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trajectoire

THE MAGAZINE ON RESEARCH, EXPERTISE AND PROFESSIONS AT IFSTTAR

P.07 FEATURE

Innovate to
**INVENT TOMORROW'S
MOBILITY**



IFSTTAR

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IN BRIEF

INTERNATIONAL SYMPOSIUM ON PAVEMENT LCA 2014

This workshop, hosted by the University of California, Davis and the University of California, Berkeley, will focus on the implementation of Life Cycle Assessment (LCA) for pavements. The workshop will be coordinated with activities of the FWHA Sustainable Pavement Technical Working Group. The workshop subject is implementation of LCA in pavement operations, at network and project levels. The purpose of the workshop is to review current status and develop recommendations for implementation of pavement LCA in North America. This workshop will be a follow up to the 2010 Pavement LCA workshop held at UC Davis and the 2012 RILEM meeting on LCA for pavement materials held in Nantes, France.

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IFSTTAR'S WEBSITE OPENS UP ITS DOCUMENTARY DATABASE AND ITS IMAGE/VIDEO LIBRARY TO THE PUBLIC



The entire scientific and technical documentary collection of the Institute, as well as its photos and videos, are now freely available on the Internet, respectively via the Madis scientific home page and the Pictolab photo/video library. They contain a wealth of information and images within the Institute's research areas (infrastructures, geotechnics, engineering structures, civil engineering, urban engineering, modes of transportation, road safety, etc.)

→ <http://www.ifsttar.fr/ressources-en-ligne/colonne-1/portail-outils/portail-documentaire/>

DIARY

May 21st-23rd • International Transport Forum - Leipzig
<http://2014.internationaltransportforum.org/>

June 11th-12th • Technical Workshops on Engineering Structures - Marne-la-Vallée
<http://actions-incitatives.ifsttar.fr/seminaires/joa/>

June 16th-19th • 10th ITS European Congress - Helsinki
<http://www.itsineurope.com/its10/>

June 19th-20th • SIMBIO-M 2014 conference - Marseille
<http://simbio-m.ifsttar.fr/>

July 8th-11th • 7th EWASHM - Nantes
<http://www.ewashm2014.com/>

On the way to mobility 2.0

On 11th February 2014, during the National Day for Mobility 2.0 in Versailles-Satory, Frédéric Cuvillier, Minister for Transport at MEDDE⁽¹⁾, announced initiatives to structure the intelligent transport systems sector in France. Key moment of the day: the creation of the VeDeCoM Institute⁽²⁾, dedicated to research on green mobility.

No less than 500 transport experts from the public and private sectors have had roundtable debates on the importance of digital technologies applied to transport, in terms of safety, but also comfort, accessibility and energy savings. Around 50 research findings were presented (32 from IFSTTAR), as well as 12 demonstrations for communicative or automated vehicles on Satory's test track. The main issues associated with intelligent transport systems have been explored: data and digital applications, intelligent vehicles, networks.

"The debate on driverless automated vehicles was very successful, as were the demonstrations, especially with the vehicles from IFSTTAR, INRIA⁽³⁾, Renault and ADM Concept," observes Jean-Marc Blosseville, Deputy Director of Versailles-Satory site, who was highly involved in organi-

sing the day. There are no impediments to road testing, but deployment will be very progressive, first for parking (automatic, then eventually through smartphones) and automated driving in cases of congestion at 30 km/h, then at 60 km/h. The strong mobilisation of the French administration should help change the law. Starting in March 2014, at the instigation of Frédéric Cuvillier, the sector's stakeholders will gather together with this in mind, but also to prioritize services to be developed and identify the needs for changing regulations ...

Better information for better anticipation

The Minister has also announced the launch of research on 'talking cars' within the scope of the Scoop@F Project: from now till 2016, over 3,000 vehicles will be tested on 2,000 kilometres of connected roads. Position, car speed and obstacles will be communicated to the road through Wi-Fi, which will provide information about authorised speeds, works in progress, accidents, etc. Two other initiatives have been mentioned: the release of public transport data in October 2014 to allow creation of new services for mobility; the construction of a national multimodal itinerary calculator for smartphones to organise your trip in real time, starting in March 2014.

(1) Ministry of Ecology, Sustainable Development and Energy

(2) Decarbonated 'talking cars' and their mobility

(3) National Institute for Research in Computer Science and Control



QUESTION FOR JEAN-MARC BLOSSEVILLE,
deputy Director of IFSTTAR's site in Versailles-Satory

**WHAT KIND OF RESEARCH WILL BE
IMPLEMENTED AT THE VEDECOM INSTITUTE?**

This public-private partnership, totally unheard of before, will allow us to transfer our most advanced technical research and deploy solutions on three unanimously recognised themes: electrification

of vehicles, delegation of driving and connectivity, and new mobility systems. Internally, we will pursue more prospective research, for example, on system-wide networks, impact analyses... The tasks will first be undertaken at our shared premises at the LIVIC⁽⁴⁾ laboratory in Versailles, then, at the end of 2016, in a future building at the Satory site: 280 researchers will be gathered there in three years' time, 340 in ten years.

