 2013).



#### 1.08 Victims by type of accident according to Safety Directive definitions





| Breakdown of human consequences |        |        |      |  |  |  |  |  |
|---------------------------------|--------|--------|------|--|--|--|--|--|
|                                 | Fatal. | Injur. | All  |  |  |  |  |  |
| Passengers                      | 0,3%   | 5,0%   | 5%   |  |  |  |  |  |
| Staff                           | 1,2%   | 3,2%   | 4%   |  |  |  |  |  |
| Third parties                   | 54,2%  | 36,2%  | 90%  |  |  |  |  |  |
| All categories                  | 56%    | 44%    | 100% |  |  |  |  |  |

|  | vents        | %     | Fatalities |       |             | Serious injuries |       |             |
|--|--------------|-------|------------|-------|-------------|------------------|-------|-------------|
| Type of accident                                     | Number of ev |       | Passengers | Staff | 3rd parties | Passengers       | Staff | 3rd parties |
| Collisions with obstacle (not at LC)                 | 143          | 7,8%  | -          | -     | 3           | 2                | 12    | 10          |
| Collisions between trains                            | 39           | 2,1%  | -          | 1     | -           | 7                | 5     | -           |
| Level crossings                                      | 427          | 23,3% | -          | 1     | 241         | 27               | 9     | 232         |
| Derailment   | 128          | 7,0%  | -          | -     | -           | -                | -     | -           |
| Individuals & rolling stock<br>in motion (not at LC) | 1 061        | 58,0% | 5          | 16    | 641         | 45               | 24    | 348         |
| Fire   | 16           | 0,9%  | -          | -     | -           | -                | 2     | -           |
| Other types  | 16           | 0,9%  | -          | 1     | 1           | -                | -     | 2           |
| Total  | 1 830        |       | 5          | 19    | 886         | 81               | 52    | 592         |



#### 1.10 Accidents at level crossings

|      | Accidents                                | Number of fatalities |           |            | % of all                | % of all | LC<br>accidents | LC fatalities |
|------|--|----------------------|-----------|------------|-------------------------|----------|-----------------|---------------|
|      | at LC Passen- Staff Third accidents gers |                      | accidents | fatalities | per million<br>train-km | train-km |                 |               |
| 2014 | 427                                      | -                    | 1         | 241        | 23%                     | 27%      | 0,10            | 0,06          |
| 2013 | 478                                      | 1                    | 1         | 283        | 25%                     | 27%      | 0,12            | 0,07          |
| 2012 | 511                                      | -                    | 1         | 327        | 26%                     | 32%      | 0,12            | 0,08          |
| 2011 | 447                                      | 6                    | 1         | 277        | 22%                     | 26%      | 0,11            | 0,07          |
| 2010 | 501                                      | 1                    | 3         | 319        | 23%                     | 28%      | 0,12            | 0,08          |
| 2009 | 494                                      | 2                    | 1         | 375        | 22%                     | 28%      | 0,12            | 0,09          |

- > Accidents at LC decreased by -9% compared with 2013 and -16% compared with 2012.
- Fatalities at LC decreased by -15% compared with 2013 and -26% compared with 2012.

