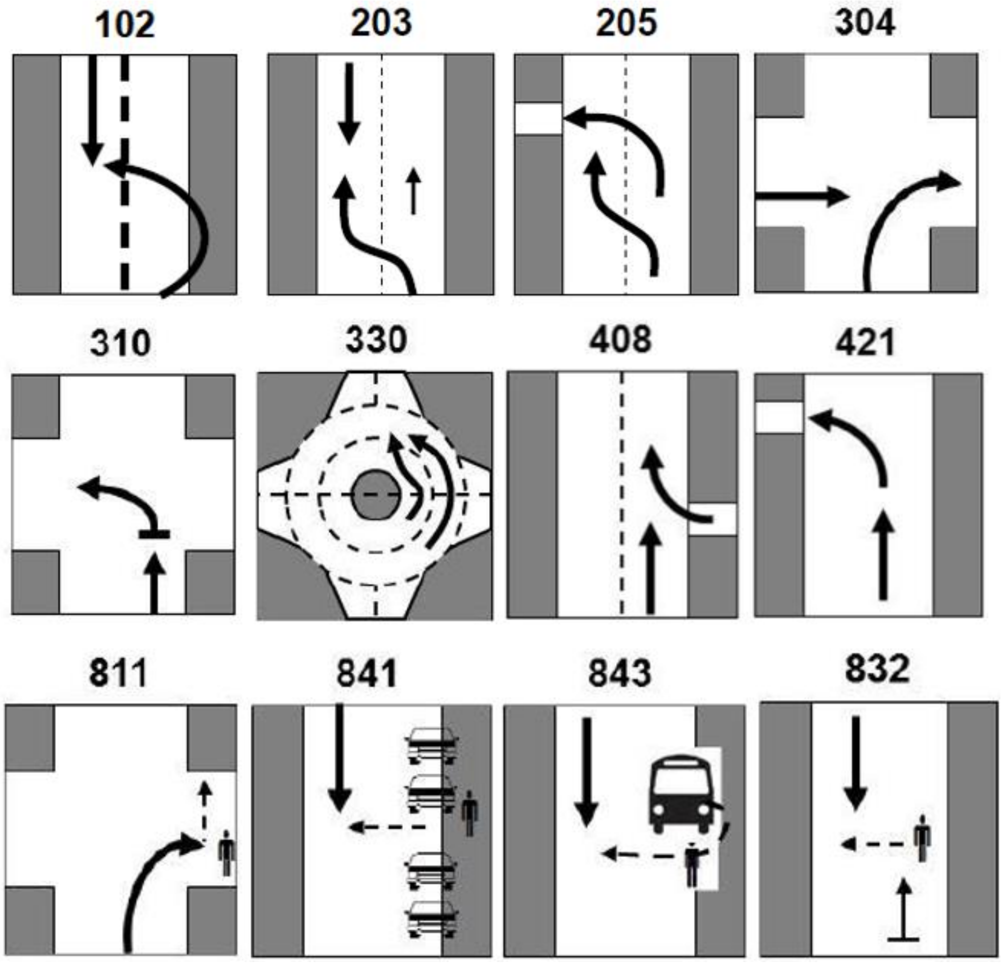
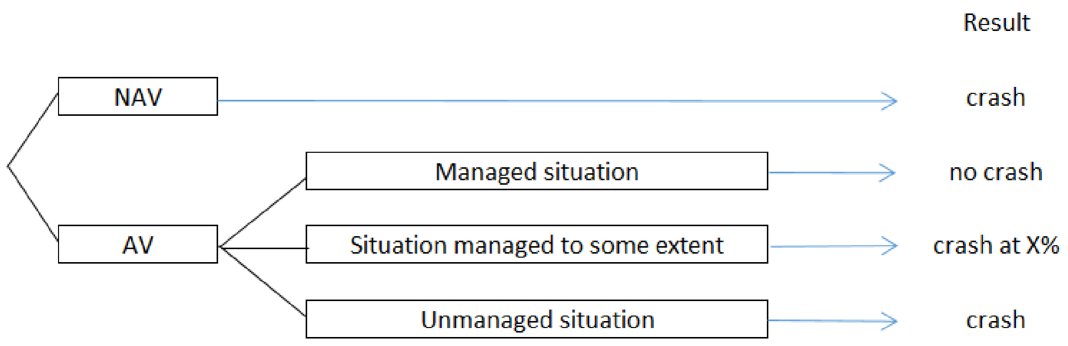
Additional file

