English version

Evaluation of the Powered Two-Wheeler Lane Splitting Experiment, january 2021

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Delegation for Road Safety

Evaluation of the Powered Two-Wheeler Lane Splitting Experiment

Evaluation Report – January 2021

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Conclusion

Mandated by the French government, the Powered Two-Wheeler Lane Splitting Experiment began on 2 February 2016, covering motorways and expressways in eleven French departments. These included the eight departments that make up the Ile-de-France region, along with the Bouches-du-Rhône, Gironde and Rhône departments. The Haute-Garonne department was also included as the control department. The main aim of the experiment was to regulate lane splitting – a widespread practice among PTW riders – and to assess the impact of legalisation and regulation of the technique. The Interministerial Delegation for Road Safety entrusted the Center for Studies and Expertise on Risks, Environment, Mobility and Planning (Cerema) with carrying out the evaluation (analysing accident rates, behaviours, and acceptance of the measures in place), and enlisted the Université Gustave Eiffel and Ergo-Centre for the training component.

Little change to accident rates... except in Gironde

Accident rates for powered two-wheelers (PTW) fell by 10% across France between the initial observation period (2012-2014) and the years in which the experiment was conducted (2016-2018). The mortality rate for PTW, which had been falling in the years preceding the start of the experiment, stabilised at between 734 and 786 users over the course of the experiment. Accident rates for PTW across all experiment areas as a whole (i.e. entire French departments) also fell by 10%, while they increased by 12% within the scope of "road networks where experimental lane splitting was permitted", as well as in the control region. This increase must be taken in context, because data tended to stabilise over the course of the experiment.

In order to determine which accidents involved legal lane-splitting (LLS) as defined in the experiment, on the one hand, and those that involved illegal lane splitting (ILS), i.e. not in compliance with the rules of the experiment, on the other, a sample of around 4500 PTW accident reports taken from the experimental networks was analysed between 2015-2018 (one year before the experiment, and three years after), in order to ascertain the circumstances of each accident involving a PTW. Accidents in which PTW were practising LLS or ILS were as follows: 1650 light accidents, 161 serious, and 16 fatal. Among the 16 fatal PTW accidents, none were riding in compliance with the rules of the LLS experiment in terms of speed and positioning, with the speed often being greatly in excess of the 50 km/h speed limit. These 16 fatal accidents represent 0.5% of PTW users killed within this period (3049), which is a very low percentage. In 90% of the physical accidents involving PTW practising LLS or ILS that we analysed, the PTW were driving between the two outside lanes (i.e. the lanes stipulated in the experiment). The most common circumstances surrounding an accident were as follows: "*A PTW rider travelling along the 'LLS network' as part of their commute, during morning or evening rush hour. Traffic was congested. The PTW positioned itself on the space between the two outside lanes (90% of cases). The driver of a non-PTW vehicle in the normal lanes of traffic, ahead of the PTW, changes lane (left of right) without seeing the PTW, resulting in a collision."* The main contributing factors to accidents that we observed were unexpected changes of lane, or the failure of non-PTW drivers to follow the French highway code, and excessive or inappropriate speed on the part of the PTW riders. In other words, ILS rather than LLS.

Accidents involving PTW practising LLS or ILS were not evenly distributed across the experimental networks. Indeed, traffic congestion was not uniform across locations, and lasted for periods of varying length. The average was around 40 to 45 accidents per year on the experimental networks in Gironde and Ile-de-France, although accidents in Ile-de-France occurred mainly on the Paris ring road. In the Rhône, Bouches-du-Rhône, and the control department (Haute-Garonne), this average fell to just under 15 accidents per year.

Statistical analysis of accidents contained in the national physical accident database for the period covering the experiment reveals that while the number of PTW accidents involving LLS or ILS increased slightly across all experimental networks, Gironde stands out: the number of PTW accidents involving LLS or ILS on the experimental network tripled in number from 13 in 2015 to 57 in 2018 (while total PTW accidents on the same network rose from 310 to 480, an increase of 54%). It should be noted that the region recorded a significant increase in road traffic on the ring road, where 90% of PTW accidents occurred. This increase in traffic resulted in an increase in congestion and the number of PTW, and therefore more LLS and ILS.

Behaviour tended towards better compliance with the rules, but compliance remains a minority practice...

The evaluation compares the behaviour of PTW users in the experiment areas before the experiment (2015) and during the experiment (2016-2018).

Behaviours were also evaluated on a control site where LLS was not trialled.

While remaining a minority behaviour, compliance with both speed and positioning rules tended to improve over the course of the experiment, especially on the Paris ring road.

With regard to PTW compliance with speed limits on the lines between the outside lanes, there was a clear general improvement across the ten experimental sites observed across the 11 experimental departments (23% compliance with 50 km/h speed limit for LLS in 2015, and 40% compliance in 2018), as well as on the control site. The speed of PTW drivers was mainly between 41 km/h and 70 km/h, with half of PTW drivers being eligible for speeding tickets (speed in excess of 55 km/h, while French law allows a 5 km/h margin of error). More detailed analysis in Gironde reveals that the difference in speeds travelled in the interlane space and other lanes of traffic stands at between 20 km/h and 30 km/h. The proportion of highly excessive speeding (>20 km/h above speed limit) is falling (20% in 2015, 9% in 2018).

Compliance with PTW positioning rules was very high (>80%), with little change since the start of the experiment, other than a trend for PTW to move away from the hard shoulder an into the normal lanes or the line between the two outside lanes, especially in the Bouches-du-Rhône, where this behaviour already existed. When traffic begins to flow once again, it seems like PTW drivers in the Rhône and the Bouches du Rhône return to the normal lanes of traffic, and to a much lesser degree in Ile-de-France and Gironde. Indeed, many users continue to lane split between the two lanes outside lanes, while this was not planned as part of the experiment. One explanation for this irregularity may be the fact that traffic remains dense for longer periods in these areas.

Low awareness of the experiment... but changes in driving habits reported

Three waves of surveys were conducted over the course of the experiment, with a sample of around 450 PTW riders and 450 car drivers in the experiment areas and control region. The surveys conducted over the three years of the experiment revealed generally low awareness of the LLS experiment, especially in Ile-de-France (32% of all PTW riders and light vehicle [LV] drivers). In Bouches-du-Rhône, the Rhône and Gironde for both PTW and LV, awareness of the experiment among those users surveyed approached 50%. Over the three years of the experiment, car drivers forgot that the experiment was running, resulting in no changes to their reported behaviour. This observation may be linked to the fact that car drivers did not feel that the experiment affected them, or affected them very little. Two thirds of LV drivers believe that it is the responsibility of PTW riders to change their driving habits. Car drivers in Gironde were those who reported changing their driving habits the most. Aggressively moving to stop PTW getting past did not feature in the behaviours reported by car drivers. Answers from participants did not change much over time. Major disparities between regions were revealed: differences in terms of how often PTW riders engaged in LLS or ILS, or in terms of how they practised LLS or ILS (higher speeds reported in Gironde and Ile-de-France, or “PTW convoys”, which mainly occur in Ile-de-France). Whatever the case, the principle of LLS remains well-received by both PTW riders and LV drivers.

Data revealed an annual increase in the reported practise of LLS, as well as a regular increase in PTW drivers reporting that they sought eye contact with other drivers on motorways and expressways in the experimental areas. An increase in the use of flashing headlights and hazard lights to signal their presence was also noted in 2018 and, to a lesser extent, use of the horn. In addition to these practices, it appears that PTW riders are in the habit of checking their blind spots and rear-view mirrors, as well as what other drivers are doing in their cars (using the phone, in particular).

Little change in driving schools

To raise awareness that LLS was being studied, the orders for the experiment dictated that the lane splitting rules were taught as part of driving lessons for any vehicle intended for use on public highways. It was included in the French driving theory tests. The study conducted by the Université Gustave Eiffel/Ergo-Centre team drew on qualitative interviews followed by a quantitative section with instructors and students involved in lessons for the Category B or any two-wheeled driving license. It found that in 2016, LLS was covered more frequently in lessons for PTW licenses in the experimental regions than it was in the rest of the country. The vast majority of instructors teaching in the control (89%) and experimental (100%) regions were aware of the regulations and the experiment. Furthermore, in the main and with no differences between the control and experimental regions, they were able to describe the main criteria for legal LLS. Instructors generally reported finding this information via their own personal research (54%). It should be noted that the percentage of instructors that mention lane splitting remains higher in the experimental regions (73%) than in the control region (55%). However, no changes in the training provided since the start of the experiment were revealed. LLS is not practised during PTW lessons for various reasons (lack of CPD for instructors, difficulty performing it safely, very few tools for introducing experimental LLS, etc.). Examples with diagrams, photos, and videos have been created to teach the technique.

In the end, the experiment had a positive impact on behaviour, despite compliance with regulations remaining a minority occurrence. It consolidated training, but there remains room for improvement in driving schools. Legal lane splitting by PTW under the rules of the experiment was well-received and clearly understood by light vehicle drivers. Accident rates seem to indicate a slight increase in physical accidents linked to legal and illegal lane splitting. In Gironde, physical accidents linked to this particular PTW behaviour tripled on the experimental road networks, as part of a trend of increased PTW accident rates (+54% between 2015 and 2018).

Contents

A. Context

- **In France, powered two-wheeler associations have long called for lane splitting to be made legal, as it is a practice that has been common in the French region of Ile-de-France for many years, albeit with no regulatory framework.**

Lane splitting describes when powered two-wheelers (PTW) drive between two vehicles heading in the same direction. The practice has been commonplace for many years despite being illegal, and it is especially prevalent in Ile-de-France and around the main major urban areas in France.

In Europe, Belgium formalised the practice of PTW lane splitting by regulating it (1 September 2012), and analysis of accident rates shows, firstly, that lane splitting is involved in a very small number of accidents, and secondly, that these measures had no impact on accident rates. They do, however, report that these results are not easily applied to other contexts (Martensen *et al.*, 2016). Belgium began with the observation that unregulated lane splitting was already an existing practice, and opted for an educational approach, promoting less risky lane splitting through training for motorcycle riders and other motorized vehicles.

In France, discussions between the government and PTW user associations to regulate lane splitting began as far back as 1999. The introduction of speed cameras in 2003, and other road safety measures between 2000 and 2010, resulted in a 60% fall in mortality for car drivers, but only a 26% decrease for motorcyclists (ONSIR, 2013).

In 2006, Rémy Heitz, delegation for road safety, appointed the prefect Régis Guyot to assess what could be done to improve road safety for powered two-wheelers. The first recommendation in his report (Guyot, 2008) was to make front license plates compulsory for powered two-wheelers, in order to make enforcement of the speed limit more efficient, with technical inspections for older powered two-wheelers coming in at number 11. The report made no mention of lane splitting, but the 35th recommendation was to prevent filtering and overtaking on urban crossroads. In 2008, road safety delegate Michèle Merli launched a consultation on safety for powered two-wheelers, proposing a moral contract with users of powered two-wheelers: front license plates and technical inspections, in exchange for legalising lane splitting (not mentioned in the report on safety measures). The consultation was never completed, with the two coercive measures in the moral contract being transferred to European jurisdiction.

In January 2012, following an information report by the parliamentary group for the causes of road traffic accidents, published on 19 October 2011 (Jung, 2011), road safety delegate Jean-Luc Névache tasked the prefect Régis Guyo with compiling a feasibility report on lane splitting for motorcycles. In their research, the work group concluded that “it seems possible and even preferable to acknowledge it, regulate it, and teach it”. The report was published in November 2012 (Guyot, 2012), and its recommendations included that accidents involving lane splitting PTW on expressways presented a low risk of mortality on a national and European level, and that it would be possible to conduct an experiment (*cf.* p21).

So it was that from 01/02/2016, in application of French Decree 2015-1750, the LLS experiment was launched in the French departments where the practice was the most widespread: in the eight departments that make up the region of Ile-de-France, and in Bouches-du-Rhône, Gironde, and the Rhône. An evaluation protocol for the experiment was defined. It was based on analysing accidents, observing practices, and evaluating acceptance by PTW riders and car drivers. The department of Haute-Garonne was chosen as the control department, to provide a counterfactual reference for the evaluation. Indeed, the decision to include a control would enable the experimental departments to be compared to a department where lane splitting remained illegal. In the next phase, Université Gustave Eiffel and Ergo-centre developed training covering LLS for PTW instructors and learner riders.

The full historical context can be found in **Appendix 6** of this report.

❖ Definition of Lane Splitting

To aid understanding of the following report, here we will remind you of the distinction made between the kind of legal lane splitting for powered two-wheelers applied in this report, and illegal lane splitting (in other words, simply illegal lane splitting with no adherence to the rules of the experiment) and filtering (not studied in this report). Below you will find the definitions put forward in the Guyot report (Guyot, 2012):

- **Legal lane splitting (LLS)** can be understood as riding between two lanes of motorized vehicles driving in the same direction. This kind of riding is not considered to be overtaking within the bounds of the experiment. The kind of lane splitting permitted in this experiment refers to riding between the two outside lanes (the two leftmost lanes in France). Hereafter, the space between these lanes will be referred to as IL1. For lane splitting to be legal, a speed limit of 50 km/h should be observed by both PTW and other traffic.
- **Illegal lane splitting (ILS)** can be understood as lane splitting that does not comply with the rules of the experiment, whether in terms of the speed of the PTW or the traffic, or the positioning of the PTW.
- Illegal lane splitting means overtaking a line of vehicles on the right or left, whether or not broken white line is crossed.

The definitions of LLS and ILS imply that they can only be performed on two-way roads and streets that only have a single lane for motorised vehicles.

French Decree 2015-1750 of 23 December 2015 lays out the framework for the experiment (**Appendix 1**). It applies to sections of motorway and roads with at least a dual carriageway, with both directions separated by a central reservation and subject to a speed limit of between 70 km/h and 130 km/h.

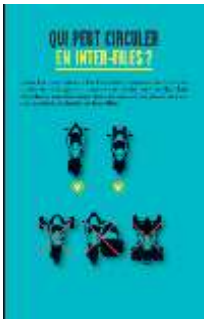
This report focuses solely on LLS by PTW within the rules of this experiment (described below), and ILS when one or more rules are not followed.

B. LLS Experiment and Evaluation Methods

1. The rules of the experiment were applied as of 1 February 2016.

The experiment began on 1 February 2016 following publication of Decree 2015-1750 of 23 December 2015. The Delegation for Road Safety (DSR) drafted two notices: one for PTW (blue) and another for other road users (orange). These communications covered all of the rules to follow in order to share the roads without any conflict.

Why? Although it is an extremely widespread practice among powered two-wheelers, lane splitting is neither regulated nor taught in driving schools. **As of February 2016, it has been trialled (subject to following certain rules) in 11 French departments that are particularly congested during rush hour.** These rules help to keep powered two-wheeler riders who are practising lane splitting safe, and reduce its risks.



Who? Only powered two- or three-wheeler vehicles less than 1 metre wide are permitted to lane split. Wider tricycles, side-cars, and quads are not allowed to lane split.

❶ lane splitting is permitted for powered two-wheelers in the 11 departments covered by the experiment, only on motorways and roads with at least a dual carriageway separated by a central reservation, and where the speed limit is set at between 70 km/h and 130 km/h.

❷ 2 PTW must travel between the two outside lanes on the carriageway

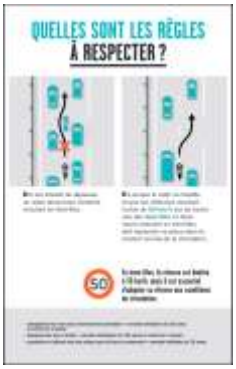
Lane splitting remains prohibited in urban areas and on roads with no central reservation.

When?

Lane splitting is prohibited when there are roadworks, or the road is icy or covered in snow.

3 LS is allowed when traffic is dense and is running in uninterrupted lines in all lanes

4 To ride between lanes, there must be enough space between vehicles; powered two-wheelers must not force their way through.

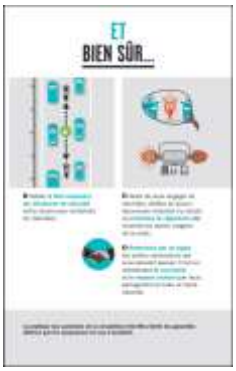


How?

5 It is prohibited to overtake another powered two-wheeler in the act of lane splitting.

Between lanes, the speed limit is 50 km/h, but speed must be tailored to traffic conditions

6 When traffic starts flowing again and vehicles are travelling at more than 50 km/h in at least one of the lanes, the powered two-wheeler must re-join the normal lane of traffic



7 Make sure to maintain suitable stopping distances between two lane splitting powered two-wheelers

8 Before you begin lane splitting, check that no powered two-wheeler is already doing so, and indicate to warn other road users.

9 Give a signal to thank other road users for letting you pass. It is by maintaining courtesy and mutual respect that we are able to safely share the road.

For other road users, all of the above information was explained in a special leaflet. Recommendations were made to help them facilitate lane splitting and make it safe for powered two-wheelers.

How?

5 Leave sufficient space to facilitate lane splitting by motorcyclists

6 Always check your rear-view mirror and check blind spots before changing lanes

7 Make sure you indicate before changing lane

ATTENTION: avoid sudden manoeuvres

In 2016, 500,000 lane splitting leaflets were printed for motorcyclists and scooter riders, along with an additional 300,000 for other road users. The DSR sent these documents to:

- Prefectures and driving schools in the departments participating in the experiment
- All prefectures in other departments for information purposes
- The points of sale of two motorcycle dealerships.

They were also published in the specialist press for powered two-wheelers, and in a free daily newspaper (20 Minutes). Staff also visited Paris, Lyon, Marseille, and Bordeaux, handing out the leaflets to powered two-wheeler riders and other road users.

On the road networks involved in the experiment, signs were used to raise awareness of LLS, with messages like: "Congestion: lane splitting allowed".

However, other than these leaflets (still available on the DSR website), no other national communication campaign covering the experiment has been run since 2016.

2. Evaluating the experiment

a) Recap of experiment objectives

As explained above, the main objectives expected of legalised lane splitting are improved travel conditions with more equitable sharing of the road between all users; the implementation of standardised lane splitting regulations; and an evaluation of the benefits these regulations provide. The evaluation aims to understand the effects of introducing legal lane splitting on the road networks in question, and to observe user uptake of the regulations and how it is taught.

b) The four sections of the experiment

The experiment will be evaluated according to four factors:

- Behaviours observed
- Tracking of accident rates
- Tracking acceptance
- Training in legal lane splitting

	Factor 1 "behaviour"	**Factor 2 "accident rates"**	**Factor 3 "acceptance"**	**Factor 4 "education"**
Means	Observations of PTW behaviour, using CCTV recordings and the analysis/measurement of images	Analysis bulletin of road traffic injury accidents (BAAC) and accident reports *Additional study only for Ile-de-France region: RECIF_2020*	Online surveys outsourced to Kantar-TNS and analysed by Cerema	- Qualitative questionnaires outsourced to Ergo-Centre - Quantitative online surveys with the 2roues-lab/AMDN platform, processed by Université Gustave Eiffel
Duration	Four-monthly observations, 2x3 hours in the morning rush hour, and 3 hours in the evening rush hour per site (reduced to 2x3 hours in Ile-de-France). Directions of travel observed on a per site basis	Four-monthly and annual analyses	**Wave 1** 2016 (June 2016) **Wave 2** 2017 (June 2017) **Wave 3** 2018 (June 2018)	- 32 to 40 1-1.5 hour interviews per instructor - 2020 - 300 respondents - 2020

	Factor 1 "behaviour"	Factor 2 "accident rates"	Factor 3 "acceptance"	Factor 4 "education"
Purpose of the Study	**10 observation sites** in experiment areas: - 3 in Ile-de-France - 2 in Bouches-du-Rhône - 2 in Gironde (+1 site in 2018[1]) - 2 in the Rhône **1 control site** in Haute Garonne	Departments studied (or region, for Ile-de-France) - Ile-de-France - Bouches-du-Rhône - Gironde - Rhône - Haute-Garonne	Populations surveyed: - PTW (and car drivers) - Car drivers only	Populations surveyed: - Driving instructors - Trained riders/drivers
Indicators observed	For legal lane splitting: - speed - positioning - PTW convoys For illegal lane splitting: - positioning	Number of PTW accidents per: - Department - Department legal lane splitting network - Department lane splitting network with PTW practising LLS Annual density of LLS accidents per route (Ile-de-France) LLS accident rate	- Understanding of the rules - Opinion on relevance of regulations and benefits - Reported behaviours (any changes)	- Reported behaviours (any changes) - Ways of talking about lane splitting - Time spent on topic - Obstacles/difficulties

c) Road networks covered by the evaluation

The LLS experiment was launched in the French departments were the practice was the most widespread: the eight departments that make up the region of Ile-de-France, Bouches-du-Rhône, Gironde, and the Rhône. The department of Haute-Garonne was chosen as the control department. The experimental road networks were defined in accordance with the government remit for the experiment: motorways and roads with a speed limit of 70 km/h or more, with two carriageways separated by a central reservation, with at least two lanes in each direction.

It should be noted that some sections included flat intersections where cyclists and pedestrians may use the road. These sections accounted for a marginal percentage of the total road network studied. They were too small to allow any conclusions to be made as part of this study. However, research into these kinds of road networks with interactions between PTW and non-motorized modes of transport has already been carried out by Gustave Eiffel University in Marseille (Clabaux, 2015).

A map of the road networks included in the lane splitting experiment can be found in **Appendix 2**.

3. Evaluating Behaviour

The evaluation compared the behaviour of PTW users in the experiment areas before the experiment (last four months of 2015) and during the experiment (2016-2018). Behaviours were also evaluated on a control site (Haute-Garonne), where LLS was not trialled.

a) Two things should be taken into account from a behavioural point of view

Observations were made while taking the two road traffic conditions into account:

[1] After the Pessac site was expanded to six lanes, the site was no longer congested, and so the conditions required for legal lane splitting were no longer in place as of 2017. As a result, this site was replaced by the Villenave-d'Ornon that still experienced congestion.

- **When legal lane splitting rules were applicable** (i.e. when traffic was moving at a speed of 50 km/h or less)
- **When legal lane splitting rules were not applicable** (i.e. when traffic was moving at a speed of 50 km/h or more)

b) Location of observation sites

Below are the local observation sites used to analyse PTW rider behaviour in the experiment areas and the control area.

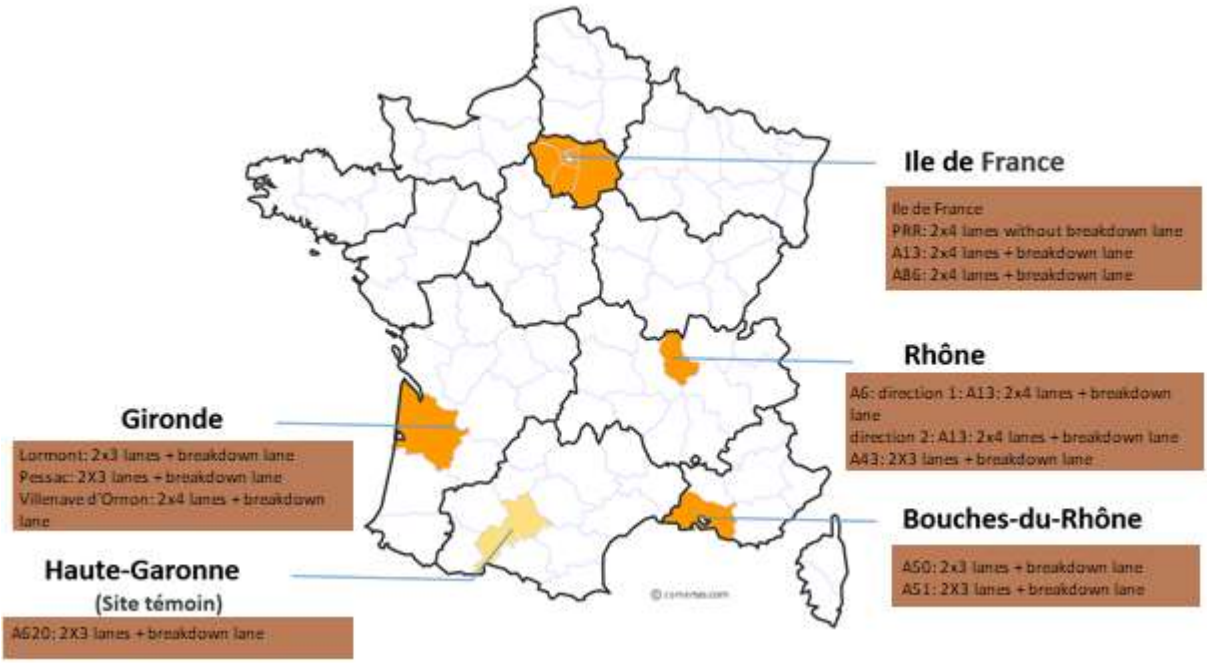


Figure 8: 10 PTW behaviour observation sites

The Villenave d'Ornon site replaced the Pessac site from 2017

Details of the observation sites can be found in **Appendix 3**. The length of the "experimental" lane splitting road networks that meet the criteria of the 2015 government remit are shown below.

	Ile-de-France	Bouches-du-Rhône	Gironde	Rhône	Haute-Garonne (control)
Length in km (sum of both directions of travel)	~ 1000	807	768	521	532

4. Analysing accident rates

The evaluation acccident rates involving PTW users in experiment areas before the experiment (2012-2014) and during the experiment (2016-2018). Accident rates were also monitored on the control site, where LLS was not trialled.

For each experiment area, as well as the control (Haute-Garonne), the before/after analysis was conducted using the BAAC files, using the 2012-2014 average accident rate as the benchmark for every department included in the study, as well as for the road networks on which the experiment was conducted.

More detailed analysis was then carried out by studying every available accident report for accidents that occurred on the experimental LLS road networks and that involved at least one PTW, using 2015 as the benchmark. By revealing all of the factors involved, these data helped us better understand the mechanisms behind accidents.

5. Evaluating acceptance

No before/after evaluation was carried out for the "acceptance" component. Instead, acceptance was tracked once the LLS measures were in place. Before the experiment, there was no acceptance to measure. The opinions of the two user samples (PTW and four-wheeled vehicles) were collected in three survey waves. It was decided not to specifically survey drivers of heavy goods vehicles, based on the principle that there would be limited interactions between PTW and HGVs on IL1, and the difficulty in compiling a representative sample for each department involved in the experiment.

The samples were representative of the French population (gender, age, income, etc.). They were formed of 1306 PTW riders and 1350 LV users. Analysis focused on the data provided by Ipsos, for the samples described below:

- 2016 - Wave 1: 460 car drivers and 445 PTW riders
- 2017 - Wave 2: 445 car drivers and 442 PTW riders
- 2018 - Wave 3: 440 car drivers and 415 PTW riders

They aimed to assess awareness of the experiment within these groups in the experiment areas and the control department (Haute-Garonne), as well as to analyse behavioural changes and the opinions expressed.

The objectives for each wave were as follows:

- To assess acceptance of regulated LLS among LV and PTW users
- To assess acceptance of regulated LLS among road users in experiment areas and the control department
- To assess how acceptance changed over time (Wave 1, Wave 2, and Wave 3).

The following subjects were covered in each wave:

- Awareness of the experiment
- Acceptance of the experiment
- Driving behaviour

A few additions were made following results obtained from the behavioural section:

- Wave 2: two items on illegal lane splitting, when the conditions for LLS are not met (frequency, reasons given)
- Wave 3: the same additions as for Wave 2 on ignoring the requirements for legal lane splitting were also included in Wave 3, and two new items on the speeds at which PTW riders lane split (speed used and reasons for not following the speed limit).

Respondents to 3 waves of survey by department studied:

Departments:	**PTW**	**LV**	**Total**
Bouches-du-Rhône	263	270	533
Gironde	263	270	533
Haute-Garonne	259	270	529
Ile-de-France	261	270	532
Rhône	260	270	530
Total	1306	1350	2656

6. Training in legal lane splitting

The evaluation of the lane splitting experiment was concluded with an analysis of changes in how the technique was taught, and the language that driving schools used to describe it following implementation of the experiment. This part of the evaluation was carried out by the Université Gustave Eiffel, in partnership with Ergo-Centre.

A qualitative component included telephone interviews with driving school instructors, covering how they organise training, and specific content on lane splitting. The samples included around a dozen respondents in each experimental area and the control department.
The study also included a quantitative component using the Assurance Mutuelle des Motards insurance company's "2-Wheel Lab", to survey PTW riders and car drivers (some 300 people in total) who had passed their driving test before and after the experiment, in order to identify any changes caused by the experiment.

This study aimed to understand training in lane splitting by comparing opinions of the motorcycle driving instructors and students working towards their motorcycle or driving license.

- **Instructor section**

88 instructors, 76 male and 12 female, with an average age of 46 (minimum = 24; maximum = 67; standard deviation = 9.8), with an average of 16 years' professional experience (minimum = 1; maximum = 42; standard deviation = 11.2) They completed an online survey that asked question about: how they saw lane splitting, their awareness of the experiment and knowledge of regulations, training content on lane splitting delivered as part of PTW and Category B license lessons, testing lane splitting during driving tests, and the impact of the possible national legalisation of lane splitting. With the aim of validating the survey's methodology (themes, sequencing of questions, length, etc.), four initial interviews were held with the driving instructors. Using surveys also enabled us to adapt to the unusual context of collecting data during the Covid-19 pandemic.

As we used a primarily qualitative approach, the sample size was large enough for analysis for both the experimental departments group and the control group (rest of France).

Instructor sample distribution in experimental and control groups

		Interview	Survey
Experimental Departments	Gironde	2	7
	Bouches-du-Rhône	0	4
	Rhône	0	2
	Ile-de-France	2	13
Control departments (rest of France)		0	62
Total		4	88

As we used a primarily qualitative approach, the sample size was large enough for analysis for both the experimental departments group and the control group (rest of France).

- **Student sample**

The "student" sample was drawn from two populations: riders/drivers who had previously passed the motorcycle (AM, A1, A2, A) and driving license. Both of these samples were selected based on the year they passed their test (or the most recent license for PTW riders holding more than one category of license) over a four-year period either "before" the start of the lane splitting experiment (2021 to January 2016) or "after" the experiment began in February 2016 (from February 2016 to early 2020). For the purposes of the study, these samples were broken down according to the department in which they passed their test: in the experimental area (departments 13, 33, 69, Ile-de-France: 75, 93, 91, 92, 94, 95, 78, 77) or in a municipality in another department, or the control area (department 31).

In this way, there were 411 former learner motorcyclists, distributed as follows:

Former learner motorcyclist sample distribution in experimental and control groups before and after experiment.

	BEFORE Group 2012-January 2016	AFTER Group February 2016-early 2020	Total
Control department	85 10 women and 75 men	172 29 women and 143 men	257
Experimental Area	63 7 women and 56 men	91 17 women and 74 men	154
Total	148	263	411

There were 811 former learner drivers, broken down as follows:

Former learner driver sample distribution in experimental and control groups.

	BEFORE Group	AFTER Group	Total
Control department	214 152 women and 62 men	321 223 women and 98 men	535
Experimental Area	113 73 women and 40 men	163 114 women and 49 men	276
Total	327	484	811

Participants answered an online questionnaire, containing questions that overlapped with those asked to instructors: either the same questions or adapted to each profiles.

The data was initially analysed separately for instructors and students. The results were then grouped together to record each theme, as the subjects investigated were similar in each population.

