Intelligent Transport Systems : a key component of Smart city

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About ATEC ITS France

OBJECTIVES :

- Develop a 5- year shared vision, as well as a current state of play
- Propose actions to speed up the current "business as usual" process
- Develop large scale projects and services
- Promote cooperation and visibility at an international level

150 members from diverse sectors (Road Infrastructure, Energy, Cybersecurity, Car Manufacturing…)

ITS in France unites multiple players, including public authorities, local communities, institutes, associations, and businesses, who must work cooperatively to achieve and implement solutions

Smart city

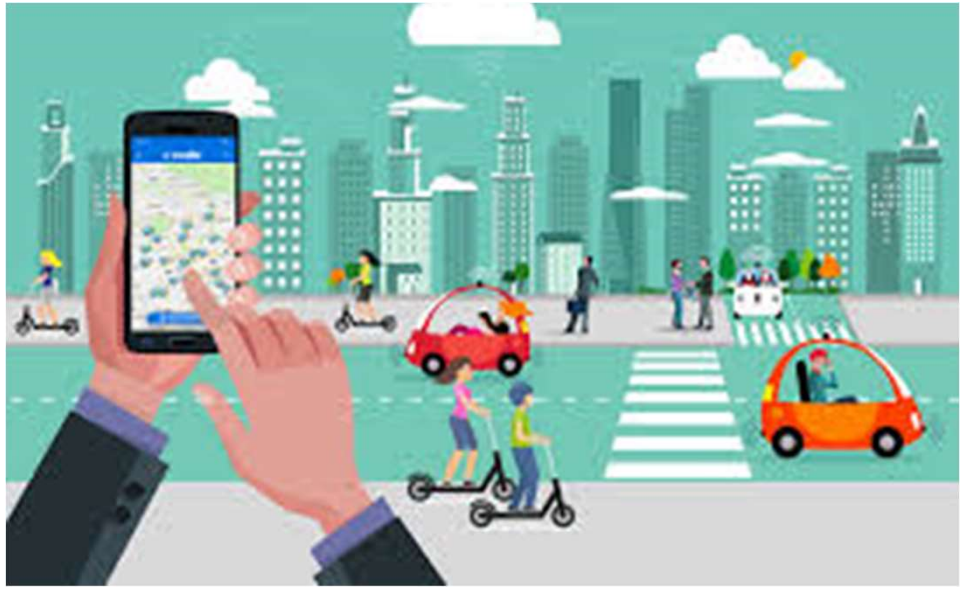
- SMART city: A smart city is a place where traditional networks and services are made more efficient with the use of digital and telecommunication technologies for the benefit of its inhabitants and business (source : European Commission)

Intelligent Transport Systems (ITS)

- Intelligent Transport Systems – systems in which information and communication technologies are applied in the field of road transport, including infrastructure, vehicles and users, and in traffic management and mobility management, as well as for interfaces with other modes of transport (*source: ITS European Directive 2010/40/EU)*

Mobility trends in city….

- The expansion of Micro Mobility modes (overboard/solowheel/electric trottinette…)
- On-demand and free-floating approach
- The development of shared mobility (ie. Car/bike sharing…)
- The restricted access of cars (ie: Low Emission zones for air quality / urban road tolls)



….not necessarily smart

Traffic congestion in 2019

Traffic congestion in 2030

….and not necessarily eco-friendly?

..and not necessarily acessible to all citizens

Smart Mobility (ITS) and Smart City : so much in common

- (Road) Infrastructures
- Information and Communication technologies
- Expertise and actors
- Interoperability and Normalization
- Energy ans space consumption
- Sustainable Business models
- Accesibility (traffic congestion)
- Well-being of inhabitants (air quality/noise)
- Regulation framework….

