



VRU-PROXI 4TH MEETING

ACCIDENTOLGY SYNTHESIS

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CONTRIBUTORS

CONTRIBUTORS

| COUNTRY | CYCLIST | PEDESTRIAN | SLOW SPEED | COMMENTS | SOURCE |
|-------------|---------|------------|------------|--------------------------------|--|
| BELGIUM | Yes | Yes | Yes * | * Low speed limits Low numbers | aurelie.wayenbergh@mobilite.fgov.be |
| GERMANY | Yes | Yes | No | Very general data on cyclists | Seiniger@bast.de |
| SPAIN | Yes | Yes | No | Urban area accidents | enrique.alcala@upm.es |
| LATVIA | Yes | Yes | No | General data | juris.dreimanis@csdd.gov.lv |
| POLAND | Yes | Yes | No | General data | jerzy.kownacki@its.waw.pl |
| FRANCE | Yes | Yes | Yes | 1 year data | cyril.chauvel@lab-france.com |
| JAPAN | Yes | Yes | Yes | Categories N2 N3 differ | saitoh-t2k6@mlit.go.jp |
| CANADA | Yes | Yes | Yes | Categories differ | kyle.hendershot@tc.gc.ca |
| RUSSIA | Yes | No | No | General data | pavel.stankov@nami.ru |
| SWITZERLAND | | | | Expected | heinz.berger@astra.admin.ch |
| HUNGARY | Yes | Yes | No | General data | balazs.csonka@hu.tuv.com |
| HOLLAND | | | | Expected | tguiting@rdw.nl |
| FINLAND | Yes | Yes | Yes | Low numbers | timo.karkkainen@trafi.fi |

- **As the VRU-Proxi IWG work focuses on very specific scenarios, the corresponding data has been extracted from the information given by the contributors, as much as possible.**
- **Fatalities were considered for this synthesis**
- **« Other impacts » and « other vehicle categories » has been discarded, as they could not bring information on the scenarios**

DATA ANALYSE PROCESS

- **As the VRU-Proxi IWG work focuses on very specific scenarios, the corresponding data has been extracted from the information given by the contributors, as much as possible.**
- **Fatalities were considered**
- **« Other cases » has been discarded, as they could not bring information on the scenarios**

02

DETAILED OUTCOMES

JAPAN – NATIONAL DATA BASE – LOW SPEED – 2010-2014

■ **Outcomes from JAPAN data on CYCLISTS: 900 fatalities**

- Main contributors : M1 (38%) – N1 (29%) – N3 (20%)
- 58% Cyclists are killed in forward motion (S+TO) by M1 (44%) – N1 (44%) – N2 (10%)
- 22% Cyclists are killed in forward motion (TODS) by N3 (68%) – M1 (17%) – N2 (8%)
- 18% Cyclists are killed in forward motion (TDS) by M1 (45%) – N2 (25%) – N1 (19%)
- 16 Fatalities (2%) in rearward motion by M1 (31%) – N2 (31%) – N1 (25%)
- M3 killed very few cyclists

■ **Outcomes from JAPAN data on PEDESTRIANS: 1,296 fatalities**

- Main contributors : M1 (44%) – N2 (27%) – N3 (14%) – N1 (13%)
- 55% Pedestrians are killed in forward motion (TDS) by M1 (44%) – N2 (30%) – N1 (12%)
- 22% Pedestrians are killed in forward motion (S+TO) by M1 (58%) – N1 (21%) – N2 (17%)
- 13% Pedestrians are killed in forward motion (TODS) by M1 (42%) – N2 (20%) – N3 (20%)
- 125 Fatalities (10%) in rearward motion by M1 (46%) – N2 (30%) – N3 (12%) – N1 (11%)
- M3 killed few pedestrians

FRANCE - VOIESUR – LOW SPEED - 2011

■ **Outcomes from FRANCE data on CYCLISTS: 28 fatalities**

- Main contributors: M1 (36%) – N3 (36%) – N2 (18%)
- 46% Cyclists are killed in forward motion (S) by M1 (38%) – N3 (38%) – N1 (23%)
- 36% Cyclists are killed in forward motion (TODS) by N3 (50%) – N2 (50%)
- 18% Cyclists are killed in forward motion (TDS) by M1 (100%)
- No fatalities in rearward motion
- M2 – M3 did not kill cyclist