7. Limitations of the evaluation

The ability to analyse accident data (BAAC files and police reports) varies depending on their availability and how well they were completed by the police. The availability rate for police reports on accidents involving a PTW on the "experimental LLS road networks" was satisfactory, at between 70% and 100% depending on the department in question. This rate was lower in Ile-de-France, varying between 53% and 65%, but not low enough to call the results of the study into question, given the large number of data studied (3565 police accident reports read).

With regard to speed camera data, the measuring protocol used has a +/- 5 km/h margin of error. The values presented take into account this margin of error, which remained stable throughout the evaluation. Only the speed of PTW driving in the inter-lane space furthest to the left and in authorised LLS conditions were calculated. The speed of other vehicles was not part of the data we analysed, in line with the evaluation criteria.

There were not many accidents involving a lane splitting or ILS PTW, except in Ile-de-France. They should therefore be analysed in perspective. Furthermore, their initial situations varied between sites (Gironde, concerning traffic), which may explain the variability in the results detailed below.

C. Results of the experiment

1. Behaviour

a) General compliance with rules

When PTW lane splitting rules were applicable (i.e. when traffic was moving at a speed of 50 km/h or less), compliance with the both the rule governing lane positioning (IL furthest left: IL1) and the speed limit remains a minority practice in the experimental areas. Compliance has, however, been rising since the start of the experiment.

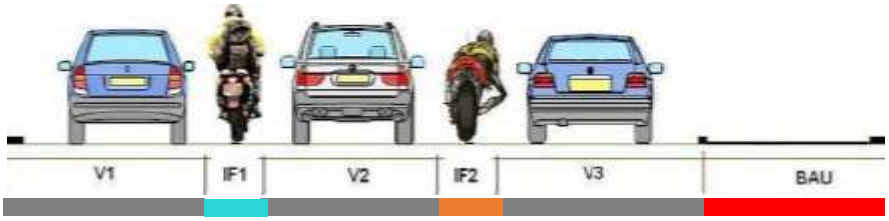


Figure 9: Lane nomenclature

Worth mention is the outlier of the A6 in the Rhône, where very high compliance with speed and positioning rules were recorded. This can be explained by the very high congestion in the left-hand lanes, and the fact that there was an interchange a few hundred metres ahead.

$$\text{Rate} = \frac{\text{Number of PTW driving in IL1 and complying with speed limit where lane splitting is authorised}}{\text{Number of PTW driving in IL1, IL2 or on the breakdown lane, where lane splitting is permitted}}$$

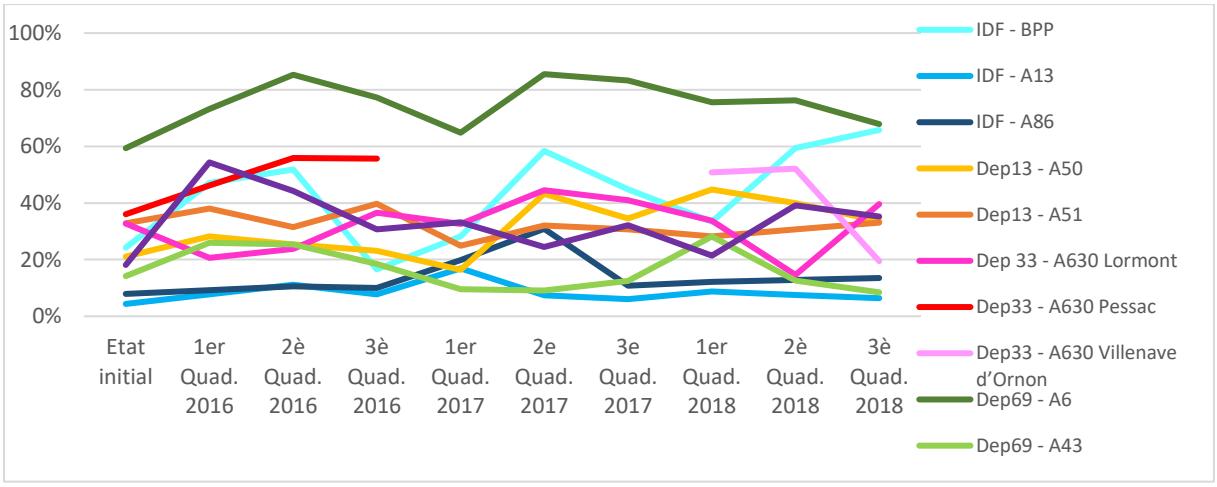


Figure 10: Four-monthly rates for PTW following rules for positioning and speed where lane splitting is permitted

The break in the curves represents the change of sites in Gironde. As explained above, the A30 site in Pessac in Gironde no longer recorded any congestion after the carriageway was enlarged to three lanes. This meant that it was no longer possible to evaluate the experiment at this location. This is why the site was no longer used, in order to avoid introducing any bias. It was replaced by the site in Villenave-d'Ornon for 2018.

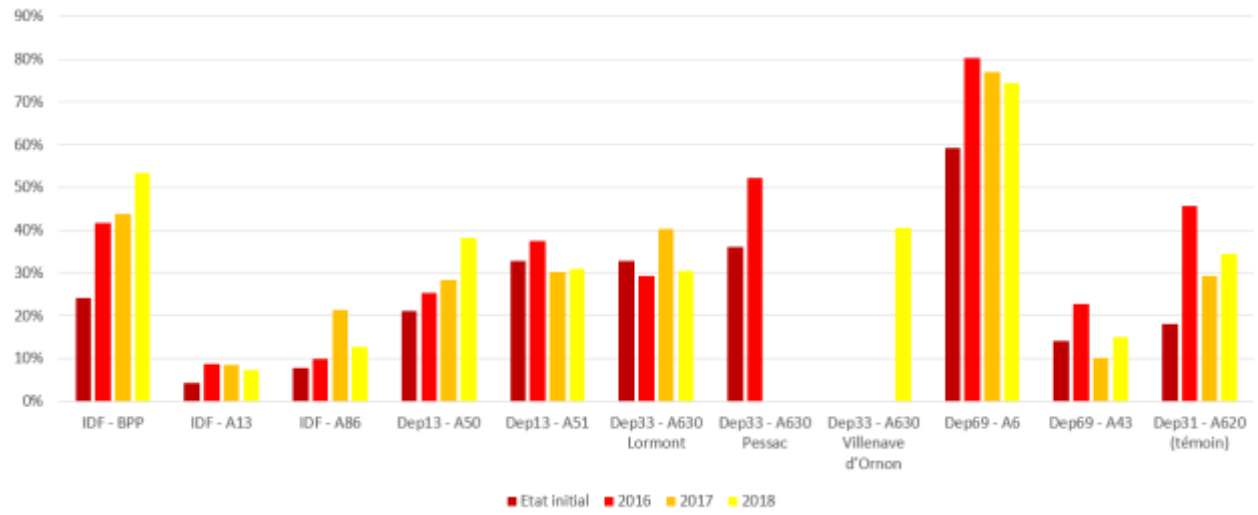


Figure 11: Annual rates for PTW following rules for positioning and speed where lane splitting is permitted

$$\text{"LLS prohibited" rates} = \frac{\text{Number of PTW driving in L1, L2 or the L3 where lane splitting is prohibited}}{\text{Total number of PTW observed when lane splitting is prohibited}}$$

When PTW lane splitting rules were no longer applicable (i.e. when traffic was moving at a speed greater than 50 km/h), compliance with the rule governing positioning in normal lanes of traffic remained in the majority (more than 80% of PTW) on the experimental sites. Compliance was, however, lower in Ile-de-France (data varies between 40% and 78% in 2018) and in Gironde, where 52% of PTW in 2018 travelled in the normal lanes in conditions where LLS was prohibited. In these two areas, the change in traffic between congested and more free-flowing periods was less dramatic, which may in part explain this result.

b) Changes to speeds in IL1

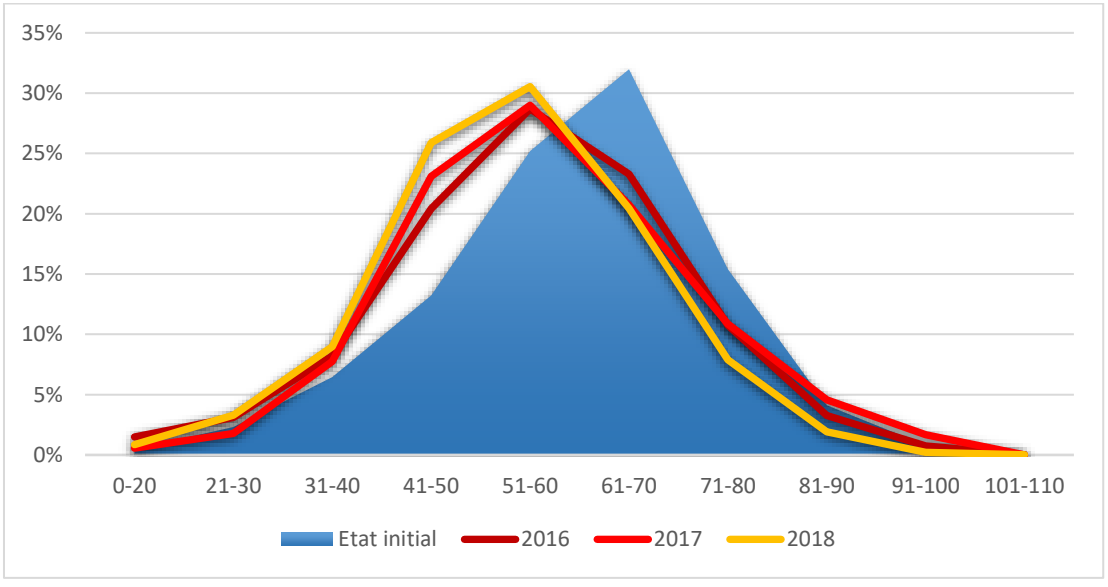


Figure 12: Speeds of LLS PTW in IL1 in experiment areas when LLS is permitted

Across all experimental areas, the distribution of speeds travelled by PTW users in IL1, in areas where LLS was permitted, were concentrated between 41 km/h and 70 km/h. This finding also applies to the control department. Details per site and per direction of travel can be found in Appendix 4: Site Behaviour Summaries.

While the average speed when lane splitting remains higher than that stipulated, a general trend towards reducing speed over the years was observed.

On a site level, differences in compliance with the speed limit was observed, even within single departments.

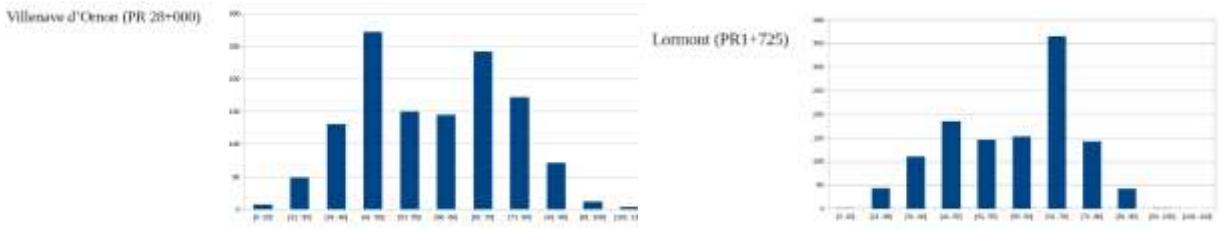
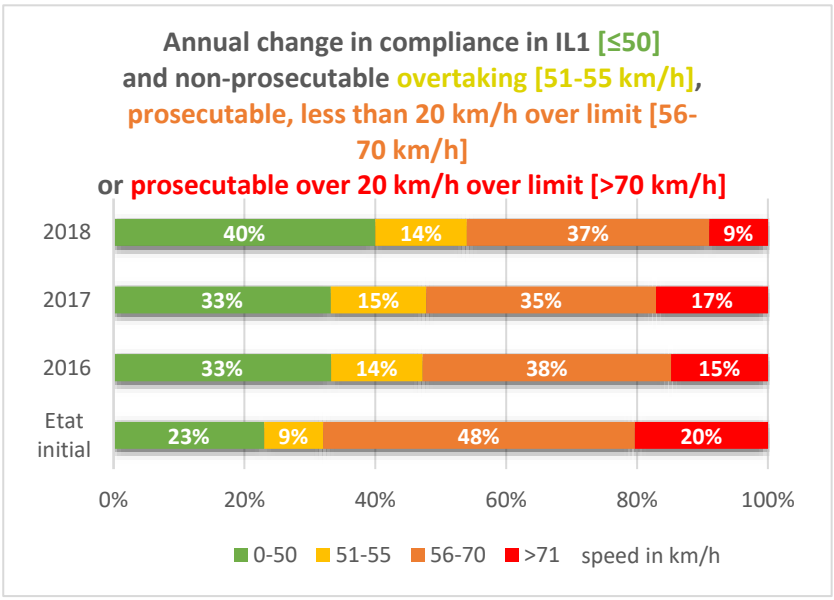


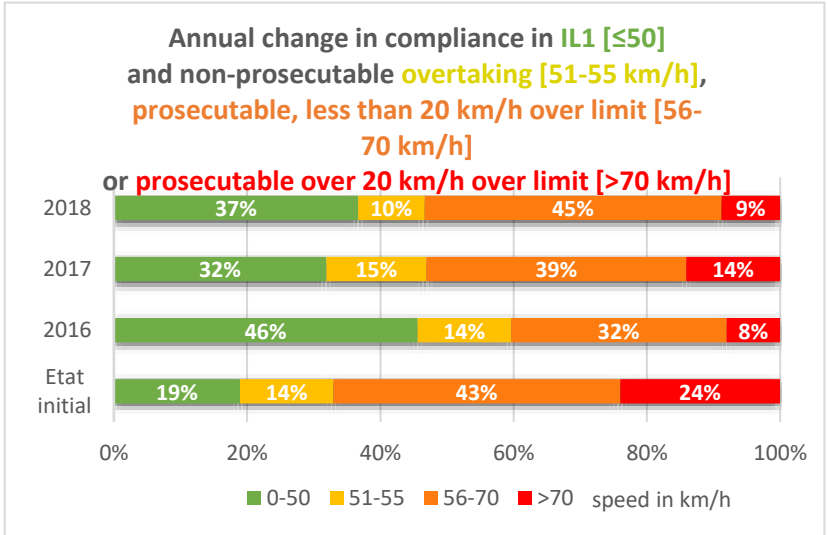
Figure 13: Example of differences in speed distribution across sites in a single department

For the experimental sites as a whole, across every department, a low rate of compliance with the 50 km/h speed limit when lane splitting in the space between the leftmost lanes (IL1) was observed. Half of users would be eligible for prosecution, but the compliance rate has been recording significant growth since the experiment began. In parallel, severe speeding (speed > 70 km/h) was falling.



experiment areas

control



At the control site in Haute-Garonne, a reduction in "severe" speeding was also observed, as well as an increase in the percentage of PTW riders travelling at less than 50 km/h, with 2016 in particular standing out for this moderation in speed.

Focus on speed differential when LLS is permitted

The speed differential between PTW users in IL1 and other users in adjacent lanes, when LLS was authorised, was estimated at between 20 km/h and 30 km/h in Gironde. This speed differential would change very little over the course of the experiment at the Lormont site, which retained the same characteristics over the years. The gradual reduction at the Pessac site was due to the end of congestion.

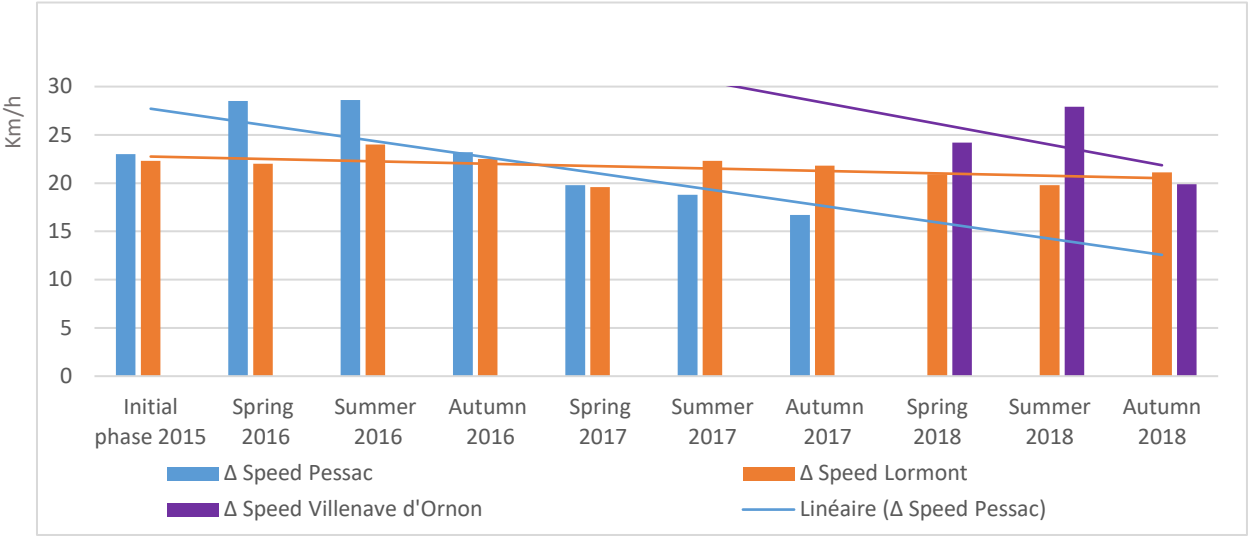


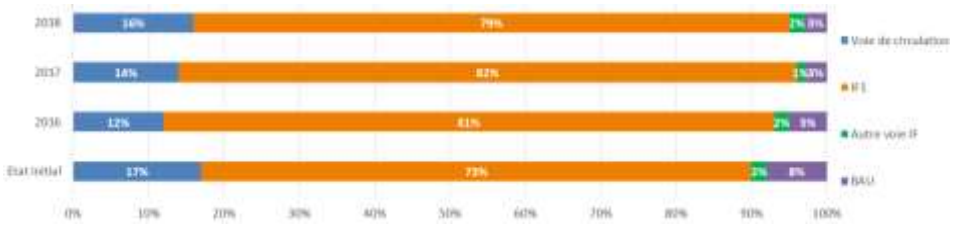
Figure 14: The speed differential between PTW users in IL1 and other users in Gironde, when LLS was permitted

Interpreting the graph

At the Pessac site in 2015, when LLS was permitted, the speed differential between lane splitting PTW in IL1 (furthest to left) and other users in the adjacent lanes was 23 km/h. The line describes the trend in variations in the differential. When it is descending, it means that the speed of PTW in IL1 where LLS is permitted is tending towards the speed of other users in adjacent lanes.

c) Changes in carriageway positioning

Under LLS conditions, 80% of PTW users rode along the leftmost space between the lanes (IL1), in both the experimental and control areas. In experimental areas, there was a transfer of PTW users away from the breakdown lane and into the normal lanes of traffic.



experiment areas

Figure 15: PTW positioning when lane splitting permitted, all experiment areas

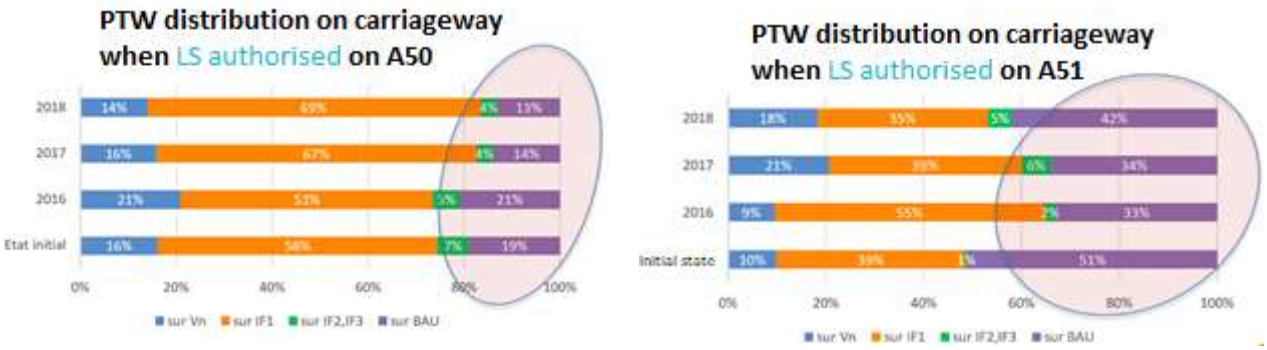
control department

Figure 16: PTW positioning when conditions for lane splitting were in place at control site

There was a reduction in traffic along IL1 in Haute-Garonne (control site) when the LLS criteria for the experiment were met, with traffic moving into normal lanes.

The use of the breakdown lane (lane reserved for public transport on A51) by PTW in Bouches-du-Rhône is a local particularity. On the A50, use of the breakdown lane fell over the years, with PTW preferring normal lanes and

IL1. On the A51, there remained high levels of traffic in the reserved lane for the duration of the experiment, while traffic in normal lanes or in another IL space tended to increase.



When traffic began flowing again and LLS was no longer permitted, most motorcyclists returned to the normal lanes of traffic. Across all sites, behaviour remained stable since the start of the experiment. 1 in 7 PTW users kept riding along IL1.

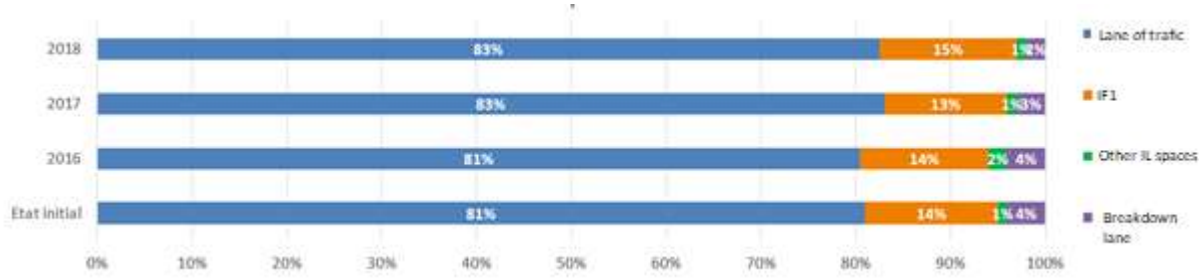
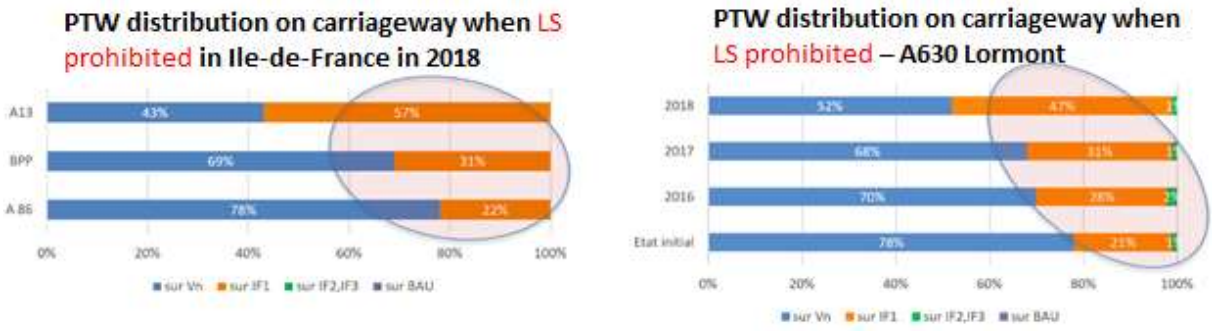


Figure 17: PTW positioning when lane splitting prohibited in experimental areas

Local differences did appear, especially in Ile-de-France and Gironde, where fewer PTW riders returned to normal lanes of traffic, instead remaining in IL1.



At the Parisian site on the A13, and at the Lormont site in Gironde, a high percentage of PTW riders continued to ride along IL1. As explained above, this particularity can be explained by the fact that changes to traffic conditions (flowing/congested) occur slower than at other experimental sites.

A summary of results by observation site can be found in **Appendix 4**.

It should be noted that the issue of "PTW convoys", defined as *a line of PTW made up of at least three PTW travelling along any point of IL1 with less than two seconds between each PTW*, seems to be occurring more frequently in Ile-de-France and at the Lormont site in Gironde.

In 2018, more than half of PTW observed in Ile-de-France travelled in "convoys" when LLS was authorised, compared to 25% in Gironde. At the other sites observed (including the control), less than 20% of users travelled in this way, with large local differences (in 2018, for example: 3% on the A43 in the Rhône – 16% on the A50 in Bouches-du-Rhône).

Even though it may feel safer for PTW, who feel more visible, ILS as a convoy is a potential source of conflict. Indeed, it is difficult for a car driver to change lanes – especially at an interchange – when they encounter a convoy of PTW riding along IL1. Likewise, riding in a convoy raises issues of insufficient stopping distances between two PTW.

As with car drivers, awareness of the risks of insufficient stopping distances remains an area for improvement. It should be noted that stopping distances are longer for PTW than for cars: 20m for a PTW compared to 17m for a car, in dry conditions (Cerema, 2016).

2. Accident Rates

a) General accident rates

Across the whole of France, the physical accident rate for powered two-wheelers fell (slightly) between 2014 and 2018.

This is mainly due to the fall in the number of scooter and moped accidents.

Figure 18: Number of accidents involving at least one PTW in France

Within the experimental departments, the general accident rate data shows falling PTW accident numbers in Ile-de-France, Gironde (significant reduction), and in Bouches-du-Rhône They remain stable in the Rhône and in Haute-Garonne (control site).

No. of PTW accidents (all road networks)	**Ile-de-France**	**Bouches-du-Rhône**	**Gironde**	**Rhône**	**Haute-Garonne (control)**
Initial figure (2012-2014 average)	8,552	1,651	593	610	339
Experiment (2016-2018 average)	7,698	1,507	427	616	354
Variation	- 10%	- 9%	- 28%	+1%	+5%

b) Accident rates on road networks with LLS experiment in place

Accident rates on road networks with the LLS experiment in place tended to rise. The data is not as robust, and so should be analysed with the necessary prudence.

No. of PTW accidents (Experimental LLS networks)	**Ile-de-France**	**Bouches-du-Rhône**	**Gironde**	**Rhône**	**Haute-Garonne (control)**
Initial figure (2012-2014 average)	1,447	73	61	45	28
Experiment (2016-2018 average)	1,570	120*	94	35	38
Variation	+9%	+64%	+54%	- 21%	+36%

*Highly variable year to year (97 in 2017 vs. 125 in 2018)

By analysing the relationship between the number of accidents involving at least one PTW on the experimental LLS network and the total number of accidents involving PTW across the entire area being studied (department or region), we revealed a rapidly increasing accident ratio in Gironde, and a slight increase across all of the other regions studied.

$$\text{Ratio} = \frac{\text{Number of PTW accidents on experimental LLS network}}{\text{Number of PTW accidents per department (for whole region, for Ile-de-France)}}$$

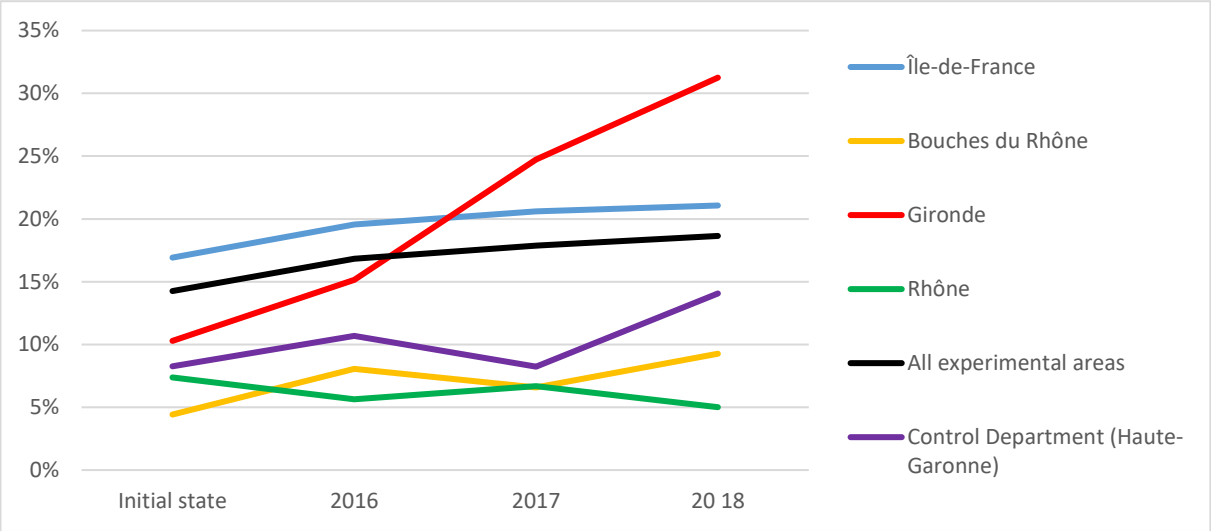
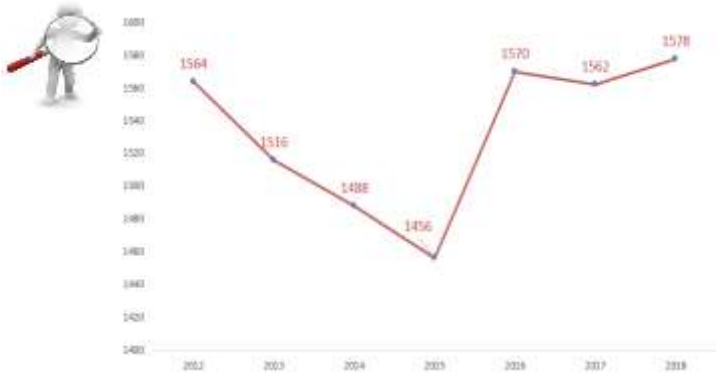


Figure 19: Change in ratio of accidents involving at least one PTW on experimental LLS networks



Between 2012 and 2015, the number of accidents involving at least one PTW user in the experimental LLS networks in Ile-de-France consistently fell.

After an increase in 2016, the number of accidents is now stable.

We should also note that in parallel, the general accident rate for PTW in Ile-de-France has also fallen by 12%, between before the experiment started and 2018.

Figure 20: Number of accidents involving at least one PTW on experimental LLS networks in Ile-de-France

Gironde is an outlier due to the combination of a considerable decrease in the PTW accident rate across all road networks in the department: 593 accidents before the experiment, and 320 in 2018, while the number of accidents involving at least one PTW user in the experimental LLS network has been rising since 2015.

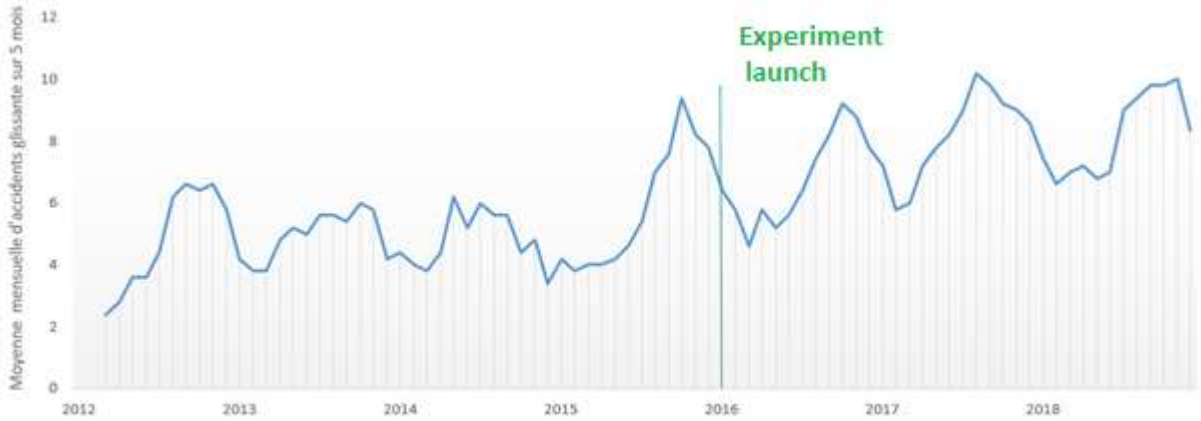


Figure 21: 5-month rolling average of accidents involving at least one PTW on the LLS network in Gironde

c) Accident rate for lane splitting PTW users on experimental LLS network

Cerema analysed all of the fatal accidents that occurred in France in 2015 in its FLAM PTW (Cerema, 2020) study. It identified more than 2400 causality factors for the **718 fatal PTW/P3W accidents** (72% being almost certain) that occurred across France.