Figure A1: Examples of pictograms



Legend: The arrows represent the actions of the vehicles or users just priori to the crash. Some contextual elements are shown on the pictograms: intersection, lines, parked vehicles…

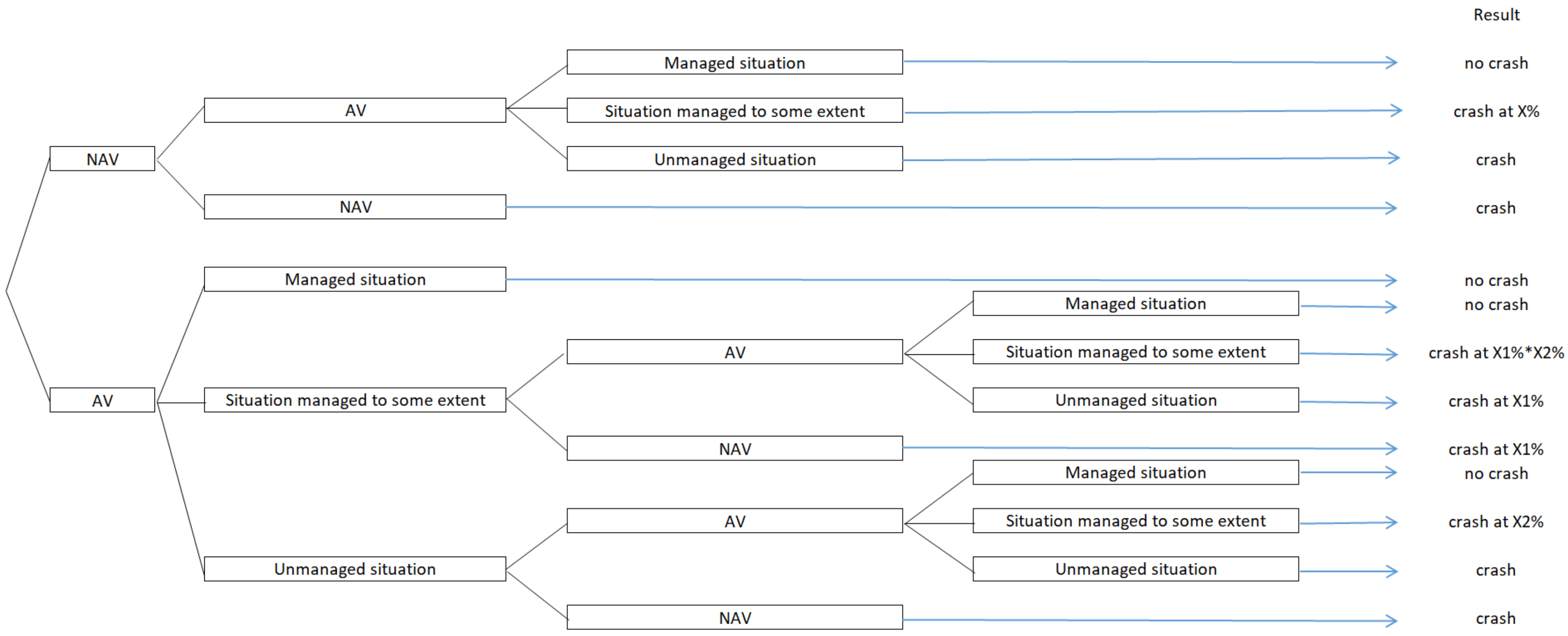
Figure A2: Decision algorithm for the cases involving one light vehicle (LV) versus another road user type