■ **Outcomes from FRANCE data on PEDESTRIANS: 229 fatalities**

- Main contributors : M1 (40%) – N3 (31%) – N1 (20%)
- 44% Pedestrians are killed in forward motion (S) by N3 (46%) – M1 (37%) – N1 (12%)
- 13% Pedestrians are killed in forward motion (TODS) by N3 (42%) – M1 (32%) – N1 (16%)
- 9% Pedestrians are killed in forward motion (TDS) by M1 (50%) – N1 (25%) – M3 (6%)
- 20% Pedestrians are killed in rearward motion by M1 (43%) – N1 (39%) – N3 (17%)
- M2 – N2 did not kill pedestrians

POLAND – POLICE DATA BASE – ALL SPEEDS – 2011-2015

- **Outcomes from POLAND data on CYCLISTS: 1251 fatalities**

- Main contributors: M1-N1 (74%) – N2-N3-M2-M3 (26%)
- 56% Cyclists are killed in side collision
- 31% Cyclists are killed in rear collision (forward-rearward)
- 13% Cyclists are killed in front collision

- **Outcomes from POLAND data on PEDESTRIANS: 5282 fatalities**

- Main contributors: M1-N1 (82%) – N2-N3-M2-M3 (18%)

LATVIA – NATIONAL – ALL SPEEDS – 2010-2016

- **Outcomes from LATVIA data on CYCLISTS: 91 fatalities**
 - Average of 13 cyclists killed per year
- **Outcomes from LATVIA data on PEDESTRIANS: 462 fatalities**
 - Average of 66 pedestrians killed per year

CANADA – NATIONAL COLLISION DATA BASA – LOW SPEED – 2011-2015

- **Outcomes from CANADA data on CYCLISTS: 2 fatalities**
 - 2 cyclists killed in 5 years
 - 1 on forward motion (S) by a LDV
 - 1 on forward motion (TODS) by a HGV

- **Outcomes from CANADA data on PEDESTRIANS: 29 fatalities**
 - Main contributors : LDV (80%) – HGV (13%) – Buses (3%)
 - 63% Pedestrians are killed in forward motion (S) by LDV (95%) – HGV(5%)
 - 13% Pedestrians are killed in forward motion (TDS) by LDV (100%)
 - 7% Pedestrians are killed in forward motion (TODS) by LDV (50%) – HGV (50%)
 - 3% Pedestrians are killed (1 case) in rearward motion by a HGV

SPAIN- NATIONAL ACCIDENT DATA BASE – ALL SPEEDS – 2010-2013

■ **Outcomes from SPAIN data on CYCLISTS: 19 fatalities**

- Main contributors: M1 (84%) – N2-N3 (11%)
- 90% Cyclists are killed in forward motion (S) by M1 (88%) – N2-N3 (6%) – M2-M3 (6%)
- 5% Cyclists are killed in forward motion (TODS) by N2-N3 (100%)
- 5% Cyclists are killed in forward motion (TDS) by M1 (100%)
- No fatalities in rearward motion

■ **Outcomes from SPAIN data on PEDESTRIANS: 477 fatalities**

- Main contributors : M1 (74%) – N1 (16%) – M2-M3 (5%) - N2-N3 (5%)
- 80% Pedestrians are killed in forward motion (S) by M1 (79%) – N1 (12%) – M2-M3 (6%)
- 6% Pedestrians are killed in forward motion (TODS) by M1 (62%) – N1 (19%) – N2-N3 (12%)
- 12% Pedestrians are killed in rearward motion by M1 (41%) – N1 (39%)

BELGIUM – NATIONAL DATA BASE – LOW SPEED LIMITS – 2014-2016

■ **Outcomes from BELGIUM data on CYCLISTS: 4 fatalities**

- Main contributors: N3-N2 (75%) – M1 (25%)
- 50% Cyclists are killed in forward motion (S) by M1 (50%) – N3-N2 (50%)
- 25% Cyclists are killed in forward motion (TDS) by N3-N2 (100%)
- No fatality in forward motion TODS
- 1 fatality in rearward motion (N2-N3)
- M2 – M3 did not kill cyclists