The main findings for motorcyclists were as follows:

- 25.6% (166 cases) of motorcyclists were in the process of overtaking, representing 10% of fatal PTW accidents, or 27 accidents.
- Fatal accidents involving legal lane splitting PTW, filtering, and ILS on every network involved: 12% scooters, 12% dirt bikes, 6% custom bikes, 4% roadsters, 4% racing, 4% road bikes
- 14% (**24 cases**) involved a motorcyclist who was **LLS, ILS, or filtering.** These 24 motorcyclists:
    - Collided with another vehicle that was changing lanes in 11 cases
    - Lost control of their bike in 7 cases
    - Collided with another vehicle (and 1 pedestrian) that was not changing lanes, in 6 cases
- Only **6 of these 24 accidents** occurred on motorways or expressways with a speed limit of 70 km/h or more. In other words, only 6 out of 768 fatal accidents occurred on roads suitable for lane splitting in 2015. Analysis of these 6 accidents reveals that 4 were ILS and 2 were possible LLS.

These results are consistent with those obtained during the experiment. Indeed, **16 fatal accidents** involving a PTW user in the act of LLS or ILS were recorded in **4 years** (details below). It should be noted that the road network involved in the study contained a high percentage of the motorway/expressway network where LLS and ILS are practised.

Indeed, analysis of police reports for accidents involving at least one PTW on the experimental LLS road network revealed the percentage of PTW users who were in the act of LLS or ILS at the time the accident occurred. The RECIF project conducted by Cerema in 2019 enabled us to study every police report for an accident involving a PTW on an experimental LLS road network available in France, in addition to analysis carried out by the departments in Province.

This sample revealed an increase in the number of accidents involving a PTW user while lane splitting or ILS on the experimental road networks since the experiment began (mainly in Ile-de-France).

No. of PTW accidents (In act of LLS on experimental LLS networks)	Ile-de-France	Bouches-du-Rhône*	Gironde*	Rhône*	Haute-Garonne* (control)
Initial figure (2012-2014 average)	283	7	13	10	7
Experiment (2016-2018 average)	397	14	44	10	9

*Low numbers, to be analysed with usual precautions

$$Ratio = \frac{Number\ of\ PTW\ accidents\ in\ act\ of\ LLS\ on\ experimental\ LLS\ network}{Number\ of\ PTW\ accidents\ on\ experimental\ LLS\ network}$$

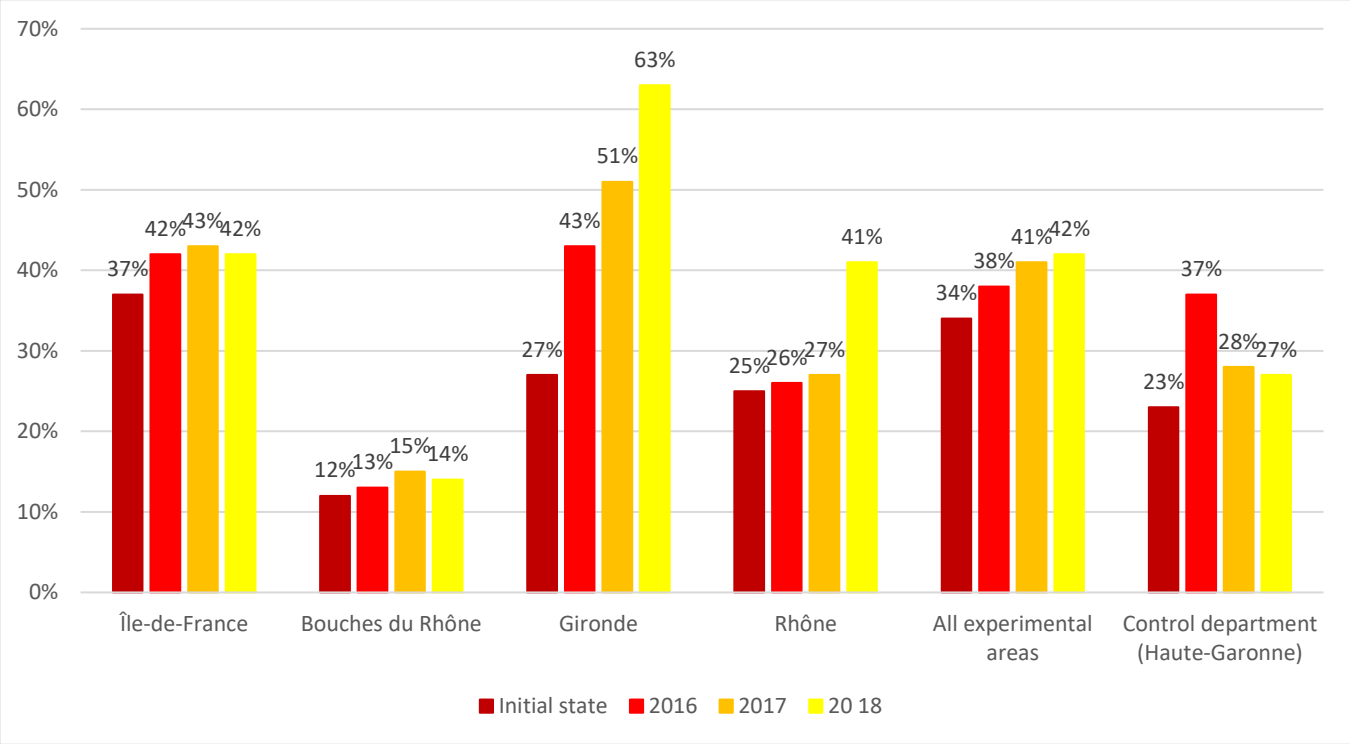


Figure 22: Number of accidents involving at least one PTW in act of LLS on experimental LLS networks/No. accidents involving at least one PTW on experimental LLS network

The accident ratio in Ile-de-France stabilised over the years of the experiment. It should be noted that accidents involving at least one PTW user in the act of LLS or ILS on the experimental LLS network in Ile-de-France formed 39% of all accidents on the Paris ring road. The variations in other experiment areas should be viewed with caution, given the low numbers of accidents. However, it is worth noting the outlier that is Gironde, where the percentage of PTW users in the act of lane splitting on the LLS or ILS network has been rising constantly since the experiment began.

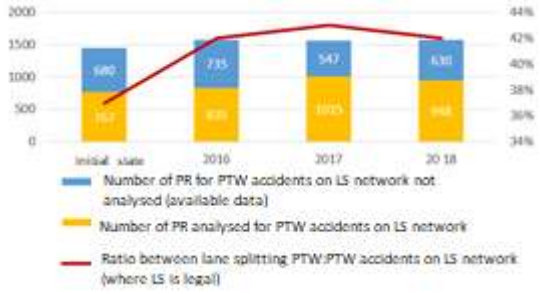


Figure 23: Changes in number of accidents involving PTW users in act of LLS on the on experimental LLS network - Ile-de-France vs. Gironde

The explanation for Gironde bucking the trend lies in the fact that most accidents that took place on the experimental lane splitting network (more than 90%) occurred on or in the immediate vicinity of the ring road. Indeed, total traffic (PTW and other vehicles) on the ring road has been rising every year: up 5.7% between 2013 and 2018. Congestion on this road network has been increasing, and with it the practice of LLS and ILS. It should be noted that during the years of the experiment, work was in progress to add extra lanes (2x3) to the ring road.

As stated above, there were 16 fatal accidents involving a PTW in the act of LLS or ILS on the experimental road networks, between 2015 and 2018.

Number of fatal/serious accidents involving a PTW in the act of LLS or ILS, over a four-year period between 2015 and 2018:

- 10/135 in Ile-de-France (8 departments)
- 3/16 in the Rhône
- 2/10 in Bouches-du-Rhône
- 1/31 in Gironde

By analysing more than 4500 police reports for the accidents, in an effort to understand the circumstances of the accident in detail, the following accident scenarios emerge:

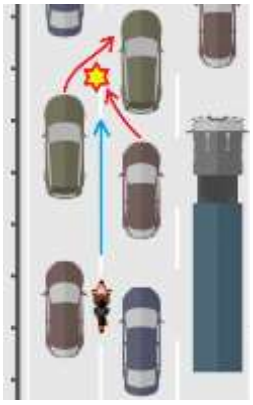


Figure 24: Typical circumstances of a PTW accident when LLS

"A PTW rider driving along the 'LLS network' as part of their commute, during morning or evening rush hour. Traffic was congested. The PTW positioned itself on the line between the two outside lanes and rode there (90% cases). The driver of a non-PTW vehicle in the normal lanes of traffic, ahead of the PTW, changes lane (left of right) without seeing the PTW, resulting in a collision."

The main factors leading to accidents that we observed were non-PTW users changing lanes without warning, not following the French highway code (not indicating, not checking before pulling out, etc.), **excessive or inappropriate speed**, and dangerous overtaking (other inter-lane areas or breakdown lane) by PTW riders.

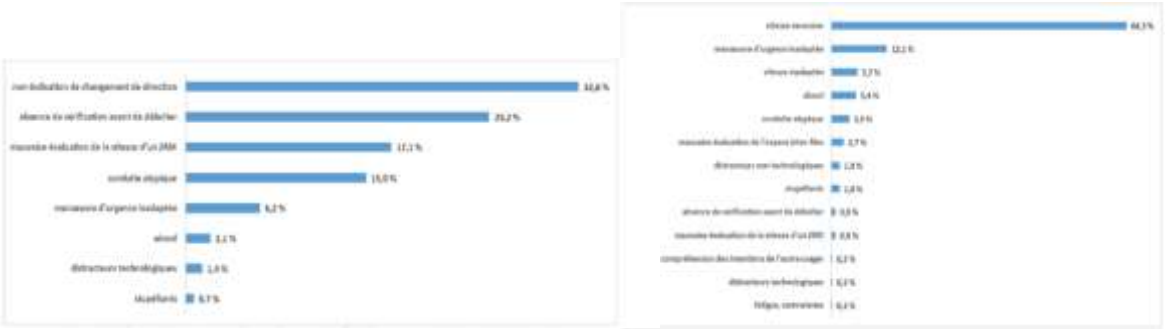


Figure 24: Human factors for drivers of non-PTW vehicles (147 cases) vs. PTW riders (339 cases) in Ile-de-France, for accidents involving at least one PTW user in the act of lane splitting on the experimental LLS network in Ile-de-France (RECIF study).

The summary of accident rate results by observation site can be found in **Appendix 6**.

3. Acceptance

The "Acceptance" section aims to assess awareness of the experiment among PTW riders and car drivers in the experiment areas and the control department (Haute-Garonne), as well as to analyse behavioural changes and the opinions held. Summaries of acce²ptance by site are available in **Appendix 5**.

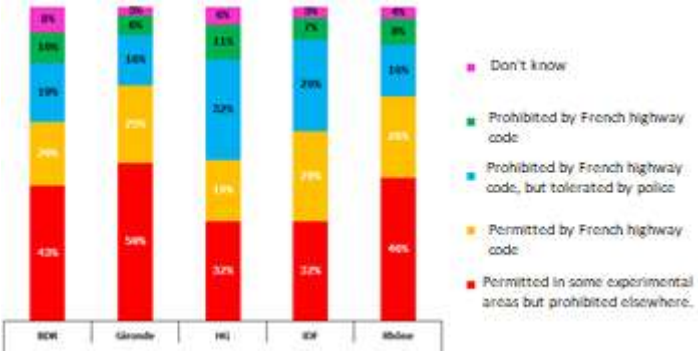
It should be noted that the questionnaire did not distinguish between LLS and ILS. This lead respondents to give their opinion about both legal lane splitting and ILS (illegal lane splitting without following rules in terms of speed limit, positioning, or distance from other vehicles).

The four categories below were distinguished when presenting results:

PTW experimental area  Cars experiment area 

PTW control department  Cars control department 

a) Awareness of the experiment



Over the three years of the experiment, there was low awareness of the experiment (<50%) across all road users. Awareness was lowest in the control department (Haute-Garonne), as well as in Ile-de-France. Respondents in Gironde reported the highest awareness of the LLS experiment.

Figure 25: Awareness of LLS regulations: applicable areas

With regard to changes in driving habits reported by car drivers, there was a constant increase in the number of users who did not know about the experiment, in both the control and experimental departments. 2/3 did not change their driving habits, and half thought that it was up to PTW to change.

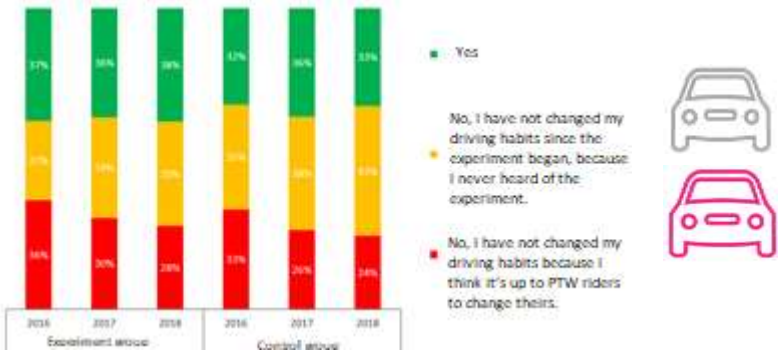
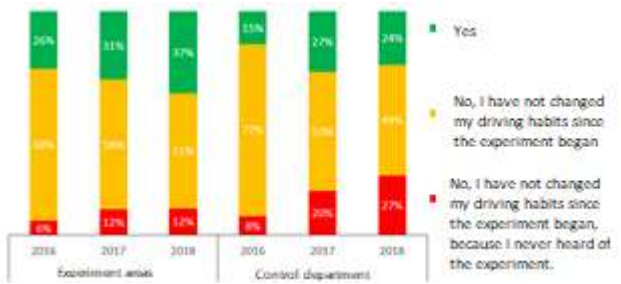


Figure 26: Changes to car driving habits

It should be noted that it was in Gironde that the most respondents reported having changed their driving habits, while those in Ile-de-France reported the least change.



It was PTW respondents who most reported having changed their driving habits over the years, especially in the experiment areas. In the control department, the percentage of PTW users who did not know about the experiment was also constantly rising.

Figure 26: Changes to PTW driving habits

Over the three years of the experiment, 30% of PTW riders changed their driving habits. Apart from in Bouches-du-Rhône, respondents in experiment areas were clearly different to those in the control department.

b) Behaviours reported

Since the main circumstances for PTW accidents between lanes involved a motorised vehicle (non-PTW) changing lanes ahead of the PTW, PTW riders must adopt strategies to:

- Be visible to other road users
- Stay alert and catch any clue that lets them predict the behaviour of other vehicles and PTW

The following results are grouped together accordingly, for better readability.

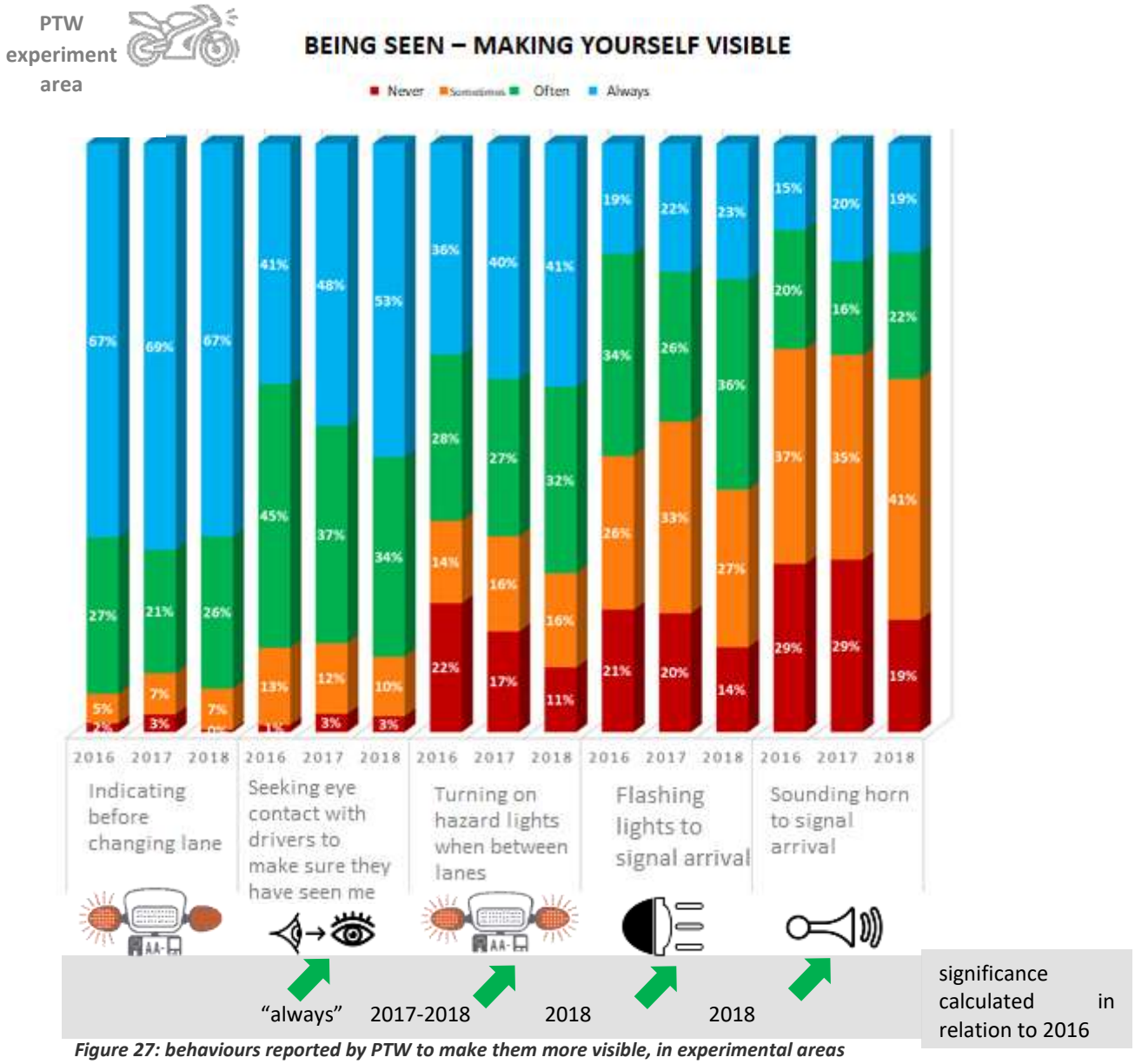


Figure 27: behaviours reported by PTW to make them more visible, in experimental areas

70% reported that they "always" indicated – 25% reported indicating "often" (stable)

Seeking eye contact is an expert practice. 85% of PTW report doing so. 53% "always" in 2018, compared to 41% in 2016 (significant change)

Although not included in the experiment for two reasons (the concept of hazard lights is different to that of lane splitting, and some PTW do not have hazard lights), this practice increased significantly. 73% report using their hazard lights "always" or "often" in 2018 (significant change).

Flashing head/tail lights – 55% report doing so “often” to “always” in 2018 (significant change)

Use of horn – 43% report doing so “often” to “always” in 2018 (significant change)

PTW experiment area

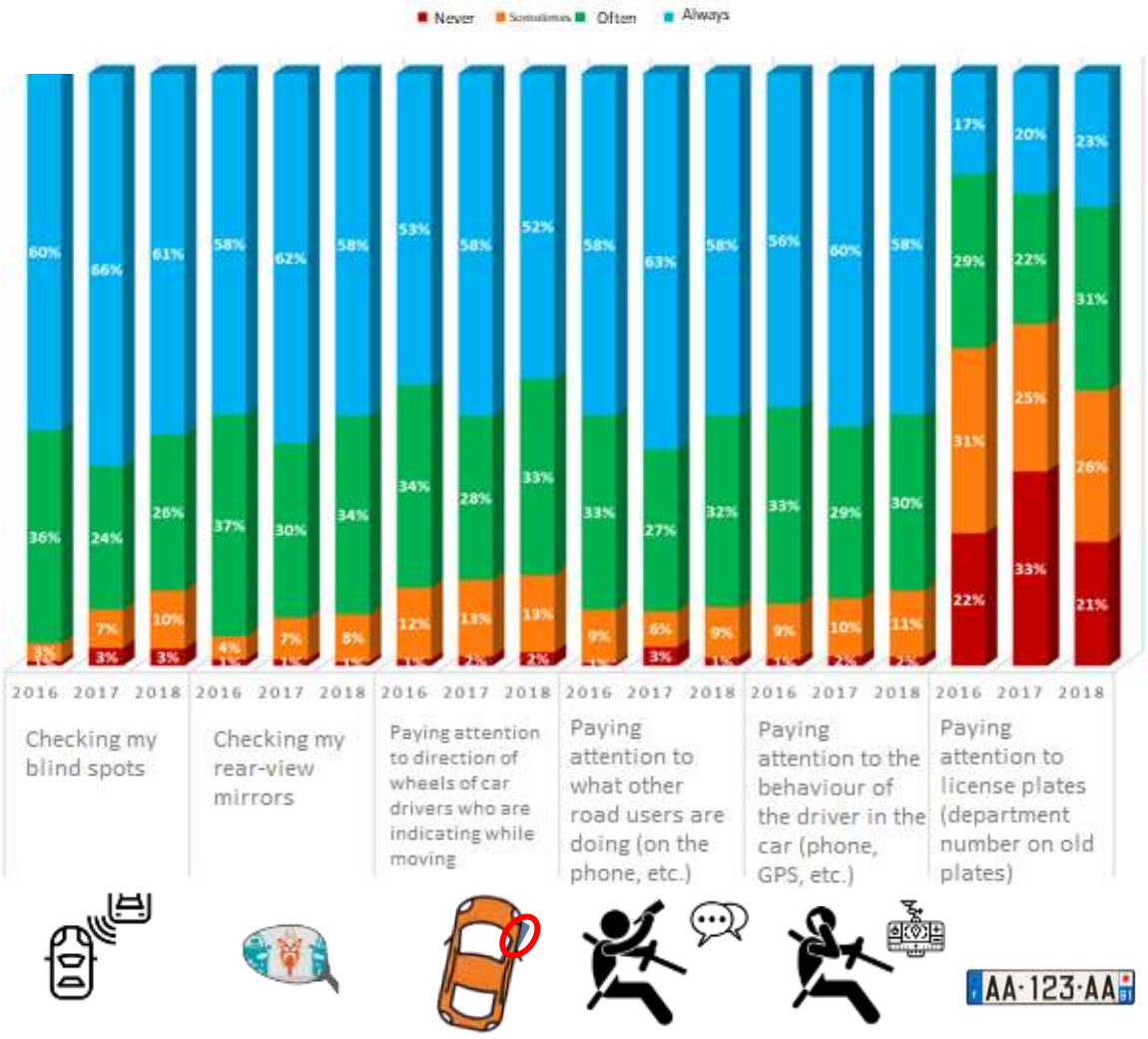


Figure 28: behaviours reported by PTW in experiment areas to predict the behaviour of other road users

85% to 90% report “always” or “often”; checking their blind spots, checking their rear-view mirrors, paying attention to the wheel direction of car, or their indicator lights, and paying attention to the activity other users, as well as the behaviour of the driver in the car.

Just under 50% of PTW riders report paying attention to license plates in 2018 (stable).

PTW experiment area

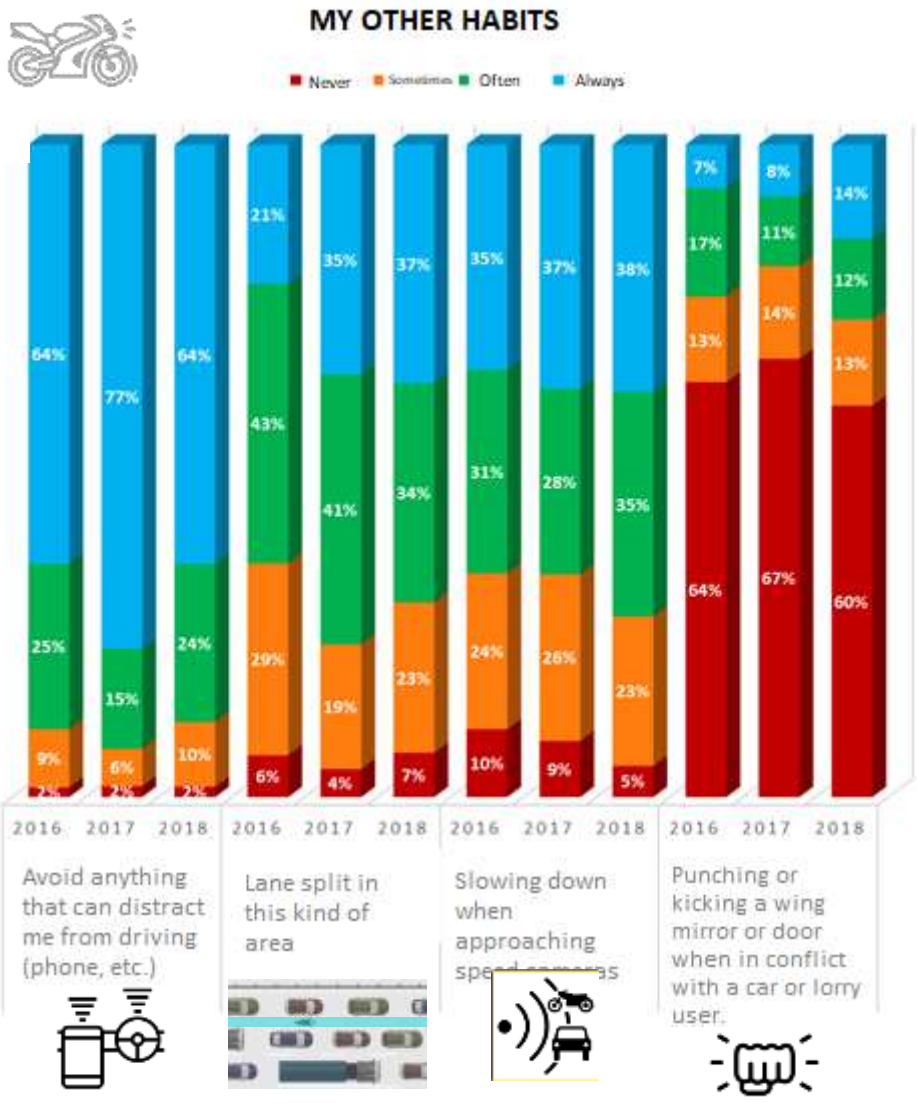


Figure 29: behaviours reported by PTW in experimental areas

90% of PTW riders report “always” or “often” paying attention to distractions. At least 65% “always” avoid distractions – 25% do so “often”.
The significant improvement seen in 2017 was not maintained in 2018, which saw a return to the initial situation.

76% of PTW users report “always” or “often” using lane splitting on motorways and expressways in 2017, and 71% in 2018 (significant change).

73% of PTW riders report “always” or “often” slowing down when coming up to a speed camera (stable). Note that 44% of PTW users in the experimental area report driving below the speed limit (57 km/h, on average).

25% of PTW riders report “always” or “often” punching or kicking a wing mirror or door when in conflict with a car user (stable).

Cars experiment area

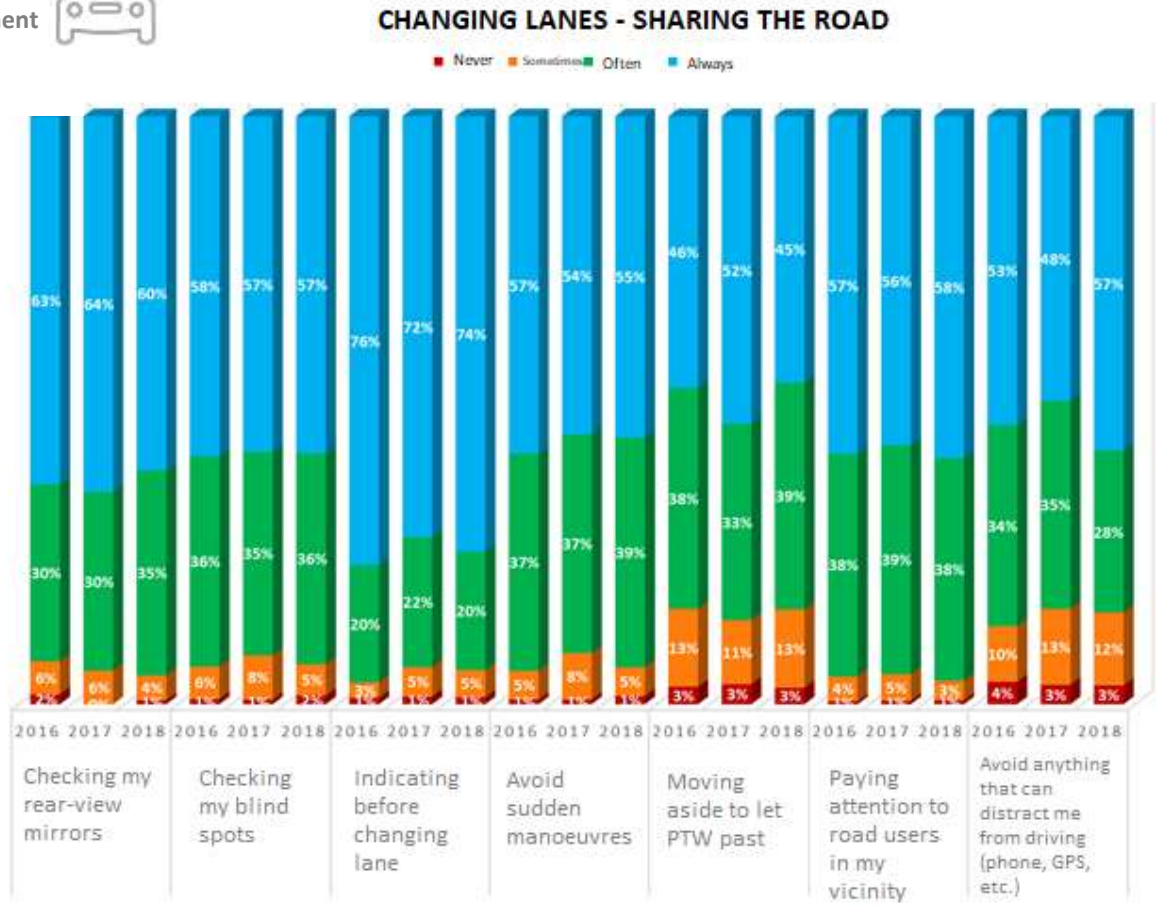


Figure 30: behaviours reported by car drivers in experin … m… …nes safer and encourage lane splitting

Car drivers' reported behaviour remained stable over these three years.

Under 10% of car users report not checking their rear-view mirrors or blind spots.