ITS and Smart Mobility : So much experience to share

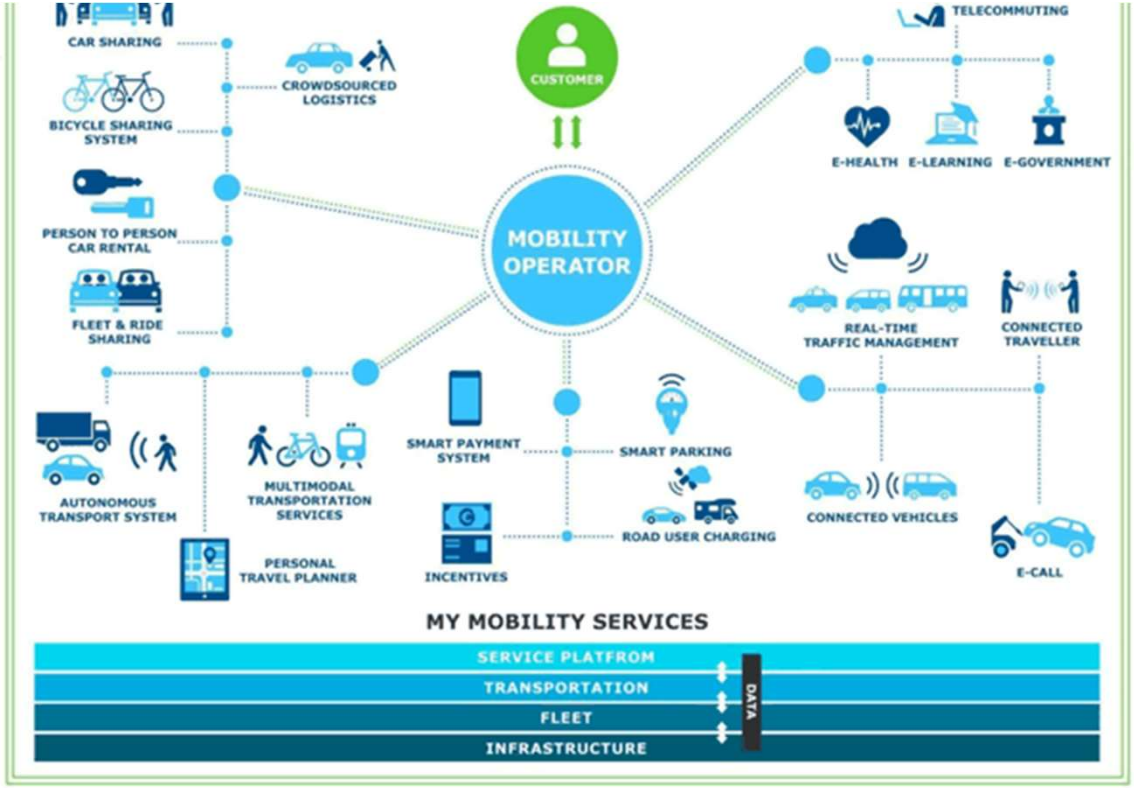
- There is not a unique model for smart mobility and smart city
- There are many technologies and expertises from ITS applications useful and complementary to Smart cities
- The place Citizens-users-inhabitants at the centre of the governance is important (acceptability and identification)
- Meet the common stakes : scarcity of natural resources, climate change, air quality, decarbonization, urban population growth, traffic congestion…
- Create the economic, social and legal framework to make ITS and smart mobility a success

I - Contribution of the ITS sector to Smart Mobility : the concept of MaaS

Mobility as a Service (MaaS) is the integration of various forms of transport services into a single mobility service accessible on demand. To meet a customer's request, a MaaS operator facilitates a diverse menu of transport options, be they public transport, ride-, car- or bike-sharing, taxi or car rental/lease, or a combination thereof. For the user, MaaS can offer added value through use of a single application to provide access to mobility, with a single payment channel instead of multiple ticketing and payment operations" (*source: MaaS alliance*)

Main characteristics of the MaaS concept

- User-centered approach
- Digital Multi-modal platforms
- Architecture-layer of services
- Real time information / predictable information
- Data storage/dematerialization (tickets/smartphone/cloud…)
- Purchase and payment (Pay as you go / consumption follow-up)