■ **Outcomes from BELGIUM data on PEDESTRIANS: 15 fatalities**

- Main contributors : M1 (60%) – N2-N3 (33%) – N1 (7%)
- 53% Pedestrians are killed in forward motion (S) by M1 (63%) – N2-N3 (17%)
- 13% Pedestrians are killed in forward motion (TDS+TOPDS) by M1 (100%)
- 13% Pedestrians are killed in rearward motion by N1 (50%) – N2-N3 (50%)
- M2 – M3 did not kill pedestrians

HUNGARY – NATIONAL DATA BASE – ALL SPEEDS – 2014-2016

- **Outcomes from HUNGARY data on CYCLISTS: 253 fatalities**
 - Cyclists are 13% of all road fatalities
 - 77% of the cyclists are killed by M1-M2-M3 and N1-N2-N3
 - 64% by M1-N1
 - 32% by N2-N3
 - 4% by M2-M3

- **Outcomes from HUNGARY data on PEDESTRIANS: 453 fatalities**
 - Pedestrians are 24% of all road fatalities
 - 92% of the pedestrians are killed by M1-M2-M3 and N1-N2-N3
 - 68% by M1-N1
 - 26% by N2-N3
 - 5% by M2-M3

GERMANY – NATIONAL STATISTICS – ALL SPEEDS – 2010-2016

- **Outcomes from GERMANY data on CYCLISTS: 408 fatalities**
 - Cyclist represent 53% of VRU killed

- **Outcomes from GERMANY data on PEDESTRIANS: 1547 fatalities**
 - Main contributors : M1 (77%) – N3 (10%) – N2 (6%) – N1(5%)
 - 70% Pedestrians are killed in forward motion (S) by M1 (83%) – N3 (8%) – N1 (4%)
 - 4% Pedestrians are killed in forward motion (TDS) by M1 (70%) – N3 (11%) – N1 (7%)
 - 4% Pedestrians are killed in rearward motion by M1 (55%) – N3 (17%) – N2 (17%)
 - M3 did not kill pedestrians on rearward motion
 - M2 did not kill pedestrians on forward motion

FINLAND – OTI FINNISH CRASH DATA INSTITUTE – LOW SPEED – 2015-2015

■ **Outcomes from FINLAND data on CYCLISTS: 73 fatalities**

- Main contributors : M1 (39%) – N3 (35%) – M3 (17%) – N1(9%)
- 43% Cyclists are killed in forward motion (TODS) by N3 (40%) – M3 (30%) – M1 (20%)
- 35% Cyclists are killed in forward motion (S) by M1 (63%) – M3 (13%) – N3 (13%) – N1 (13%)
- 13% Cyclists are killed in rearward motion by N3 (67%) – M1 (33%)

■ **Outcomes from FINLAND data on PEDESTRIANS: 141 fatalities**

- Main contributors : M1 (54%) – N2-N3 (25%) – N1 (12%) – M3(13%)
- 66% Pedestrians are killed in forward motion (S) by M1 (68%) – N1 (8%) – N2-N3 (8%)
- 16% Pedestrians are killed in forward motion (TODS) by N2-N3 (50%) – M3 (33%) – M1 (15%)
- 16% Pedestrians are killed in rearward motion by M1 (33%) – N3 (33%) – N1 (33%)

RUSSIA – POLICE DATA BASE – ALL SPEEDS - 2016

- **Outcomes from RUSSIA data on CYCLISTS: 426 fatalities**
 - 5331 accidents
 - 8% fatalities in average
 - May vary depending on region : from 3% to 16%

- **Outcomes from RUSSIA data on PEDESTRIANS:**
 - No data available

03

OUTCOMES SYNTHESIS

MAIN TRENDS SO FAR FOR CYCLISTS – LOW SPEED ACCIDENTS

- **M1 and N3 are the main contributors for cyclist fatalities**
- **M2 and M3 are minor contributors**

- **Most cyclists are killed when the opposite vehicle is moving forward and straight**
- **Cyclists are often killed when the opposite vehicle is moving forward and turn opposite to driver side**
- **Cyclists killed when the opposite vehicle is moving backwards are not common (see peculiarities)**

MAIN TRENDS SO FAR FOR CYCLISTS – ALL SPEEDS ACCIDENTS

- **M1 and N3 are the main contributors for cyclist fatalities**
- **N1, M2 and M3 are very minor contributors**