85% of car users report "always" or "often" letting PTW overtake.

Almost 5% of car users pay no attention to road users driving in their vicinity.

15% report not avoiding distractions (GPS, phone, etc.).

Cars experiment area

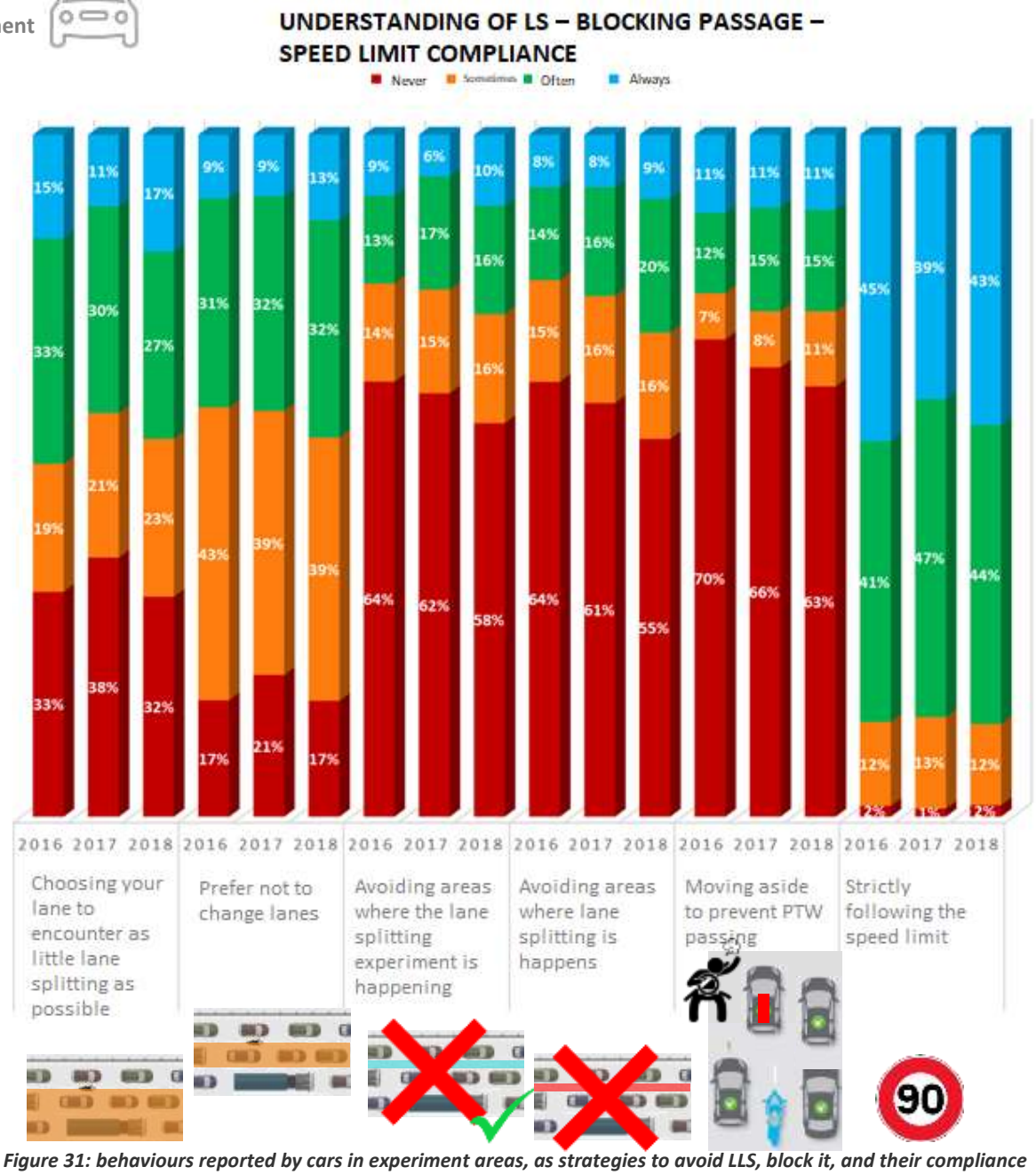


Figure 31: behaviours reported by cars in experiment areas, as strategies to avoid LLS, block it, and their compliance with speed limit

Car drivers' reported behaviour remained stable over these three years. Most car drivers reported that they do not avoid areas where lane splitting takes place.

14% of car drivers report not following the speed limit (always or sometimes).

26% of car drivers report moving to prevent PTW from overtaking in 2018 (always or often). It should be noted that this behaviour is lowest in Ile-de-France, Gironde, and the Rhone, in relation to the control department (Haute-Garonne).

PTW control department

In the control department, the results were generally stable over the course of the experiment, and similar to in the experiment areas. The following behaviours were reported less in 2018:

- *"Indicating before changing lane"*
- *"Seeking eye contact with drivers to make sure they have seen me"*
- *"Avoiding anything that can distract me from driving"*
- *"Paying attention to the behaviour of the driver in the car"*

While the percentage remains low, *"Punching or kicking the wing mirror or door"* is gaining in popularity over the years.

Cars control department

With regard to the behaviours reported by car drivers, the results also remained stable over the three waves of the survey, and similar to in the experiment areas.

There was an increase in the percentage of respondents that reported *"Checking their blind spots"* and *"Paying attention to other road users in their vicinity"*.

c) Opinions on legal lane splitting

Most road users, in experiment areas and the control department, agreed with the following items, with PTW riders agreeing more than car drivers:

- *"Lane splitting is inseparable from riding a PTW"*
- *"Lane splitting lets traffic flow easier"*
- *"Lane splitting helps you get to appointments on time"*
- *"Lane splitting helps limit air pollution"*
- ***"Lane splitting causes accidents"*** - a higher percentage of car drivers agreed:
  - 50% of PTW users in experiment areas vs. 55% in the control department (2018)
  - 58% of car drivers in experiment areas vs. 65% in the control department (2018)

These responses highlight respondents' uncertainty about what LLS actually entails. Are they only thinking of LLS as described in this experiment, or about a combination of LLS and ILS, which would go a long way to explaining the findings.

d) Emergency manoeuvres and accidents

In every area studied, PTW users reported performing more manoeuvres to avoid a collision, in comparison with car drivers.

e) Summary of acceptance results

In conclusion, answers from survey participants did not change much over time. The surveys revealed major differences between regions. These differences may be explained in terms of how frequently and for how long appropriate LLS conditions were in place (congestion), especially the higher reported speed in Gironde and Ile-de-France, or the "PTW convoy", which was found mainly in Ile-de-France. Whatever the case, the practice remains well-received by both PTW riders and LV drivers.

Almost half of PTW riders report not following the speed limit, a fact confirmed by observations on-site, but this is a general issue that does not apply solely to LLS.

For LV users, LLS is either widely practised by the LLS users that share the roads with them, and they are used to it, or it is less commonplace and it is just another event that occurs while they are driving. Whatever the case, there is sometimes a misunderstanding between these two categories of road users, with PTW riders criticising

LV drivers of not paying enough attention to them as vulnerable road users, while LV drivers sometimes, but rarely, experience aggression from PTW users. LLS is not a right, but a possibility. It adds to the complexity of driving on the motorways and expressways where it is practised.

Proper communication about and training in LLS (information gathering, etc.) could help avoid possible conflicts between PTW and LV users.

4. The "educational" aspect of LLS

The Université Gustave Eiffel/ERGO-Centre study revealed that in experiment areas in 2016, LLS was covered more frequently in lessons for PTW. However, no changes to training were noted since the beginning of the experiment, LLS is not practised during lessons for various reasons (lack of CPD for instructors, difficulty performing it safely, very few tools for introducing experimental LLS, etc.).

a) Awareness of the experiment and regulations

- **Instructors**

Results show that the vast majority of instructors teaching in the control (89%) and experiment (100%) areas were aware of the regulations and the experiment.

Furthermore, in the main and with no differences between the control and experimental regions, instructors were able to describe the main criteria for legal lane splitting: maximum permitted speed of 50 km/h on roads with speed limits of over 70 km/h, use of the space between two leftmost lanes, etc.

Instructors generally reported finding this information via their own personal research (54%).

- **Students**

More than 75% of former learner PTW riders, though, report that lane splitting was not covered in their lessons (with a smaller number reporting that they don't recall). In terms of training for car drivers, though, almost 55% of them report no mention of this specific technique.

When lane splitting was covered in lessons, it was without any connection to the lane splitting experiment for motorcyclists. However, significantly more car drivers reported that LLS was covered when they had taken their lessons in experiment areas, rather than the control department, following the launch of the experiment.

In line with what has just been covered above, when the technique was covered during lessons, the rules enacted with the launch of the lane splitting experiment were mentioned less frequently in PTW lessons than in car driving lessons.

b) Training content

- **Instructors**

In terms of training, the lane splitting experiment did not lead to any major changes in training content delivered by participating instructors. More specifically, instructors who did not cover LLS before the experiment still didn't cover it, while those who covered lane splitting before the experiment continued to do so.

It should be noted that the percentage of instructors that touch on lane splitting remains higher in the experimental regions (73%) than in the control regions (55%).

When instructors reported covering lane splitting, they did so in the form of advice (83%) offered primarily during practical driving lessons (84%). Even though instructors see LLS as a useful technique (61%), they think it is

difficult for novices to perform (60%), relatively dangerous (66%), and a potential source of conflict with other road users (56%). This result may be explained by the lack of a distinction between LLS and ILS, with instructors being aware of the propensity of some riders to ignore the rules of LLS ion favour of ILS.

According to the instructors surveyed, the main difficulties in teaching LLS during initial driving lessons are: the inability to recreate LLS on a track (65%), the difficulty instructors have in following a lane splitting pupil, because the vast majority of them are in a car (65%), insurance for motorcycles and driving schools (64%), the instructor's fears for the student's safety (55%), and the student's own fear when lane splitting (53%).

The surveys also revealed that 84% of these instructors reported covering lane splitting in Category B driving lessons (83% in control department and 89% in experimental areas), in the form of advice (66%). 93% of instructors surveyed think that it is necessary to mention the subject with students learning to drive a car, to make them aware of sharing the road with motorcyclists.

- **Students**

The relevant former students were also asked about training content covering lane splitting. They were also invited to complete an assessment of how well they managed lane splitting interactions after passing their test, measured using indicators.

In general, training content aimed to teach the right actions, safer behaviours and/or raise awareness of and highlight particular dangers when lane splitting. In respondents' recollection, it was one or the other for most former learner motorcyclists, and one or the other for car drivers.

For former learner motorcyclists, lane splitting was covered in the classroom with the instructor (excluding theory test) and to a lesser extent while riding (in most of these cases, the instructor was also riding a PTW). No specific training in lane splitting on the road seems to exist, or is at the very least sometimes included in slow riding exercises. Out of these training methods, it's unsurprising that this seems the most effective to learners, given that they learn in practical lessons on the road. But in general, irrespective of the how the technique is taught, former learners appreciate the relevance of the teaching content delivered to them (clarity in describing vulnerable situations when lane splitting, vulnerable situations to bear in mind, advice in relation to car driver behaviour), and recognise that later practice would be useful, but they wish more time was spent learning the necessary skills.

For former learner car drivers, lane splitting was covered in the classroom with the instructor (excluding theory test) and when driving with an instructor. In both cases, a majority of them also recognised the relevance and usefulness of the training content. In practical terms, and unlike learner PTW riders, they were proportionally more likely to say that enough time was spent learning the practical skills.

With regard to former learners' overall opinion on motorcycle lessons, it isn't surprising that out of the 411 former learners surveyed, a majority thinks that they "were not properly trained in lane splitting". 285 (69.3%) compared to 126 (30.6%) who disagree. This result is in line with the percentage who reported receiving training in LLS. However, while the launch of the lane splitting experiment had no impact on how many students remembered receiving training in the technique, it seems that it did have an impact on how many reported feeling "well-trained", with a statistically significant increase in respondents who thought so among those who passed their test after February 2016 (34.2% in the After group), rather than in the previous four years (24.5% in the Before group), $p < .05$. Prudence dictates that this result should be considered in light of the low percentage of former learners who report being well-trained in lane splitting.

With regard to car drivers, among the 811 participants surveyed, almost 70% (553) of them report having received enough training to adopt the right behaviours when powered two or three wheelers are lane splitting, compared to 30% who say otherwise. The launch of the lane splitting experiment did have an impact on training, given that a statistically significant larger number of car drivers who passed their Category B test after January 2016, in an area in which the experiment was conducted, reported feeling better trained than those who passed their test the previous year.

D. Ideas for future strategies

The national target for 2020-2030 is to halve the number of deaths on our roads. The experiment with legal lane splitting set out to understand the effects of this measure, with a view to ultimately improving this traffic statistic. It's main achievements include the identification of ideas to make lane splitting safer for every road user.

The lane splitting experiment on motorways and expressways on the road networks of 11 departments shows that behaviour did indeed change, with a movement towards better compliance with the enacted rules (positioning and speed). However, with no supervision in place, we found that most PTW riders failed to adhere to the experiment's speed limits. This was conformed by feedback from the surveys on acceptance of lane splitting, with regard to compliance with speed limits. And yet, compliance with the 50 km/h speed limit is a key factor in accidents involving lane splitting. The accident rate for experimental lane splitting remains very low in terms of both mortality and severity, as long as the stipulated rules are followed.

Research into acceptance also revealed that major progress can be made in terms of awareness of LLS rules among users of powered vehicles, be they PTW or cars. As for heavy goods vehicles, their awareness and understanding of lane splitting rules was not included in the study. Lastly, in terms of education, LLS and its rules are well known to driving instructor professionals, but having more tools and a framework would make their teaching work easier.

We can also put forward a few ideas for any further implementation of lane splitting.

Improve enforcement of legal lane splitting rules

Analysis of behaviour and accident rates indicate that ensuring compliance with the lane splitting rules stipulated in the Decree of 2015 is more a matter of ensuring compliance with the speed limit than with rules on positioning, which are generally followed. Speed enforcement seems like a good way to limit the risks associated with lane splitting on road networks that match the criteria outlined for the experiment. Given that mobile speed traps are difficult to use on the ground, especially because under the current legal framework: they would require the speeding PTW rider to be intercepted amidst dense traffic; they expose the police to danger; and it is not easy to capture the speed of individual vehicles due to the poor legibility of PTW license plates from a distance, we believe there are two sound approaches to take. We think it would be useful to consider speed traps for lane splitting PTW without any interception by mobile officers, accompanied by the development of a tailor-made automated enforcement system that focuses primarily on monitoring speeds when lane splitting is taking place. The development of technology means that such a system may well be feasible.

More clearly define the road network where legal lane splitting is permitted

It would be good to specify which road networks and road users are affected by the rules. Indeed, during the experiment, it was not specified whether the road network in question was closed to pedestrians (there were no pavements or pedestrian crossings), nor to cyclists mixing with powered traffic or using cycle lanes. However, in the spirit of this experiment, modes of slow transport were not included. This was not stated, but it is a straightforward way of identifying where LLS is permitted. It would help everyone distinguish legal lane splitting from illegal lane splitting, at intersections and traffic lights, for example.

As such, it is worth considering signage to indicate when lane splitting is allowed. It may also be worthwhile to approach the issue from the opposite angle, and signpost when lane splitting is prohibited, especially sections where the dimensions of the road infrastructure prevents LLS from being used safely (lanes narrowing to cross a hard spot, for example). Designing such a sign could be useful.

Better communications and awareness of legal lane splitting

It would be desirable to regularly run mass awareness campaigns on lane splitting, across several different communication channels. The aim is to raise awareness among everyone who drives on urban motorways where

legal lane splitting is in place, especially drivers who have not been able to receive training, i.e. those who already have a license and drivers who passed their test in other countries, etc.

It could be conducted via targeted initiatives tailored to different geographical areas. Lane splitting was performed differently in Île-de-France (PTW convoy), Bouches-du-Rhône (with a more "flexible" interpretation of the highway code) and in departments where the practice is not commonplace.

Different studies reveal the importance of the perceived legitimacy of the rules, if it is to be applied by road users. Thus, explaining how the new rules are safer than "current driving practices" could assist in greater adherence.

Better teaching of legal lane splitting

It would be desirable to teach regulated LLS on motorway networks and urban expressways to both PTW riders and other users. To that end, the provision of adapted teaching materials should be planned. Because most drivers on the road already have their license, continuing education should be considered when there are significant changes to the rules.

Teaching could be adapted to different sized engines. In France, teaching for the Category A license covers more than the license for a 125cc vehicle. The skills learned when working towards the Category A license could be useful with regard to LLS (checking rear-view mirror, predicting reactions of LV users, such as wheel positioning, etc.). These skills are not necessarily learned by riders of 125cc PTW.

The field results obtained through the evaluation we have conducted reveal the following benefits to more widespread training in lane splitting.

- It would bring consistency on a national level, as to whether the technique is taught or not. It would bring clarity on what constitutes legal lane splitting and what doesn't, for both instructors and learners.
- It would enable standardised, broader communication tools to be produced, suitable for all channels, and driving schools in particular, who are the official champions of good training practices. Surveys revealed that instructors became aware of teaching lane splitting through their own personal research (motorcycle press, for example). This resulted in partial knowledge of the regulations, or confusion as to the rules in place.
- It would provide a framework for training content. Our data has revealed that training situations were "improvised" by instructors, based on their own personal driving experience. They tried to share information about lane splitting, but once again with very mixed results. A common legislative framework could lead to more polished and consistent educational content and teaching methods being developed.
- It would enable teaching objectives about LLS to be discussed. Practical training on the road seems to be difficult within the current framework, with most instructors being present in a car: proof can be found in the feedback from learner motorcyclists, relatively few of whom received educational content on LLS. However, learner awareness of risks and visual exploration strategies could be incorporated more widely into classroom lessons, in videos or simulations, etc.
- According to the instructors surveyed, this awareness seems to be vital to car drivers, too, in terms of safety and sharing the road with other users. Rules on interactions could be taught to a larger number of learner car drivers.
- Former learner motorcyclists and car drivers who had passed their test when surveyed also agreed on the need for training in lane splitting for every road user. This shared opinion illustrates the affect that training has on behaviour and on safety, more generally, for those who receive it. But it may possibly also illustrate the difficulty in interacting with other users when their behaviour does not adhere to the behavioural standards known by all, understood by all, and shared by all (Ragot-Court *et al.*, 2019).

These results are in line with literature on novice motorcyclists (Aupetit, 2011), the real behaviour of lane splitting motorcyclists (Aupetit and Espié, 2012) and on the car driver's point of view on their difficulty interacting with

lane splitting motorcyclists (Ragot-Court *et al.*, 2019). This research enabled us to ascertain a certain range of knowledge and skills that experienced motorcyclists use when lane splitting. All of these skills are learned independently on the road, with the initial lessons playing a limited, or no, role in this learning process. Motorcyclists discover lane splitting and the associated risks after they have passed their test. This form of learning by "trial and error" is extremely high-risk in real traffic conditions, and leads to conflict with other road users through driving in ways that can be perceived as erratic. For these reasons, we believe it would be wise to allow lane splitting to be covered more broadly in driving lessons, in a safe, controlled setting, and to provide instructors with more resources with which to teach it.

Specify the rules for the development of reserved lanes

The experiment included the A51 in Bouches-du-Rhône, that has a reserved lane. And yet, the presence of reserved lanes, especially for car-pooling, will become much more widespread on urban motorways. The position of the reserved lanes will be adapted to each specific case (left-hand lane, right-hand lane, etc.). The position of PTW between lanes should be clearly specified, in particular to remove any ambiguity for the general public of where PTW can ride and subject to which conditions.

Better understand powered two-wheeler traffic

As in any evaluation, the lane splitting experiment for powered two-wheelers was subject to the technological limitations when collecting data and creating suitable indicators. While knowledge of accident numbers and circumstances is very important, the evaluation encountered persistent problems in quantifying PTW traffic. In the early 2010s, Cerema's Metramoto research project highlighted all of the difficulties encountered in making technological progress in this subject. 4 technologies were trialled, but no operational solution at a realistic cost could be found. With advances in artificial intelligence and image analysis, we may now be able to learn more about PTW traffic. This would enable us to assess exposure to risk, which would complement analysis of accidents. However, it may still be a few years before operational solutions can be deployed.

Better communication on appropriate speeds

For a long time now, collision physics has shown that the energy dissipated was linked to mass and the square of the speed. Biomedical research has also shown that the human body is highly sensitive to the energy dissipated during a collision. Powered two-wheeler users, unlike car or HGV drivers, are classed as vulnerable due to the fact that they are not protected by their vehicle or the systems that are designed to absorb shocks, like seatbelts, airbags, and the collapse of the vehicle to reduce the impact energy passed on to the human body. Accordingly, a fall or collision at 30 km/h should have less serious consequences for PTW riders. We also need to consider what happens when a car changes lanes, which is a different dynamic when the traffic is moving at 30 km/h to when it is almost at a standstill. This is why, when it comes to teaching lane splitting, it would be desirable for powered two-wheeler riders to use traffic travelling at 30 km/h or less as a reference for traffic that is almost at a standstill, and speeds of up to 50 km/h only if the traffic is flowing smoothly at a constant speed without too much concertina effect. This kind of message could **help** better train users.

Improve visibility of powered two-wheelers

By analysing more than 4500 police reports for accidents, in an effort to understand the circumstances of the accident in detail, the circumstances that emerge highlight the difficulty car drivers have in spotting PTW. Furthermore, the acceptance survey showed that 73% of PTW users report "always" or "often" using their hazard lights in 2018. This habit is problematic, on the one hand because hazard lights are not immediately linked to lane splitting, and on the other, some PTW do not have hazard lights. The AVIMOTO research project (V. Cavallo 2015) conducted by Université Gustave Eiffel demonstrated the utility of a special kind of light for powered two-wheelers. The evaluation of the PTW lane splitting experiment strengthens the case for such a development.

APPENDICES

Appendix 1: Full text of French Decree of 23/12/2015

Decree no. 2015-1750 of 23 December 2015 on the lane splitting experiment

NOR : INTS1523598D

Publics concernés: conducteurs de véhicules de catégorie L3e et L5e d'une largeur d'un mètre maximum. **Objet**: expérimentation de la circulation inter-files sur les autoroutes et les voies à caractéristiques autoroutières des départements de la région Ile-de-France, des Bouches-du-Rhône, de la Gironde et du Rhône.

Entrée en vigueur: le texte entre en vigueur le lendemain de sa publication. **Notice**: à titre expérimental et par dérogation à certaines règles de circulation, le décret autorise la circulation inter-files de certains véhicules à deux ou trois roues motorisés d'une largeur d'un mètre maximum. Un conducteur est en inter-files lorsqu'il circule entre les deux files de véhicules situées sur les deux voies de circulation les plus à gauche d'une chaussée. Cette circulation n'est pas considérée comme un dépassement. La circulation inter-files est autorisée lorsque la circulation s'est, en raison de sa densité, établie en file ininterrompue sur toutes les voies, jusqu'à une vitesse maximale de 50 km/h. Elle ne peut être exécutée que sur les autoroutes et les routes, dont la vitesse maximale autorisée est supérieure ou égale à 70 km/h, à deux chaussées séparées par un terre-plein central et dotées d'au moins deux voies chacune, des départements des Bouches-du-Rhône, de la Gironde, du Rhône et de ceux de la région Ile-de-France, notamment le boulevard périphérique parisien. Afin de diffuser la connaissance de l'encadrement de cette pratique, les règles régissant la circulation inter-files seront intégrées à l'enseignement de la conduite de tout véhicule admis à circuler sur la voie publique. La durée de l'expérimentation, dont les dates de début et de fin sont fixées par arrêté du ministre chargé de la sécurité routière, est de quatre ans, prorogeable dans la limite d'un an. L'expérimentation fait l'objet de rapports annuels d'évaluation. Références: le décret peut être consulté sur le site Légifrance

Art. 1er. – A titre expérimental, dans les départements des Bouches-du-Rhône, de la Gironde, du Rhône et de la région Ile-de-France, il est dérogé aux dispositions des articles R. 412-9, R. 412-23 et R. 412-24 du code de la route afin d'autoriser, dans les conditions fixées par le présent décret, la circulation inter-files.

Art. 2. – I. – La circulation inter-files se caractérise par une circulation entre les files de véhicules situées sur les deux voies, ayant le même sens de circulation, les plus à gauche d'une chaussée. Elle est possible sur les autoroutes et les routes à deux chaussées séparées par un terre-plein central et dotées d'au moins deux voies chacune, où la vitesse maximale autorisée est supérieure ou égale à 70 km/h, lorsqu'en raison de sa densité, la circulation s'y est établie en files ininterrompues sur toutes les voies autres que celles réservées, le cas échéant, à la circulation de certaines catégories particulières de véhicules ou d'usagers.

II. – La circulation inter-files est autorisée à tout conducteur dont le véhicule est d'une largeur d'un mètre maximum et relève de la catégorie L3e ou L5e.

III. – La circulation inter-files s'effectue dans le respect des conditions suivantes:

1o L'espacement latéral entre les véhicules circulant dans les deux voies les plus à gauche d'une chaussée est suffisant;

2o Aucune des voies de circulation sur la chaussée n'est en travaux ou couverte de neige ou de verglas sur tout ou partie de sa surface;

3o Avant de circuler en inter-files, le conducteur avertit de son intention les autres usagers;

4o La vitesse des véhicules en inter-files est limitée à 50 km/h;

5o Il est interdit à un véhicule en inter-files de dépasser un autre véhicule en inter-files;

6o Le conducteur en inter-files doit reprendre sa place dans le courant normal de la circulation, après avoir averti de son intention les autres usagers, lorsque les véhicules, sur au moins une des deux files, circulent à une vitesse supérieure à la sienne.

Art. 3. – Le conducteur circulant en inter-files en contravention avec l'une des dispositions mentionnées aux articles précédents ne peut se prévaloir des dérogations aux règles du code de la route prévues à l'article 1er. Il est puni de l'amende et, le cas échéant, de la peine complémentaire ainsi que de la réduction du nombre de points du permis de conduire sanctionnant l'infraction correspondant à son comportement.

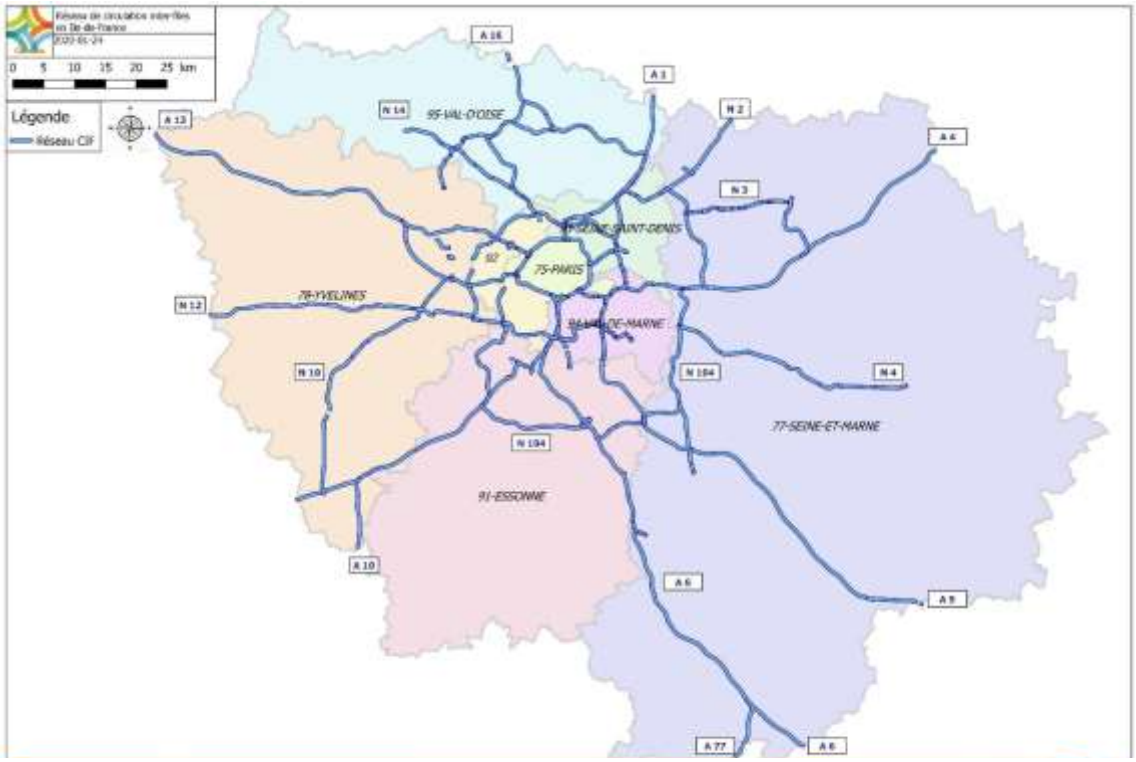
Art. 4. – La circulation inter-files est expérimentée pour une période de quatre ans, prorogeable dans la limite d'un an. Le ministre chargé de la sécurité routière fixe, par arrêté, les dates de commencement et de fin de l'expérimentation. Il peut également la suspendre par arrêté.

Art. 5. – L'expérimentation fait l'objet de rapports annuels d'évaluation. Le dernier est établi au plus tard trois mois avant la date prévue pour son terme.

Art. 6. – Le ministre de l'intérieur est chargé de l'exécution du présent décret, qui sera publié au Journal officiel de la République française.