|         |   |                           | F          | ATALITIE | S           | SERI       | OUS INJU | RIES        |             |
|---------|---|---------------------------|------------|----------|-------------|------------|----------|-------------|-------------|
|         | 2014                                    | Number<br>of<br>accidents | Passengers | Staff    | 3rd parties | Passengers | Staff    | 3rd parties | ALL VICTIMS |
|         | Collisions with an obstacle (not at LC) | 36                        | -          | -        | -           | -          | 8        | 2           | 10          |
|         | Collisions between trains               | 21                        | -          | 1        | -           | 4          | 2        | -           | 7           |
| on      | LC accidents                            | 63                        | -          | -        | 32          | -          | -        | 33          | 65          |
| t stati | Derailments                             | 56                        | -          | -        | -           | -          | -        | -           | -           |
| Ą       | Hit by a train (not at LC)              | 392                       | -          | 7        | 211         | -          | 10       | 172         | 400         |
|         | Falling from a train                    | 53                        | 5          | 1        | 2           | 38         | 3        | 6           | 55          |
|         | Other cases                             | 18                        | -          | 1        | 1           | -          | -        | 1           | 3           |
|         | Total at station                        | 639                       | 5          | 10       | 246         | 42         | 23       | 214         | 540         |
|         | Collisions with an obstacle (not at LC) | 107                       | -          | -        | 3           | 2          | 4        | 8           | 17          |
|         | Collisions between trains               | 15                        | -          | -        | -           | 3          | 3        | -           | 6           |
| e       | LC accidents                            | 350                       | -          | 1        | 199         | 27         | 9        | 197         | 433         |
| en lir  | Derailments                             | 70                        | -          | -        | -           | -          | -        | -           | -           |
| do uC   | Hit by a train (not at LC)              | 599                       | -          | 8        | 424         | -          | 10       | 164         | 606         |
| Ū       | Falling from a train                    | 11                        | -          | -        | 1           | 7          | -        | 4           | 12          |
|         | Other cases                             | 13                        | -          | -        | -           | -          | 2        | 1           | 3           |
|         | Total in open line                      | 1165                      | -          | 9        | 627         | 39         | 28       | 374         | 1077        |
|         | not specified                           | 26                        | -          | I        | 13          | I          | 1        | 4           | 18          |
| GRAN    | D TOTAL                                 | 1830                      | 5          | 19       | 886         | 81         | 52       | 592         | 1635        |

#### 1.11 Number of accidents and victims by type of accident

> 64% of accidents occured on open line, whilst 35% happened in stations (1% in unspecified locations).

> 70% of fatalities occured on open line (29% in stations).

> Persons hit by a train and LC accidents represented 99% of fatalities on open line (96% in stations).

#### 1.12 Passenger victims by type of accident and location



- > "Fall from a train" represented 91% and train collisions 9% of victims at station.
- ➢ 6 accidents at LC caused 27 serious injuries (69% of passenger victims on open line).

#### 1.13 Staff victims by type of accident and location



"Individual hit by a train" is the main risk in stations (52% of victims and 67% of fatalities) and on open line (43% of victims and 89% of fatalities).

### 1.14 Victims by type of traffic



| Type of accident   | Freight trains | Passenger trains | Locomotive running light,<br>shunting, infrastructure works<br>train and other infrastructure train | Train not identifed |
|--|----------------|------------------|---|---------------------|
| Collision  | 5              | 25               | 9   | 1                   |
| Derailment   | -              | -                | -   | -                   |
| Level-crossing<br>accidents                                  | 74             | 413              | 23  | -                   |
| Accidents to persons<br>caused by rolling stock<br>in motion | 165            | 808              | 42  | 64                  |
| Other accidents  | 1              | 2                | 1   | 2                   |
| TOTAL victims  | 245            | 1248             | 75  | 67                  |



- > Passenger trains were involved in three out of four victims.
- > Regional trains were involved in 45% of victims against 25% for long distance trains.