VeDeCoM, with 54.1m€ over ten years within the framework of "Investing for the Future" Initiative, gathers together 42 partners, of which 10 are founders⁽⁵⁾. ■

↳ jean-marc.blosseville@ifsttar.fr

(4) Laboratory for Vehicle Infrastructure Driver Interactions

(5) Mov'eoTec, CETIM, ESIGEELEC, ESTACA, IFPEN, IFSTTAR, PSA Peugeot-Citroën, Renault, Safran, Valeo



Patent for the Algoroute project: “Microalgae for asphalt”

Faced with the inevitable increasing rarity of petroleum, and in anticipation of energy transition, we need to find a material offering an alternative to asphalt without damaging pavement durability. This is the goal at the heart of the Algoroute project, in which the possibility of producing a binder using a promising biomass, microalgae (or more specifically, the residue resulting from initial development), was analysed. To that end, IFSTTAR gathered together various skill sets from the academic and private sectors: process engineering, chemistry, and specialists in the exploitation of microalgae. These partners were united under a “scientific wager”, co-financed by Pays de Loire Region (2011-2014). At a total cost of 320,000€, the Pays de Loire Region provided 250,000€, with the remainder mainly being financed by IFSTTAR (funding a PhD student). IFSTTAR’s

direct involvement consisted in the task of leading the project and in performing physical-chemical tests, traditionally used for asphalt.

The primary outcome is the development of a procedure for transforming micro-algal biomass through “hydrothermal liquefaction”. This method produces a material rheologically similar to petroleum-based asphalt. This invention was the object of a patent application filed in France on 26 September 2013 under no. 13,59293 in the names of ALGOSOURCE, IFSTTAR, the University of Nantes, CNRS (National Center for Scientific research), ONIRIS and the Ecole des Mines of Nantes.

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Evaluating driving in real time

IFSTTAR is one of the key partners of the European project UDRIVE (European naturalistic Driving and Riding for Infrastructure & Vehicle Safety and Environment), a large-scale European study on road user behaviour.

Launched in October of 2012, UDRIVE gathers together 19 European institutes of academic and industrial research. “It’s a large-scale study on European driving behaviour under actual conditions,” explains Hélène Tattegrain, LESCOT Director.

“The goal is to establish an immense database in order to draw conclusions which will result in improving road safety.” IFSTTAR, particularly active in this sector, is coordinating this project by involving two of its Units: LESCOT and LIVIC. Over two years, 400 drivers – in 120 cars, 50 lorries, and 40 motorised two-wheelers – will be filmed while driving their own vehicles. Their driving will be recorded using sensors; their field of vision will also be filmed and GPS data will be continually collected in order to reconstruct the vehicle’s trip. IFSTTAR is in charge of analysing most of the data; LIVIC will be responsible for those related to accident causes; LESCOT for those related to driver behaviour. “We hope, in particular, to better understand how drivers interact with pedestrians, cyclists and other drivers, and to identify what might distract their attention and cause accidents,” Tattegrain clarifies. “IFSTTAR will especially work on the major causes of the lack of road safety by focusing on incidents.”

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Freight transport in minute detail

Several innovative freight transport solutions will be assessed within the scope of the international MetroFreight project.

Freight transport creates problems of congestion, noise nuisance and pollution. *"However, some solutions are emerging and out of one million deliveries undertaken every day in the Paris region, several tens of thousands are already innovative,"* explains Laetitia Dablanc, Research Director at Production Systems, Logistics, Transport Organization and Work Laboratory (SPLOTT). Over the

last few years, tricycles (either motorized or not), electrical vehicles, local deliveries, storage spaces in city centres, and barge delivery systems are appearing. That is a lot of solutions, but still being assessed badly.

This is the reason why, within the project MetroFreight (2013-2017), IFSTTAR is leading ten or so studies on the Ile-de-France (Paris region) based on a survey result of the CNRS Transport Economics Laboratory on freight transport in city centres. *"Our objective is to contribute to the analysis and development of modeling tools, allowing politicians to better understand the behaviour of this complex system, which mirrors the changes of urban economy, such as e-business",* adds Laetitia Dablanc. PhD students will look into congestion problems and localisation of storage spaces. Pollution due to lorries, as well as the socio-economic description of the freight transport delivery sector, will also be studied. A total of ten or so studies will be carried out at the same time on the Ile-de-France (Paris region).

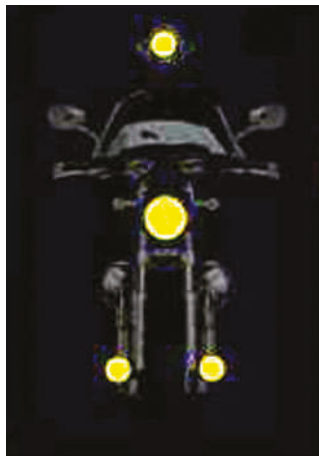
↳ laetitia.dablanc@ifsttar.fr



More visible motorcycles

LEPSIS is studying the visual perception of motorcycles by drivers and is offering new solutions.

"Since February 2011, day-time running lights are mandatory on all new vehicles, which no longer allows one to distinguish motorcyclists driving with all of their lights on in automobile traffic," explains Viola Cavallo, Research Director at LEPSIS. *Furthermore, car drivers are not able to correctly evaluate the speed of motorcycles and do not sufficiently anticipate their arrival time. When they have to turn left, the motorcycle is sometimes, unfortunately, already too close, and an accident occurs."* With this in mind, researchers at LEPSIS have launched the Avimoto Project – improve motorcycle visibility –, funded by the Maif Foundation. With highly innovative driving simulators at their disposal, they tested



various front-light configurations on two-wheelers. Using advanced High Dynamic Range techniques, in particular, they re-created the perception of motorcycle lights and vehicle lights under daytime, twilight and night-time conditions, with a good level of realism.