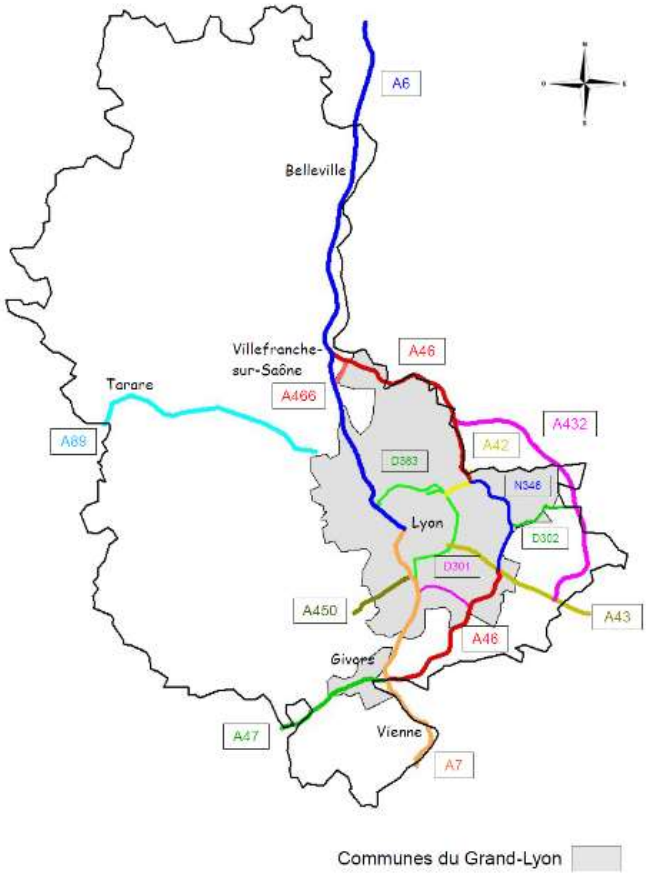
Appendix 2: Map of road networks affected by the lane splitting experiment

Road networks affected by the experiment in Ile-de-France

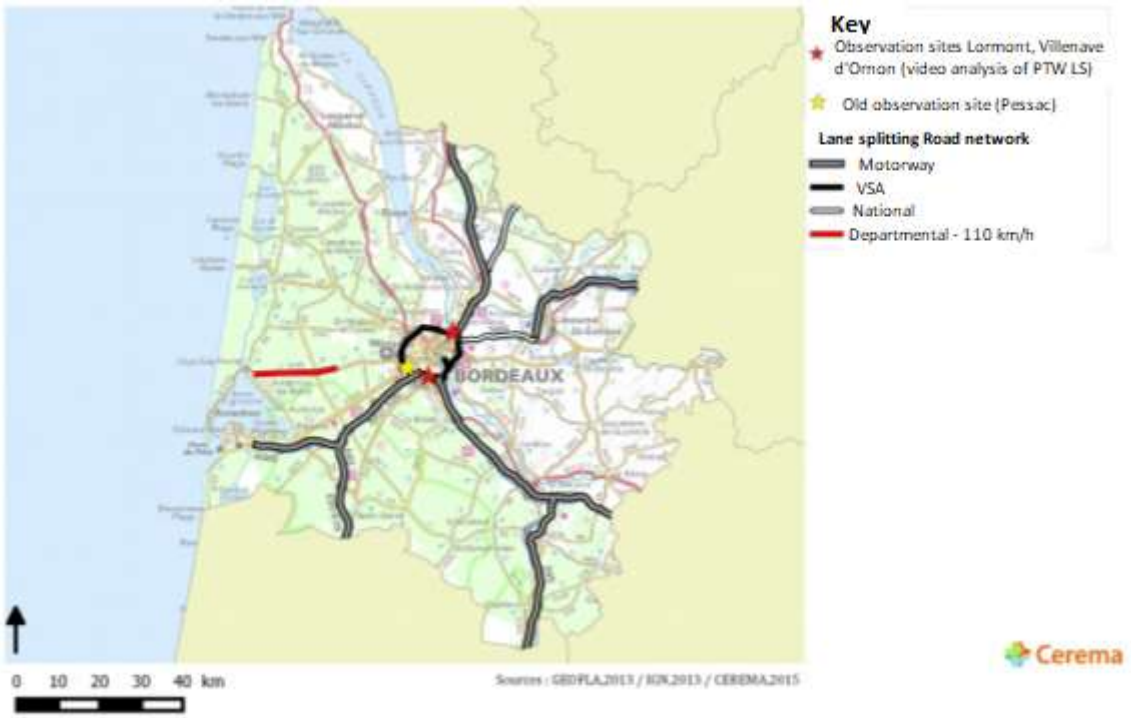


Road networks affected by the experiment in Bouches-du-Rhône

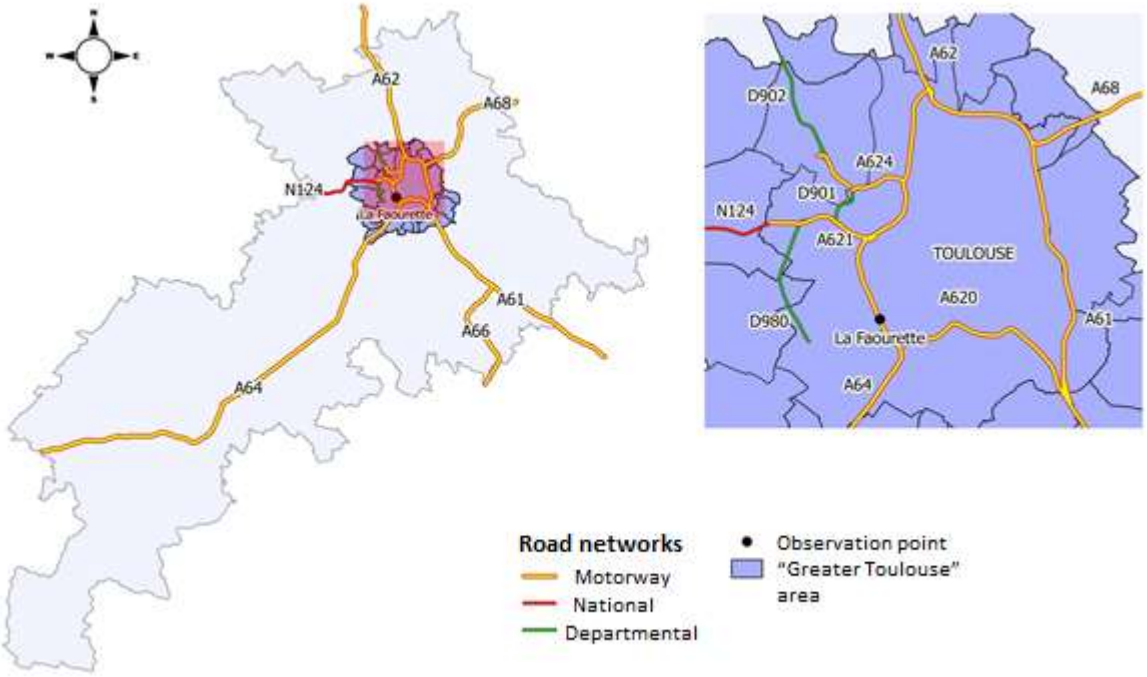
Road networks affected by the experiment in the Rhône



Road networks affected by the experiment in Gironde



Road networks meeting experiment inclusion criteria in Haute-Garonne (control site)



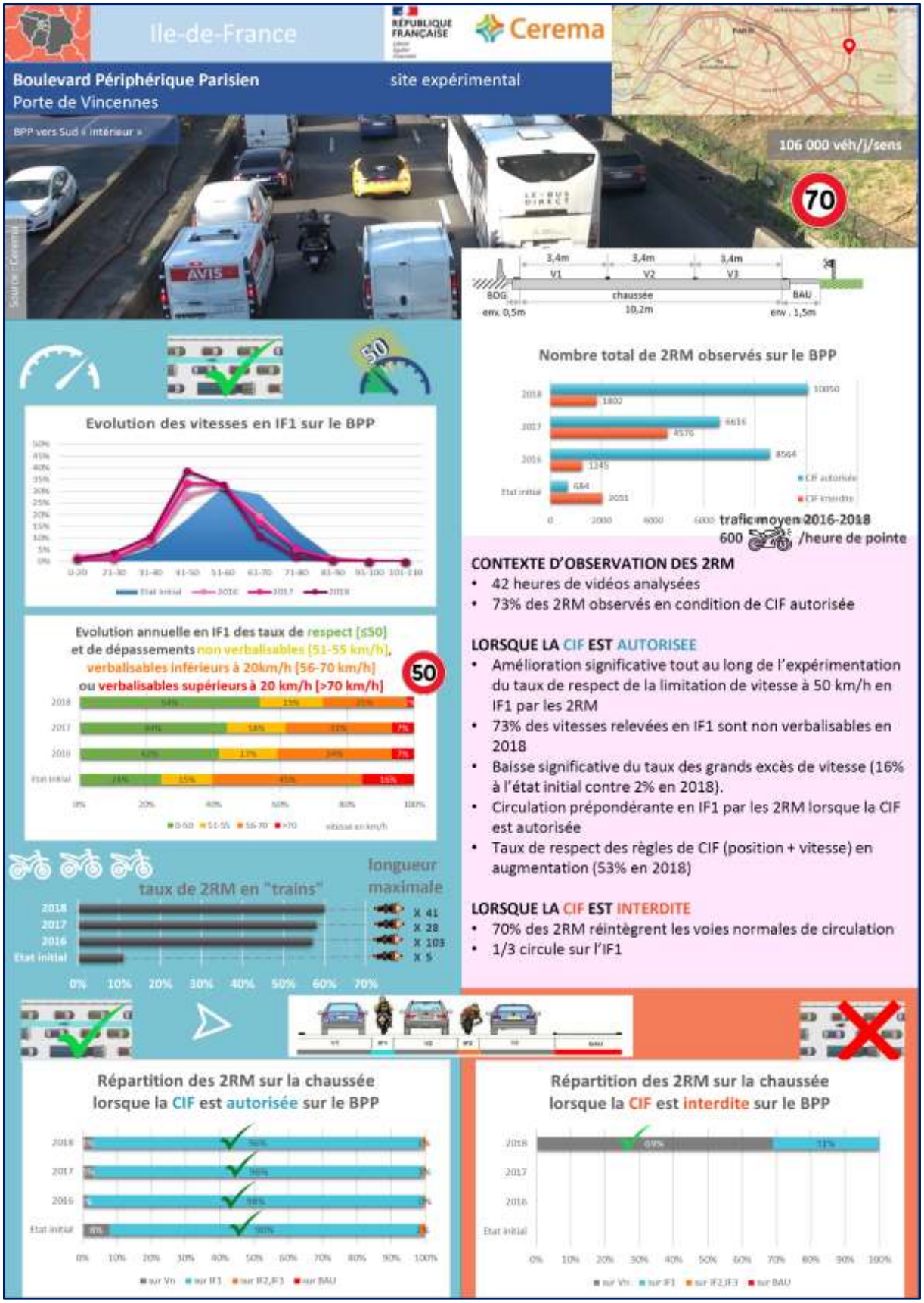
Appendix 3: LLS experiment behavioural observation sites

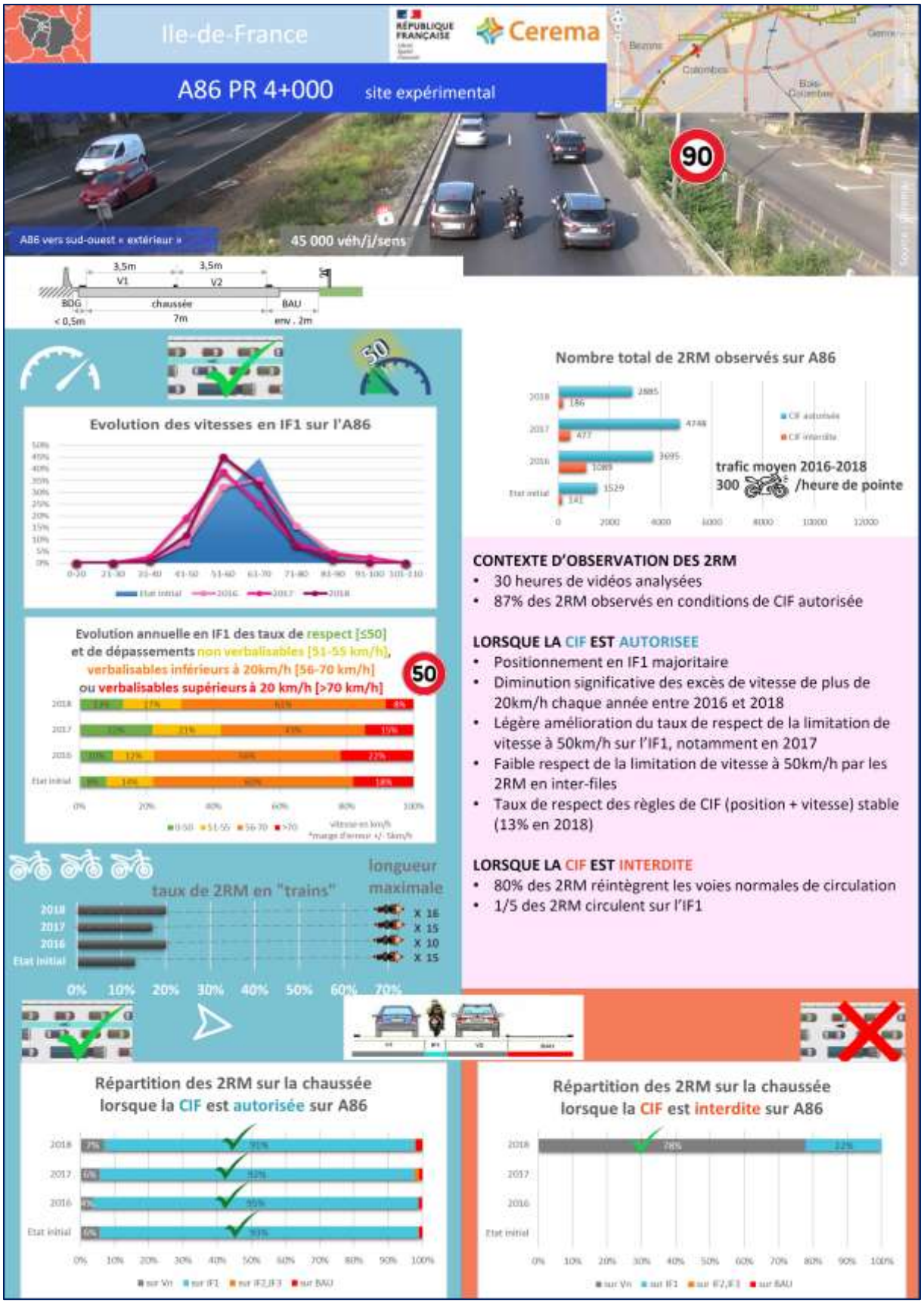
Site no.	Site name	Zone	Photo	Geometrical characteristics	AADT (both directions together)	Speed limit
1	Paris Ring Road – Porte de Vincennes	Ile-de-France		Direction 1: 4 lanes with no breakdown lane (w = 13.9m) Direction 2: 4 lanes with no breakdown lane (w = 13.9m)	201,000	70 km/h
2	A13 – RP 6+000	Ile-de-France		Direction 1: 3 lanes + breakdown lane (w = 10.2m + breakdown lane) Direction 2: 3 lanes + breakdown lane (w = 10.2m + breakdown lane)	142,000	110 km/h
3	A86 – RP 4+000	Ile-de-France		Direction 1: 2 lanes + breakdown lane (w = 7m + breakdown lane) Direction 2: 2 lanes + breakdown lane (w = 7m + breakdown lane)	93,000	90 km/h
4	A50 – RP 5+700 and 6+300 “LA VALENTINE”	Bouches du Rhône		Direction 1: 3 lanes + breakdown lane (w = 10.5m + 2.5m) Direction 2: 3 lanes + breakdown lane (w = 10.5m + 2.5m)	125,000	90 km/h
5	A51 – RP 2+000 and 3+300	Bouches du Rhône		Direction 1: 3 lanes + breakdown lane (w = 9.5m + 3.5m) Direction 2: 3 lanes + breakdown lane (w = 10.5m + 2.5m)	125,400	90 km/h

Site no.	Site name	Zone	Photo	Geometrical characteristics	AADT (both directions together)	Speed limit
6	A630 – RP 1+725 LORMONT	Gironde		Direction 1: 3 lanes + breakdown lane (w = 10m + 3.5m) Direction 2: 3 lanes + breakdown lane (w = 10m + 3.5m)	117,000	90 km/h, except HGVs (80 km/h)
7 a	A630 – RP 21+500 PESSAC	Gironde 2015 – 2017		Direction 1: 3 lanes + breakdown lane (w = 10m + 3.5m) Direction 2: 3 lanes + breakdown lane (w = 10m + 3.5m)	105,000	90 km/h, except HGVs (80 km/h)
7b	A630 – RP 28+000 VILLENAVE D'ORNON	Gironde 2018		Direction 1: 3 lanes + weaving section + breakdown lane (w = 13.5m + 3.5m) Direction 2: 3 lanes + weaving section + breakdown lane (w = 13.5m + 3.5m)	132,000	90 km/h, except HGVs (80 km/h)
8	A6 – RP 450+700 ECULLY	Rhône		Direction 1: 3 lanes + breakdown lane (w = 11m + 3m) Direction 2: 4 lanes + breakdown lane (w = 15.5m + 3m)	118,000	90 km/h, except HGVs (80 km/h)

Site no.	Site name	Zone	Photo	Geometrical characteristics	AADT (both directions together)	Speed limit
9	A43 – RP 2+500 SAINT PRIEST	Rhône		Direction 1: 3 lanes + breakdown lane (w = 11.6m + 3m) Direction 2: 3 lanes + breakdown lane (w = 11.6m + 2.5m)	133,000	Before 4/5/16 90 km/h, except HGVs (80 km/h) Since 4/5/16: 70 km/h
10	A620 – RP 9+500 TOULOUSE	Haute-Garonne		Direction 1: 3 lanes + breakdown lane (w = 10.5m + 3m) Direction 2: 3 lanes + breakdown lane (w = 10.5m + 2.5m)	134,000	90 km/h

Appendix 4: Site Behaviour Summaries





CONTEXTE D'OBSERVATION DES 2RM

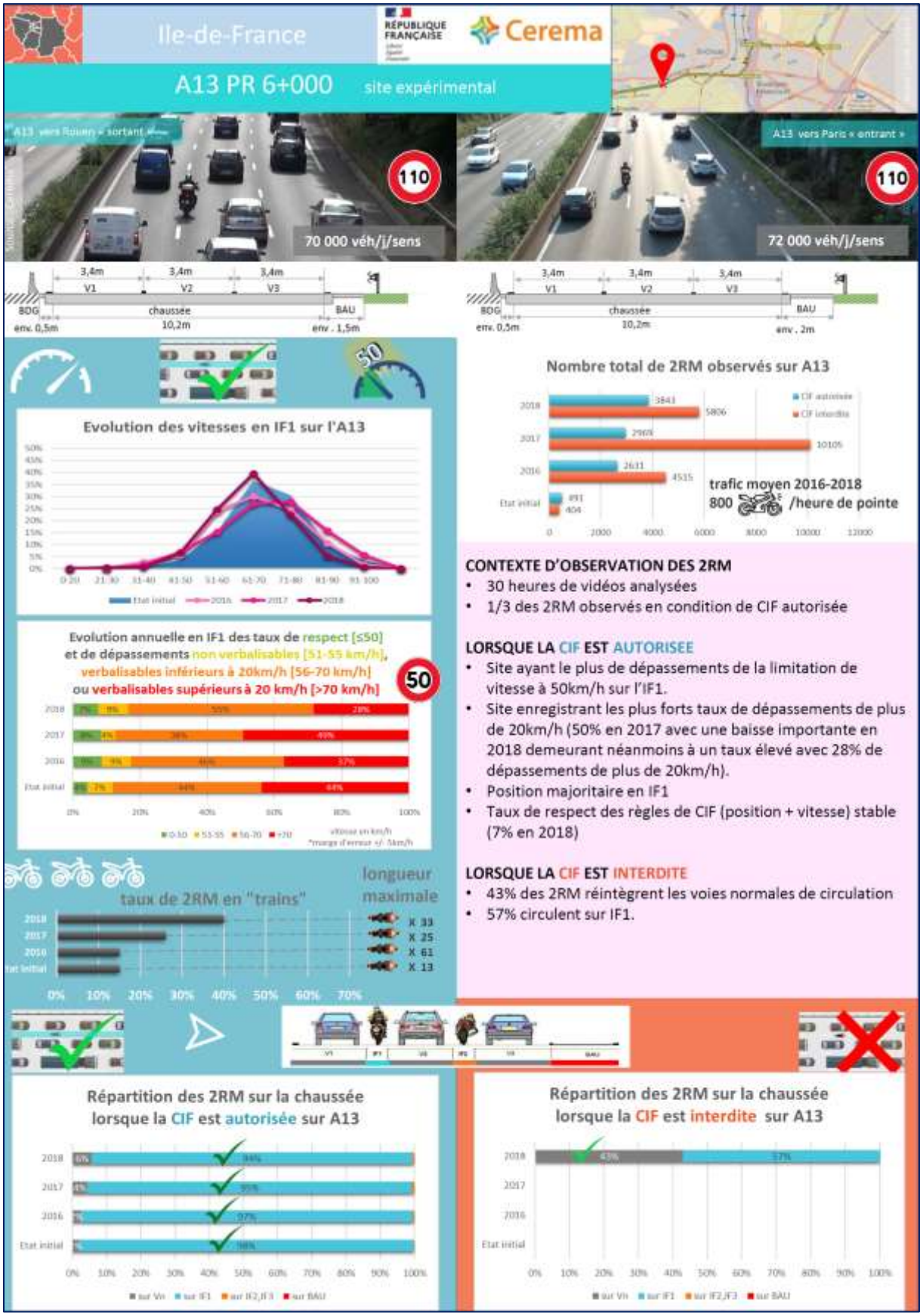
- 30 heures de vidéos analysées
- 87% des 2RM observés en conditions de CIF autorisée

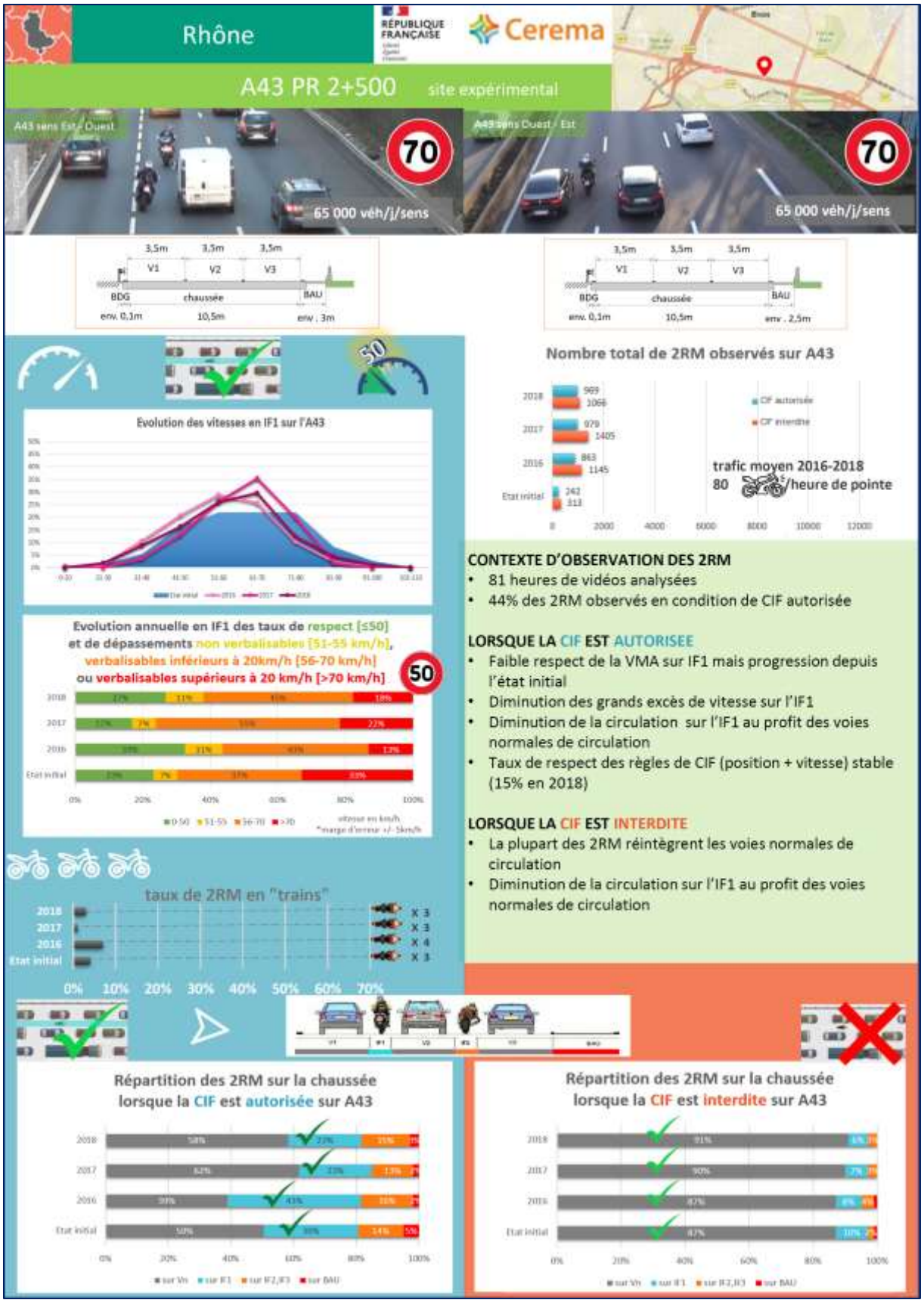
LORSQUE LA CIF EST AUTORISEE

- Positionnement en IF1 majoritaire
- Diminution significative des excès de vitesse de plus de 20km/h chaque année entre 2016 et 2018
- Légère amélioration du taux de respect de la limitation de vitesse à 50km/h sur l'IF1, notamment en 2017
- Faible respect de la limitation de vitesse à 50km/h par les 2RM en inter-files
- Taux de respect des règles de CIF (position + vitesse) stable (13% en 2018)

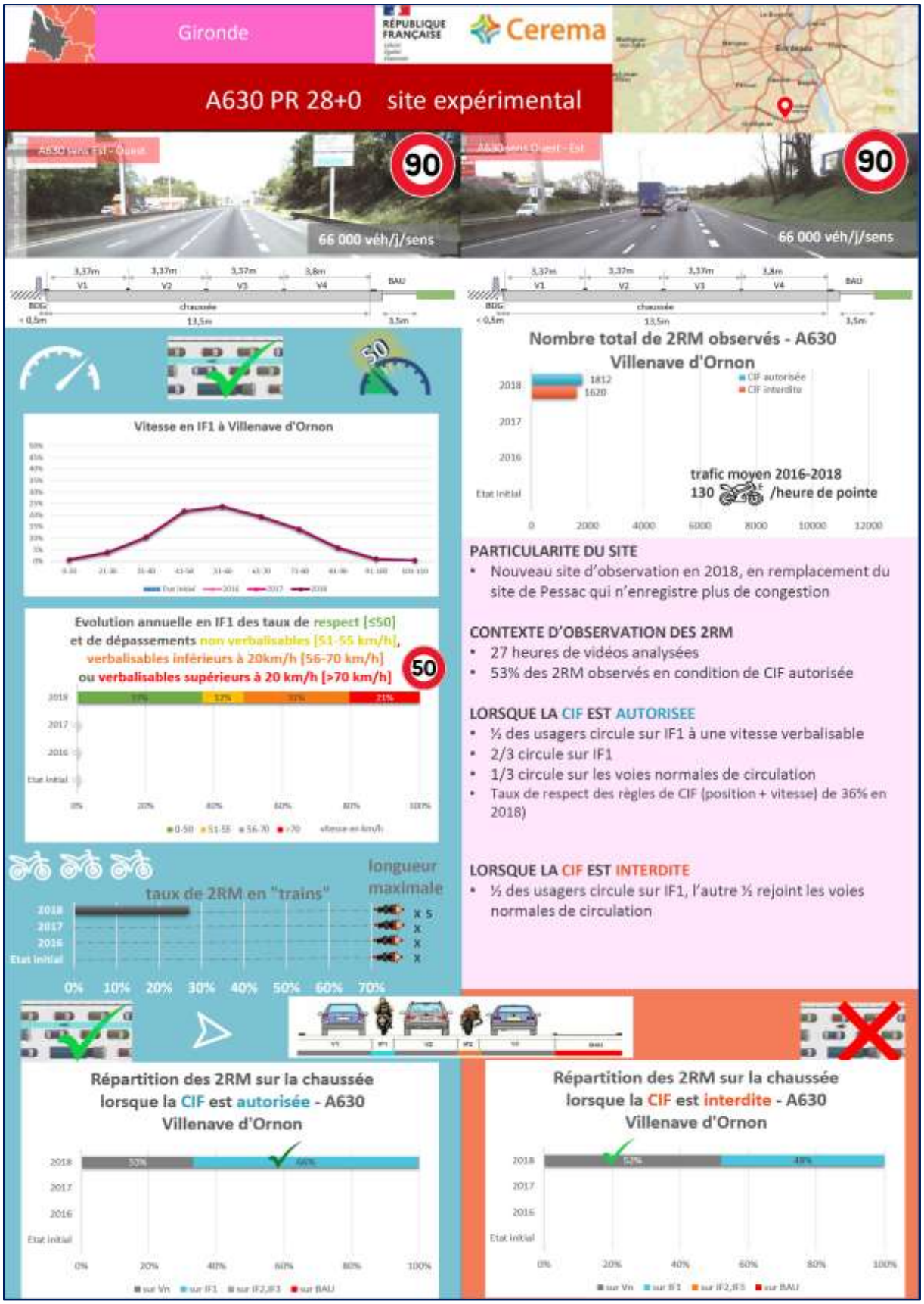
LORSQUE LA CIF EST INTERDITE

- 80% des 2RM réintègrent les voies normales de circulation
- 1/5 des 2RM circulent sur l'IF1

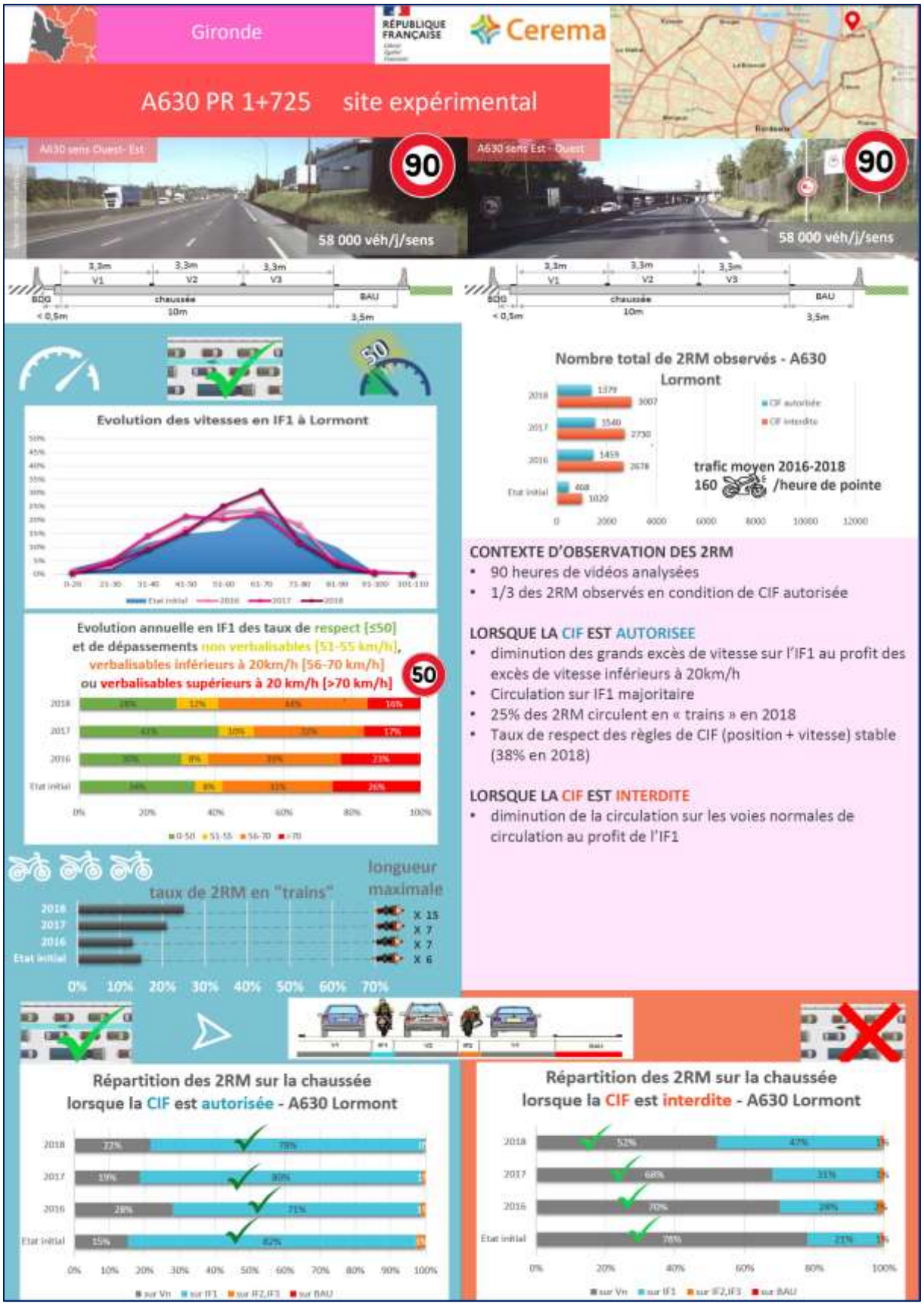

Ile-de-France
RÉPUBLIQUE FRANÇAISE
Cerema
A13 PR 6+000 site expérimental
A13 vers Rouen « sortant »
110
70 000 véh/j/sens
A13 vers Paris « entrant »
110
72 000 véh/j/sens
3,4m
V1
3,4m
V2
3,4m
V3
BDG
env. 0,5m
chaussée
10,2m
BAU
env . 1,5m
3,4m
V1
3,4m
V2
3,4m
V3
BDG
env. 0,5m
chaussée
10,2m
BAU
env . 2m
50
Evolution des vitesses en IF1 sur l'A13
Nombre total de 2RM observés sur A13
2018
3841
5806
2017
2969
10105
2016
2611
4515
Etat initial
891
404
trafic moyen 2016-2018
800
/heure de pointe
Evolution annuelle en IF1 des taux de respect [≤50]
et de dépassements non verbalisables [51-55 km/h],
verbalisables inférieurs à 20km/h [56-70 km/h]
ou verbalisables supérieurs à 20 km/h [>70 km/h]
50
CONTEXTE D'OBSERVATION DES 2RM
• 30 heures de vidéos analysées
• 1/3 des 2RM observés en condition de CIF autorisée
LORSQUE LA CIF EST AUTORISEE
• Site ayant le plus de dépassements de la limitation de vitesse à 50km/h sur l'IF1.
• Site enregistrant les plus forts taux de dépassements de plus de 20km/h (50% en 2017 avec une baisse importante en 2018 demeurant néanmoins à un taux élevé avec 28% de dépassements de plus de 20km/h).
• Position majoritaire en IF1
• Taux de respect des règles de CIF (position + vitesse) stable (7% en 2018)
taux de 2RM en "trains"
longueur maximale
X 33
X 25
X 61
X 13
LORSQUE LA CIF EST INTERDITE
• 43% des 2RM réintègrent les voies normales de circulation
• 57% circulent sur IF1.
Répartition des 2RM sur la chaussée lorsque la CIF est autorisée sur A13
Répartition des 2RM sur la chaussée lorsque la CIF est interdite sur A13