Legend: NAV= Non automated vehicle / AV=Automated vehicle

The first step draw determines the nature of the LV: automated or nonautomated vehicle. Then, if the vehicle was automated, we used the probability given by the experts about the occurrence of the crash according to the capacity of the AV to manage the situation. There were 3 options: the situation is managed and the crash is avoided; the situation is unmanaged and the crash would still occur; or when the probability was not 0 or 1, a second draw using the experts' probability was done. Based on this draw, the crash occurs or is avoided.

Figure A3: Decision tree for crash cases involving two light vehicles (LV)



Legend: NAV= Non automated vehicle/AV=Automated vehicle

If the first vehicle is nonautomated then we apply the same rules as in figure A2

If the first vehicle is automated but does not manage the situation (probability of 0 given by the experts), the outcome (crash or no crash) depends on the type of the second vehicle: if this is a nonautomated vehicle the crash occurs, if the vehicle is automated, the situation is that of figure A2.

If one of the two vehicles is considered capable of managing the situation by the experts, the crash is avoided.

If the outcome is uncertain because the vehicle's ability to manage the situation is not zero or equal to 1 ($0 < \text{probability given by the experts} < 1$), the outcome is determined according to the situation of the second vehicle.
If this second vehicle is considered unable to manage the situation because it is not automated or the probability of managing the situation given by the experts is 0, then the outcome will depend on the draw concerning the 1st vehicle and its probability of managing the situation (crash at X1%).
If the second vehicle is an automated vehicle and is able to prevent the crash to some extent according to the experts, then either the crash is avoided if the situation can be managed, or an additional draw is made. Therefore, crash will not occur if one of the two vehicles had a favorable outcome to the draw regarding the management of the situation (crash at X1%*X2%).

Figure A4: Example of an expert's answer

Below is the answer of an expert concerning LV/M2W crashes for the pictograms of type "crash with a vehicle leaving its parking space, being in parked or entering or leaving a private way, garage..."

Class 400: crash with a vehicle leaving its parking, being in parking or entering or leaving a private way, garage…

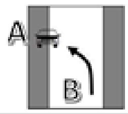
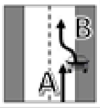
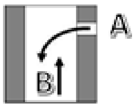
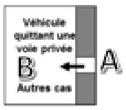
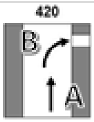
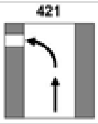
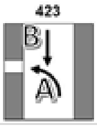
Pictogramme(s)	AV situation	Will the accident still occur in this configuration if the AV has the position of vehicle A or B?		If so, to what extent?	
406 	A	☐Yes	☐No	10	time(s) out of 10
	B	☐Yes	☒No		time(s) out of 10
404 	A	☒Yes	☐No	4	time(s) out of 10
	B	☐Yes	☒No		time(s) out of 10
411 	A	☐Yes	☒No		time(s) out of 10
	B	☒Yes	☐No	7	time(s) out of 10
419 	A	☐Yes	☒No		time(s) out of 10
	B	☒Yes	☐No	inc on nu	time(s) out of 10
420  421 	A	☐Yes	☒No		time(s) out of 10
	B	☒Yes	☐No	10	time(s) out of 10
423 	A	☐Yes	☒No		time(s) out of 10
	B	☒Yes	☐No	8	time(s) out of 10
Pictogramme correction :	A	☐Yes	☐No		time(s) out of 10
	B	☐Yes	☐No		time(s) out of 10