The results: yellow motorcycle lights are more recognizable. Their positioning makes a difference as well. So that a car driver can have an idea of motorcycle displacement, three lights are needed: two on the front fork, and a third on the motorcyclist's helmet. These results will without a doubt result in the creation of new regulations.

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IFSTTAR is the national contact point for transport-related European projects

The new Framework Program for Research and Technological Development (PCRD), named "Horizon 2020" (H2020), has been launched. As a major public partner in transport-related issues, IFSTTAR is coordinating the French support scheme for companies and research institutes to obtain European financing.

"The system, called National Contact Point (PCN), is nothing new," recalls Patrick Malléjacq, Director of IFSTTAR's European and International Affairs. He is also the coordinator for H2020 Transports PCN. "It was already a part of the 7th edition; each member-State has its own for each theme." The PCN's aim is to inform, make people aware, and advise project sponsors about H2020 financing options. This system makes perfect sense in France for making national investments more profitable. The French strategic agenda for research, transfer and innovation (France Europe 2020), adopted in May 2013, was created in compliance with H2020.



Transport on the front line

Horizon 2020 offers a new thematic organisation: the projects respond to society challenges such as health, food safety, climate, energy, transportation, etc. This last theme, funded with 6.3 billion Euros between 2014 and 2020 (545 million Euros this year), is second in terms of financing, higher than in the 7th edition.

70% will be dedicated to subjects concerning mobility, 25% to green vehicles and 5% to research in small and medium size businesses. Expected short-term impacts are detailed (cost reduction, increased efficiency...) each time, without limiting resources.

PCN Transport gathers together ten members⁽¹⁾. "We send a newsletter to the entire research and innovation community," explains Patrick Malléjacq. "We organise many regional seminars with local partners to explain the rules of participation, the opportunities and conditions for submitting proposals, and to explain project budgets. We advise project sponsors, we help them to join existing consortiums, we guide them towards other PCNs if necessary, etc." Many actions IFSTTAR also carries out internally for its own teams.

(1) Ministry of Ecology, Sustainable Development and Energy, Ministry of Post-graduate Studies and Research, Ministry of Productive Recovery, Mov'eo Competitiveness Cluster on behalf of clusters dedicated to the automobile (Mov'eo, Vehicle of the Future, ID4Car, LUTB), Alliances Ancre and AllEnvi, Aerospace Valley, Lyon's École Centrale, Paris-Est Marne-la-Vallée University, Industries association for construction and naval activities.

↳ patrick.mallejacq@ifsttar.fr

QUESTION FOR MATHILDE PICCO,
European Project Manager for the Mov'eo Cluster

HOW THE AUTOMOBILE COMPETITIVENESS CLUSTERS DO CONTRIBUTE?

This is the first time that we will be part of PCN, at the request of the ministries, so that innovation actors within our territories (major industrialists, small and medium size companies, laboratories) can take more advantage of European funding.

As for Mov'eo, it is turning more and more towards Europe, by supporting its members individually and by participating in European networks. In the PCN transport framework, we deal with all the questions related to subjects such as road transportation, urban mobility, information and communication technology, and green vehicles. We particularly offer our support to small and medium size companies (which comprises 60% of our members) for finding partners, building projects, joining

consortiums. We sometimes also suggest their participation in consortiums being created. These actions are in line with the H2020 official aim, to integrate small and medium size companies as much as possible in projects, by providing them with 20% of the budget (5% more than in the 7th edition): 15% within the framework of collaborative projects and, something new, 5% dedicated (without any specific theme) to feasibility or market studies, to R&D, or to facilitate their market access. ■



INNOVATE TO INVENT TOMORROW'S MOBILITY

Mobility is more and more perceived and claimed as a right. However, the equation is complicated and poses a significant social challenge: achieving a more sustainable and green mobility, but also smarter, safer and more comfortable. To address it, research has been called to the forefront.

Mobility, and more generally, transportation will need to make big changes in the coming decades. Privately-owned cars will more and more communicate with each other, and with their environment, and will also become more intelligent, aware at every moment of their precise location. Public transportation will be able to anticipate some system failures. As for soft modes of transport, they will be better integrated into urban traffic using new driving regulations. These are some of the avenues being explored by IFSTTAR. Here is a glimpse at what the mobility of tomorrow might look like.





'TALKING' CAR

One solution for meeting the mobility challenge is to make our cars more intelligent, having them communicate with each other, with other road users, with road infrastructures and road management centres. This is what experts call C-ITS (Cooperative Intelligent Transport Systems). Such sharing of information might warn of imminent dangers, for example, or indicate the speed to use for going through green lights, or available recharge stations for electric cars, or even provide the time remaining for the light to turn green. *"But before deploying multiple services harmoniously on a European scale, a number of tests is necessary. Hence IFSTTAR's active implication in the SCORE@F Project¹, which ended in 2013,"* explains Jacques Ehrlich, Director of the LIVIC (Laboratory for Vehicle Infrastructure Driver Interactions). Project goal: evaluate the various C-ITS services on a simulator, on IFSTTAR's test track in Versailles-Satory, but also on roads and highways.