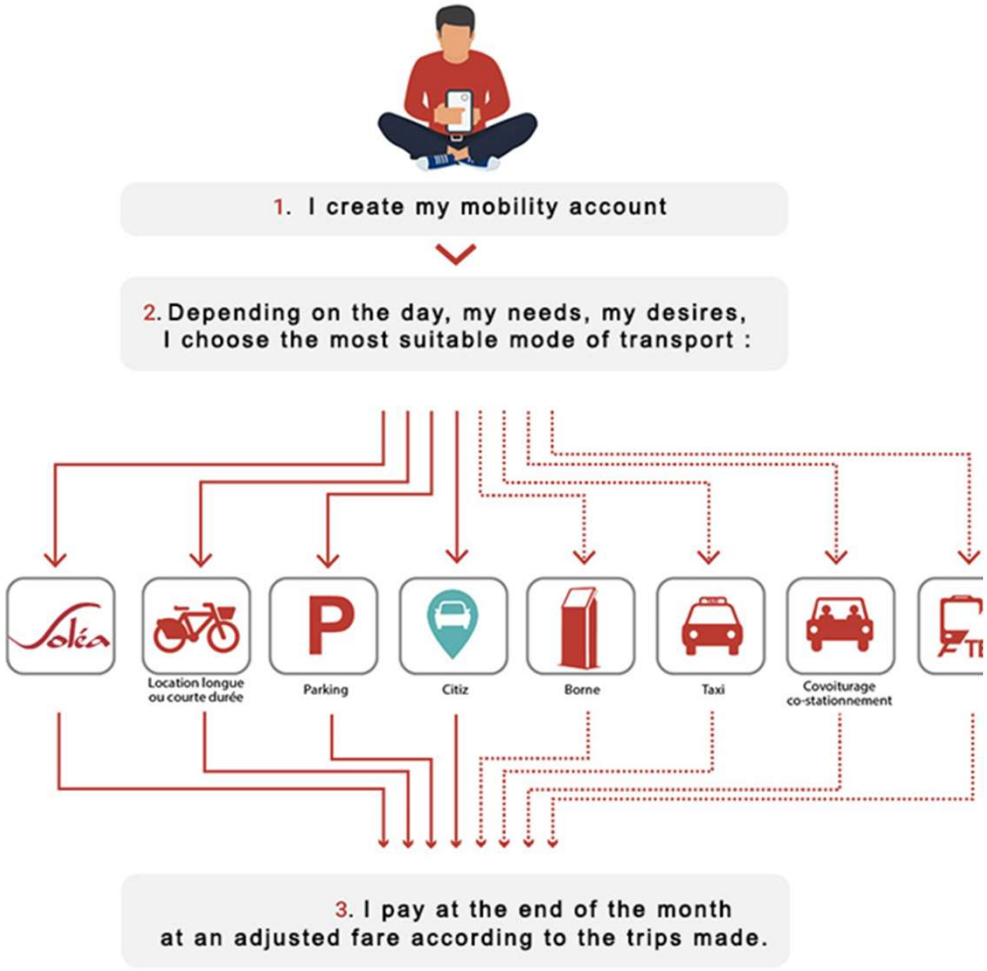
Examples of MaaS

Helsinki : an integrated offer developed by a private compagny / the possibility to have illimited access to public transport/bikes in free-floating/car sharing services (2 hours a day)/taxi (5Km) for 500€ a month