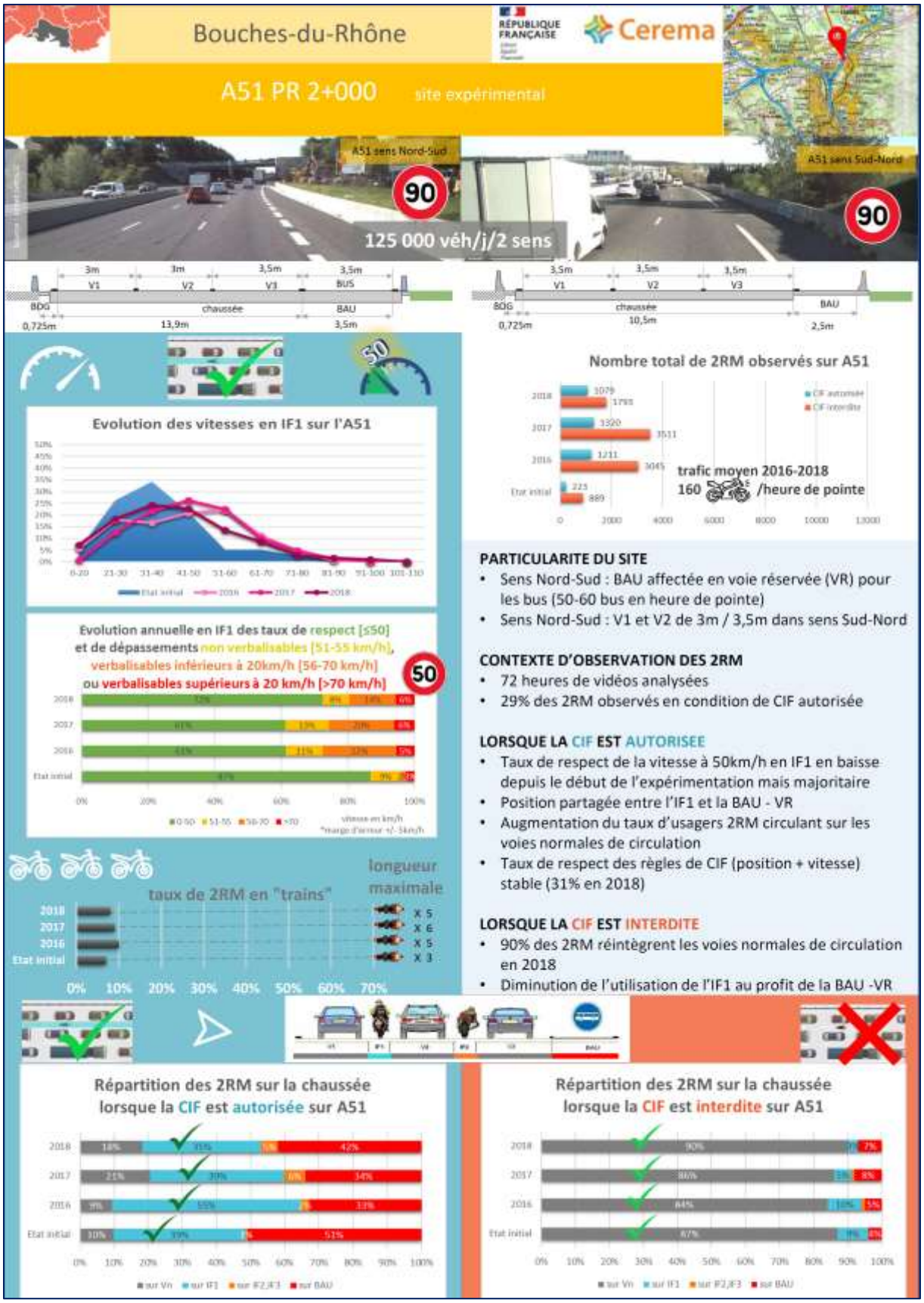

Rhône
RÉPUBLIQUE FRANÇAISE
Cerema
A43 PR 2+500 site expérimental
A43 sens Est / Ouest
70
65 000 véh/j/sens
A43 sens Ouest / Est
70
65 000 véh/j/sens
3,5m 3,5m 3,5m
V1 V2 V3
BDG chaussée BAU
env. 0,1m 10,5m env . 3m
3,5m 3,5m 3,5m
V1 V2 V3
BDG chaussée BAU
env. 0,1m 10,5m env . 2,5m
50
Evolution des vitesses en IF1 sur l'A43
Nombre total de 2RM observés sur A43
2018 969 1066
2017 979 1405
2016 863 1145
Etat initial 242 313
CIF autorisée
CIF interdite
trafic moyen 2016-2018
80 /heure de pointe
Evolution annuelle en IF1 des taux de respect [≤50] et de dépassements non verbalisables [51-55 km/h], verbalisables inférieurs à 20km/h [56-70 km/h] ou verbalisables supérieurs à 20 km/h [>70 km/h]
50
CONTEXTE D'OBSERVATION DES 2RM
• 81 heures de vidéos analysées
• 44% des 2RM observés en condition de CIF autorisée
LORSQUE LA CIF EST AUTORISEE
• Faible respect de la VMA sur IF1 mais progression depuis l'état initial
• Diminution des grands excès de vitesse sur l'IF1
• Diminution de la circulation sur l'IF1 au profit des voies normales de circulation
• Taux de respect des règles de CIF (position + vitesse) stable (15% en 2018)
LORSQUE LA CIF EST INTERDITE
• La plupart des 2RM réintègrent les voies normales de circulation
• Diminution de la circulation sur l'IF1 au profit des voies normales de circulation
taux de 2RM en "trains"
2018 X 3
2017 X 3
2016 X 4
Etat initial X 3
0% 10% 20% 30% 40% 50% 60% 70%
Répartition des 2RM sur la chaussée lorsque la CIF est autorisée sur A43
Répartition des 2RM sur la chaussée lorsque la CIF est interdite sur A43

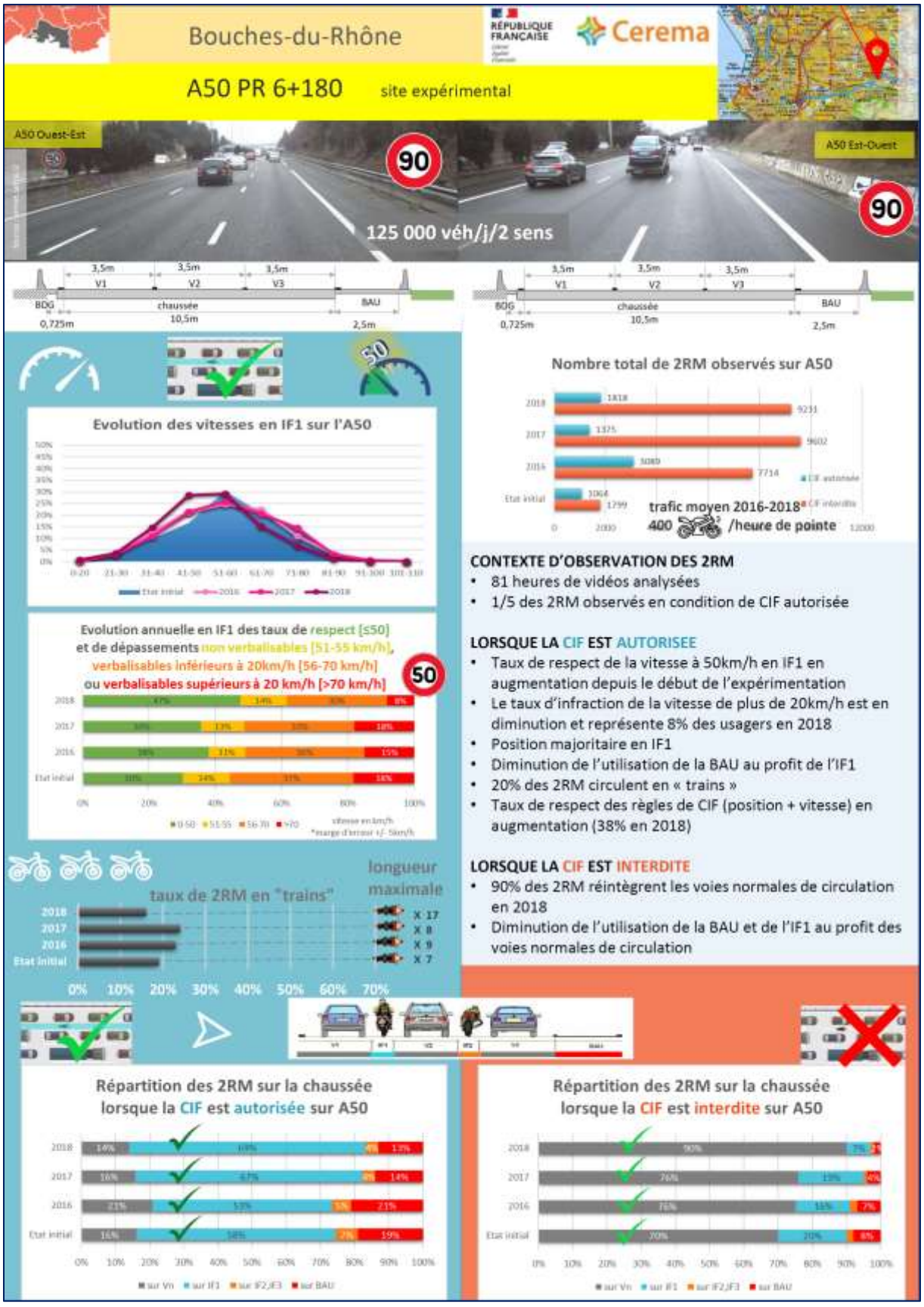

Rhône
RÉPUBLIQUE FRANÇAISE
Cerema
A6 PR 450+700 site expérimental
A6 sens Nord - Sud
90
60 000 véh/j/sens
A6 sens Sud - Nord
90
60 000 véh/j/sens
3,5m
V1
V2
V3
V4
BDG
< 0,5m
chaussée
15,0m
BAU
env. 3m
3,5m
V1
V2
V3
BDG
env. 0,5m
chaussée
10,5m
BAU
env. 3,0m
Evolution des vitesses en IF1 sur l'A6
Evolution annuelle en IF1 des taux de respect [≤50]
et de dépassements non verbalisables [51-55 km/h],
verbalisables inférieurs à 20km/h [56-70 km/h]
ou verbalisables supérieurs à 20 km/h [>70 km/h]
50
Nombre total de 2RM observés sur A6
2018
1879
2015
2017
1471
2478
2016
1744
1703
Etat initial
582
508
CIF autorisée
CIF interdite
trafic moyen 2016-2018
140
/heure de pointe
CONTEXTE D'OBSERVATION DES 2RM
• 81 heures de vidéos analysées
• 46% des 2RM observés en condition de CIF autorisée
LORSQUE LA CIF EST AUTORISEE
• Site enregistrant les plus forts taux de respect de la position et de la vitesse
• Pas d'évolution depuis le lancement de l'expérimentation
• Taux de respect des règles de CIF (position + vitesse) en augmentation (74% en 2018)
LORSQUE LA CIF EST INTERDITE
• La plupart des 2RM réintègrent les voies normales de circulation
• Pas d'évolution depuis le lancement de l'expérimentation
taux de 2RM en "trains"
longueur maximale
2018
2017
2016
Etat initial
X 5
X 4
X 5
X 6
0% 10% 20% 30% 40% 50% 60% 70%
Répartition des 2RM sur la chaussée lorsque la CIF est autorisée sur A6
Répartition des 2RM sur la chaussée lorsque la CIF est interdite sur A6

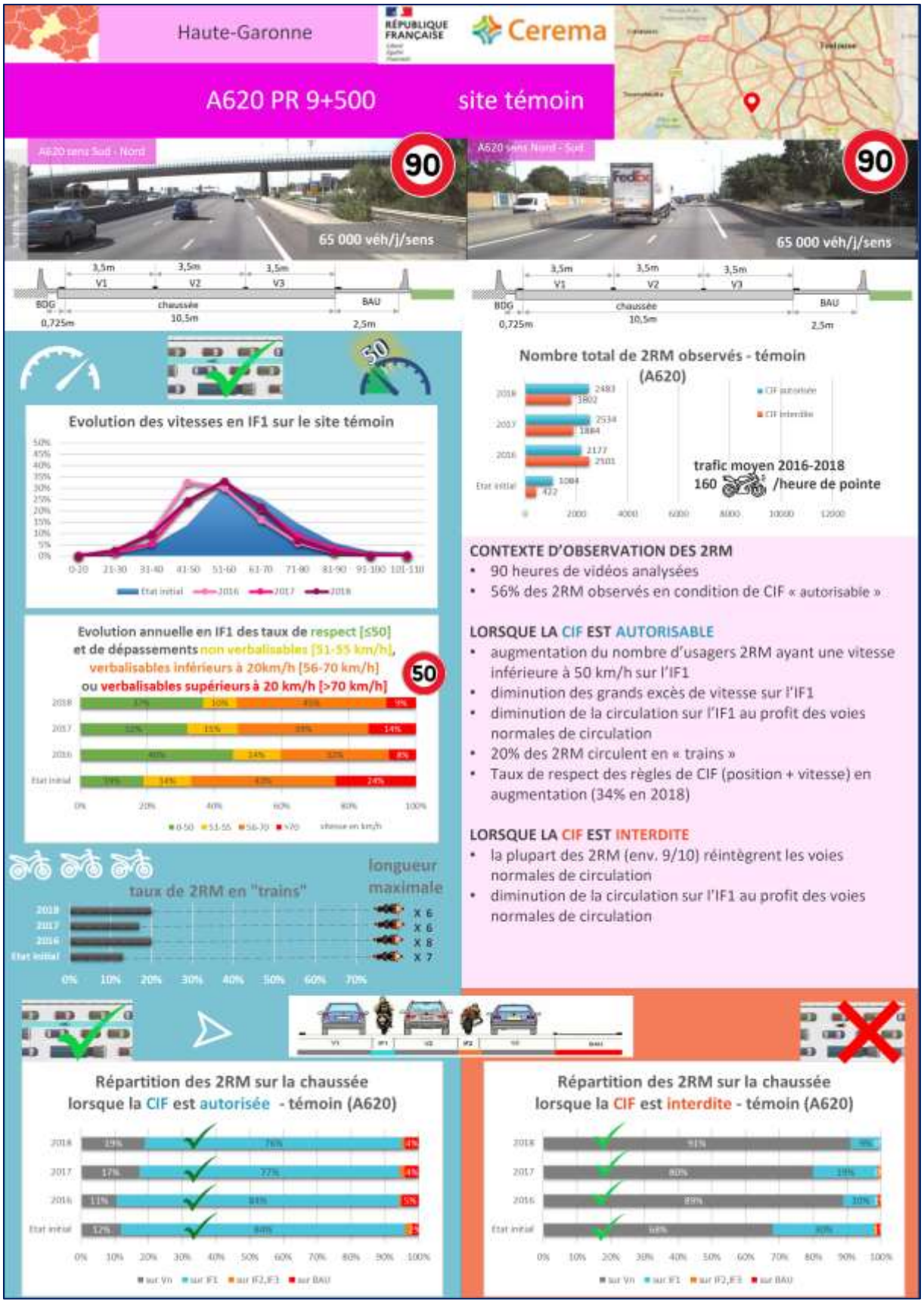

Gironde
RÉPUBLIQUE FRANÇAISE
Cerema
A630 PR 28+0 site expérimental
90
66 000 véh/j/sens
90
66 000 véh/j/sens
Vitesse en IF1 à Villenave d'Ornon
50
Evolution annuelle en IF1 des taux de respect [≤50] et de dépassements non verbalisables [51-55 km/h], verbalisables inférieurs à 20km/h [56-70 km/h] ou verbalisables supérieurs à 20 km/h [>70 km/h]
50
taux de 2RM en "trains"
longueur maximale
Nombre total de 2RM observés - A630 Villenave d'Ornon
CIF autorisée
CIF interdite
1812
1620
trafic moyen 2016-2018
130 /heure de pointe
PARTICULARITE DU SITE
• Nouveau site d'observation en 2018, en remplacement du site de Pessac qui n'enregistre plus de congestion
CONTEXTE D'OBSERVATION DES 2RM
• 27 heures de vidéos analysées
• 53% des 2RM observés en condition de CIF autorisée
LORSQUE LA CIF EST AUTORISEE
• ½ des usagers circule sur IF1 à une vitesse verbalisable
• 2/3 circule sur IF1
• 1/3 circule sur les voies normales de circulation
• Taux de respect des règles de CIF (position + vitesse) de 36% en 2018)
LORSQUE LA CIF EST INTERDITE
• ½ des usagers circule sur IF1, l'autre ½ rejoint les voies normales de circulation
Répartition des 2RM sur la chaussée lorsque la CIF est autorisée - A630 Villenave d'Ornon
Répartition des 2RM sur la chaussée lorsque la CIF est interdite - A630 Villenave d'Ornon


Gironde
RÉPUBLIQUE FRANÇAISE
Cerema
A630 PR 21+500 site expérimental
90
90
53 000 véh/j/sens
3,3m
V1
V2
V3
BDG
< 0,5m
chaussée
10m
BAU
3,5m
Evolution des vitesses en IF1 sur Pessac
Evolution annuelle en IF1 des taux de respect [≤50]
et de dépassements non verbalisables [51-55 km/h],
verbalisables inférieurs à 20km/h [56-70 km/h]
ou verbalisables supérieurs à 20 km/h [>70 km/h]
50
taux de 2RM en "trains"
longueur maximale
Etat initial
Nombre total de 2RM observés - A630 Pessac
CIF interdite
CIF autorisée
3662
1427
847
733
232
trafic moyen 2016-2018
100 /heure de pointe
PARTICULARITE DU SITE
• Fin de la congestion en 2017. Site d'observation déplacé à Villenave d'Ornon
CONTEXTE D'OBSERVATION DES 2RM
• 54 heures de vidéos analysées
• 16% des 2RM observés en condition de CIF autorisée
LORSQUE LA CIF EST AUTORISEE
• diminution des excès de vitesse sur l'IF1
• Circulation sur IF1 majoritaire
• Taux de respect des règles de CIF (position + vitesse) en augmentation (52% en 2018)
LORSQUE LA CIF EST INTERDITE
• La majorité des usagers 2RM rejoint les voies normales de circulation
Répartition des 2RM sur la chaussée lorsque la CIF est autorisée - A630 Pessac
Répartition des 2RM sur la chaussée lorsque la CIF est interdite - A630 Pessac

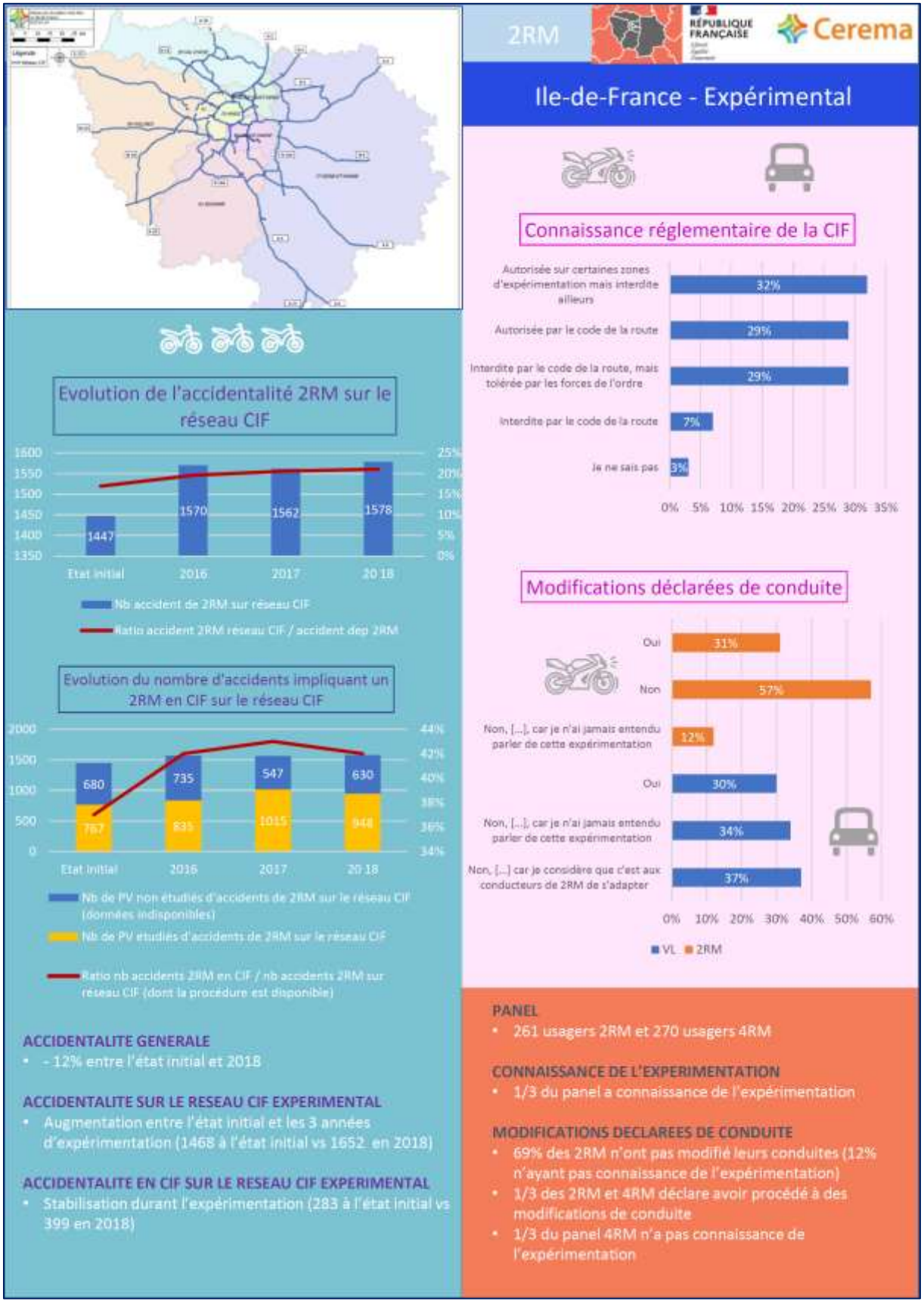

Gironde
RÉPUBLIQUE FRANÇAISE
Cerema
A630 PR 1+725 site expérimental
A630 sens Ouest - Est
A630 sens Est - Ouest
90
58 000 véh/j/sens
3,3m
V1
V2
V3
BDG
chaussée
10m
BAU
3,5m
< 0,5m
50
Evolution des vitesses en IF1 à Lormont
Nombre total de 2RM observés - A630 Lormont
trafic moyen 2016-2018
160 /heure de pointe
CONTEXTE D'OBSERVATION DES 2RM
• 90 heures de vidéos analysées
• 1/3 des 2RM observés en condition de CIF autorisée
LORSQUE LA CIF EST AUTORISEE
• diminution des grands excès de vitesse sur l'IF1 au profit des excès de vitesse inférieurs à 20km/h
• Circulation sur IF1 majoritaire
• 25% des 2RM circulent en « trains » en 2018
• Taux de respect des règles de CIF (position + vitesse) stable (38% en 2018)
LORSQUE LA CIF EST INTERDITE
• diminution de la circulation sur les voies normales de circulation au profit de l'IF1
Evolution annuelle en IF1 des taux de respect [≤50] et de dépassements non verbalisables [51-55 km/h], verbalisables inférieurs à 20km/h [56-70 km/h] ou verbalisables supérieurs à 20 km/h [>70 km/h]
taux de 2RM en "trains"
longueur maximale
X 15
X 7
X 7
X 6
Répartition des 2RM sur la chaussée lorsque la CIF est autorisée - A630 Lormont
Répartition des 2RM sur la chaussée lorsque la CIF est interdite - A630 Lormont

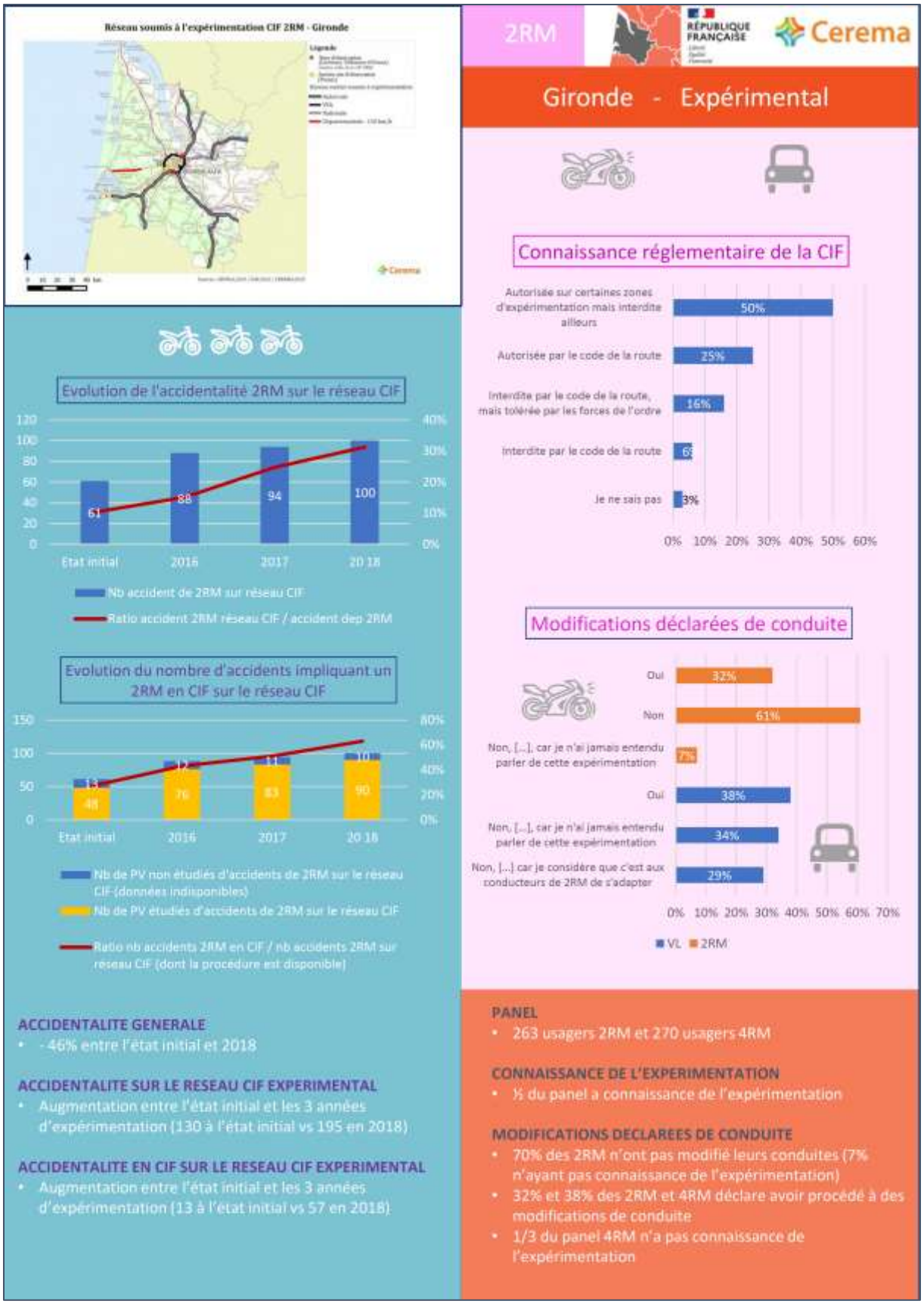

Bouches-du-Rhône
RÉPUBLIQUE FRANÇAISE
Cerema
A51 PR 2+000
site expérimental
A51 sens Nord-Sud
A51 sens Sud-Nord
90
125 000 véh/j/2 sens
3m
3m
3,5m
3,5m
V1
V2
V3
BUS
BDG
0,725m
chaussée
13,9m
BAU
3,5m
3,5m
3,5m
3,5m
V1
V2
V3
BDG
0,725m
chaussée
10,5m
BAU
2,5m
Evolution des vitesses en IF1 sur l'A51
Nombre total de 2RM observés sur A51
trafic moyen 2016-2018
160
/heure de pointe
Evolution annuelle en IF1 des taux de respect [≤50]
et de dépassements non verbalisables [51-55 km/h],
verbalisables inférieurs à 20km/h [56-70 km/h]
ou verbalisables supérieurs à 20 km/h [>70 km/h]
50
taux de 2RM en "trains"
longueur maximale
2018
2017
2016
Etat initial
X 5
X 6
X 5
X 3
0%
10%
20%
30%
40%
50%
60%
70%
PARTICULARITE DU SITE
• Sens Nord-Sud : BAU affectée en voie réservée (VR) pour les bus (50-60 bus en heure de pointe)
• Sens Nord-Sud : V1 et V2 de 3m / 3,5m dans sens Sud-Nord
CONTEXTE D'OBSERVATION DES 2RM
• 72 heures de vidéos analysées
• 29% des 2RM observés en condition de CIF autorisée
LORSQUE LA CIF EST AUTORISEE
• Taux de respect de la vitesse à 50km/h en IF1 en baisse depuis le début de l'expérimentation mais majoritaire
• Position partagée entre l'IF1 et la BAU - VR
• Augmentation du taux d'usagers 2RM circulant sur les voies normales de circulation
• Taux de respect des règles de CIF (position + vitesse) stable (31% en 2018)
LORSQUE LA CIF EST INTERDITE
• 90% des 2RM réintègrent les voies normales de circulation en 2018
• Diminution de l'utilisation de l'IF1 au profit de la BAU -VR
Répartition des 2RM sur la chaussée
lorsque la CIF est autorisée sur A51
Répartition des 2RM sur la chaussée
lorsque la CIF est interdite sur A51