"Our teams were given many assignments: develop user services, integrate the SCORE@F system into our vehicles, determine the detection rate of messages about imminent danger sent to the vehicles, evaluate the range and quality of signals broadcasted and the time between the occurrence of an accident and the moment when the driver was warned, etc.," he clarifies. Their work has allowed us to show that a vehicle driving the wrong way receives a warning message without fail, and that 95% of the vehicles in the vicinity are also warned. What's more, according to the nature of the signal and the surroundings, the range varies from 300 metres to a kilometre (in a rural setting). In some technical configurations, the number of messages exchanged between vehicles is sometimes too many, which overloads the systems. This is a problem we need to resolve.

"Analyses of driver behaviour (carried out by Renault and PSA) are also rich with information," adds Ehrlich. The services aimed at enhancing security are particularly appreciated, significantly improving the drivers' vigilance: they anticipate deceleration or lane changing more quickly. Conversely, some information



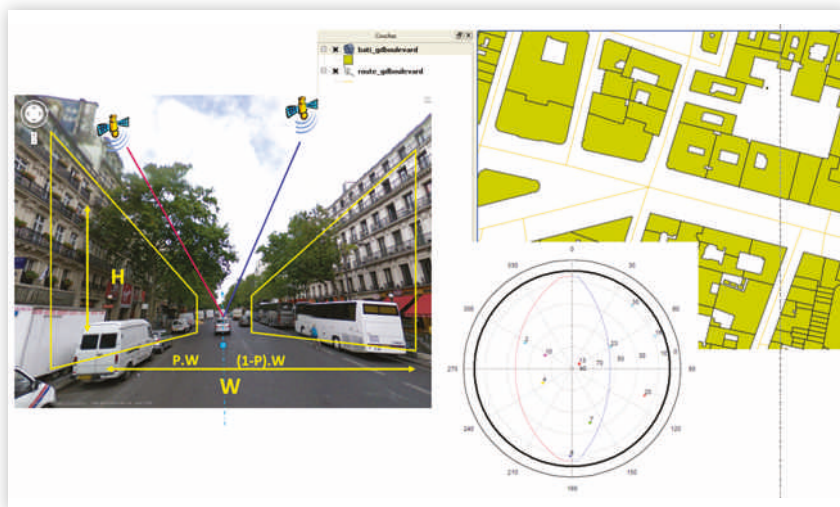
THE SERVICES AIMED
AT ENHANCING SECURITY
ARE PARTICULARLY
APPRECIATED

considered as not pertinent by a driver might be uselessly stressful to him, which could become dangerous. Another observation by users is that the imprecision in the lateral localisation of events reported does not allow providing information about in which lane they are.

1. Experimental Cooperative Road System for France. Project led by Renault and approved by the Move'o cluster.

GPS POSITIONING IMPROVED

Other experts are working on improving the precision of vehicle positioning. Because 20 years after its official launch, GPS still generates too many errors. Case in point: some materials commonly used in urban building façades (metal, reinforced concrete, etc.) that reflect signals sent by satellites. Solutions exist to correct this phenomenon of multiple paths, characteristic of the traffic lanes bordered by tall buildings – that experts call urban canyons or urban trenches.



“THE PROJECT WILL CONCLUDE AT THE END OF THIS SUMMER, BUT WE ARE ALREADY IN CONTACT WITH MAPPING COMPANIES WORKING IN THE SECTOR OF INTELLIGENT TRANSPORT SYSTEMS TO STUDY HOW THEY COULD INTEGRATE OUR METHOD”

“They work well when they receive both direct AND reflected signals at the same time, but they are not efficient if receiving only reflected signals. We can automatically eliminate signals that are too weak, but that reduces the sensibility of the sensor too much, which we need to keep unspoiled, on the contrary, in these problematic environments where visible satellites are rare,” David Bétaille explains, researcher at the geolocation laboratory at the Nantes site. In the end, the error in positioning may reach 10 metres, which is incompatible with today’s expected precision as regards road transport modes, for each and every thoroughfare.

To try to remedy this problem, IFSTTAR has been involved in the INTURB² Project since 2012. “In this context, we have developed a method for distinguishing satellites that emit their signals directly to the vehicle, from those in which the signals are first reflected

by the structure, Bétaille points out, “And instead of eliminating the latter, our method corrects them to improve the precision of the positioning.” Using an Institute car equipped with a high-end inertial navigation system, Bétaille and his colleagues first recorded the trajectories in traffic lanes... down to the decimetre! Then, with Google Street View, they estimated the width of these traffic lanes and the height of the buildings on each side. Using this data, they created 3D modelling of the lanes and thus determined the direct and reflected signals of the urban trenches travelled.

The results: their modelling reduced the positioning errors in 3D by almost 70%, going from a median of 31 to 9 metres. The INTURB team automated the method by creating an algorithm based on BD Topo, an IGN database that provides all the axes of all the traffic lanes in France, as well as the position and height of all the buildings that border them. Here again, the precision was improved to around 70%. “The project will conclude at the end of this summer, but we are already in contact with mapping companies working in the sector of intelligent transport systems to study how they could integrate our method,” Bétaille concludes.