- **90% cyclists are killed when the opposite vehicle is moving forward and straight**
- **Cyclists happen to be killed when the opposite vehicle is moving forward and turn to driver side or opposite to driver side**
- **Cyclists killed when the opposite vehicle is moving backwards are rare**

MAIN TRENDS SO FAR FOR PEDESTRIANS – LOW SPEED ACCIDENTS

- **M1 is the main contributor for pedestrian fatalities**
- **N2-N3 are altogether a danger for pedestrians**
- **M2 and M3 are minor contributors**

- **Pedestrians are often killed when the opposite vehicle is moving forward and straight**
- **Pedestrians are often killed when the opposite vehicle is moving forward and turning**
- **Pedestrians are quite often killed when the opposite vehicle is moving backwards**

MAIN TRENDS SO FAR FOR PEDESTRIANS – ALL SPEEDS ACCIDENTS

- **M1 is the main contributor for pedestrian fatalities, by far**
- **N may altogether be a danger for pedestrians**
- **M2 and M3 are minor contributors**

- **Most pedestrians are killed when the opposite vehicle is moving forward and straight, by far.**
- **Pedestrians are sometimes killed when the opposite vehicle is moving forward and turning**
- **Pedestrians are sometimes killed when the opposite vehicle is moving backwards**

SUMMARY MATRIX - PEDESTRIANS

| PEDESTRIANS | | M1 | N1 | N3 | N2 | M2 M3 | FW S | FW TDS | FW TODS | RW |
|-------------|---------|----|----|----|----|----------|---------|-----------|------------|-----|
| LS | JAPAN | 44 | 13 | 14 | 27 | 2 | 22% | 55% | 13% | 10% |
| LS | FRANCE | 40 | 20 | 31 | 0 | 9 | 44% | 9% | 13% | 20% |
| LS | CANADA | 80 | 0 | 13 | 0 | 7 | 66% | 13% | 7% | 3% |
| LS | BELGIUM | 61 | 6 | 33 | | | 53% | 13% | | 13% |
| LS | FINLAND | 54 | 12 | 25 | | 13 | 66% | - | 16% | 16% |
| AS | SPAIN | 74 | 16 | 5 | | 5 | 80% | 3% | 6% | 12% |
| AS | GERMANY | 77 | 5 | 10 | 6 | | 82% | 4% | 2% | 4% |
| AS | HUNGARY | 68 | | 26 | | 5 | - | - | - | - |

SUMMARY MATRIX - CYCLISTS

| CYCLISTS | | M1 | N1 | N3 | N2 | M2 M3 | FW S | FW TDS | FW TODS | RW |
|----------|---------|----|----|----|----|----------|---------|-----------|------------|--------|
| LS | JAPAN | 38 | 29 | 20 | 13 | 20 | 58% | 18% | 22% | 2% |
| LS | FRANCE | 36 | | 36 | 18 | | 46% | 18% | 36% | - |
| LS | BELGIUM | 25 | | 75 | | | 50% | 25% | | 1 case |
| LS | FINLAND | 39 | 9 | 35 | | 17 | | | | |
| AS | SPAIN | 84 | 0 | 11 | | | 90% | 5% | 5% | - |
| AS | GERMANY | na | na | na | na | na | na | na | na | na |
| AS | HUNGARY | 48 | | 30 | | | na | na | na | na |

04

LOCAL PECULIARITIES

LOCAL PECULIARITIES FOR CYCLISTS

- **M3 killed 17% of cyclists in Finland**
- **N1 is a high contributor for cyclist fatalities in Japan (29%)**
- **Cyclist can be killed when opposite vehicle is moving backward in Japan (16 cases – 2%) and Finland (13% - needs explanation)**

LOCAL PECULIARITIES FOR PEDESTRIANS

- **Canadian figures are above average on LDV and moving forward scenario**

05

NEXT STEPS

- **Get more data (CH, NL, UK ?)**
- **Clarify remaining shadow zones**
- **Select accident scenarios VRU-Proxi IWG wants to take into consideration**

THANK YOU

GLOSSARY

- **TODS = Turn Opposite to Driver Side**
- **TDS = Turn to Driver Side**
- **S = Straight**
- **TO = Take Off**
- **LS = Low Speed**
- **AS = All Speeds**
- **NA = Non Available**