TRAFFIC MANAGEMENT in urban areas

>>> THE FRENCH EXPERTISE <<<

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CHARGÉ DES
TRANSPORTS

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MEETING mobility needs

A SECTOR OF EXCELLENCE IN FRANCE, dating back from the 1970s, urban traffic management has led to the development of particularly innovative tools. The specificities of French towns, notably their very high density, has led to the development of effective systems of traffic management. French companies were able to develop these tools smoothly, with and for the towns, in response to the mobility needs of today and in anticipation of those of the future. French expertise has become a global reference point in this domain.

Innovative and interoperable, the urban traffic management systems combine a range of equipment and services: traffic lights at junctions, access control equipment, variable message signs, various sensors, on-board equipment in vehicles, parking terminals, communication equipment, central supervision and regulation systems, information systems and services. These different systems are perfectly compatible with each other since they all use standards agreed on by the towns, the state and the industrial sector. In addition, particularly stringent certification procedures assure the quality and robustness of this equipment.

These adaptable systems have been upgraded to become more sustainable. They are one of the levers of action that support the Urban Transport Plans, now required in all French agglomerations with over 100,000 inhabitants. Thus the traffic management systems can be used by actors in the mobility sector to reduce individual motorised traffic and promote active means of transport (walking, cycling) and public transport.

Quality performance in urban traffic management systems requires close cooperation between all actors, institutional, managers of the different infrastructures and transport operators. These systems should take the particularities of each region into account: French engineering firms are well-placed to provide guaranteed expertise in this domain. Finally, these systems require qualified human resources and effective maintenance. High-level training opportunities and quality maintenance services address these needs.

THIS DOCUMENT ILLUSTRATES

The main urban traffic management tools, using examples* of services or technologies developed by French companies

**The measures/ means and companies mentioned in this document are given as examples and do not claim to be exhaustive.*

TOOLS for the MANAGEMENT of URBAN TRAFFIC


intelligent
pedestrian crossing
new
urban delivery
services
tracking
public transport
vehicles
controlling
traffic sensors
PARKING
CENTRAL TRAFFIC
CONTROL SYSTEMS
TRAFFIC
USERS
INFORMATION

1. Managing TRAFFIC FLOW

THE MAIN MEASURES

- Real time management of traffic flows
- Junction regulation

WITH THE DEVELOPMENT OF THE AUTOMOBILE INDUSTRY in the 20th century, traffic lights have become vital as a way of regulating the ever-increasing level of traffic and ensuring the safety of motorists, pedestrians and cyclists.

Today, smart transport systems help to improve traffic management, including public transport. In France, the number of particularly densely populated towns, used by large numbers of road users, has led to the development of innovative solutions.

BORDEAUX

The Gertrude system

The combined semi-public company Gertrude Saem was founded in 1981 by the urban community of Bordeaux. Its initial aim was to reduce road congestion. The system marketed by this company is now used in many towns in France and across the world: Dunkirk, Reims, Troyes, Metz, Montpellier, Algiers, Monterrey, Porto, Lisbon, Wroclaw and Beijing.

Scheme

The Gertrude scheme enables real-time management of traffic lights. Using a network of sensors that measure traffic, it calculates every second the optimum settings of different traffic light junctions and transmits this information to the controllers.

Management

Traffic assessments rely on a dense network of sensors that record traffic flow and road occupancy and detect public transport vehicles. In order to reduce the costs of installing sensors, many towns now use wireless sensors (see Hikob firm page 17).

The system settings can be adjusted so as to:

- stimulate traffic flow on a certain road;
- reduce speed on another road;
- prioritise pedestrians at crossings;
- facilitate the circulation of public transport vehicles and emergency vehicles.

The system also contains a supervision function to manage various incidents and events.

THE ⊕

› The system has surpassed its initial objective. Owing to the integration of actions allowing priority at traffic lights, it can now contribute to greatly improving the flow of public transport vehicles.

www.gertrude.fr

CANNES

Navinéo

Navinéo is a system for real-time monitoring of a bus fleet using geolocalisation. The Engie Ineo firm has developed a variety of services: bus regulation, information on waiting times, incident management and requests for traffic light priority.

Scheme

Using a connected bus system, Navinéo notably makes it possible for the system that gives priority to public transport vehicles at traffic lights to be effectively managed.

Management

Whether the aim is to introduce a high-level bus service, or resolve specific local problems or improve punctuality, this system can be adapted to the characteristics of the junction and offers several different types of priority solutions.