Researchers are also interested in soft modes of transport such as bicycles. Based at the site in Versailles-Satory, researchers from the Mobility and Behaviour Psychology Laboratory (LPC), have studied, for example, the perception by 2,000 road users of two very recent cycling paths: the contra flow lane (DSC) and the right turn on red (TAD)³. Having already been rolled out in numerous French towns, the former allows bicycles to drive in the opposite direction of oncoming traffic on one-way roads, using a dedicated bicycle lane. Still very rare, the latter permits cyclists to turn right at a red light, while of course yielding to cars in the transversal lane onto which they are turning, as well as pedestrians.

In concrete terms, the team first had participants fill out a detailed questionnaire to assess their knowledge about these two cycling paths. Then, the paths were presented to them in detail: photos of streets with contra flow lanes, intersections with right turn on red for bicycles, associated road signs, explanations of how they work, and even videos of real-life situations. The participants' opinions about these paths were then collected: are they well conceived, useful, obstructing, dangerous...

"At the beginning of the study, 63% of the participants actually knew how a contra flow lane works, while only 7%

knew for the right turn on red," points out Nadine Chaurand, researcher at the LPC. "The right turn on red being much less common, we expected it to be less widely known... but not that much! The percentage among frequent cyclists barely reached 12%." These stats should be of concern

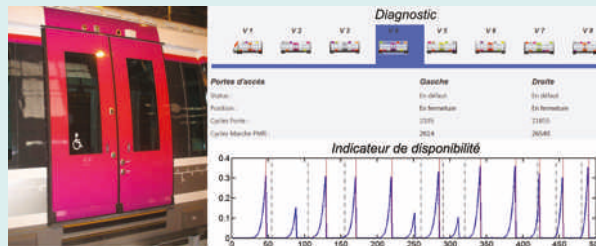
for road safety in cities. The data obtained on the perception of these two cycling paths are just as interesting. While the right turn on red is found to be more obstructive than the contra flow lane for pedestrians, the latter is considered more obstructive than the former for cyclists and drivers, especially in certain situations, such as on narrow streets, when lorries are present, or when a car exits a carriage entrance.

Using all of the results collected, many possibilities for improvement are worth considering: communication initiatives and training programmes about the right turn on red, first and foremost, aimed at non-cyclists; creating signs for the right turn on red to place on transversal lanes to avoid drivers thinking that the cyclists are going through a red light; better marking for contra flow lanes in front of carriage entrances (on the ground, signage, etc.)... "It would also be interesting to carry out studies taking into account a larger number of factors: the intensity and the distribution of traffic; special cases; intersections that may particularly cause accidents, etc.," Chaurand concludes.

2. Positioning INTEgrity in URBan Environments. Project financed by the General Directorate of Infrastructures, Transport and the Sea, involving IFSTTAR and the Mathematical Computation Society.

3. Proposed Acceptability for Contra flow lanes and Right turn on red for bicycles.

TRAINS: A VIRTUAL AGENT FOR MAINTENANCE



conditions," explains Laurent Boullaut, researcher at the Engineering of Surface Transportation networks and Advanced Computing Laboratory (GRETIA). This demonstrator, currently being manufactured, is composed of an industrial PC embedded on the TER that transmits information about the running state of the doors and the access steps by radio: any friction, problems with the drive belt tension, etc. "On the ground, algorithms developed by our team generate real-time warnings if critical thresholds for malfunctions are reached." Consequently, maintenance teams can react preventively before an actual failure occurs. "Finally, we have developed a software to optimise the maintenance of these passengers' access services."

1. Project leaded by Bombardier Transports, approved by the i-Trans and Advancity clusters.

A door that wouldn't open, a folding step for people in wheelchairs that jammed... it does not take more to block a TER (Regional Express Train) at the platform and disrupt the whole network. To prevent this problem, IFSTTAR has participated in the SurFer Project¹. "It has allowed us to develop a predictive diagnostics demonstrator tested across the Paris network under actual

VÉLIB' MODELING

Using data provided by JCDecaux and Paris' City Hall, IFSTTAR researchers analysed Vélib' use in Paris.

Objective: to help localisation and size of bike sharing systems.



SOME FIGURES:

1,226
Vélib' stations

39,936
terminals

18,092
bikes being used

When the Vélib' experience started in July 2007, 7,000 bikes were spread out over 750 stations. Six years later, the bike fleet has almost tripled, to 20,000 Vélibs, 1,200 stations and 220,000 yearly subscribers. A team at IFSTTAR's Engineering of Surface Transportation networks and Advanced Computing Laboratory (GRETTIA) in Marne-la-Vallée has started to study this transformation through data provided by Paris' City Hall and JCDecaux, the French specialist in urban advertising, which is also in charge of the system.

"Along with free access information like the usage rate of Vélib' stations, we used five months of anonymous data from pick-up and drop-off terminals of each bike used," explains Latifa Oukhellou, researcher at GRETTIA. Using this data, researchers have identified the various usages and shown that all stations were not used in the same way. *"Some are almost exclusively used for commuting trips between*

home to work, while others are rather used for leisure," continues Etienne Côme, working in the same laboratory. It has highlighted the "pulse" of the city, created by the daily trips of Parisian cyclists, commuting between home and work.

"Inherently, this data says a lot about how the city works at a socio-economical level," Latifa Oukhellou continues. *"It can also allow us to forecast the number of bicycles coming in and out, and help the stations function better."* This is a first step towards modeling the Vélib' network and anticipating this system's behaviour in cases of expansion or major changes. The researchers will thus benefit from the experience acquired in Mobilletic, a new inter-ministerial research and innovation project on ground transportation that will give the opportunity to study all transport modes in the city of Rennes, including self-service bicycles.