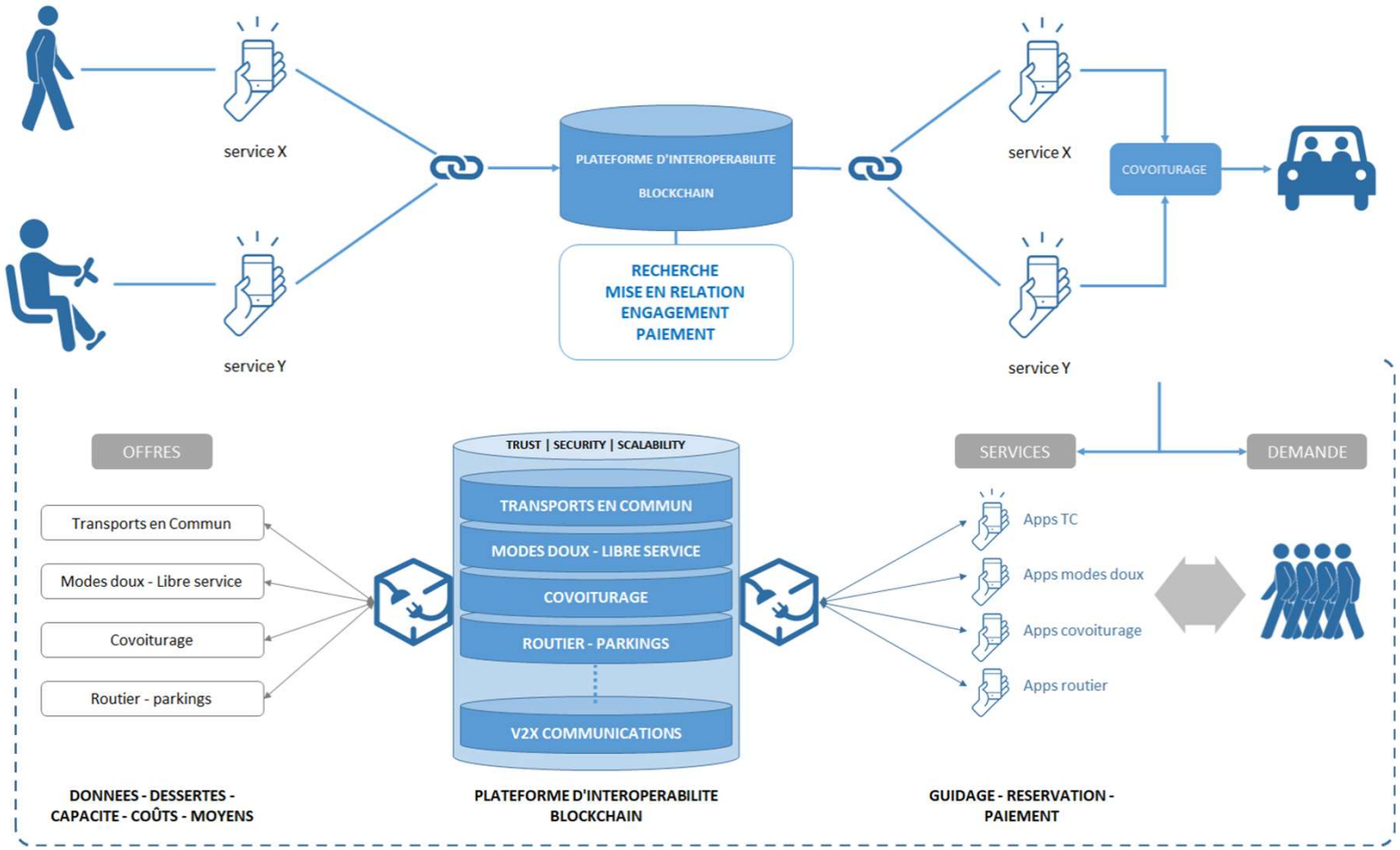
Vienna : a public and open multimodal plateform