- **Centralised control:** the on-board calculator filters priority requests in relation to the status of the bus (ahead/behind schedule). It sends the request, via the operation assistance system radio network, to the central traffic light management system which issues priority orders, taking into account the conditions recorded (degree of emergency, state of the traffic).
- **The request for long or short range priority:** each vehicle controls the triggering of the traffic light in the run-up to the intersection. For short range light turning, the priority request is transmitted locally directly from the vehicle. For long range light turning, the priority request is transmitted by the network's long range radio infrastructure.

THE +

- Increase in commercial speed and reduction in the number of vehicles in queues by reducing waiting times at traffic lights.
- Journey time reliability.
- Reduction of energy consumption.
- Driving flexibility and improvements in comfort.

Engie Ineo

Engie Ineo is an expert in electrical engineering, information and communication systems, transportation and mobility. With a network of 300 agencies in France and worldwide, it covers a very wide range of activities: installing transport, telecommunication and energy infrastructures, tertiary and industrial projects, security and defence projects. It works in all stages of these projects, from design to implementation. With over 15,000 employees, it is an innovative company that supports municipalities and regions in energy and digital transition. Engie Ineo is part of the Engie group.

www.engie-ineo.fr

PARIS

MediaCity

In operation on the T3 line of the tramway in the Paris region, this service guarantees priority to trams and ensures no cars or other road vehicles can block the level crossings.

Scheme

Citilog has developed an innovative solution for detecting traffic jams based on integrated video analysis in its MediaCity product.

Management

This product is used in around 20 crossing points between this tram line and the road network. The analysis module produces real time calculations of the spatial occupancy rate of waiting lanes for vehicles turning left. When a blockage risk is identified, an alarm is set off which extends the period of the interphase allowing the level crossing to be cleared so that it is free of all vehicles when the tram arrives. An approaching tram thus benefits from absolute priority to ensure comfort and commercial speed.

THE +

- This service avoids resorting to a special traffic light phase to manage left-turns that cross tram lines in central reservation zones. This phase would be especially detrimental to the flow capacity of traffic and the safety of pedestrians.

Citilog

Providing intelligent solutions for real-time supervision and video surveillance, Citilog offers turnkey or specific solutions from an image processing software suite in the field of transport (automatic detection of incidents, measurement of traffic and a comprehensive video management system). Citilog products appear on all types of infrastructure:

- tunnels (Lincoln-Holland in New-York, M30 in Madrid);
- bridges (Shanghai), Millau viaduct;
- urban roads.

Citilog has branches in the United States, Hong-Kong and Spain.

www.citilog.com

2. Optimising PARKING MANAGEMENT

THE LAW TO MODERNISE REGIONAL PUBLIC ACTION AND AFFIRM METROPOLISES of 27th January 2014 introduced decentralisation of parking jurisdiction.

The law provides that municipalities and inter-municipal associations should possess the means to organise parking regulation on public roads and to reinforce the efficacy of their urban mobility policies.
To deal with the current challenges of urban parking new management systems have emerged. This development is reinforced by the law of 2014 which provides that municipalities and inter-municipalities can delegate the control of on-street parking and set the financial penalties themselves in the event of non-payment.

THE MAIN MEASURES

- E-parking
- Optimisation of the use of parking spaces

CANNES

The Whoosh mobile application

The city of Cannes has been using the Whoosh service since 2013. It is marketed by Parkeon and facilitates paid on-street parking.

Scheme

Whoosh lets users pay remotely for parking rights using their mobile phones. It is free to register for the service which is done on the application or on the internet by entering one's registration number and e-mail. Vehicle number plates and bank details are only requested during the first transaction. Then, each time the car is parked, users can simply fill in the parking zone and the time period required. The parking charge is then paid by direct debit. The time period can be extended remotely and users receive a warning before the end of the parking time period and thus avoid infractions.

Management

All transactions are recorded in a data centre and are accessible on-line. Payment monitoring, management of parking ticket appeals and management of the end of time period alarm are all integrated into one interface. Parking validity can be monitored by parking enforcement officers by entering the number plate on their tablet which is connected to the web service. Eventually, the same tablet will issue the parking ticket if an infraction is found.

THE +

The city of Cannes:

- offers a simple, quick, practical, secure and ergonomic payment method which makes paid on-street parking more convenient, dynamic and fair in the eyes of the users;
- increases the rate of payment compliance by motorists and thus increases the associated revenues;
- can develop, using the data gathered, optimum methodologies for regional management, by analysing user behaviour and road use.

Whoosh's services are now used by over 30 local governments, such as Lille, Strasbourg, Nanterre, Saint-Étienne, Montreuil and Besançon.