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↳ To see the city's pulse: <http://www.comeetie.fr/blog/?p=255>

WHAT ARE YOU EXPECTING FROM THE ANALYSIS OF THE VÉLIB' DATA BY IFSTTAR?

A better understanding of the system. The general behaviour of the Vélib' network is overall well understood, because it repeats from one year to the next. So we are able to forecast the flow of bicycles, especially according to weather forecasts

and the season, and react accordingly. However, we are unable to anticipate the effect of a change in the network, such as an extension of the network, a shift in location or enlarging the stations. This is why we are interested in system modeling.

It could also help us optimizing the way we re-distribute the bikes daily.

QUESTION FOR MARC MERLINI,
director for Mass Public Applications
at JC Decaux.

2014 RESEARCH PROGRAMME: a document reflective of research carried out at IFSTTAR

Within 100 or so pages, we find a selection of major projects completed in 2013, and others that are projected to be finished in 2014, and, finally, some new projects. This document provides a good overview of the research being produced at IFSTTAR; it will be soon available on the Institute's website.



"It's the second edition of the document in its present form. It serves as the basis for communication with our technical mentor, the MEDDE¹, about our research at the close of the year. It will then be subject to formal approval by our scientific committee in March," summarizes Marie-Line Gallenne, Deputy Director of Research and Support for Public Policy Planning (PAPP).

It is a good illustration of the variety of means undertaken by the Institute vis-à-vis its aims to improve the quality and security of citizens in the sectors of transport and urban planning. It is also a tool that allows us to measure if the research conforms to the commitment of objectives and performance. *"Its task is twofold," she explains, "to present the research we plan to begin and complete (programme), and that which we finished last year (assessment), without forgetting the deliverables that can be disclosed such as software, patents, calculation codes, procedures and methods of measure, databases, public works, expertise, etc. On about half a page each, we present over 120 projects, 40-some deliverables, and six federating projects² among the 20-some in which IFSTTAR is taking part, in this 2014 version."*

A unique identity

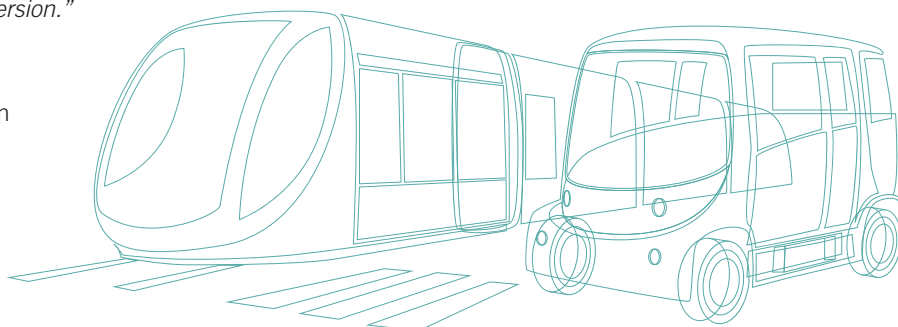
Most of our research is contractual, within the framework of departmental or national funding, such as the National Research Agency (ANR), or international financing, notably within the context of European projects, usually over three or four years.

Moreover, in order to initiate cross-cutting projects between the five departments of the Institute, created in 2013, and to establish IFSTTAR's identity, research management tools were strengthened last year. They are now being distributed among the teams. The GERi (Research and Discussion Groups) allow to build multidisciplinary scientific networking on transversal topics, common issues for many departments or laboratories; the ORSI (Strategic and Incentivized Research Operations) are veritable research programmes grouping together numerous multidisciplinary projects carried out in partnership with the scientific and technical network, notably the CEREMA. The R2I (IFSTTAR Incentivized Research) allow to explore new ideas and new tools (material, software, databases, testing, new types of surveys, etc.). This year, 22 GERi already exist, of which 3 are new; 40 ORSI, of which 8 are new; and 18 R2I, of which 7 are new.

"We have already observed a certain balancing of our research on the four axes defined in our scientific strategy," says Gallenne, *"especially towards an understanding of the impact of pollution on health, and a more asserted concern for cities in relation to mobility, and urban and environmental planning. This proves that we have correctly anticipated the research topics."* The 2014 research programme is marked by the creation of the CEREMA in January 2014, and the desire to consolidate partnerships with the 11 previous departments of the METL³ and the MEDDE. *"It was an opportunity to look back at collaborations we had in 2013 in order to establish partnerships based on strong and lasting commitments under new forms,"* she affirms.

- (1) Ministry of Ecology, Sustainable Development and Energy
- (2) R5G, Equipex Sense-City, IRT Railénium, IRT Jules Verne, ITE Efficacy, ITE Vedecom
- (3) Ministry of Territorial Equality and Housing

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Interview with Julian Devaux

PhD student at IFSTTAR's Laboratory for City, Mobility and Transport, Julian Devaux earned his degree at the end of November 2013.

His subject: how does daily mobility influences teenagers' socialization in a rural environment.

Today, he teaches Sociology at Paris-Est Marne-la-Vallée University.

WHAT TRIGGERED YOUR INTEREST IN THE SUBJECT?