## 1.15 Accidents and victims by type of accident, causes and location

| Type of                 | Causes    |      | Location         |    |                  |     |         | Victims |         |         |     |     |
|-------------------------|-----------|------|------------------|----|------------------|-----|---------|---------|---------|---------|-----|-----|
| accidents               |           |      | Type of location |    | Location details |     |         |         | Fatal.  | S. Inj. |     |     |
| ta alfa dala a la la ta | INF       | 1    | -                | OL | 703              | 711 | LC      | 144     | 145     | Р       | -   | -   |
| hy a train              | KS<br>LIF | -    | -                |    |                  |     | SC      | 2/      | 2/      |         |     |     |
| by a train              |           |      | 50<br>1          | S  | 425              | 433 | DV<br>T | 10      | 0<br>10 | S       | 15  | 21  |
| 1141                    | WF        | 1    | 1                |    |                  |     | ST ST   | 2       | 2       |         |     |     |
| 1157                    | TP        | 1104 | 1119             | Ot | 13               | 13  | 0       | 951     | 965     | Т       | 741 | 380 |
|                         | INF       | 29   | 4                |    |                  | 245 | LC      | 283     | 365     |         |     | 20  |
| Train collision         | RS        | 9    | 2                | OL | 353              | 345 | SC      | 6       | 1       | Р       | -   | 29  |
| with an obstacle        | HF        | 34   | 9                | c  | 66               | 42  | BV      | 4       | 1       | c       | 1   | 21  |
|                         | RU        | 1    | -                | 5  | 00               | 42  | Т       | 3       | -       | 3       | 1   | 21  |
| 426                     | WE        | 53   | 3                | Ot | 7                | 5   | ST      | 1       | -       | т       | 141 | 200 |
| 392                     | ТР        | 300  | 374              |    |                  | -   | 0       | 129     | 25      | •       |     |     |
|                         | INF       | -    | -                | OL | 11               | 12  | LC      | -       | -       | Р       | 5   | 45  |
| Individual falling      | RS        | -    | -                |    |                  |     | SC      | 1       | 1       |         |     |     |
| from a train            | HF        | 3    | 3                | S  | 53               | 55  | BV      | -       | -       | S       | 1   | 3   |
| <b>C A</b>              | RU        | 49   | 50               |    |                  |     |         | 2       | 2       |         |     |     |
| 67                      |           | - 12 | -                | Ot | -                | -   | 0       | - 61    | 64      | т       | 3   | 10  |
| 07                      | INF       | 12   | 3                |    |                  |     | LC      | -       | -       |         |     |     |
| Train collision         | RS        |      | -                | OL | 15               | 6   | SC      | 6       | 4       | Р       | -   | 7   |
| with another            | HF        | 38   | 10               | _  |                  | _   | BV      | 1       | -       |         |     | _   |
| train                   | RU        | -    | -                | S  | 21               | 7   | т       | -       | -       | S       | 1   | 5   |
| 39                      | WE        | -    | -                | 0  | 2                |     | ST      | 3       | -       | -       |     |     |
| 13                      | ТР        | -    | -                | Οť | 3                | -   | 0       | 29      | 9       | I       | -   | -   |
|                         | INF       | 39   | -                | OL | 70               | _   | LC      | 2       | -       | D       |     |     |
| Derailment              | RS        | 24   | -                | UL | /0               | -   | SC      | 46      | -       | r       |     | _   |
| Derdinient              | HF        | 46   | -                | s  | 56               | -   | BV      | -       | -       | s       | _   | _   |
|                         | RU        | 2    | -                | -  |                  |     | Т       | 2       | -       |         |     |     |
| 128                     | WE        | 8    | -                | Ot | 2                | -   | ST      | 1       | -       | т       | -   | -   |
| -                       | TP        | 2    | -                |    |                  |     | 0       | 77      | -       |         |     |     |
| Electrocution           | INF       | -    | -                | OL | 1                | 1   | LC      | -       | -       | Р       | -   | -   |
|                         | КЗ        | 1    | 1                |    | 3                | 3   | SC DV   |         | -       |         |     |     |
|                         |           | -    | -                | S  |                  |     | вν      | -       | -       | S       | 1   | -   |
| 4                       | W/F       |      |                  |    |                  |     | ST      |         |         |         |     |     |
| 4                       | TP        | 3    | 3                | Ot | -                | -   | 0       | 4       | 4       | Т       | 1   | 2   |