Parkeon

By offering a cross-cutting service for parking management and ticketing solutions for public transport, Parkeon now works in 60 different countries and is accelerating its growth in emerging countries, in Eastern Europe, Russia, Latin America, Africa and Asia-Pacific, with a network of over 80 partners and distributors. The company employs over 1,100 people across the world, 500 of which are in Besançon.

Besançon is where Parkeon equipment is made but it is also the nerve centre where substantial R&D activities take place (over 8% of revenues are invested in R&D each year).
In 2015, Parkeon's total revenue amounted to 225 million euros.

www.parkeon.fr
www.whooshstore.fr
(application available on iOS and Android)

PARIS REGION

A parking guidance system

Unibail-Rodamco, owner of the Vélizy 2 shopping complex in the Paris region, one of the largest shopping complexes in Europe, introduced a parking guidance system in September 2011. The aim was to allow customers arriving at the shopping centre by car to easily find a vacant parking space in the car park.

Scheme

The parking guidance system in the exterior zones of the car park is made up of:

- **Occupation sensors,** supplied by SmartGrains and fitted into all 3,000 parking spaces in order to count the vehicles;
- **Active-control display boards,** supplied by the company SVMS, to indicate the number of free spaces.

When a motorist arrives at the car park, he/she can read the number of free spaces left in real time on the display boards. Zone-by-zone information is provided at the entrances and junctions and at the end of each row.

Management

Each space is equipped with a wireless, durable and extremely low consumption sensor (battery autonomy of 5 years). Each sensor is stuck on the ground surface and detects the presence or absence of a parked vehicle above it by measuring variations in the magnetic field. This detection method is not affected by exterior environmental conditions (rains, dust, etc.). The information is transmitted by radio waves to the totems at the start of each row and to the display panels which display in real time the number of available spaces and their location. As a complement, the shopping complex manager has the software to assess in real time how full the car park is and thus obtain useful statistics to manage the complex.

THE ⊕

› Parking guidance provides shopping centre managers with a dynamic, reliable and practical system so that their customers can find a parking space more easily and quickly. This system can increase the reception capacity of the car park by 10% and thus increase the number of visitors to the site.

SmartGrains

The start-up, SmartGrains, produces and markets a parking guidance package aimed at shopping centres, hypermarkets, supermarkets, stations and airports. The company was founded in 2009 and employs about 10 people in Paris and elsewhere.

www.smartgrains.com

MADRID

On-road parking enforcement outsourcing

Among other objectives, many local authorities aim to encourage faster rotation in saturated areas, promote modal reporting and improve compliance to parking payment obligations. In response to these issues, many countries are allowing local authorities to delegate on-road parking control. This is the case in the United Kingdom, Belgium, Spain and since 1 January 2018, in France.

Scheme

At the end of 2013, the city of Madrid outsourced the management of some of its parking system to the company Indigo - over 84,000 paying on-road spaces.

Management

Indigo company designs of innovative solutions and services to improve parking space use and financial management.

- **Automated enforcement**

A car equipped with a camera reads number plates and analyses the status of the parked vehicles. The number plate reading and the information provided during payment are checked in real time. With this solution, 1,500 spaces can be checked in an hour. In comparison, walking parking attendants can check 150 spaces in an hour;

- **Diverse payment means**

Payment can be made in cash, by card (prepaid or bankcard) or with a mobile phone (iOS, Android). If the motorist goes over the time limit, he/she must pay a fixed parking fine of €60. However, it is also possible, if the infraction does not go over an hour, to immediately regularize the situation for a total of €4.

- **Price modulation**

This means that parking can be managed in function to the type of client (resident or hourly), the type of car (polluting or less polluting) or depending on the occupancy rate of the zone. For example, prices can be raised in high traffic zones (town centres) in order to decrease the number of cars and relieve congestion.

THE +

- More flexible with an optimal client service for motorists.
- Appreciable results in terms of revenue for authorities and vehicle rotation in the city centre. Payment rates have gone up to 85% in Madrid and 95% in London.
- A system that supports city mobility policies (delineation of paying zones, support for managing enforcement and city centre decongestion).

Indigo

Indigo is a French company, a world leader in parking and individual mobility, that employs 18,000 people in 17 countries and over 500 towns and cities. It is the only operator in the sector to be active in three continents and in all types of parking: on-road, public multi-story car parks and private shared car parks. Indigo operates over 4,600 car parks across the world, with over 2.3 million parking spaces and over 2,500 kilometres of on-road parking. In a burgeoning mobility market, projected to be worth 100 billion euros by 2025, Indigo is a key actor in mobility of the future. In Belgium, Spain, Great Britain and soon in France, Indigo manages enforcement and fines for clients who break the rules, in line with local regulations.

www.parkindigo.com

3. Implementing MULTIMODAL MANAGEMENT

IN RESPONSE TO A GROWING DEMAND FOR TRANSPORT, cities have implemented policies that promote public transport and non-motorised means to limit pollution and mitigate saturation of the road network.