Table A1: Experts' presentation

Expert	Biography and references
Thierry BELLET	Thierry Bellet has 3 Master's degrees (in Cognitive Psychology, University of Lyon, 1990; in Ergonomics, University of Paris, 1991 and in Artificial Intelligence, Telecom ParisTech, 1993), and received his PhD in Cognitive Ergonomics in 1998 from the University of Paris 5. He is currently a Senior Researcher at the Laboratory of Ergonomics and Cognitive Sciences applied to Transport, Gustave Eiffel University, Lyon, France. His research interests include cognitive psychology, cognitive modelling and simulation. human-computer interaction and artificial intelligence. From 1998 to 2009, he collaborated with UC Berkeley (PATH) on the driver modelling issue for Automated Highway. He also participated to 25 National and European projects dedicated to the human centred design of advanced driving aid systems and vehicle automation, Human-Machine Cooperation and adaptive Intelligent Co-Piloting systems. Bellet T.. Cunneen M.. Mullins M.. Murphy F.. Pütz F.. Spickermann F.. Braendle C.. Baumann M. F. (2019). From semi to fully autonomous vehicles: New emerging risks and ethico-legal challenges for human-machine interactions. *Transportation Research Part F: traffic psychology and behaviour*. *63*. 153-164. Bellet. T.. Paris. J. C.. & Marin-Lamellet. C. (2018). Difficulties experienced by older drivers during their regular driving and their expectations towards Advanced Driving Aid Systems and vehicle automation. *Transportation research part F: traffic psychology and behaviour*. *52*. 138-163. Kyriakidis. M.. De Winter. J. C. F.. Stanton. N.. Bellet. T.. Van Arem. B.. Brookhuis. K.. Martens. M. H.. Bengler. K. . Andersson. J.. Merat. N.. Reed. N.. Flament. M.. Hagenzieker. M. & Happee. R. (2019). A human factors perspective on automated driving. *Theoretical Issues in Ergonomics Science*. 1-27. Bellet T.. Banet A. (2012). Towards a conceptual model of motorcyclists' Risk Awareness: A comparative study of riding experience effect on hazard detection and situational criticality assessment. Accident Analysis and Prevention. 49. pp. 154-164. Bellet. T.. Hoc. J.-M.. Boverie. S.. Boy. G. A. (2012). From Human-Machine Interaction to Cooperation : towards the Integrated Copilot. In C. Kolski (Ed.). *Human-Computer Interaction in Transport*. Ashgate. pp. 129-156. Bellet T. (2011). Analysis. modeling. and simulation of human operator's mental activities. In G.A. Boy (Ed.). *The Handbook of Human-Machine Interaction: A Human-Centered Design Approach*. Ashgate. pp. 23-52.
Philippe CHRETIEN	Philippe Chrétien is an engineer from Ecole Centrale de Paris 1982 (CentraleSupélec. France). He holds an MEDD from the Carnegie Bosch Institute in 1998 (Pittsburgh. USA) and is a General Delegate of CEESAR since 11/2015: a nonprofit association created almost 30 years ago to research ways to improve road safety. He has three complementary professions: 1. Accidentology integrating field data collection, statistical analysis, 3D and temporal reconstruction, and accident simulation to evaluate driving aids.... 2. Human behaviour integrating data collection, pre-processing, anonymization and annotation, and analysis of vehicle situations and human behaviour 3. Biomechanics of shocks integrating human body tolerances and calibration experiments for biofidelity of digital models and shock dummies. Other associated functions: Administrator of MOV'EO. member of the steering committee of the DAS Safety Road users and Secretary of the "CentraleSupélec Automobile" Professional Group Scientific conferences ATEC/ITS and ITS Europe: Innovations and accidentology in urban areas Intelligent Transformation of the Traffic System and Road Safety For an efficient. ecological and safe driving Contribution to the safety of the connected vehicle
Nicolas DE RUS	Graduated with a Master of Research in Economics: Economics of Environment. Energy and Transport, including Transport, Networks and Territories, co-awarded by the Ecole Nationale des Travaux Publics de l'Etat and the Laboratoire Aménagement Economie Transport in Lyon in 2018. Project Manager - Autonomous Vehicle Evaluation within Cerema Normandie Centre since early 2019, in the Multimodal