| Type of            | Causes |      |      | Location         |      |                  |    | Victims |      |        |         |     |
|--------------------|--------|------|------|------------------|------|------------------|----|---------|------|--------|---------|-----|
| accidents          |        |      |      | Type of location |      | Location details |    |         |      | Fatal. | S. Inj. |     |
|                    | INF    | -    | -    | 01               | 12   | 2                | LC | -       | -    | Р      | _       |     |
| Fires              | RS     | 14   | 2    | 01               |      | -                | SC | -       | -    |        |         |     |
| 11105              | HF     | -    | -    | s                | 4    | _                | BV | -       | -    | S      | _       | 2   |
|                    | RU     | -    | -    | J                | - T  |                  | т  | -       | -    |        |         | -   |
| 16                 | WE     | 2    | -    | Ot               | _    | _                | ST | -       | -    | т      |         | _   |
| 2                  | ТР     | -    | -    | 01               |      |                  | 0  | 16      | 2    | _      |         |     |
| Assident involving | INF    | 2    | -    | 01               | _    | -                | LC | -       | -    | Р      | _       | _   |
| dangerous goods    | RS     | 6    | -    | 01               |      |                  | SC | -       | -    |        |         |     |
| without release    | HF     | 1    | -    | s                | 10   | _                | BV | -       | -    | S      | _       | _   |
|                    | RU     | 1    | -    | Ĵ                |      |                  | т  | -       | -    |        |         |     |
| 10                 | WE     | -    | -    | Ot               | _    | -                | ST | -       | -    | т      | _       | _   |
| -                  | TP     | -    | -    |                  |      |                  | 0  | 10      | -    |        |         |     |
| Assident involving | INF    | -    | -    | 01               | _    | _                | LC | -       | -    | Р      | _       | _   |
| dangerous goods    | RS     | 1    | -    | 01               |      |                  | SC | -       | -    |        |         |     |
| with release       | HF     | -    | -    | s                | 1    | _                | BV | -       | -    | S      | _       | _   |
|                    | RU     | 1    | -    | Ū                |      |                  | т  | -       | -    |        |         |     |
| 2                  | WE     | -    | -    | Ot               | 1    | _                | ST | 1       | -    | т      | _       | _   |
| -                  | TP     | -    | -    | 01               |      |                  | 0  | 1       | -    |        |         |     |
|                    |        |      |      |                  |      |                  |    |         |      |        |         |     |
| TOTAL              | INF    | 72   | 7    | OL               | 1165 | 1077             | LC | 429     | 510  | Р      | 5       | 81  |
|                    | RS     | 55   | 5    |                  |      |                  | SC | 86      | 33   |        |         |     |
|                    | HF     | 156  | 58   | S                | 639  | 540              | BV | 12      | 9    | S      | 19      | 52  |
|                    | RU     | 55   | 51   |                  |      |                  | Т  | 17      | 12   |        |         |     |
| 1830               | WE     | 64   | 4    | Ot               | 26   | 18               | ST | 8       | 2    | Т      | 886     | 592 |
| 1635               | TP     | 1421 | 1510 |                  |      |                  | 0  | 1278    | 1069 |        |         |     |
|                    |        |      |      |                  |      |                  |    |         |      |        | 910     | 725 |
|                    |        |      |      |                  |      |                  |    |         |      |        |         |     |

| number of | INF: Infrastructures    | OL: Open line       | LC: Level crossings      | P: passengers    |
|-----------|-------------------------|---------------------|--------------------------|------------------|
| accidents | RS: Rolling stock       | S: At station       | SC: Switches & Crossings | S: Staff         |
|           | HF: Human Factors       | Ot: Other locations | BV: Bridges & Viaducts   | T: Third parties |
|           | RU: Railway users       |                     | T: Tunnels               |                  |
| number of | WE: Weather-Environment |                     | ST: Secondary tracks     |                  |
| victims   | TP: Third Parties       |                     | O: Other or unidentified |                  |





#### **1.17 UIC Global Safety Index**

The UIC Global Safety Index was created in 2015 by the Safety performance Group. It reflects more aspects than the sole number of events. Each event is weighted following the type of accident, the category of victim, the number of victims and the railway system responsibility. Its general formula is as follows:

$$GSI = ((Cv \times Cn) + Ca) \times Cr$$

where:

> Cv is the coefficient for the category of victim, from 1 (a serious trespasser injury) to 8 (a passenger fatality);

> Cn is the coefficient for the number of victims, from 0 (no victim) to 5 (more than 5 victims);

> Ca is the coefficient for the type of accident, from 1 (a person hit by a train) to 7 (a derailment or a collision between trains;

> Cv is the coefficient for the railway system responsibility, from 1 (external causes) to 2 (internal causes).