The interaction between the different modes makes a multimodal management of travel necessary. Many cities have decision-making structures that facilitate discussion between the actors.

THE MAIN MEASURE

Centralised multimodal mobility management

BRUSSELS

Claire-Siti

The Claire-Siti platform has been developed by the French institute of science and technology for transport, development and networks (Ifsttar). It is used in France and abroad in Brussels and New Dehli.

Scheme

Claire-Siti is a tool designed to manage mobility phenomena with a resolutely multimodal and inter-modal approach. The system allows:

- the integration of multimodal transport data;
- supervision in real-time of how all types of network are operating;
- analysis of performance (service quality, greenhouse gas emissions);
- help-to-mobility services to be provided.

In Brussels, the system is used to supervise bus and tram networks.

Management

Claire-Siti has different functions:

- an interpretation function that tracks performance and incident indicators;
- a diagnosis and information function that communicates network malfunctions, highlights the causal links between different malfunctions, and informs users and operators on disruptions affecting the various modes of transport;
- a decision-making function for action planning (such as bus timetables or regulatory actions) in non-real time. Actions can then be enforced in real time;
- a disruption monitoring function that replays operating days in non-real time in order to carry out comparative analyses.
- a projection and simulation tool based on two modules in order to make road traffic forecasts in real-time and evaluate new mobility services using multi-agent simulation.

These features rely on a model of innovative generic data based on three areas of data: the space describing the logical network, the representation space and the resources and moving units space.

THE ⊕

> The system links representations of the different modes, network or lines to pinpoint interactions, diagnose phenomena and make recommendations on operational actions.

> This instrument can be installed over (as an overlay) any existing type of regulation system, monomodal or multimodal.

> A monomodal version is included in the THALES company's commercial offer.

TOULOUSE MÉTROPOLE

Campustrafic

Toulouse Metropole has developed a centralised approach to optimise the effectiveness of its transport network in order to improve journey quality and facilitate crisis management.

Scheme

Campustrafic is an overall management system for transport in the Toulouse agglomeration. It brings together several different management services in the same location:

- **the CAPITOUL control station** for the Toulouse urban network;
- **the Tisséo control station** for managing the public transport services in the agglomeration;
- **the control station for traffic management and engineering** managed by the interdepartmental road directorate of Southwest France;
- **the control station for the Motorways of Southern France company.**

Management

Toulouse Metropole has a decision-making structure based on cooperation, action design procedures to manage malfunctions on the networks, a shared building which facilitates dialogue between the different operators and interconnected systems allowing operators an overall view of all the different networks. The compound also possesses a crisis management room so as to rapidly implement an incident command system.

THE +

- The structure in place has demonstrated its effectiveness in some particularly serious crisis management situations.
- It makes drawing up a multi-actor traffic management plan considerably easier so as to respond to protests, maintenance periods and festive events.

4. Ensuring SAFETY

THE MAIN MEASURE

Smart sensors

MANY DISRUPTIONS (weather related, accidents, demonstrations) regularly impact network operations. Their effects on user safety depend on the nature of the event: whether it can be foreseen, how long it lasts and the traffic on the network at the time.

A key issue is whether there are well-functioning tools in place to define and deal with these events. Innovation has made surveillance and decision-making tools available to managers, as well as complete expert systems adapted to the situations encountered.

LYON METROPOLE

The Grizzly system

The product of a collaboration with the HiKoB start-up, this innovative system allows real-time information gathering on climatic developments on the road network. Thus winter road interventions can be initiated with optimal efficiency.

Scheme

Grizzly is a network of wireless, autonomous sensors, installed on road surfaces and outdoors. These sensors can detect icy conditions in critical zones in order to optimise operations.

Management

This instrument collects data in real time on temperature, humidity and dew points in critical and specific zones that can not be covered by Météo France forecasts. This information, transmitted by radio links, is published on a dedicated website that operators can consult so as to better target their salting operations.