	Transport Infrastructures Department. Nicolas de Rus is involved in all topics related to autonomous vehicles in the fields of socio-economy and road safety. Here are some studies related to autonomous vehicles on which he could work on or participate in: - Evaluation of the road safety issues of an on-demand transport service by autonomous vehicles in Rouen - RNAL - Objectivation of user behaviour in interaction with the autonomous vehicle - RNAL - Evaluation of an autonomous shuttle service in Nantes – MySMARTLife
Vincent JUDALET	Vincent Judalet is a teacher-researcher at ESTACA'Lab since August 2016 and doctor since March 2016 (IFSTTAR). V Judalet. S Glaser. D Gruyer. S Mammar. 2018. Fault detection and isolation via the interacting multiple model approach applied to drive-by-wire vehicles Sensors 18 (7). 2332 V Judalet. S Glaser. D Gruyer. S Mammar. IMM-based sensor fault detection and identification for a drive-by-wire vehicle. IFAC-PapersOnLine 48 (21). 1158-1164 V Judalet. S Glaser. C Boussard. S Mammar. Implementation of first order algebraic estimators for numerical filtering and derivation applications IFAC Proceedings Volumes 47 (3). 9152-9158 V JUDALET. S GLASER. V KOCHER. D CHARONDIERE. Virtual reality for real driving: a tool to fill the gap between simulators and test tracks Proceedings of the Driving Simulation Conference A Mechernene. V Judalet. A Chaibet. M Boukhnifer. Motion Prediction and Risk Assessment for The Decision Making of Autonomous Vehicles International Journal of Robotics and Automation 5. 32-39
Reakka KRISKHNAKUMAR	Reakka Kriskhnakumar is currently the "Head of Studies of the Department of Epidemiology and Accident Science (DESA)". Her areas of expertise are the evaluation of active and passive safety systems accident scenarios and automated driving. She is co-author of the following paper and presented it at TRB: Guyonvarch. L..Hermitte. T.. Lecuyer. E.. Saulgrain. A.. Krishnakumar. R.. Herve. V.. Lesire. P.. Chajmowicz. H.. Thiolon. G.. and Buffat. S. Data Driven Scenarios for AD/ADAS Validation. Presented at 99rd Annual Meeting of the Transportation Research Board. Washington. D.C.. 2020.
Isabelle RAGOT- COURT	Isabelle RAGOT-COURT has a PhD in social psychology and has been a researcher since 2002. Initially, at the Laboratory of Psychology of Driving (LPC), she joined the Laboratory of Accident Mechanisms (LMA) in Salon de Provence in 2008. Her research topics are vulnerable users, including motorized two-wheelers. and in particular the psycho-social determinants of their behaviours and the difficulties of interaction with other users of the system. She is also co-leader of a project that animates a community sharing scientific and technical knowledge for motorized two-wheelers. **Ragot-Court. I.**. Hidalgo. M.. & Eyssartier. C (2019). Les automobilistes et la Circulation Inter-Files: Contextes de pratique. Difficultés et Acceptabilité avant la mise en œuvre expérimentale de l'encadrement de cette pratique des deux/trois roues motorisés par les pouvoirs publics. Une aide à l'évaluation de l'expérimentation 2016-2019. Recherche Transports Sécurité (RTSE). https://doi.org/10.25578/RTS_ISSN1951-6614_2019-0X Hidalgo. M.. **Ragot-Court. i.** & Eyssartier. C (2015). La circulation inter-files: pratique pour les deux-roues. mais qu'en pensent les automobilistes ? Analyse comparée de discours d'automobilistes sur ce comportement typique des usagers en deux-roues motorisés. *Nouvelles perspectives en sciences sociales - NPSS. 11. 2.* Editions Prise de parole. p253-284 Ragot-Court. I. & Van Elslande. P. (2011). Les comportements et leurs déterminants dans l'accidentalité des deux-roues motorisés (COMPAR). Rapport final. Rapport sur convention IFSTTAR/DSCR N 0007202. 198p
Thierry SERRE	Thierry SERRE is a Doctor-Engineer and senior researcher at IFSTTAR since 1998. He worked 12 years at the Laboratory of Applied Biomechanics and is now deputy director of the Laboratory of Accident Mechanisms Analysis. His topics of interest are accident reconstruction, vulnerable users and more specifically PTW, vehicle dynamics and biomechanics. He is a co-organizer of a French community dealing with knowledge on PTW road safety and is a French representative at the European Standardization Comity CEN/TC162/WG9 entitled « Motorcycle rider protective clothing » since 2011.