Hanover : a unique monthly (facture) for mobility consumption

Mulhouse : a single user account



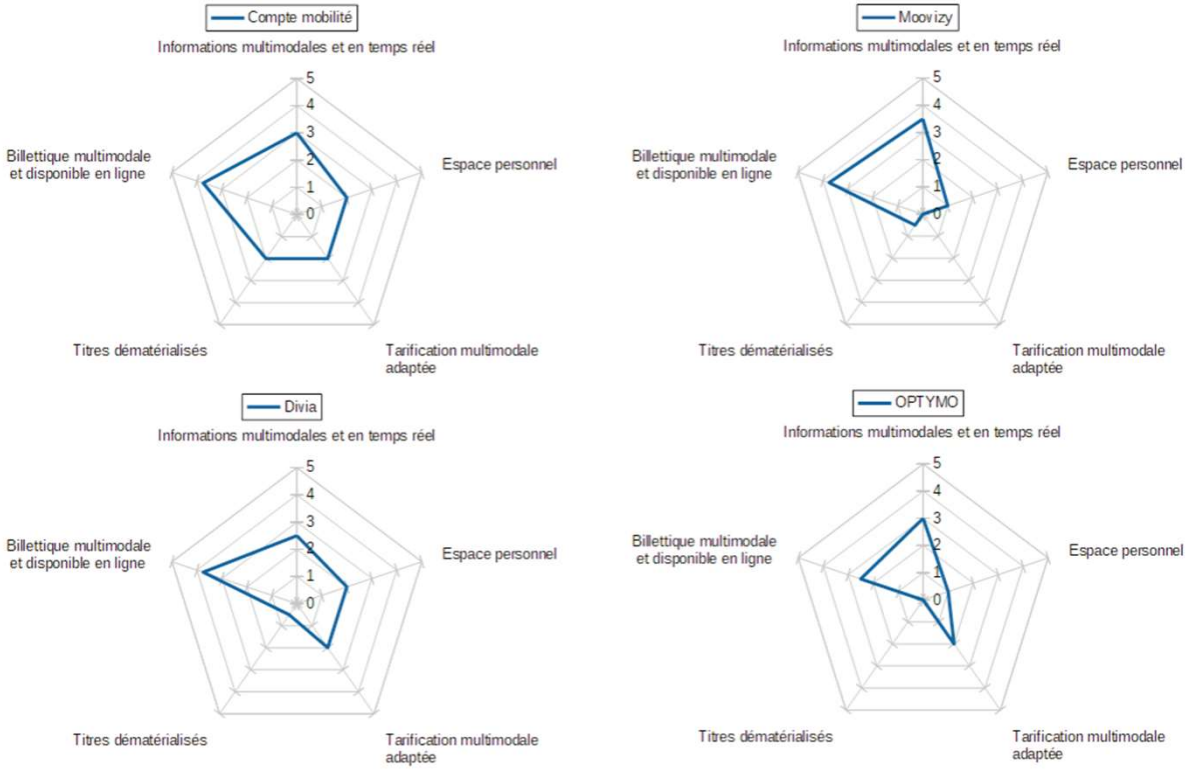
MaaS and blockchain



Some lessons from MaaS experience

- Development of MaaS implies (already) transport network, sufficient users (high density zones / low density zones) and existing alternatives to individual car
- Importance of a public transport service (the core architecture of the nework)
- Business model/financing of the mobility for all: users, public authorities/both…)
- Importance of assembling many expertise (ie. from public transport/ parking/ road at local level)

MaaS : not a unique model



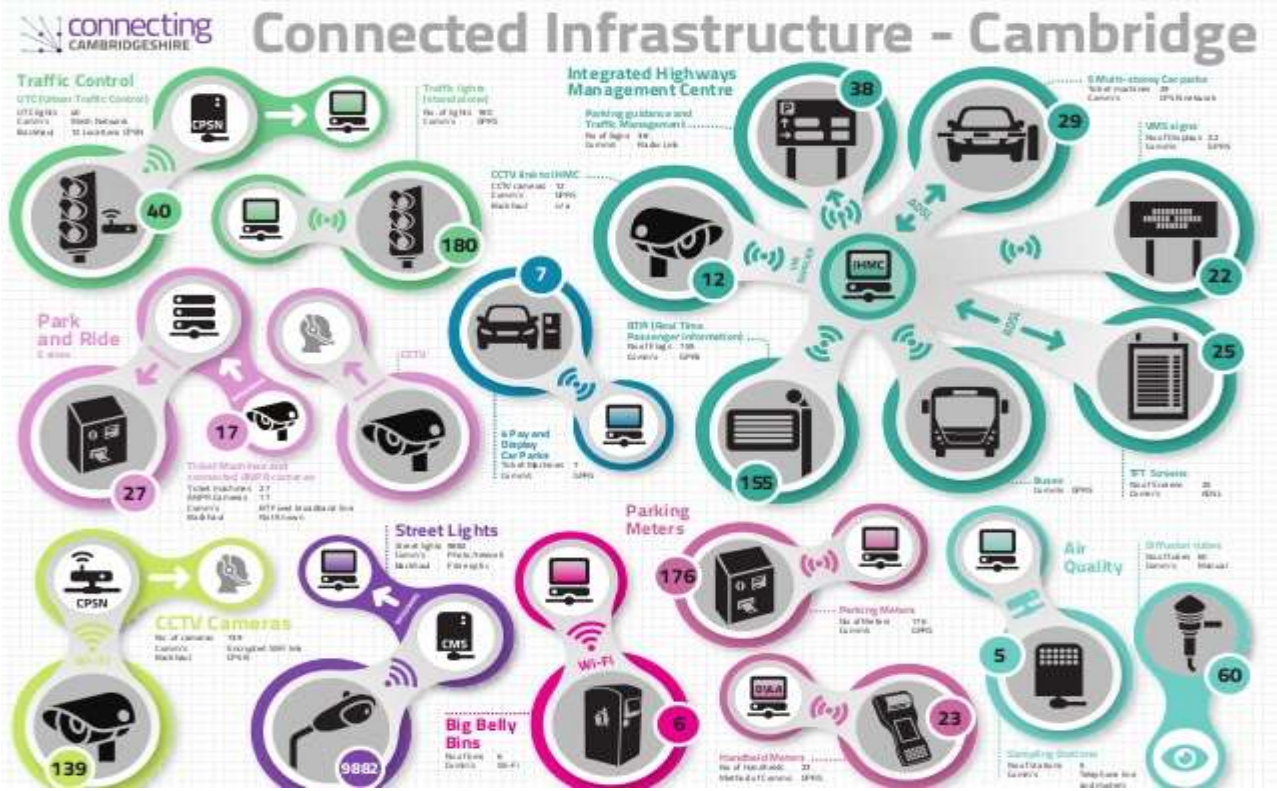
II - Contribution of ITS architecture approach for Smart city