THE ⊕

- **The sensors have an energy autonomy and lifespan of 10 years.**
- **Installation and connection costs are reduced. These wireless communicating sensors can be connected to networks already in place.**
- **The intervention initiation process is optimised. It thus contributes to reducing the consumption of labour resources and materials and reduces the environmental impact of salting operations.**

HIKOB

HIKOB designs wireless, autonomous and multi-point acquisition systems designed to supply data from the ground in real time. They are built with energy-autonomous magnetometer sensors. Cost-efficient, easy to install, with no wiring, they require no preventive maintenance operations. They are a reliable, effective and cost-efficient solution for operating managers of networks, roads and urban mobility. They automatically connect to an IP network using the auto-configuration function. In order to be easily connected to traffic regulation systems, they possess standardised interfaces (REST-XML programming interface, DIASER communication interface, serial communication bus and dry contact outputs).

www.hikob.com

TOULOUSE

Intelligent pedestrian crossing

Intelligent pedestrian crossings, used in Toulouse since 1986, have demonstrated their ability to take into account two types of road use: that of pedestrians, which is individual and not very predictable, and that of motorists, who circulate en masse along specific channels.

Scheme

The intelligent pedestrian crossing is an intelligent and educative traffic light helping pedestrians to cross busy roads. The scheme comprises of:

- a modified pedestrian light which includes a flashing yellow line between the green man and the red man;
- classic three-coloured lights for vehicles;
- a system that detects pedestrians;
- a mast that includes additional signalling and a system of lighting the pedestrian crossing during the night.

Management

When there are no pedestrians, the flashing yellow light is off; it starts flashing as soon as a pedestrian stops at the crossing. At the same time, the three-coloured lights for cars start flashing in yellow to warn the driver of the presence of a pedestrian. If the pedestrian decides to cross within 5 seconds (following when he/she is detected), the yellow light continues flashing for a time so that the pedestrian can reach the opposite pavement. Otherwise, the vehicle lights turn to red in order for the pedestrian light to turn green.

This system only stops cars – the red light for cars – if pedestrians need them to. It does not make pedestrians wait for no reason when they can and wish to cross immediately using the yellow flashing light.

THE +

> The system gives the lights credibility and makes pedestrians more responsible.

> It reduces the energy consumption of the devices.

Suppliers of this type of system are:

For the traffic lights, FARECO and Lacroix City

www.fareco-fayat.com

www.lacroix-city.com

For the pedestrian detectors, ASSYSTEM supplies the CAPITEC detector and FLIR the SafeWalk detector.

www.exatelys.com

www.flir.fr

5. Optimising URBAN LOGISTICS

THE GOODS TRANSPORTATION SECTOR, which makes up 15 to 25% of urban traffic, remains one of the largest emitters of greenhouse gas pollution in cities and contributes to road congestion.

In order to limit the nuisances caused by road freight transport in urban areas (congestion, noise, pollution), public authorities encourage alternative ways of transporting goods, including bicycles, electric vehicles or natural gas vehicles, as well as waterway or rail transport.

THE MAIN MEASURE

Goods delivery by waterway or bicycle

PARIS

Delivery of goods via the Seine

Franprix, a subsidiary of Groupe Casino, have been delivering goods via the Seine river to hundreds of shops in the heart of Paris since August 2012. This scheme was developed in partnership with the XPO Logistics group (road haulier), Haropa Ports of Paris, SCAT (waterway transport) and Terminaux de Seine (a goods handler). It received support from Voies navigables de France and the Île-de-France regional authority.

Scheme

The goods, loaded in containers, are transported by lorry to the river port and then on a barge into the centre of Paris. The barge is then unloaded and the goods are delivered directly to shops in Paris as well as in several Hauts-de-Seine municipalities.

Management

The customised containers are loaded in the Chennevières-sur-Marne depot. These containers are trasnported by road to Bonneuil-sur-Marne port, 8 kilometres away. As they arrive in the port, the containers are loaded onto a barge using a mobile 90-tonne crane. A second Franprix depot, in operation since 2016, is located in the Bonneuil-sur-Marne port in order to manage the flow of containers. The barge then travels 20 kilometres along the Marne river and then on the Seine, passing through two locks to arrive in Paris at the La Bourdonnais quay. The barge is then unloaded and each container is put on a lorry in compliance with PIEK standards (a standard that guarantees noise levels below 60dB). The contents are then distributed to the 300 Franprix shops in question. This multimodal logistic chain delivers 45 containers to Paris every day.

THE +

- This river alternative reconciles economic and environmental stakes.
- It offers direct access to city centres, with reliable delivery times.
- According to Franprix statistics, the scheme will eventually reduce road mileage by 450,000 kilometres/year, the equivalent of almost 13,000 circuits of the Paris ring road, with 3,800 fewer lorries on the roads and avoiding the emission of nearly 250 tonnes of CO_2.