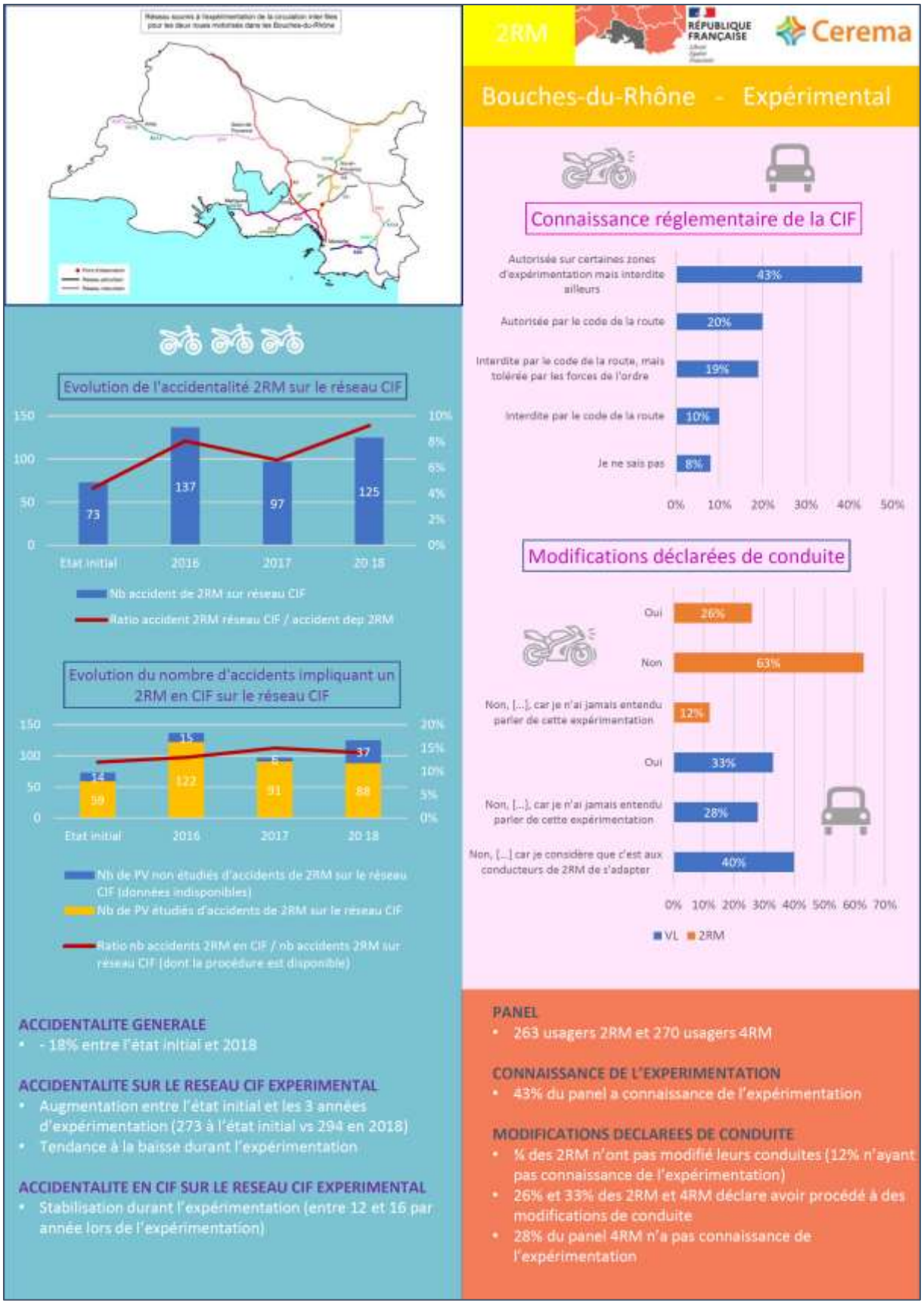

Bouches-du-Rhône
RÉPUBLIQUE FRANÇAISE
Cerema
A50 PR 6+180
site expérimental
A50 Ouest-Est
A50 Est-Ouest
90
125 000 véh/j/2 sens
3,5m
V1
V2
V3
BDG
0,725m
chaussée
10,5m
BAU
2,5m
Evolution des vitesses en IF1 sur l'A50
Nombre total de 2RM observés sur A50
trafic moyen 2016-2018
400 /heure de pointe
CONTEXTE D'OBSERVATION DES 2RM
81 heures de vidéos analysées
1/5 des 2RM observés en condition de CIF autorisée
LORSQUE LA CIF EST AUTORISEE
Taux de respect de la vitesse à 50km/h en IF1 en augmentation depuis le début de l'expérimentation
Le taux d'infraction de la vitesse de plus de 20km/h est en diminution et représente 8% des usagers en 2018
Position majoritaire en IF1
Diminution de l'utilisation de la BAU au profit de l'IF1
20% des 2RM circulent en « trains »
Taux de respect des règles de CIF (position + vitesse) en augmentation (38% en 2018)
LORSQUE LA CIF EST INTERDITE
90% des 2RM réintègrent les voies normales de circulation en 2018
Diminution de l'utilisation de la BAU et de l'IF1 au profit des voies normales de circulation
Evolution annuelle en IF1 des taux de respect [≤50] et de dépassements non verbalisables [51-55 km/h], verbalisables inférieurs à 20km/h [56-70 km/h] ou verbalisables supérieurs à 20 km/h [>70 km/h]
50
taux de 2RM en "trains"
longueur maximale
2018
2017
2016
Etat initial
X 17
X 8
X 9
X 7
Répartition des 2RM sur la chaussée lorsque la CIF est autorisée sur A50
Répartition des 2RM sur la chaussée lorsque la CIF est interdite sur A50

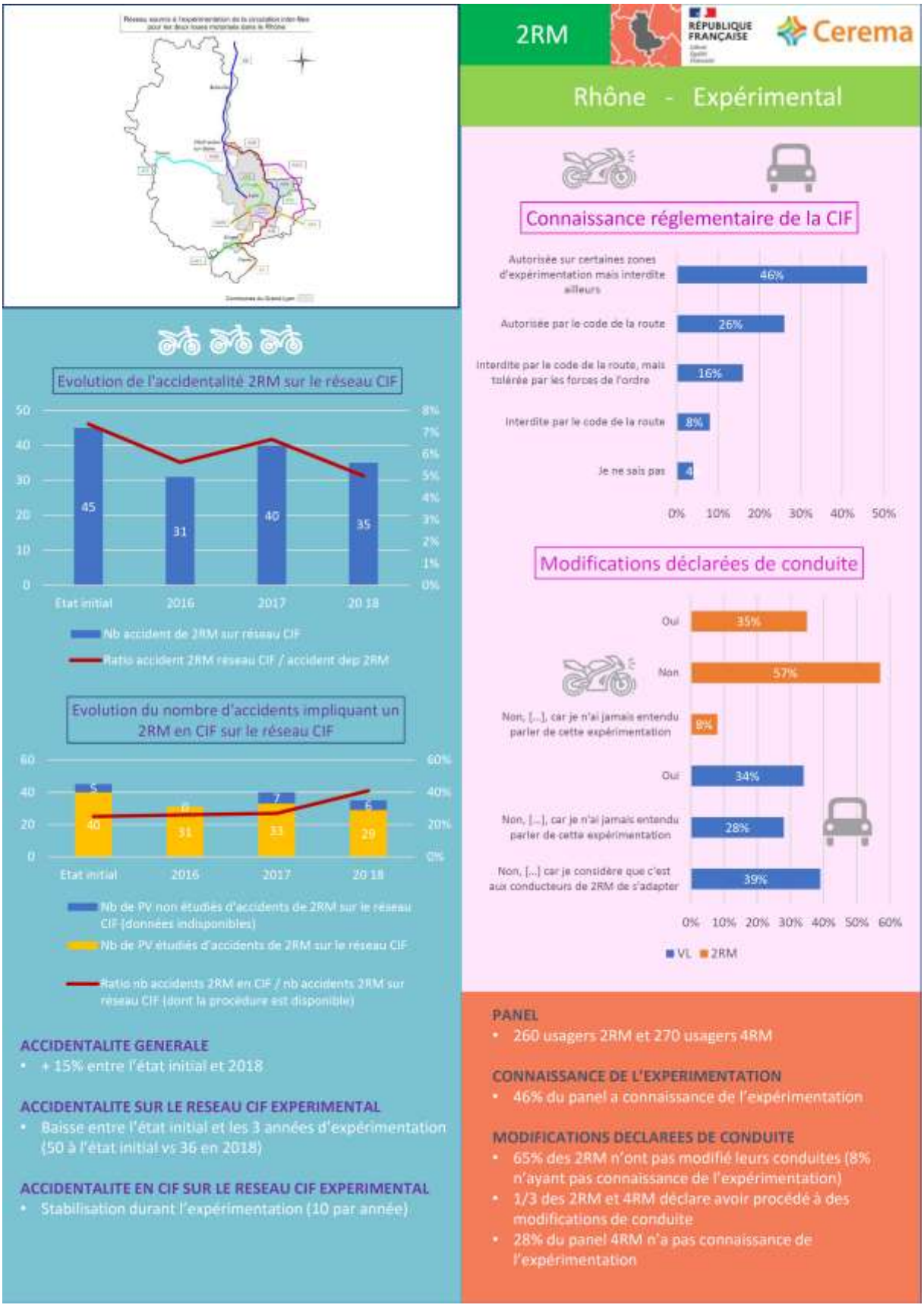

Haute-Garonne
RÉPUBLIQUE FRANÇAISE
Cerema
A620 PR 9+500 site témoin
A620 sens Sud - Nord
A620 sens Nord - Sud
90
65 000 véh/j/sens
3,5m
V1
V2
V3
BDG
0,725m
chaussée
10,5m
BAU
2,5m
50
Evolution des vitesses en IF1 sur le site témoin
Nombre total de 2RM observés - témoin (A620)
trafic moyen 2016-2018
160 /heure de pointe
CONTEXTE D'OBSERVATION DES 2RM
• 90 heures de vidéos analysées
• 56% des 2RM observés en condition de CIF « autorisable »
LORSQUE LA CIF EST AUTORISABLE
• augmentation du nombre d'usagers 2RM ayant une vitesse inférieure à 50 km/h sur l'IF1
• diminution des grands excès de vitesse sur l'IF1
• diminution de la circulation sur l'IF1 au profit des voies normales de circulation
• 20% des 2RM circulent en « trains »
• Taux de respect des règles de CIF (position + vitesse) en augmentation (34% en 2018)
LORSQUE LA CIF EST INTERDITE
• la plupart des 2RM (env. 9/10) réintègrent les voies normales de circulation
• diminution de la circulation sur l'IF1 au profit des voies normales de circulation
Evolution annuelle en IF1 des taux de respect [≤50] et de dépassements non verbalisables [51-55 km/h], verbalisables inférieurs à 20km/h [56-70 km/h] ou verbalisables supérieurs à 20 km/h [>70 km/h]
taux de 2RM en "trains"
longueur maximale
Répartition des 2RM sur la chaussée lorsque la CIF est autorisée - témoin (A620)
Répartition des 2RM sur la chaussée lorsque la CIF est interdite - témoin (A620)

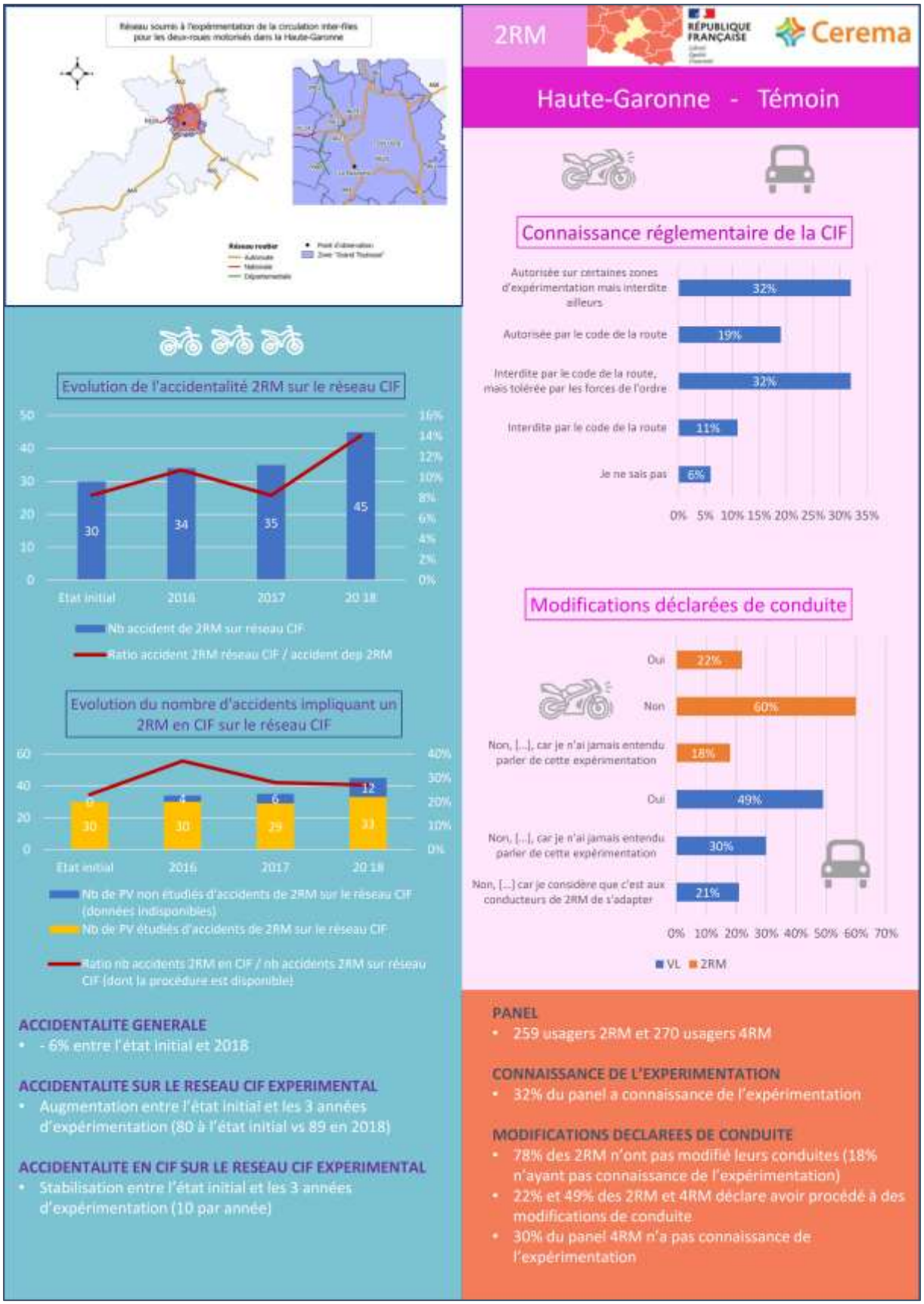
Appendix 5: Accident rate/acceptance summaries




Réseau soumis à l'expérimentation CIF 2RM - Gironde
2RM
RÉPUBLIQUE FRANÇAISE
Cerema
Gironde - Expérimental
Connaissance réglementaire de la CIF
Autorisée sur certaines zones d'expérimentation mais interdite ailleurs
50%
Autorisée par le code de la route
25%
Interdite par le code de la route, mais tolérée par les forces de l'ordre
16%
Interdite par le code de la route
6%
Je ne sais pas
3%
0% 10% 20% 30% 40% 50% 60%
Evolution de l'accidentalité 2RM sur le réseau CIF
120
100
80
60
40
20
0
40%
30%
20%
10%
0%
61
88
94
100
Etat initial
2016
2017
20 18
Nb accident de 2RM sur réseau CIF
Ratio accident 2RM réseau CIF / accident dep 2RM
Evolution du nombre d'accidents impliquant un 2RM en CIF sur le réseau CIF
150
100
50
0
80%
60%
40%
20%
0%
13
17
11
10
48
76
83
90
Etat initial
2016
2017
20 18
Nb de PV non étudiés d'accidents de 2RM sur le réseau CIF (données indisponibles)
Nb de PV étudiés d'accidents de 2RM sur le réseau CIF
Ratio nb accidents 2RM en CIF / nb accidents 2RM sur reseau CIF (dont la procedure est disponible)
Modifications déclarées de conduite
Oui
32%
Non
61%
Non, [...], car je n'ai jamais entendu parler de cette expérimentation
7%
Oui
38%
Non, [...], car je n'ai jamais entendu parler de cette expérimentation
34%
Non, [...] car je considère que c'est aux conducteurs de 2RM de s'adapter
29%
0% 10% 20% 30% 40% 50% 60% 70%
VL
2RM
ACCIDENTALITE GENERALE
- -46% entre l'état initial et 2018
ACCIDENTALITE SUR LE RESEAU CIF EXPERIMENTAL
- Augmentation entre l'état initial et les 3 années d'expérimentation (130 à l'état initial vs 195 en 2018)
ACCIDENTALITE EN CIF SUR LE RESEAU CIF EXPERIMENTAL
- Augmentation entre l'état initial et les 3 années d'expérimentation (13 à l'état initial vs 57 en 2018)
PANEL
- 263 usagers 2RM et 270 usagers 4RM
CONNAISSANCE DE L'EXPERIMENTATION
- ½ du panel a connaissance de l'expérimentation
MODIFICATIONS DECLAREES DE CONDUITE
- 70% des 2RM n'ont pas modifié leurs conduites (7% n'ayant pas connaissance de l'expérimentation)
- 32% et 38% des 2RM et 4RM déclare avoir procédé à des modifications de conduite
- 1/3 du panel 4RM n'a pas connaissance de l'expérimentation


2RM
RÉPUBLIQUE FRANÇAISE
Cerema
Bouches-du-Rhône - Expérimental
Connaissance réglementaire de la CIF
Autorisée sur certaines zones d'expérimentation mais interdite ailleurs
43%
Autorisée par le code de la route
20%
Interdite par le code de la route, mais tolérée par les forces de l'ordre
19%
Interdite par le code de la route
10%
Je ne sais pas
8%
0% 10% 20% 30% 40% 50%
Modifications déclarées de conduite
Oui
26%
Non
63%
Non, [...], car je n'ai jamais entendu parler de cette expérimentation
12%
Oui
33%
Non, [...], car je n'ai jamais entendu parler de cette expérimentation
28%
Non, [...] car je considère que c'est aux conducteurs de 2RM de s'adapter
40%
0% 10% 20% 30% 40% 50% 60% 70%
VL 2RM
Evolution de l'accidentalité 2RM sur le réseau CIF
150
100
50
0
10%
8%
6%
4%
2%
0%
73
137
97
125
Etat initial
2016
2017
20 18
Nb accident de 2RM sur réseau CIF
Ratio accident 2RM réseau CIF / accident dep 2RM
Evolution du nombre d'accidents impliquant un 2RM en CIF sur le réseau CIF
150
100
50
0
20%
15%
10%
5%
0%
7
59
122
5
91
37
88
Etat initial
2016
2017
20 18
Nb de PV non étudiés d'accidents de 2RM sur le réseau CIF (données indisponibles)
Nb de PV étudiés d'accidents de 2RM sur le réseau CIF
Ratio nb accidents 2RM en CIF / nb accidents 2RM sur réseau CIF (dont la procédure est disponible)
ACCIDENTALITE GENERALE
- 18% entre l'état initial et 2018
ACCIDENTALITE SUR LE RESEAU CIF EXPERIMENTAL
Augmentation entre l'état initial et les 3 années d'expérimentation (273 à l'état initial vs 294 en 2018)
Tendance à la baisse durant l'expérimentation
ACCIDENTALITE EN CIF SUR LE RESEAU CIF EXPERIMENTAL
Stabilisation durant l'expérimentation (entre 12 et 16 par année lors de l'expérimentation)
PANEL
263 usagers 2RM et 270 usagers 4RM
CONNAISSANCE DE L'EXPERIMENTATION
43% du panel a connaissance de l'expérimentation
MODIFICATIONS DECLAREES DE CONDUITE
% des 2RM n'ont pas modifié leurs conduites (12% n'ayant pas connaissance de l'expérimentation)
26% et 33% des 2RM et 4RM déclare avoir procédé à des modifications de conduite
28% du panel 4RM n'a pas connaissance de l'expérimentation


2RM
RÉPUBLIQUE FRANÇAISE
Cerema
Rhône - Expérimental
Connaissance réglementaire de la CIF
Autorisée sur certaines zones d'expérimentation mais interdite ailleurs
46%
Autorisée par le code de la route
26%
Interdite par le code de la route, mais tolérée par les forces de l'ordre
16%
Interdite par le code de la route
8%
Je ne sais pas
4
0% 10% 20% 30% 40% 50%
Modifications déclarées de conduite
Oui
35%
Non
57%
Non, [...], car je n'ai jamais entendu parler de cette expérimentation
8%
Oui
34%
Non, [...], car je n'ai jamais entendu parler de cette expérimentation
28%
Non, [...] car je considère que c'est aux conducteurs de 2RM de s'adapter
39%
0% 10% 20% 30% 40% 50% 60%
VL 2RM
Evolution de l'accidentalité 2RM sur le réseau CIF
50
40
30
20
10
0
8%
7%
6%
5%
4%
3%
2%
1%
0%
45
31
40
35
Etat initial
2016
2017
20 18
Nb accident de 2RM sur réseau CIF
Ratio accident 2RM réseau CIF / accident dep 2RM
Evolution du nombre d'accidents impliquant un 2RM en CIF sur le réseau CIF
60
40
20
0
60%
40%
20%
0%
5
40
6
31
7
33
5
29
Etat initial
2016
2017
20 18
Nb de PV non étudiés d'accidents de 2RM sur le réseau CIF (données indisponibles)
Nb de PV étudiés d'accidents de 2RM sur le réseau CIF
Ratio nb accidents 2RM en CIF / nb accidents 2RM sur réseau CIF (dont la procédure est disponible)
ACCIDENTALITE GENERALE
• + 15% entre l'état initial et 2018
ACCIDENTALITE SUR LE RESEAU CIF EXPERIMENTAL
• Baisse entre l'état initial et les 3 années d'expérimentation (50 à l'état initial vs 36 en 2018)
ACCIDENTALITE EN CIF SUR LE RESEAU CIF EXPERIMENTAL
• Stabilisation durant l'expérimentation (10 par année)
PANEL
• 260 usagers 2RM et 270 usagers 4RM
CONNAISSANCE DE L'EXPERIMENTATION
• 46% du panel a connaissance de l'expérimentation
MODIFICATIONS DECLAREES DE CONDUITE
• 65% des 2RM n'ont pas modifié leurs conduites (8% n'ayant pas connaissance de l'expérimentation)
• 1/3 des 2RM et 4RM déclare avoir procédé à des modifications de conduite
• 28% du panel 4RM n'a pas connaissance de l'expérimentation


2RM
RÉPUBLIQUE FRANÇAISE
Cerema
Haute-Garonne - Témoin
Réseau soumis à l'expérimentation de la circulation inter-files pour les deux-roues motorisés dans la Haute-Garonne
Connaissance réglementaire de la CIF
Autorisée sur certaines zones d'expérimentation mais interdite ailleurs 32%
Autorisée par le code de la route 19%
Interdite par le code de la route, mais tolérée par les forces de l'ordre 32%
Interdite par le code de la route 11%
Je ne sais pas 6%
0% 5% 10% 15% 20% 25% 30% 35%
Evolution de l'accidentalité 2RM sur le réseau CIF
30 34 35 45
Etat initial 2016 2017 20 18
Nb accident de 2RM sur réseau CIF
Ratio accident 2RM réseau CIF / accident dep 2RM
Modifications déclarées de conduite
Oui 22%
Non 60%
Non, [...], car je n'ai jamais entendu parler de cette expérimentation 18%
Oui 49%
Non, [...], car je n'ai jamais entendu parler de cette expérimentation 30%
Non, [...] car je considère que c'est aux conducteurs de 2RM de s'adapter 21%
0% 10% 20% 30% 40% 50% 60% 70%
VL 2RM
Evolution du nombre d'accidents impliquant un 2RM en CIF sur le réseau CIF
0 4 6 12
30 30 29 33
Etat initial 2016 2017 20 18
Nb de PV non étudiés d'accidents de 2RM sur le réseau CIF (données indisponibles)
Nb de PV étudiés d'accidents de 2RM sur le réseau CIF
Ratio nb accidents 2RM en CIF / nb accidents 2RM sur réseau CIF (dont la procédure est disponible)
ACCIDENTALITE GENERALE
- 6% entre l'état initial et 2018
ACCIDENTALITE SUR LE RESEAU CIF EXPERIMENTAL
Augmentation entre l'état initial et les 3 années d'expérimentation (80 à l'état initial vs 89 en 2018)
ACCIDENTALITE EN CIF SUR LE RESEAU CIF EXPERIMENTAL
Stabilisation entre l'état initial et les 3 années d'expérimentation (10 par année)
PANEL
259 usagers 2RM et 270 usagers 4RM
CONNAISSANCE DE L'EXPERIMENTATION
32% du panel a connaissance de l'expérimentation
MODIFICATIONS DECLAREES DE CONDUITE
78% des 2RM n'ont pas modifié leurs conduites (18% n'ayant pas connaissance de l'expérimentation)
22% et 49% des 2RM et 4RM déclare avoir procédé à des modifications de conduite
30% du panel 4RM n'a pas connaissance de l'expérimentation

Appendix 6: Historical context

1. On motorways and expressways: a technique in use for more than 30 years

Lane splitting has been used for several decades. It occurs when a powered two-wheeler **travels between two lanes of motorised vehicles** that are at a standstill or travelling at a slow speed. It can be seen around major urban areas, where traffic congestion is an issue. It is extremely commonplace in Ile-de-France, especially on the Paris ring road.

Figure 1: Lane splitting on motorways or urban expressways – source: Cerema

2. A way to avoid queuing in traffic jams... saving time for PTW.

Many PTW users have adopted lane splitting because it **saves a lot of time during rush hour, when traffic is slow or congested**.It mainly applies to journeys in urban and peri-urban areas in major cities, where congestion on main roads is an integral part of the realities of mobility. Lane splitting can be seen on fast urban roads, and is not the same as the filtering seen in the city centre, in intercity areas, on two-way roads or on streets with a single lane for motorised vehicles.
Some highlight that the transfer of road users to PTW could be good for car drivers, by reducing the number of cars on the road (Hurt et coll., 1981). This approach does not apply to major French cities. Indeed, it fails to take into account that any increase in capacity is soon filled by traffic from elsewhere and the creation of new journeys. The findings in major French cities are unequivocal: the transfer of road users to PTW have not resulted in less cars on the road. On congested roads, PTW can, however, temporarily ease the flow of traffic (accidents notwithstanding) by making use of the spaces between queues[2].

To sum up, the saturation of road networks, the narrow chassis, and the solid handling at lower speeds demonstrated by powered two-wheelers, coupled with the practically inexistant enforcement of lane splitting, have seen use of the technique increase over the years, despite not being permitted by law.

3. A European standard... Lane splitting across the continent

A pragmatic response to the challenges of mobility, beyond the risk inherent to lane splitting, it remains an **unregulated**, but often **tolerated technique**. The powered two-wheeler riders who currently engage in lane splitting run the risk of prosecution (dangerous undertaking, non-compliance with stopping distances, or failure to indicate) as well as being found liable for road traffic accidents.

[2] In Paris, their presence can be seen in the statistics, with the percentage of powered two-wheelers rising from 10% of traffic on major roads in 2001, to 15% in 2006. Traffic composed of powered two-wheelers rose by 45% between 1999 and 2008. [TEC issue 185 – Thanos VLASTOS Jan-March 2005].

The lack of regulations makes it impossible to have a clear and enlightening conversation to distinguish between legal lane splitting and illegal lane splitting.

An experimental trial period was first announced in late 2010, in order to obtain information to aid decision-making on whether to legalise the practice or not. A draft law was presented to the French parliament on 3 April 2012, but failed to pass. The conditions for using lane splitting were quite restrictive: authorised on urban expressways for traffic flowing at at least 15 km/h, but not more than 30 km/h.

ASSEMBLÉE NATIONALE

N° 4493 Enregistré à la Présidence de l'Assemblée nationale le 3 avril 2012.

Renvoyée à la commission des lois

PROPOSITION DE LOI

visant à autoriser les véhicules à **deux roues** à **moteur** à circuler en inter-files sur les voies rapides urbaines,

(Renvoyée à la commission des lois constitutionnelles, de la législation et de l'administration générale de la République, à défaut de constitution d'une commission spéciale dans les délais prévus par les articles 30 et 31 du Règlement.)

Article unique

Après l'article L. 431-1 du code de la route, il est inséré un article L. 431-2 ainsi rédigé :

« *Art. L. 431-2.* – Le véhicule à deux roues à moteur est autorisé à circuler en inter-files, sur les voies rapides urbaines, lorsque les flux principaux de la circulation automobile sont à l'arrêt ou s'écoulent à une vitesse inférieure à 15 km/h.

« La vitesse en inter-files ne peut excéder 30 km/h. Le conducteur du véhicule à deux roues à moteur actionne ses feux de détresse. Il ne peut doubler un autre véhicule à deux roues à moteur circulant lui-même en inter-files. »

Lane splitting by PTW is a de facto part of mobility in many European countries and on the other side of the Atlantic, without any specific legal framework, owing to the use of PTW, changes in motorised transport, and the associated problems of congestion.

Only Belgium has **legalised** and regulated lane splitting by a Royal Decree of 11 June 2011, stating that the speed of PTW must be equal to or less than 50 km/h, and that the speed differential between the PTW and other users must be equal to or less than 20 km/h. Belgium began with the observation that unregulated lane splitting was already an existing practice, and opted for an educational approach, promoting less risky lane splitting through training for motorcycle riders and drivers of other motorized vehicles.

Matersen *et al.* (IBSR, 2015) conducted a before and after analysis of accident rates (2009-2010 compared to 2012-2013) that showed that lane splitting accidents accounted for a low percentage of PTW accidents (2.6%), and that legalisation had no effect on this figure. The study decided upon the limited use of lane splitting compared with other European countries, highlighting the difficulty in applying these results to other countries.

In the Netherlands in 1991, a road safety charter was drafted in partnership with KNMV[3] and the public authorities, introducing **tolerance** for lane splitting. It makes the following recommendations:

→ That lane splitting PTW:

- Adhere to a maximum speed differential of 20 km/h between PTW and other road users
- Use signals lights when lane splitting
- Are positioned on the line between the two outside lanes
- Use of the breakdown lane is prohibited

→ For car drivers:

- Not to obstruct the space to the right of the leftmost lane (driving on the right), and even to make it easier for PTW users by moving left or right depending on the lane being used
- Clearly signal when changing lanes, and check that no PTW is in the process of overtaking

In Norway, lane splitting is also tolerated, with the understanding that it is done at a lower speed and without compromising road safety, similar to the Netherlands.