I had noticed that there were many studies on teenagers in urban suburbs, but very few on those living in a rural environment. And that none of them were dealing with daily mobility. Yet, a lot of research showed that trips regularly made by teenagers are key to freeing themselves from codes passed on by parents or in school, and to becoming more independent. I also had a more personal reason: I myself spent my adolescence in a rural environment, in a little village 15 kilometres from Auxerre. And like the one I studied for my thesis, apart from the school bus, there was no public transport!

HOW DID YOU PROCEED?

From March 2010 to September 2012, I followed about twenty teenagers between 11 and 19, in their daily lives; they were living in a small village of about 400 inhabitants, located in the Gâtinais francilien. Thanks to several interviews with each of them, I collected a wealth of data on the types of transportation they used, the places they went to and the frequency of their outings, who they were going with, what they did, etc. I went with them on some of their outings. I also asked some of their parents about their educational strategy related to types of transport, their own uses of transport or their residential trips.

WHAT DID YOU DISCOVER?

The mobility of these teenagers influences their socialisation on different levels. Firstly, it obliges them to create relationships with other teenagers to take advantage of rare occasions for getting a ride: the cars of those who already have a driving licence, the back seat of a scooter, a parent's car, etc. Secondly, the reason for their trips determines their cultural tastes. Contrary to teenagers who limit their trips locally (generally working class), those who travel regularly to neighbouring urban centres,

quickly adopt an urban culture; this is especially the case in children of executives with urban origin who present a much stronger socialisation. Thirdly, those who travel the most are more likely to move if necessary, especially if their parents have moved around a lot. Lastly, I observed that boys occupy public space quicker (first on bicycles, then on scooters), whereas girls – much more protected – must be content with walking for a longer time.

HOW CAN WE IMPROVE THE MOBILITY OF RURAL TEENAGERS?

The easiest way would be to increase the choices of public transport in rural areas, but it costs a lot of money. Another option would be to increase school and cultural outings because, for some teenagers, it is the only way to get to town. During these outings, I observed that teenagers who rarely leave their village are highly apprehensive of urban public transportation. Lastly, we could imagine reducing the cost of driving licences in rural areas, as access to cars is key to pursuing higher education and obtaining a job.

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Budapest: first under- ground line without a certified driver



An IFSTTAR team has carried out the certification of the automated system of line 4 of the brand new underground in Budapest, Hungary.

The story begins in the 1970s, when Lille's underground launched one of the very first automated lines without a driver. *"A centre of competence and expertise for automated systems was born in the region within INRETS,"* explains François Baranowski, Research Director of the ESTAS (Evaluation of Automated Transport Systems and their Safety Laboratory) research unit at IFSTTAR in Villeneuve-d'Ascq. *"This specialisation has endured over the course of automated underground systems in Europe."* And those skills are still recognized around the world, notably by CERTIFER, one of the world leaders in Independent Safety Assessment (ISA) of Railways and other Guided Transport Systems.

"CERTIFER OFTEN CALLS ON US FOR THE CERTIFICATION OF AUTOMATED SYSTEMS,"

"CERTIFER often calls on us for the certification of automated systems," Baranowski continues. And that was the case for line 4 of Budapest's underground. *"The Hungarian network is one of the oldest in Europe, and up till now only line 2 had undergone major renovation works, with among other things, the setting up of an autopilot system, redundant with the driver,"* he carries on. *"Line 4 will however be the only one without a driver."* This 7.5km-long line will be equipped with a laser security system, as in Lyon, which allows the detection of a user eventually falling onto the tracks.

Tested by IFSTTAR, the automated systems developed by Siemens should receive its ISA certificate of security in March. Line 4, currently in its testing phase, will open its doors to the public as soon as the certificate will be issued.

■ WHY CALL ON IFSTTAR?

For our expert assessments, we have a panel of around 400 people at our disposal, among which are full-time staff at CERTIFER, some freelancers, and some retired persons, as well as some employee provided by the RATP, the SNCF and IFSTTAR. This Institute has always been a privileged partner of our agency since it participated in our creation in 1997. It is part of our various structures even today. It is also a major stakeholder in the field, notably in the certification of rail-telecommunications systems such as the GSM-R (with the Laboratory on Electronics, Waves and Signal Processing for Transport: LEOST), and of course, for that of automated underground systems. Baranowski's team performs over half of our certifications in this sector. It has experience in that certification, having already worked on the Siemens system of the Turin underground, and long before that, on Lille's system. Our client Siemens has absolute confidence in the team.

Question for SERGIO FURLAN, Business Engineer for the rail-certification agency CERTIFER.

Critical overview of urban policies



Soft transport modes, tramways, green networks, empty streets, slow cities..., what do these trendy words hide? Answers and thoughts in a book, *Nouvelles idéologies urbaines* (new urban ideologies), co-written by

Hélène Reigner, researcher in Political Sciences at IFSTTAR, and published by Presses Universitaires de Rennes in October 2013.

HOW DID THE IDEA TO WRITE AN "ANALYTICAL DICTIONARY OF MOBILE, GREEN AND SAFE CITIES" COME ABOUT?

It was the result of a long-lasting cooperation that started in 2007 between the two other co-authors: Thierry Brenac, researcher at IFSTTAR, and Frédérique Hernandez, professor of Space Management and Urbanism at IUAR-AMU*. The 6-handed writing process took some time, but it forced us to avoid the usual professional jargon. We wanted to distance ourselves from trendy semantics and technical objects considered as inherently virtuous. This book is a tool for students and professionals, to arm them for complex realities.