The expansion of connected devices in cities :

- Mobile devices (vehicles)
- Infrastructure (road sensors, parking)
- Street furniture (camera, traffic lights, escalator…)

The opportunities offered by 5G and IPV6 to this expansion

The opportunities offered by the cloud



C-ITS : Cooperative Intelligent Transport Systems (C-ITS)

C-ITS : Cooperative Intelligent Transport Systems (C-ITS) use technologies that allow road vehicles to communicate with other vehicles, with traffic signals and roadside infrastructure as well as with other road users. The systems are also known as vehicle-to-vehicle communications, or vehicle-to-infrastructure communications *(source : European Commission*)

An example of C-ITS architecture with the SCOOP project

The objectives :

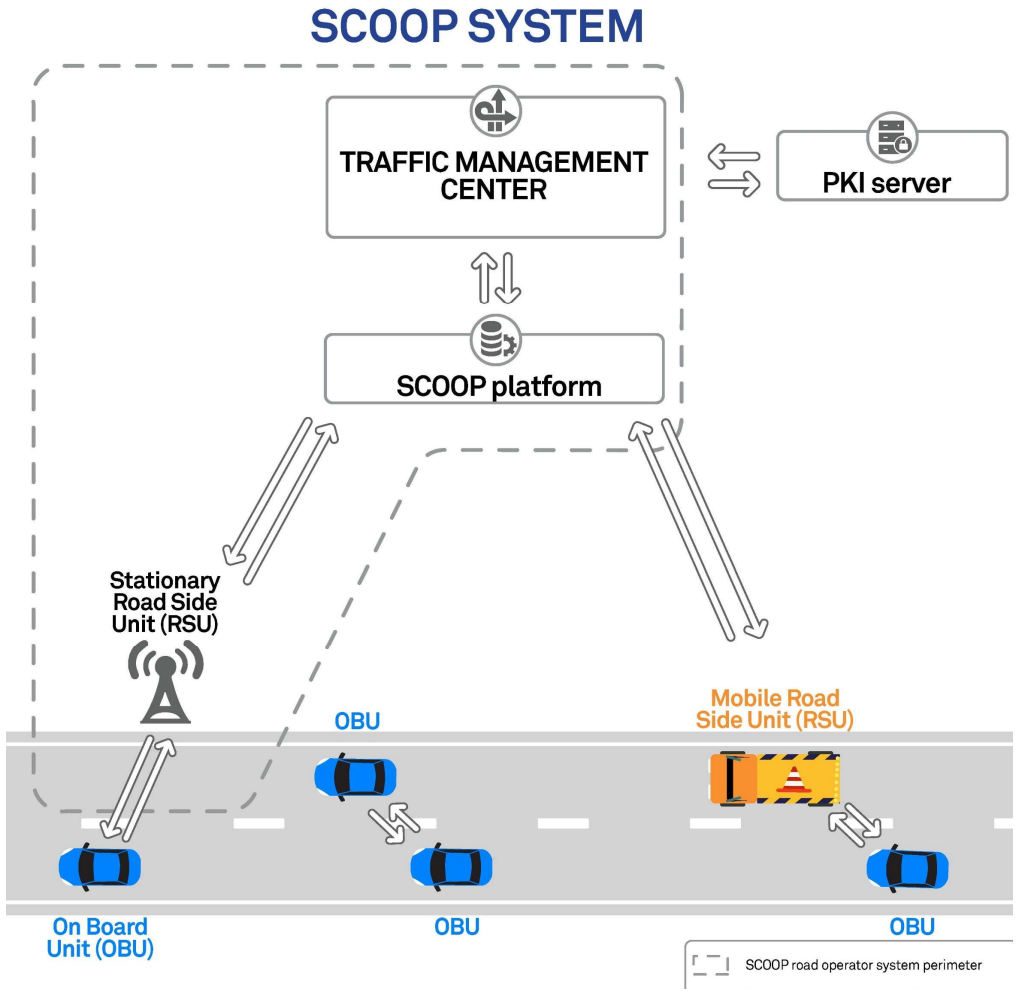
- Improving road safety and the safety of road operating agents
- Making traffic management more efficient and contributing to the reduction of emissions
- Optimizing infrastructure management costs, making vehicles fit for the future and developing new services