PARIS REGION

La Petite Reine

La Petite Reine is a home delivery company that makes all its deliveries using a 100% green and silent fleet. It was the first company to launch an ecological delivery service in Paris in 2001. Ten years later, the Star's Service group, leader in last-kilometre delivery, has become the first stakeholder in la Petite Reine.

Scheme

- The 90 electrically assisted delivery tricycles made by LOVELO, called Cargocycles®, were specifically designed to transport goods in cities. They weigh 100kg, have a load capacity of 180kg and deliver all types of goods that fit into the vehicle's volume of 1.5m³.
- The 50 electric refrigerating light utility vehicles have an autonomy of 80 kilometres and can hold larger loads (up to 650kg and a volume of 2.5m³).

Management

The organisation relies on the coordinated use of urban logistics platforms and clean vehicles designed to be compatible with high urban density. Employees can carry out neighbourhood deliveries using depots located in central Paris. Delivery by Cargocycles® permits better access to city centres, including pedestrian zones in city centres. Ergonomic and taking up little space, the bicycles can be parked near the delivery addresses and thus reduce traffic jams. The delivery drivers carry out over 400,000 environmentally-friendly deliveries per year and cover over 1 million clean kilometres every year, with no CO_2 or particulate matter emissions and no noise pollution.

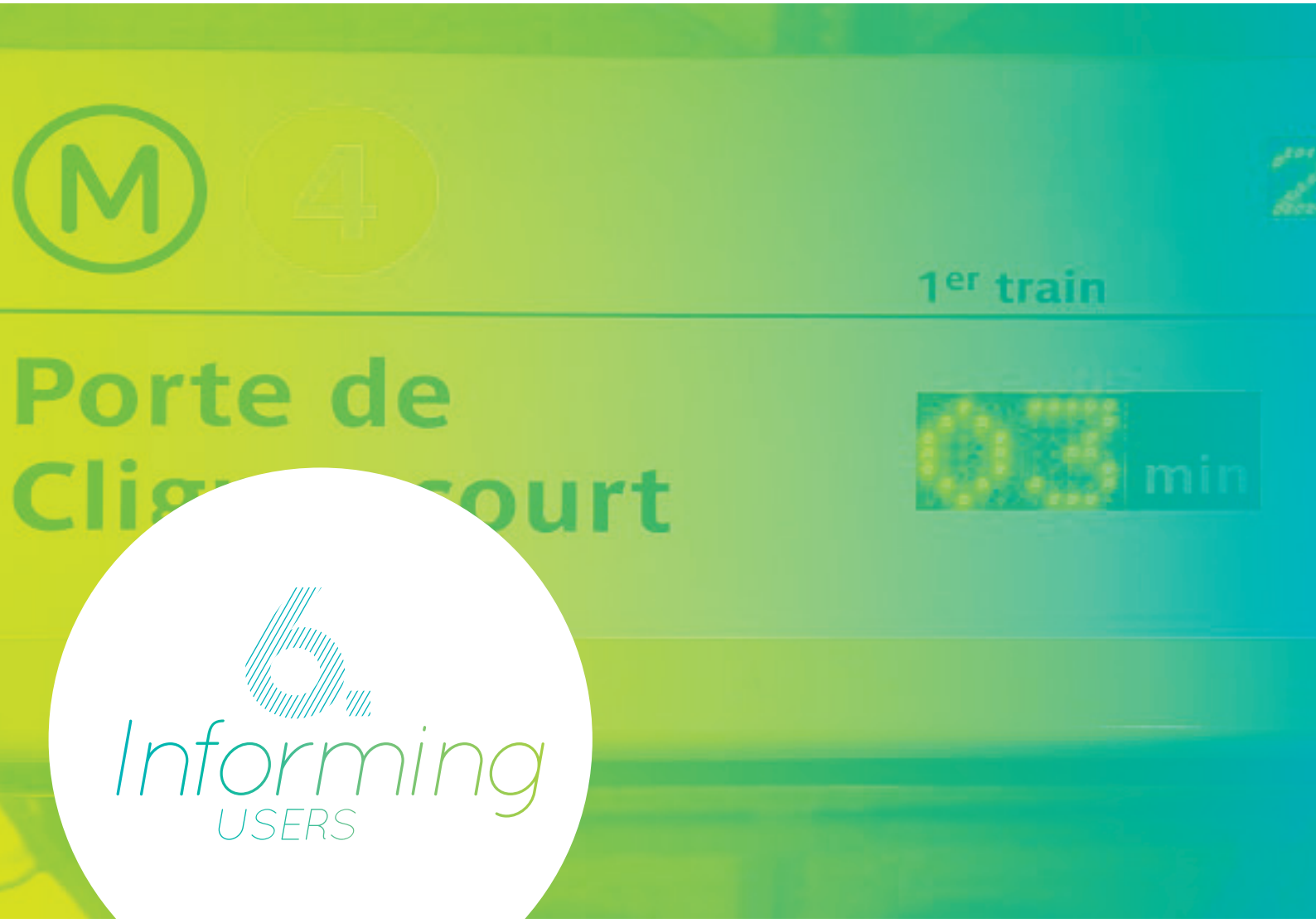
THE +

› La Petite Reine also plays a social role. The company runs a scheme to employ young unemployed and/or unqualified people as delivery cyclists and maintenance workers. In the company, 30% of staff are employed on fixed-term back-to-work contracts and are supported by a team of support workers and are each assigned a back-to-work agent.

LOVELO

Created in 2009, this small-to-medium business has produced a wide range of bicycles and rosalies in response to the various urban services needs. It is located in Eure-et-Loir and employs 6 people. Its sales revenues are progressively rising, including export sales.

www.lovelo.com



6. Informing USERS

THE MAIN MEASURE

Information in real time

TECHNOLOGICAL ADVANCES in the geolocalisation and communication domain have led to the development of real-time information tools.

Transport information makes it easier for travellers to plan their journeys and makes the use of public transport a more attractive option.

RENNES

The m.starbusmetro mobile application

Since October 2012, the Keolis transport company and the city of Rennes have provided free real-time transport data (real-time bus schedules, number of available parking spaces etc.) and have made the m.starbusmetro mobile application available as a complement to this system. This application allows instant access to timetable information in real time for the Star network (Star: Rennes agglomeration public transport service - bikes, buses, underground and park-and-ride) using a smartphone connected to the internet.

Scheme

The application provides information in real time on:

- star bikes (a bike share system), including the number of bikes and spaces available in stations;