HOW DID YOU CHOOSE THE TWENTY-SIX DEFINITIONS: THE RIGHT TO MOBILITY, PEDESTRIANISATION, ELECTRIC VEHICLES, MEETING POINTS, ETC.?

The list could have been much longer! The common denominator in these expressions is that they are ubiquitous in urban policies, which promise to "make our lives and cities more beautiful". They are often used and are imposed on us as so obvious that we don't wonder about them anymore. Yet, we should be wary of the obvious! We wanted to bring out what was behind those slogans, the understated social consequences, building on results from international scientific literature.

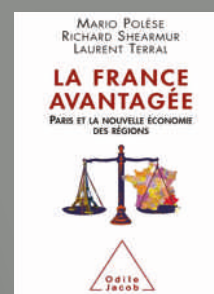
WHAT THESIS DO YOU SUPPORT?

At the service of noble causes such as safety or sustainability, these urban policies are consensual, whereas they are at the core of major issues. This book is very close to our hearts because it is our role as researchers to tell practitioners and politicians: beware of these tools; they are not simple tools of traffic organisation. Beware of their social consequences. For whom are you making cities and lives more beautiful? To certain categories of users at the expense of others.

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LA FRANCE AVANTAGÉE
PARIS ET LA NOUVELLE ÉCONOMIE DES RÉGIONS



Authors: Mario Polèse, Richard Shearmur and Laurent Terral (IFSTTAR - LVMT)
Editions Odile Jacob
224 pages

LES MÉTROPOLIS FLUVIALES
CONCILIER AMÉNAGEMENT ET LOGISTIQUE POUR
UN DÉVELOPPEMENT URBAIN DURABLE



Supervised by Antoine Beyer (IFSTTAR - SPLOTT) and Jean Debie
Critiques & cités, département Futurs Urbains
L'Œil d'Or, 2014
316 pages

MÉTHODOLOGIE DES ENQUÊTES
« CONDITIONS DE TRAVAIL DES CONDUCTEURS
DE POIDS LOURDS »
DE LA CONCEPTION AUX DONNÉES EXPLOITABLES



Authors: Marie Lebaudy / Patrick Hamelin
Ref: OM13

meeting with

Henri Van Damme left IFSTTAR at the end of January 2014. Scientific director since 2009, he participated in its creation in 2011. Before joining to the Massachusetts Institute of Technology (MIT) in Boston to teach and do research on energy, he presents us with an informed look at the Institute.



IFSTTAR'S CHALLENGE IS TO MAKE MOBILITY SUSTAINABLE, FROM A TECHNICAL, ENVIRONMENTAL AND SOCIETAL PERSPECTIVE.

Three years after its creation, what do you think of IFSTTAR?

As I've always said, the roadmap given to the Institute is a golden opportunity, central to the concerns for citizens (land-use planning, mobility, transport, cities, etc.). Despite everything, our research community is undersized for meeting these expectations: for the last National Research Agency's calls for tender, in October 2013, the mobility and sustainable city sectors accounted for less than 3% of the 8,500 proposals received. That's far too few, in my opinion!

About Innovate mobility, what is the perimeter of the Institute?

On the one hand, IFSTTAR is a road safety observatory for the factors that lead to accidents, and their consequences (in particular, barely avoided "near-accidents") and on the evolutions of the practices of mobility. For example, it's good to know if the cap on mobility (in kilometers travelled) will become widespread, or remain restricted to a rather young, urban and rich minority.

On the other hand, the Institute performs research: on road safety (vehicles, road networks, from road signage to biomechanical studies in order to reduce the passenger injury, etc.); on traffic flow (information for drivers or operators, etc.); on the impacts of transport (pollution, noise, etc.); on new energy solutions; on intermodality and new services linked to mobility (car pooling, services in train stations, etc.); and even planning.

As far as road safety is concerned, how is the research divided among the other actors, especially with automobile manufacturers?

We ensure that they are complementary. Car manufacturers are investing heavily in the weight reduction of vehicles, in automated driving, or in the batteries of electric cars, while we focus our means on better management of this electrical energy or, in the longer term, within the framework of our 5th Generation Road (R5G) project, on roadway induction recharging solutions. We also perform monitoring on long-term solutions, such as for fuel cells. In general, IFSTTAR must continue to work upstream,

in partnership with the manufacturers and stakeholders in mobility, to provide them with basic knowledge.

How do you envision the Institute's future?

We are convinced that mobility is a right that citizens are not willing to give up. Our challenge is to make it sustainable, from a technical, environmental and societal perspective. In order to test our approaches, we should especially not miss out on the opportunities connected to the creation of Greater Paris. We are probably the only European institute to have such a wide variety of subjects, from engine specifications to land-use planning. The organization of the TRA 2014⁽¹⁾ European congress on ground transportation will give the Institute a deserved international influence, already acquired through international partnerships such as in the R5G project, or the mixed unit created in 2013 with our German counterpart, the DLR⁽²⁾. ■

(1) Transport Research Arena:
<http://www.traconference.eu/>

(2) Deutsches Zentrum für Luft- und Raumfahrt
German research centre dedicated to transport, aeronautics and aerospace.