The graph below compares the trends of the GSI with the trends of number of events and number of victims (Base 100 in 2006).



# Part 2

# Time series and trends 2006-2014

## Part 2 - Time series and trends 2006-2014

2.01 Significant accidents

#### CAUSES

2.02 Causes

2.03 Internal causes

2.04 External causes

#### HUMAN CONSEQUENCES

**TYPE OF ACCIDENT** 

| 2.05 Human consequences                      |
|--|
| 2.06 Severe accidents (two and more victims) |
| 2.07 Passengers                              |
| 2.08 Staff                                   |
| 2.09 Third parties                           |
|  |
|  |
| 2.10 Collisions with an obstacle             |
| 2.11 Collisions between trains               |
| 2.12 Derailments                             |
| 2.13 Individuals hit by a train              |
| 2.14 Individuals falling from a train        |
| 2.15 Accidents at level crossings            |

#### 2.01a All significant accidents

Significant accidents declared by railway members of the Safety Database dropped from 2 371 in 2006 to 1 830 in 2014, which means a decrease of 23%.

"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. Suicides and accidents in workshops, warehouses and depots are excluded.





#### 2.01b Victims of rail accidents

Trends in number of victims show three-year stages:

- around 2 500 victims per year in 2006-2007
- around 2 300 victims per year in 2008-2010
- around 2 000 victims per year in 2011-2013
- around 1 600 victims in 2014

The number of victims in 2014 represents 67% of the number of victims in 2006. This means that one third of 2006 victims were spared in 2014. This is the most positive trend in railway safety issues we may observe on the past nine years.

#### 2.02a Accidents per internal / external causes

The number of accidents with internal causes decreased -32% between 2006 and 2014.

The number of accidents with external causes decreased -20% between 2006 and 2014.

External causes are responsible for an average of 80% of accidents; the lowest was 76% in 2007 and the highest was 82% in 2009.

#### Reminder

 Internal causes: infrastructure, rolling stock, human factors and railway users;

- external causes: third parties, weather and environment.



#### 2.02b Victims per internal / external causes



The number of victims in accidents with internal causes dropped drastically from 460 in 2006 to 121 in 2014, a decrease of -74%.

The number of victims in accidents with external causes only decreased -23%.

As a result, accidents with external causes are responsible of 93% of all victims in 2014 (81% in 2006) and more than 97% of all fatalities.

#### 2.03a Accidents per internal causes

Accidents with "human factor" causes decreased -25% between 2006 and 2014.

We observe a huge drop of accidents with "railway users" causes: -72%

On the contrary, trends are increasing for accidents with "infrastructure" cases and no change is noticeable for accidents with "rolling stock" causes.





#### 2.03b Victims per internal causes

2014 victims of accidents with internal causes represent only one third of the 2006 victims.

However, it seems difficult to observe well defined trends as accidents and victims are quite disconnected. A few severe accidents may have a huge number of victims (years 2010 and 2013, for instance).

To be noticed: accidents with rolling stock or infrastructure main causes do not generally lead to a large number of victims.

#### 2.04a Accidents per external causes

Graphs 2.04a and 2.04b show that a lot of accidents had unclassified causes when the database was first implemented.

The data quality has improved over the years, reclassifying events in other established categories. Hence, the difficulty to analyse trends over the whole period.