- the Star network (the bus service of the agglomeration), with bus times for each stop;
- the underground line A, including underground station statuses (open/closed) and whether the station lifts are operating;
- the park-and-ride schemes, including the number of available spaces in each car park and the status of the park-and-ride (open/closed).

Management

All stops on the network are referenced and equipped with specific bar codes (QR). A traveller with a smartphone can read these codes found at every bus stop in the Star network to get real-time bus schedule information. The information is also available by typing in the bus stop name. The traveller can thus immediately receive the exact time the next bus will arrive. The Star network's real-time data is also available as open data. The information is provided as downloadable files.

THE +

> The city of Rennes, in conjunction with Keolis, was the first French agglomeration to provide open access data on its transport network. This partnership has made it possible to develop new services such as the Handimap application to help disabled people obtain urban mobility or the Isokron application that merges transport data with that of social networks.

> The Star network is "NF Service" certified. This label, based on traveller satisfaction, is a quality guarantee of the service provided by the Star network.

Keolis

Urban transport network operator and specialist in operating and maintaining public transport networks, Keolis facilitates transport data provision with its platform, OpenDataSoft. Aimed at entrepreneurs seeking to develop new intelligent services, this platform collects flow data from different sensors which can then be reused by developers who are not specialists in transportation. The product on offer, Open Data Mobilité, is used by the city of Rennes to provide public transport data.

www.keolis.com

GRAND LYON

Solar-powered traveller information terminals

The solar simulator, LumiSunX™, launched by the enterprise Lumiplan is a calculation procedure developed in collaboration with institutional research centres and academics. It facilitates the installation of solar-powered traveller information terminals.

Scheme

The simulator was used in Grand Lyon, on the initiative of the transport syndicate of the Lyon agglomeration, where over one hundred solar-powered traveller information terminals have been installed in the city.

Management

This simulator is capable of measuring the capacity of a site to operate solar-powered traveller information terminals (TIT) and provide a solution in the form of an adapted product in order to guarantee continuous and optimal operation in any weather. The preliminary stage allows the technical characteristics of the TIT in question to be determined in a rational manner. For this purpose, the solar TIT includes high-performing components: photovoltaic panels made of monocrystalline technology, chargers equipped with high-performing MPPT (maximum power point tracking) technology, very high storage density batteries, low consumption electronic components and liquid crystal displays.

THE +

- Equipment that respects the environment with a near-zero electricity consumption.
- A traveller information service available 24 hours a day and 7 days a week.