In the United Kingdom and Luxembourg, lane splitting is tolerated as long as it is performed at a lower speed and with care.

In Austria, lane splitting is residual and tolerated as long as the other vehicles are not moving and that there is enough space for it.

3 Koninklijke Nederlandse Motorrijders Vereniging = *Royal Dutch Motorcycle Association*

In Italy, Germany, Switzerland, Sweden, and Spain (to a lesser extent), lane splitting is **banned**.

4. Campaign against dangerous driving: the PTW problem

In France, the good results obtained for car drivers, and the less positive results for PTW, in the road accident mortality figures, combined with the desire to hit ambitious targets, led to attention being focused on PTW from 2005 onwards.

In 2000, road safety was declared a "Grand national cause".

In 2003, the implementation of automatic speed cameras helped to drastically reduce the number of fatal road traffic accidents, by lowering the speed of all motorised vehicles, albeit to a lesser extend for PTW which remained above the average speed of other vehicles. Indeed, initially the automated enforcement speed cameras only flashed the front of vehicles, while PTW have a single license plate at the back. The results are unequivocal: between 2000 and 2010, there was a 60% fall in mortality for car drivers, but only 25.7% for motorcyclists (ONSIR).

The percentage of total road deaths accounted for by[4] PTW accidents rose mechanically to a worrying extent after 2003, due to the lower reduction in PTW mortality compared to other modes of transport.

PTW were then identified as having high potential for measures to combat dangerous driving. In 2006, Rémy Heitz, delegation for road safety, appointed the prefect Régis Guyot to analyse the potential. A report was published in 2009, recommending compulsory front license plates for powered two-wheelers in order to make enforcement of the speed limit more efficient, as well as technical inspections for older powered two-wheelers coming in at number 11. The report made no mention of lane splitting, but the 35th recommendation was to prevent filtering and overtaking on urban crossroads. In 2008, road safety delegate Michèle Merli launched a consultation proposing a moral contract with users of powered two-wheelers: front license plates and technical inspections, in exchange for legalised lane splitting (not mentioned in the report on safety measures). At the 6th plenary session of the PTW consultation on 12 March 2010, it emerged that "across Europe in general, PTW are experiencing an inverse trend to improvements in road safety. They would constitute one of the **European road safety objectives** for the following decade (2010-2020)."

The consultation was never completed. The two coercive measures in the moral contract were transferred to a European level. In January 2012, following report 3864 from the parliamentary group for the causes of road traffic accidents, published on 19 October 2011, road safety delegate Jean-Luc Névache tasked the prefect Régis Guyo with compiling a feasibility report on lane splitting for motorcycles. In their research, the work group concluded that "it seems possible and even preferable to acknowledge it, regulate it, and teach it". The report was published in November 2012, and its recommendations included that accidents involving lane splitting PTW on expressways presented a low risk of mortality on a national and European level, and that it would be possible to conduct an experiment.

5. First studies of accident rates for PTW in act of lane splitting

The first studies of accident rates for PTW in the act of lane splitting and illegal lane splitting (initially, no distinction was made between the two practices) in France focused primarily on Ile-de-France (*filtering and intersections*, LREP[5], 2004; *Lane splitting and physical accidents in department 92*, LREP, 2005; *Accident rates for PTW on the Paris ring road*, Paris City Hall, 2010). A section of these studies was immediately dedicated to accident rates while lane splitting. The study included the **urban environment**, such as filtering at red lights, as well as **motorway** or **expressway** infrastructure.

4 Percentage of PTW accidents = no. physical accidents with PTW/total number of physical accidents
5 LREP Eastern Paris Regional Lab, now Cerema

Tracking of 16 motorcyclists in Ile-de-France revealed that lane splitting and filtering could account for the lion's share of a PTW journey: up to 77% of distance travelled and 72% of travel time on a commute, resulting in journey times of half to one thirds of that for the same journey by car (*CSC 2RM Project*[6], S. Aupetit, IFSTTAR[7], Sept 2011). Other studies estimate these savings at 50%.

IFSTTAR CSC 2RM Study in Focus - Speed differentials and FFMC recommendations

In the IFSTAR study that analysed footage from on-board cameras on 16 motorcycles in Ile-de-France, accompanied by an interview with the riders, the matter of **speed differential** was mentioned particularly frequently with regard to lane splitting. Indeed: "Every motorcyclist talked about their speed differential (relative speed) compared to car drivers, rather than their absolute speed.""Thus, according to the interviews, the speed differential with cars is a determining factor in rising between lanes".

It was also highlighted that riding a PTW in traffic requires high levels of concentration, in order to be able to quickly react to unforeseeable events. The mental strain is considerable. PTW users are constantly assessing:

- General traffic conditions (width of space between lanes - IL1, vehicle speed, distance between vehicles in lanes)
- Car driver behaviours (direction of wheels signalling the intention to change lanes; license plates, for the risk of a user not from the same region changing lanes; driver behaviour inside the car, and mobile phones and GPS in particular; head movements towards passenger seats, for the risk of involuntary lateral movement).
- The behaviour of other PTW users (motorcyclists' mistrust of scooters – not so much for 125cc riders who need to have held the Category B license for two years – maxi-scooters that do not feel like they are classed as motorcyclists). They compensate by reducing their speed and increasing the stopping distance

When traffic is flowing at higher speeds, the space between lanes is no longer the deciding factor, instead being replaced by the distance between vehicles in the lanes. The space between lanes then becomes the space in which PTW users zigzag.

The study also revealed that while some PTW riders stop lane splitting when traffic starts moving fluidly again (over 50 km/h), others report that they always lane split, irrespective of the speed of traffic, at speeds of over 20-30 km/h.

Traffic flow speed	**0-10 km/h**	**10-40 km/h**	**over 50 km/h**
Speed differential observed	38 km/h	19 km/h	• 28 km/h for 12/16 lane splitting motorcyclists • ceasing LLS for 4/16 motorcyclists
Perceived safety of lane splitting PTW	**"safe"**	**"at risk"** Vehicles changing lanes frequently, often suddenly and without warning	4/16 prefer to stop lane splitting, but others lane split irrespective of how fast traffic is flowing
Main traffic indicators	IL1 width	• IL1 width ++ • Distance between vehicles in L1 and L2.	• IL1 width - • Distance between vehicles in L1 and L2 ++

Table 1: summary of practices observed and reported by 16 motorcyclists in the IFSTTAR CSC-2RM study

All agreed that the speed differential should not exceed 20 km/h. It does, however, exceed that when traffic is at a standstill.

[6] Study of spontaneous driving behaviour of PTW in urban and peri-urban areas.

[7] IFSTTAR: Institut français des sciences et technologies des transports, de l'aménagement et des réseaux (French Institute of Science and Technology for Transport, Development and Networks), now the Université Gustave Eiffel

Despite the small sample (16 interviews), the information gathered was consistent with communications from the Fédération Française des Motards en Colère (French Federation of Angry Motorcyclists - FFMC).

FFMC Recommendations:

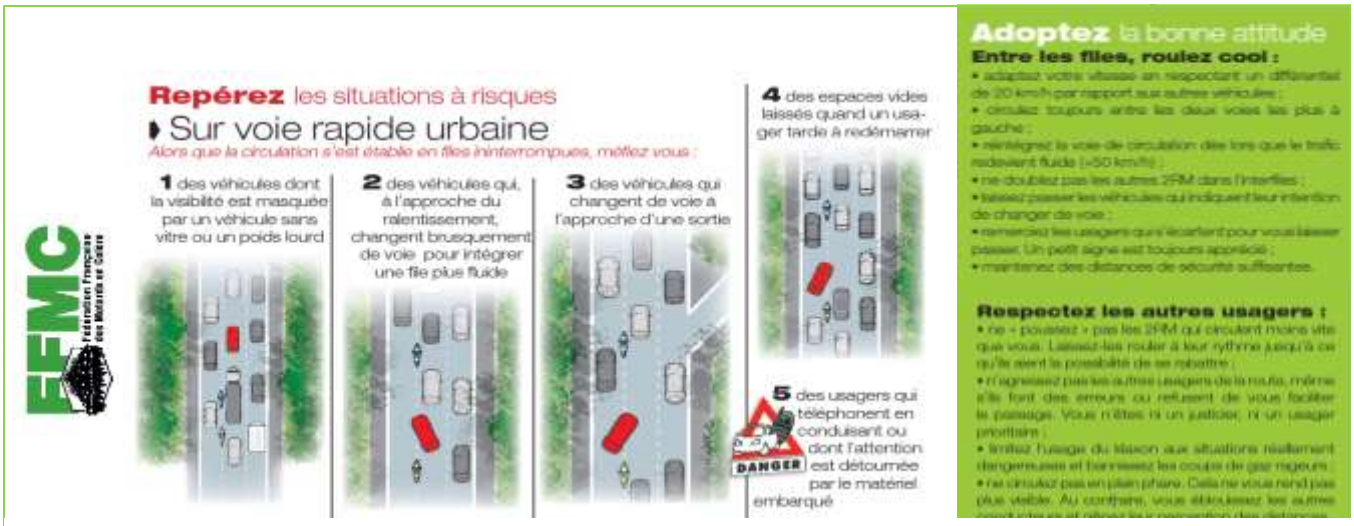
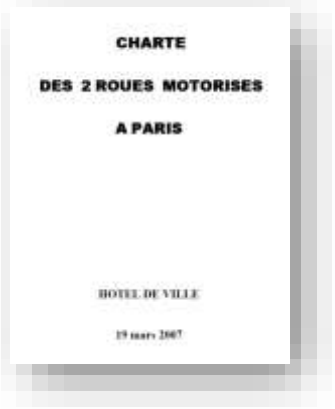


Figure 2: extract from FFMC flyer on lane splitting

6. 2007: A safe driving charter signed in Paris



A number of consultations with user associations took place in the early 2000s, culminating in the signature of a safe driving charter between motorcycle associations and the city of Paris in 2007. While the Paris Police Force did not sign the document (with good reason: it is responsible for enforcing the law, and lane splitting is unregulated), it nevertheless took part in the consultations. It should be noted that in the 2007 charter, lane splitting is tolerated. The charter focused on the recommended behaviours between PTW and cars, for safe sharing of the road.

7. From 2009 to 2012: 1st observations of lane splitting on motorways/expressways

From late 2009, an observatory was created (managed by CERTU [8] and delivered locally by CETE [9], which would become Cerema) to develop an experiment protocol for observing the behaviour of road users with regard to lane splitting, across a number of sites: Lyon, Paris (Ile-de-France), Bordeaux ring road, A50 and A51 in Aix-en-Provence – Marseille and the RN338 in Rouen. None of these sites featured flat intersections nor non-motorised users (pedestrians, cyclists). The aim was to test the feasibility of gathering and harnessing data in this way, and to uncover the initial findings in terms of choice of lane, the space between lanes, speed, and behaviours. The observatory was also able to gather data from sites outside Ile-de-France, where lane splitting was observed.

Geographical differences were revealed in the position, speed, and behaviour of PTW when lane splitting, with particular marked differences in the Provence-Alpes-Côte d'Azur region, where motorcyclists made use of the breakdown lanes.

Lessons learned from this observatory

The observation and analysis of powered two-wheeler behaviour on five structural urban link roads (urban expressways) in Paris, Lyon, Marseille, Bordeaux, and Rouen revealed the diversity in how lane splitting is performed across France.

PTW users apply different strategies depending on the local context, the width of the carriageways, levels of congestion, and even personal preferences.

Lane splitting was generally performed between the two outside lanes. Lane splitting using the breakdown lane was, however, observed at certain sites (up to 1/3 of lane splitting in Marseille) – see table below.

Source: PTW Behaviour Observatory 2009-2012, Cerema

Site	A13 (Paris)	A51 (Marseille)	A6 (Lyon)	RN338 (Rouen)	Bordeaux ring road
Characteristics	2X3 lanes + breakdown lane	2X3 lanes + breakdown lane	2X3 lanes + breakdown lane	dual carriageway	2X2 lanes + breakdown lane
Speed limit	110 km/h	10 km/h	90 km/h	90 km/h	90 km/h
PTW traffic	9-15% on average	N.C.	1 to 2 %	2%	2 to 4 %
Position of PTW (flowing traffic)	>80% of PTW between lanes	Mostly in queues of traffic			
Position of PTW (congestion)	vast majority in outside IL	Outside IL (2/3) + breakdown lane (1/3)	majority in outside IL + breakdown lane	Outside IL	Outside IL
Use of hazard lights or indicators	About 60%	About 20%	About 55%	About 35%	About 70%
Speed differential between PTW and other road users	Highly variable between observation sites Overall. The faster lanes of traffic are moving, the lower the speed differential with lane splitting PTW				
Conflict between PTW and other road users	Little conflict between PTW and other road users				

[8] CERTU: Centre for studies on networks, transport, urban planning and public construction, now CEREMA

[9] CETE: Centre for the Technical Study of Equipment, now Cerema

Focus on speeds used:

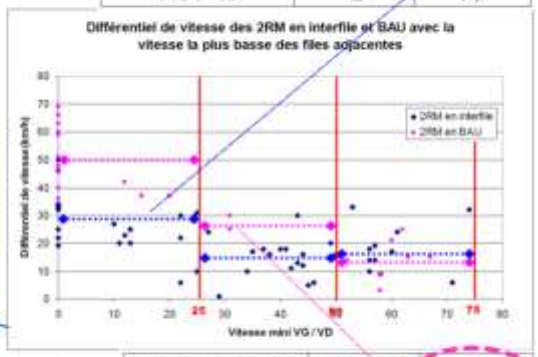
It was found that the speed of PTW was primarily relative to the speed of traffic flow. By identifying three speed thresholds for traffic flow, the following speed differentials when lane splitting were observed at four sites in Paris, Lyon, Marseille, and Bordeaux (observations were discontinued in Rouen due to insufficient PTW traffic).

Traffic flow speed (km/h)	0 ≤ V <25	25 ≤ V <50	V ≥ 50
Average PTW/car speed differential	29-42 km/h	15-28 km/h	17-18 km/h
Speed differential within which 85% of PTW ride	34-66 km/h	26-46 km/h	22-32 km/h

The detail of speed differentials observed by site is shown in the tables below.

Classe de vitesses moyenne sur VG-VM+rapide	Différentiels de vitesse ds 2RM en inter-file (Km/h) sur A13 le 28 juin 2011 matin					
	2RM isolé		Train 2RM		2RM	
	Diff. Vitesse moyenne	V85 du diff. vitesse	Diff. Vitesse moyenne	V85 du diff. vitesse	Diff. Vitesse moyenne	V85 du diff. vitesse
0-24 km/h	41.6	61.0	33.7	50.1	37.4	53.0
25-49 km/h	25.0	34.9	24.9	38.0	25.0	38.0
50-74 km/h	16.6	28.0	18.0	26.3	17.2	27.3
Total général	22.7	34.2	23.1	37.5	22.9	36.0

Classes de vitesse des usagers en file (km/h)	D85 (km/h)	Différentiel moyen (km/h)
0 ≤ v < 25	34	29
25 ≤ v < 50	30	15,4
50 ≤ v < 75	32	17,5



Classes de vitesse des usagers en file	D85 (km/h)	Différentiel moyen (km/h)
0 ≤ v < 25	66	50,1
25 ≤ v < 50	30	27,5
50 ≤ v < 75	25	14,6

Classe Vitesse Véhicules	Observation 10 février 2011		Observation 21 juillet 2011		Observation 25 novembre 2011	
	Différentiel Vmoy	Différentiel V85	Différentiel Vmoy	Différentiel V85	Différentiel Vmoy	Différentiel V85
V= 0km/h					49km/h	56km/h
0km/h< V <25km/h	36km/h	43km/h			35km/h	45km/h
25km/h<= V <50km/h	15km/h	26km/h			32km/h	46km/h
50km/h<= V <70km/h						
V>70km/h			11km/h	22km/h		

D85 (km/h) = speed differential between lane splitting PTW and the adjacent lanes, within which 85% of PTW ride
Average differential = average speed differential between lane splitting PTW and the adjacent lanes, for all PTW.

Figure 3: Results for speed differentials before the observatory at four sites on the A13 (Paris), Lyon, Marseille, Bordeaux

High speed lane splitting was a recurring phenomenon at each of the sites observed.

8. Lane splitting safety factors

Using Cerema's 2009-2021 PTW observatory it was possible to record the main safety factors relevant to lane splitting.

- **Speed**

The speed at which powered two-wheelers travel is the key factor in determining whether they are able to react the unpredictable behaviour of other road users, as well as the severity of any accident. A number of factors were highlighted: PTW speed, the speed of traffic flow, and the speed differential between lane splitting PTW and the other lanes of vehicles.

- **Width of space between lanes**

The width of the space between lanes is dictated by the infrastructure, and lane width in particular, including the hard shoulder and the central reservation system used. The central reservation can act as a wall to varying degrees, affecting car drivers' ability to hug the outside of their lane.

PTW overtaking in a narrow space between lanes (4 second sequence) on the Paris ring road

Here, the level of risk is very high, despite the short duration. The PTW takes one second to overtake the vehicles, which is the same as the average driver's reaction time. By infringing on the safety buffer around the two car drivers, and failing to comply with lateral distances, the PTW makes the car drivers feel unsafe.
This observation was also found in the AUTOFILE study of 2014. Indeed, it was found that among car drivers:

- 72% think that PTW perform dangerous manoeuvres
- 68% Think that PTW lane split when there isn't enough space between two lanes
- 74% think that PTW are unpredictable
- 67% think that PTW pressure them to force overtaking

- **Space and time between vehicles**

The space between vehicles in normal lanes of traffic allows vehicles to change lanes and makes leaving a lane of traffic more risky, including when vehicles are slow to start moving again.

Vehicles changing lanes when a PTW arrives (6 second sequence)

The time between lane splitting PTW is also a major safety factor which, if it is not respected, leads to a risk of collision if one PTW breaks suddenly.

- **PTW traffic**

The more PTW users engage in lane splitting, the more car drivers expect to encounter them, and the less they risk changing lanes without checking properly. This data is confirmed by the IFSTTAR's AUTOFILE studies from 2014 [Ragot-court, I.et al. Projet AUTOFILE: Les automobilistes et la circulation des deux-roues motorisés (AUTOFILE Project: Car drivers and powered two-wheeler traffic)].
It should be highlighted that in high levels of PTW traffic, some PTW users may be tempted to ride faster due to "pushy" PTW, or to avoid having to re-join a queue for a longer period.

- **Signalling lane changes**

Signalling of lane changes is a significant safety factor. Unlike sudden lane changes, changing lanes without indicating presents a serious risk. They were a common feature found when studying accident rates.

- **Attention paid to 4-wheeled users, PTW, and their own driving**
- **Vicinity of interchanges**

Indeed, lane changes were found to carry a higher risk when performed in the vicinity of exit ramps.

- **Weather conditions**

In unfavourable weather conditions (rain, fog, etc.), PTW are much less visible.

A survey of 1943 PTW riders, conducted by 2-roues Lab' (motorcycle insurer research lab) in 2012, found that lane splitting/filtering is perceived as more dangerous on ring roads (compared to in the city, on roads and motorways): 86% of respondents feel at high or quite high risk.

The main dangers identified in lane splitting are:

- Users changing lanes (inside to outside 80%, outside to inside 78%)
- Speed (75%),
- Non-compliance with stopping distances (67%)

77% of respondents thought there was no maximum permitted speed for lane splitting, and 62% thought that lane splitting PTW were riding too fast.

Source: http://2roueslab.mutuelledesmotards.fr/files/c770437874d1c3296b5c20720a4c3cd4.pdf

9. Publication of Guyot report in November 2012 – key findings

The Guyot report from 2012 summarised all existing accident rate studies. The report summarised and expanded accident rates (physical accidents only) to include incidents included in statistics provided by the AMDM (motorcycle insurer). The AMDM study focused on 150 lane splitting claims between 01/09/2010 and 01/09/2011.

The report introduced a distinction between legal lane splitting and illegal lane splitting:

- **Illegal lane splitting** can be understood as overtaking a line of vehicles on the right or left, whether or not they cross a broken white line; the zigzagging between vehicles performed by some PTE users, especially in urban areas, is particularly dangerous
- **Legal lane splitting** can be understood as the simultaneous overtaking – on inside and outside – of two queues of powered vehicles travelling along two lanes of traffic along a one-way carriageway.

The key points to remember are as follows:

1. **Accidents involving lane splitting PTW on expressways presented a low risk of mortality on a national and European level.**

Key takeaways from national survey on motorcycle accident rates between lanes:

Less than 2 accidents/day *	**3.2% of motorcycle accidents**	**+4% every year**	**7 to 8 motorcyclists killed every year**	**Few injured people hospitalised (2%)**	**More slight injuries (4.3%)**
(from an average of 46 motorcycle accidents per day)	*(annual average between 2005 and 2011)*	*(average annual growth between 2005 and 2011)*	*(annual average between 2005 and 2011)*	*(annual average between 2005 and 2011)*	*(annual average between 2005 and 2011)*

Table 2: Guyot report national survey **** Between 2005 and 2011***

European and American studies tend to confirm that lane splitting is rarely fatal, especially in congested traffic. In the United States, more rear end collisions were recorded in the states where lane splitting is banned.

As for the causes of accidents, the "accident-causing nature of lane splitting has more to do with the speed at which it is performed, rather than the practice itself". The most common scenario is a PTW colliding, or in a few cases a just falling off, when a car driver changes lanes. The low visual salience of motorcycles is a more significant contributing factor than its position between lanes. Motorcyclists are less visible to car drivers to the same degree as they are travelling at an inappropriate speed for the prevailing conditions, as Brenac and Clabaux (IFSTTAR) went on to prove.

The analysis of insurance incidents confirmed the accident rate studies. Most incidents occurred when other users were changing lanes. Most collisions were of medium and low impact, causing moderate or mild injuries.

2. **Real local differences were found between departments.**

Ile-de-France stands out through the size of its road network, with a concentric urban area made up of four bypass rings. The demand in terms of necessary journeys, compared to the capacity of the roadway infrastructure, incentivises PTW to use lane splitting. Lane splitting is a longstanding tradition in this area, and the informal rules are passed on. During the commute, car drivers and PTW are generally experienced, and the public space is generally shared without any problems.

In Provence-Alpes Côte d'Azur, however, the technique is more diverse. Marseille is the city with Europe's second most regularly congested road network.

With regard to accident rates, while they remain moderate compared to national levels, road safety issues concerning lane splitting are significantly more serious than in Ile-de-France, and to a lesser extent in Provence-Alpes Côte d'Azur and Rhône-Alpes.

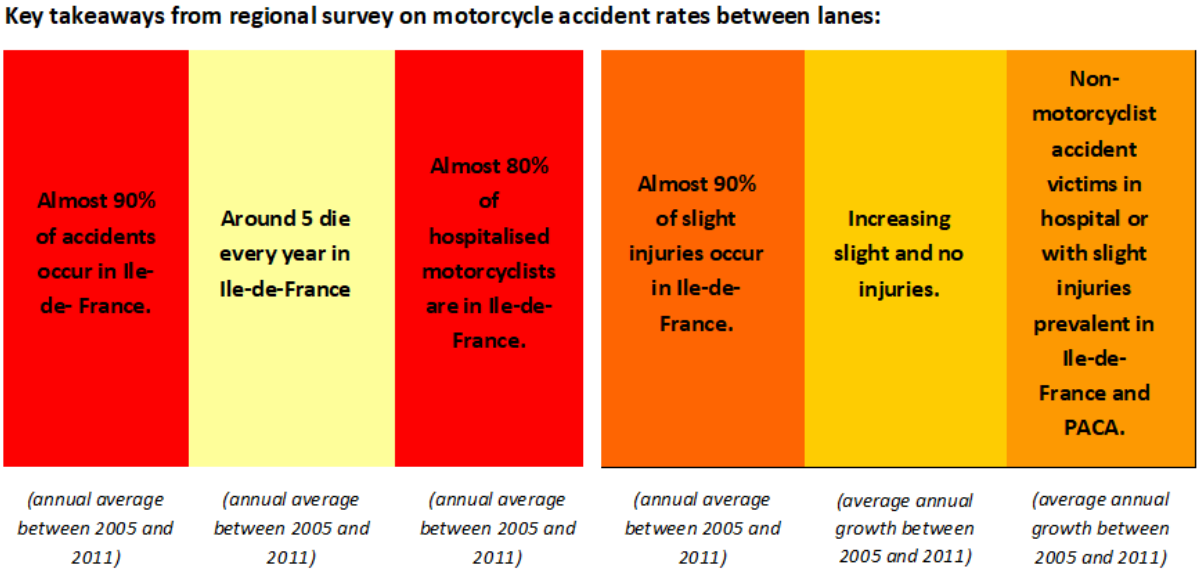


Figure 4: Regional accident rate survey in Guyot report. Interpretation: for every 10 accidents involving legal lane splitting PTW in the observed departments, 9 were in the departments that make up Ile-de-France.

The Paris ring road: a special case

Closer analysis of lane splitting accident rates in Ile-de-France reveal that it is a major issue on the Paris ring road. Indeed, in Ile-de-France, 30% of physical accidents involving a lane splitting PTW occur on the Paris ring road, despite the ring road accounting for only 3.5% of the region's expressway road network (35 km out of 1000 km). However, the vast majority of these accidents are not very severe in terms of physical damage. The report concluded that the contributing factors for mortality and severity lie elsewhere, "doubtless due to excessive speed and speed differentials, combined with other accident-causing behaviours".

3. **A distinction should also be made between the two following driving environments: the urban environment and motorways/expressways.**

In the four most common between-lane accident scenarios, three tended to take place in an urban environment, and were therefore of no relevance to the experimental lane splitting network. The 4th is typical of 2x2 lane or more roads, boulevards and urban avenues (urban) as well as expressways (arterial roads or bypasses).

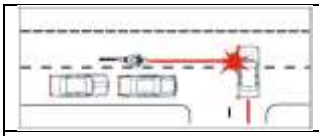
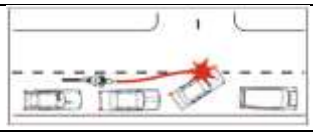
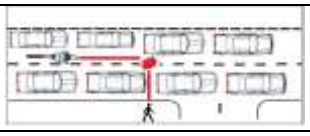
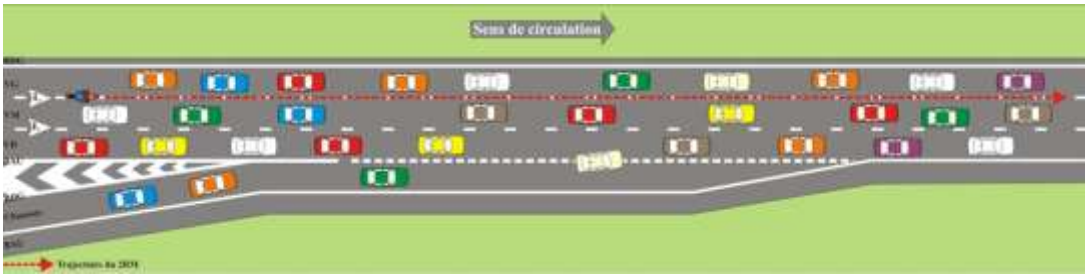
		
Scenario 1: A lane splitting PTW colliding with a vehicle that was initially hidden; a vehicle in the queue lets a non-priority vehicle pass on the inside (resident access, parking, or intersection).	Scenario 2: A lane splitting PTW moving along a queue of vehicles at a standstill, and colliding with one of the vehicles turning left at an intersection or for resident access.	Scenario 3: PTW collision with a pedestrian crossing the road in dense traffic, hidden by unmoving or slowly moving vehicles, often at or near an intersection

Figure 5: The three main accident scenarios when filtering in urban environments



Scenario 4: a vehicle changes lanes without seeing the PTW riding between two lanes of traffic on a dual carriageway (or more), with or without separated carriageways

Recommendations of the Guyot report

"Lanes that involve too much scope for interaction between very different users with varying levels of vulnerability, and often with insufficient safety features (central islands for pedestrians, for example) make lane splitting dangerous for powered two-wheeler users, as well as for other road users they interact with."

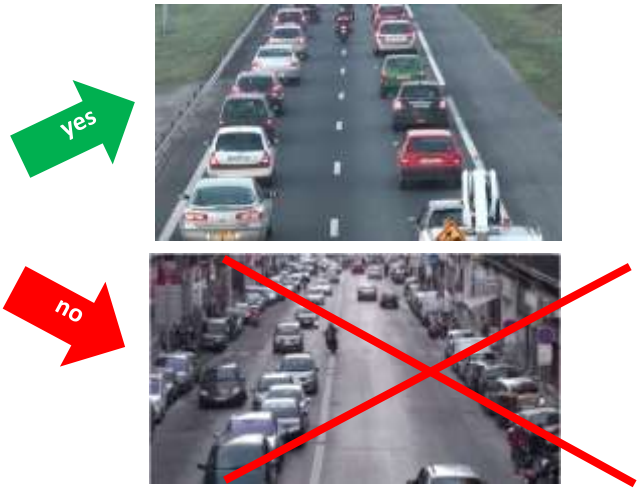
"Analysis of accident rates and the circumstances leading up to accidents initially leads to the conclusion of only allowing lane splitting on the roads that are most suitable for it."

10. Launching the experiment

To limit the risk of interactions between road users, it is recommended that **lane splitting be permitted on motorways or expressways** (with separated junctions, carriageways separated by physical divides for two-way roads, no pedestrians or cyclists, no resident access).

To that end, the powered two-wheeler lane splitting experiment was enacted according to the principles set by the Road Safety and Traffic Delegation. The conditions were defined and specified in the following documents:

- Circular to Prefects from the Ministry of the Interior, dated 22 December 2014
- Appendix to circular of 22 December 2014 that specified the experiment protocol
- Decree no. 2015-1750 of 23 December 2015 on the lane splitting experiment, amending the highway code to enable the experiment to be run effectively (full text of Decree in appendix)
- Order of 4 January 2016 setting the start and end dates for the experiment, on 1 February 2016 and 31 January 2020, respectively.



The experiment objectives for the specified network were as follows:

1. To set standardised national rules for lane splitting
2. Improved sharing of the road between all users of target road networks
3. Assess if these rules enhance the safety of PTW and 4-wheeled vehicle users
4. If the rules are to become the national standard: to teach the rules for LLS in driving lessons for all motorised vehicles

The experiment was ultimately intended to answer the following questions:

Should lane splitting be permitted or banned within the framework set for the experiment?
Should the recommended rules be adapted or amended? Do they need more detail?
Should the eligible road network be changed?

Appendix 7: Glossary, terminology, abbreviation

Term	Abbreviation
Center for Studies and Expertise on Risks, Environment, Mobility and Planning	Cerema
Kilometres	Km
Hour/Time	h
Ile-de-France (the French departments making up the Greater Paris region)	IDF
Legal Lane splitting adhering to French rules	LLS
Illegal lane splitting	ILS
Powered two-wheelers	PTW
Motorcycles	MC
Speed Limit	SL
Interlane 1 (space between two outside lanes)	IL1
Delegation for Road Safety	DSR
Analysis of accidental bodily injury reports	BAAC
Police report	PR
Breakdown lane	Breakdown lane
Paris ring road	PRR
Motorways	A1, A3, etc.
Heavy goods vehicle	HGV
Light vehicles	LV
Metres	M
Number	No.
Versus/compared to	Vs.
Factors Related to Fatal Accidents	FLAM
Average daily traffic per site	AADT
Road point	RP
Width	w
Speed (velocity)	V

Appendix 8: Bibliography

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