#### 2.04b Victims per external causes





#### 2.05a Accidents per human consequences

Fatal accidents roughly represent half of all significant accidents. This proportion is quite stable along the years, with a trend towards fewer fatal accidents.

A maximum of 55% of fatal accidents was observed in 2007 and 2009 and a minimum of 49% in 2014.

Fatal accidents decreased by 27% from 2006 to 2014 while serious injury accidents decreased by 35%.





#### 2.05b Fatalities and serious injuries

We observe a decrease of fatalities as well as serious injuries.

This evolution appears quite erratic as it might depend on a small number of severe accidents.

From 2006 to 2014, fatalities decreased by -29% while serious injuries decreased by -37%.

Every year, railway accidents lead to more fatalities than serious injuries, due to the preeminence of "individuals hit by a train" (see graph 2.13).

#### 2.06a Severe accidents (two and more victims)

Accidents with two and more victims decreased -52% between 2006 and 2014.

Collisions with road vehicles at level crossings represent 73% of the severe events (64% in 2006).

'Groups of individuals hit by a train' is the second most common severe accident : 14 events in 2014, half at station and half on open line.

In 2014, the most severe event had 13 victims (serious injuries) in a collision with road vehicle at a level crossing.



#### 2.06b Victims of severe accidents



Severe accidents are unpredictable. 2014 appears as the safest year of the last nine years.

Serious injuries decreased -48% and fatalities decreased -60% compared to 2006.

#### 2.07a Accidents with passenger victims

The number of accidents with passenger victims was stable from 2006 to 2008 (around 90 events), rose to 140 on the 2009-2012 period, and decreased afterwards to levels unseen by the past.

Around 80% of events with passenger victims are "individuals falling from a train". We observe a decrease of two thirds between 2012 and 2014.







From 2013 to 2014, the number of passenger victims decreased -80%, confirming the fact that 2013 was the "annus horribilis" for rail safety in Europe.

From 2006 to 2013, there seemed to be an uncompressible threshold of 20 passenger fatalities. But 2014 smashed this threshold with a total of 5 passenger fatalities (individuals falling from a train).

#### 2.08a Accidents with staff victims

Accidents with staff victims decreased -64% on the whole period. The improvement of staff safety began in 2009.

We observe a peculiar high level of staff falling from a train till 2008. 90% of these events occurred on the same network, which means there was probably a misunderstanding of definitions at the beginning of the database project.

From 2009 to 2014, the number of accidents with staff victims decreased only -25%, showing the difficulty to improve the staff safety.



#### 2.08b Staff victims



Staff serious injuries decreased - 67% since 2006, whilst staff fatalities decreased -54%.

During 2014, 15 rail agents died when hit by a train and 4 in other situations.

#### 2.09a Accidents with third parties victims

The number of accidents with third parties victims decreased -27% since 2006.

The number of accidents at LC decreased more deeply (-37%) than the number of individuals hit outside LC (-17%).

These two types of accidents represented 94% of accidents with third parties victims in 2006, and 98% in 2014.





#### 2.09b Third parties victims

Fatalities decreased -27% from 2006 to 2014, whilst serious injuries decreased -32%.

Fatalities represent around 60% of all victims every year.

In 2014, most victims where trespassers (63%), followed by LC users (32%) and other third parties (5%), mostly pedestrians on public railway area (platforms).

#### 2.10a Collisions with an obstacle

Collisions with an obstacle decreased -24% between 2006 and 2014.

There was no decrease in collisions with an obstacle at stations.

We shouldn't forget that most collisions with an obstacle occur at level crossings (see graph 2.15).



#### 2.10b Victims of collisions with an obstacle



Collisions with an obstacle had fewer human consequences in 2014 than 2006:

 $\Rightarrow$  1.2 victim per event in 2006;  $\Rightarrow$  0.9 victim per event in 2014.

The total number of victims decreased -40%.

This change is similar for serious injuries and fatalities.

We shouldn't forget that most collisions with an obstacle occur at level crossings. see graph 2.15.