	Analysis of pre-crash characteristics of passenger car to cyclist accidents for the development of advanced drivers assistance systems FrançoisChar. ThierrySerre. Accident Analysis & Prevention. Volume 136. March 2020 Issues and challenges for pedestrian active safety systems based on real world accidents H. HAMDANE. T. SERRE. C. MASSON. R. ANDERSON Accident Analysis and Prevention. 2015. vol. 82. pp 53–60 Relevant factors for active pedestrian safety based on 100 real accident reconstructions H. HAMDANE. T. SERRE. C. MASSON. R. ANDERSON International Journal of Crashworthiness. 2016. Vol. 21. Issue 1. pp 51-62 TAYLOR AND FRANCIS. Acquisition and analysis of road incidents based on vehicle dynamics C. NAUDE. T. SERRE. M. DUBOIS-LOUNIS. J-Y. FOURNIER. D. LECHNER. M. GUILBOT. V. LEDOUX. Accident Analysis and Prevention. Elsevier. 8p. DOI: 10.1016/j.aap.2017.02.021 NAUDE. Claire. SERRE. Thierry. PERRIN. Christophe. GUILBOT. Michèle. LEDOUX. Vincent. 2018. Road riding hazardous situations for motorcycles. TRA 2018. 7th Transport Research Arena. 16/04/2018. Vienne. AUTRICHE. 10p. The motorcyclist impact against a light vehicle : Epidemiological. accidentological and biomechanic analysis T. SERRE. M. LLARI. JL. MARTIN. A. MOSKAL. C. MASSON. C. PERRIN Accident Analysis and Prevention. 2012. vol. 49. pp223– 228 Pedestrian and Bicyclists accidents: in-depth investigation. numerical simulation and experimental reconstitution with PMHS T. SERRE. C. MASSON. C. PERRIN. S. CHALANDON. C. LLARI. C. CAVALLERO. M. PY. D. CESARI.. International Journal of Crashworthiness. 2007. vol12. n°2. pp227-234 In-depth study of accidents involving light goods vehicles T. SERRE. C. PERRIN. M. DUBOIS-LOUNIS. C. NAUDE 6th International Conference ESAR (Expert Symposium on Accident Research). 2014. 11p Towards a classification of road incidents acquired from public fleets of vehicles T. SERRE. C. NAUDE. S. CHAUVET. J-Y. FOURNIER. D. LECHNER. V. LEDOUX International Symposium on Future Active Safety Technology toward zero-traffic-accident. Nagoya. September 22-26. JAPAN. 2013. p6
Eric VIOLETTE	Eric VIOLETTE is an engineer in industrial automation, in charge of road safety at the CEREMA Normandie-centre. He coordinates studies and works on traffic analysis, observation and analysis of vehicle/infrastructure/driver system interactions (car and 2WD), experimentation and evaluation of safety arrangements for interurban roads. He is a member of the expert committee of the National Road Safety Council. Millot M.. Le Lez C.. **Violette E**.. Duchamp G.. Mompart N.. Eyssartier C.. Buttignol V.. Chaumontet R. (2019) *How can the reduction in speed from 90 km/h to 80 km/h on French roads be assessed ? Proceedings of the 26th World Road Congress. Abu Dhabi. Oct 2019.* Naude C.. Serre T.. Subirats P.. **Violette** E.. Ledoux V. (2019). *On-board data collection and road safety diagnosis. 32nd ICTCT conference in Warsaw. Poland. 24 - 25th October 2019.* **Violette E..** Gallenne ML. (2019). Données infrastructure et trafic : usages en sécurité routière. Revue Générale des Routes et Aérodromes. juin 2019. Saint Pierre G.. **Violette** E.. Braquemont A. (2019). Floating Car Data : observer les véhicules pour améliorer la sécurité routière. Revue Générale des Routes et Aérodromes. juin 2019. **Collectif**. ouvrage coordonné par Laurent Carnis. Catherine Gabaude et Marie-Line Gallenne. (2019). La sécurité routière en France : quand la recherche fait son bilan et trace des perspectives. Éditions l'Harmattan. mai 2019. 438 p.