V2V – V2I – I2V – VtoX….

Vehicles are equipped with sensors to detect events such as a slippery road, an emergency brake, etc….

…and with on-board units to transmit the information to vehicles behind (**V2V**) and to the road operator **(V2I)** through road - units.

The road operator can also transmit information (roadworks, etc.) to the vehicles through their on-board units **(I2V)**



SCOOP architecture: the central ITS station (the trusted third party)

The central ITS station, called ITSS-C or SCOOP platform, receives and processes information received from the management terminal or the road operator's traffic management system.

The central ITS station sends information to the operator's cooperative equipment (roadside stations or stations in the operator's vehicles).,

The central ITS station does not communicate directly with the user's vehicles. It processes information received from the roadside stations and makes it available to the operator.

The public key infrastructure (PKI) guaranteeing confidentiality and security

- The PKI server aims to secure the exchanges between the ITS stations thanks to its issued electronic certificates.
- The PKI system is used with the purpose of guaranteeing the integrity and the authenticity of exchanged messages
- The certificates issued by the PKI system to the ITS stations are anonymous and renewable frequently. In practice, the ITS stations request the PKI a pool of pseudonym certificates with a limited lifetime and specified rights.
- This PKI system is hosted and operated in a secured data-center compliant with the practices of a trust service provider.

Interoperable Standardized C-ITS: a condition for deployment connected mobility

- **For enabling messages between the SCOOP platform and infrastructure**

  The messages transmitted by the SCOOP platform to the roadside units (ITSS-R) are sent in a DATEX II V2.3 format – following a specific communication protocol of the road operator.

- **For enabling a hybrid communication approach:** links between the mature ad-hoc wireless technology ITS-G5 (no network coverage or subscriptions required, particularly in the rural areas) and cellular networks (3G/4G)

Interoperable C-ITS : european cooperation

- **The C-ITS platform** : a European Strategy on Cooperative Intelligent Transport Systems

- **The C-Roads Platform** : a joint initiative of European Member States and road operators for testing and implementing C-ITS services in light of cross-border harmonisation and interoperability
  - A working group on Uban C-ITS

- **The European Telecommunications Standards Institute (ETSI)**
  - A wide range of subjects : C-ITS and Smart Mobility

Conclusion - From smart mobility (MaaS) to City as a Service (CaaS)

- An ever-incrasing scope of services derived from mobility services. Are there still boarders between mobility users and citizens?

- Social acceptability of connected services is not necessarily guarenteed by technologies

- Which model of governance? Which territory for Smart city at the time of cloud, big data…?

From MaaS to CaaS