#### 2.11a Collisions between trains

Most collisions between trains occur during shunting operations.

There is no observable trend towards fewer collisions between trains.

There were declared more collisions between train on open line in 2014, than in any previous year.



#### 2.11b Victims of collisions between trains



After four awful years (from 2010 to 2013), the number of victims of collisions between trains returned to the level of previous years.

In 2014, two accidents led to respectively 4 and 3 passenger serious injuries, six accidents showed staff victims and thirty-one accidents had no human consequences.

The severity rate (number of victims per accident) fell from 1.1 in 2006 to 0.3 in 2014.

#### 2.12a Derailments

There is no indice of diminution of derailments in Europe.

The number of derailment is stable since 2010.

We observe a similar evolution for derailments at stations (+28%) and derailment on open line (+20%) between 2006 and 2014.



#### 2.12b Victims of derailments



On the whole period, we notice that 96% of derailment have no human consequences.

Unfortunately, 12 derailments (1% of all derailments) were disastrous and led to 5 or more victims.

This was particularily obvious with two accidents that occurred during 2013.

For the first year of history, there was no victim of derailment on participating rail networks during 2014.

#### 2.13a Individuals hit by a train: accidents

The number of accidents involving an "individual hit by a train" decreased -18% between 2006 and 2012, similarily on open line and at station.

But there was no improvement since 2012:

- $\Rightarrow$  1130 events in 2012;
- ⇒ 1132 events in 2013;
- $\Rightarrow$  1141 events in 2014.



#### 2.13b Individuals hit by a train: victims



Individuals being hit by a train is fatal in two thirds of events. This proportion remains equal along the years.

Split of victims in 2014:

- ⇒ Trespassers 79%
- ⇒ LC users 12%
- ⇒ Persons hit on platform 6%
- Staff 3%

#### 2.14a Individuals falling from a train: accidents

The number of individuals falling from a train decreased -65% between 2006 and 2014.

2013 showed a reduction of . 50% compared to the previous year.

This was confirmed in 2014 with a total of 64 events, mostly at station.

Passengers were involved in 50 cases, unauthorised persons in 10 cases and staff in 4 cases.

Seriously injuried persons represented 87% of victims during 2014.



#### 2.14b Individuals falling from a train: victims



#### 2.15a Accidents at level crossings

Safety at level crossings showed an huge improvement since 2006:

 $\Rightarrow$  the number of collisions with a road vehicle dropped -40%;

⇒ the number of accidents involving pedestrians and cyclists decreased -25%. Unfortunately, we observe a stagnation since 2008.

The split of victims (see graph below) is remarkably stable along the years.



#### 2.15b Victims of accidents at level crossings





#### Definitions from the Commission Directive 2009/149/EC ("Safety Directive"), app. 1

"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. Suicides and accidents in workshops, warehouses and depots are excluded.

"Significant damage to stock, track, other installations or environment" means damage that is equivalent to EUR 150 000 or more.

"Extensive disruptions to traffic" means that train services on a main railway line are suspended for six hours or more.

#### Safety Database European Members

| Company      | Country        | Code |
|--------------|----------------|------|
| ADIF         | Spain          | ES   |
| ADIF AV      | Spain          | ES   |
| CFL          | Luxembourg     | LU   |
| CFR SA       | Romania        | RO   |
| DB AG        | Germany        | DE   |
| Eurotunnel   | France - UK    | -    |
| HZ           | Croatia        | HR   |
| Infrabel     | Belgium        | BE   |
| JBV          | Norway         | NO   |
| MÁV          | Hungary        | HU   |
| Network Rail | United Kingdom | GB   |
| ÖBB          | Austria        | AT   |
| РКР          | Poland         | PL   |
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| SŽDC         | Czech Rep.     | CZ   |
| Trafikverket | Sweden         | SE   |
| ŽSR          | Slovak Rep.    | SK   |

## UIC Safety Report 2015 Significant Accidents 2014

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