Table A2: Fleiss' kappa coefficient according to the crash configuration

Crash configuration	LV/Pedestrian	LV/Cyclist	LV/M2W	LV/LV	LV/Truck
Fleiss' kappa coefficient	0.48	0.53	0.36	0.73	

Table A3: Configurations' weight in the VOIESUR database

Crash type	LV alone	Other case alone	LV/Pedestrian	LV/cyclist	LV/M2W	LV/LV	LV/Truck	Other case with two active users	More than two
Injury	11.8%	8.0%	65.3% in total					8.8%	6.2%
			17.7%	4.9%	21.9%	18.3%	2.5%		
Fatal	27.1%	11.5%	47.4% in total					7.4%	6.6%
			13.8%	2.2%	10.2%	14.4%	6.9%		

Abbreviations: AV=Autonomous Vehicle; LV= Light Vehicle; M2W=Motorized-Two-Wheeler

Table A4: Standard deviation of the average percentages presented in Tables 1 & 2

Crash type	% AV	LV/Pedestrian		LV/Cyclist		LV/M2W		LV/LV		LV/Truck
		UF SD	F SD	UF SD	F SD	UF SD	F SD	UF SD	F SD	SD
Injury	10	0.409	0.530	1.063	1.343	0.645	0.835	0.690	0.810	0.726
	50	0.788	0.858	2.017	2.059	0.871	1.016	0.937	0.947	1.054
	100	0.946	0.393	2.062	1.540	0.668	0.268	0.493	0.124	0.396
Fatal	10	0.296	0.473	0.713	1.094	0.394	0.465	0.479	0.526	1.302
	50	0.631	0.706	1.293	1.385	0.608	0.603	0.747	0.743	1.918
	100	0.927	0.318	2.062	0.554	0.416	0.087	0.352	0.057	0.617

Abbreviations: AV=Autonomous Vehicle; LV= Light Vehicle; M2W=Motorized-Two-Wheeler; UF=Unfavourable; F=Favourable; SD=Standard deviation

Table A5: Configurations' weight by year for all types of crashes nationally observed by the police (ONISR)

year	LV alone	Other case alone	LV/Pedestrian	LV/LV	LV/other	Other/Pedestrian	Other case with two active road users	More than two
2010	12.6%	11.0%	15.5%	11.2%	31.8%	5.9%	4.4%	7.6%
2011	12.3%	11.0%	14.8%	10.1%	31.9%	6.2%	4.6%	7.7%
2012	12.2%	11.1%	15.3%	11.8%	31.0%	6.2%	4.5%	7.9%
2013	12.3%	11.0%	15.3%	12.3%	30.6%	6.1%	4.6%	7.9%
2014	12.2%	11.0%	15.4%	12.0%	30.3%	6.2%	4.7%	8.2%
2015	12.7%	10.7%	15.7%	11.9%	30.1%	6.0%	4.6%	8.3%
2016	13.2%	10.2%	16.5%	11.8%	29.7%	5.8%	4.2%	8.8%
2017	14.0%	10.8%	16.2%	11.9%	29.1%	5.4%	4.0%	8.7%
2018	13.4%	11.5%	15.4%	10.8%	29.2%	6.8%	4.2%	8.7%

Abbreviations: LV= Light Vehicle