Lumiplan

Created in 1972, Lumiplan Transport designs and installs information systems for the public transport sector: buses, coaches and trams. The company offers solutions for supplying real time information to travellers both on-board and at stops. It also offers on-board security systems (video-surveillance and rear vision surveillance) as well as operating HEURES support software to optimise flows and improve line management.
The Lumiplan group is also active in dynamic information provision for local authorities and leisure spaces by offering electronic screens, pilot software and mobile applications aimed at users.
Lumiplan has an annual turnover of 30 million euros, works with over 2,000 clients and is commercially active in over 20 countries across the world. Lumiplan employs 180 staff members across France and internationally.
www.lumiplan.com

For FURTHER INFORMATION

THE ACTORS

Working alongside large companies with international acclaim, many small and medium-sized companies specialise in the urban traffic management domain. They make a decisive contribution to innovation. The following list is not exhaustive; it identifies some of the private actors, across several wide fields of operation. Other references can be obtained from the road utilities syndicate, **www.ser-info.com** and the Atec ITS **association www.atec-itsfrance.net.**

Traffic regulation

Aximum
www.aximum.fr

Capsys
www.capsys.eu

Engie-Ineo
www.engie-ineo.fr

Fareco
www.fareco-fayat.com

Gertrude Saem
www.gertrude.fr

LACROIX City
www.lacroix-city.com

Logiroad
www.logiroad.fr

Polyvelec
www.polyvelec.com

SEA signalisation
www.sea-signalisation.fr

SPIE
www.spie.com

Thales
www.thalesgroup.com

Urban parking

Effia
www.effia.fr

Indigo
www.parkindigo.com

Parkingmap
www.parkingmap.fr

Parkeon
www.parkeon.fr

Qucit
www.qucit.com

Smartgrains
www.smartgrains.com

Mobile applications to facilitate urban parking

Copark
www.copark.co

Drop don't park
www.dropdontpark.com

ECTOR
www.ectorparking.com

Onepark
www.onepark.fr

OpnGO
www.opngo.com

Parkmatch
www.parkmatch.eu

Park&Trip
www.parkandtrip.com

Paybyphone
www.paybyphone.fr

Twoonpark
www.twoonpark.com

Yespark
www.yespark.fr

Zenpark
www.zenpark.com

Traveller information, operation assistance system and ticketing

Actoll
www.actoll.com

Cityway
www.cityway.fr

Conduent
www.conduent.com

Ineo Systrans
www.navineo.fr

Instant System
www.instant-system.com

Ixxi
www.ixxi-mobility.com

Joul
www.zenbus.fr

Kisio
www.kisio.org

Lumiplan
www.lumiplan.com

Mobigis
www.mobigis.fr

Okina
www.okina.fr

Pysae
www.pysae.com

Ubitransports
www.ubitransports.com

Urban logistics

La Petite Reine
www.lapetitereine.com

Lovelo
www.lovelo.com

Dynamical signalling, electromagnetic sensors, safety equipment

Automatic systems
row.automatic-systems.com

Franche-Comté signaux (FCS)
www.franche-comte-signaux.fr

Isosign
www.isosign.fr

Kerlink
www.kerlink.fr

Labocom
www.labocom.fr

Magsys
www.magsys.net

SERFIM
www.serfim.com

SES nouvelle
www.ses-signalisation.com

SVMS - Signature
www.groupe-signature.com

Signaux Girod
www.signaux-girod.fr

Sterela
www.sterela.fr

TTS
www.ttsys.fr

Cameras, automated image processing, accident detection

Citilog
www.citilog.com

Neavia
www.neavia.com

Survision
www.survision.fr

Wireless cabling

HiKob
www.hikob.com

Engineering

Artelia
www.arteliagroup.com

BMIA
www.bmia.fr

Carte blanche conseil
www.cbconseil.com

Ceryx
www.ceryx-ts.net

EGIS
www.egis.fr

Ingerop
www.ingerop.fr

Orange business services
www.orange-business.com

Setec ITS
www.its.setec.fr

Sopra Steria
www.soprasteria.com

Systra
www.systra.com

Fédération Syntec
www.syntec.fr

Public transport network operators

Keolis
www.keolis.com

Transdev
www.transdev.com

RATP Dev
www.ratpdev.com

Public actors

Ministry for an ecological and solidary transition
www.ecologique-solidaire.gouv.fr

The French Centre for Studies and Expertise on Hazards, the Environment, Mobility and Development (Cerema)
www.cerema.fr

French Institute of Transport Science and Technology, Planning and Networks (IFSTTAR)
www.ifsttar.fr

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