1. Stakeholder perspectives on Business Models

This chapter describes C-ITS business models from various stakeholder perspectives. Most input was provided by stakeholders based on the projects they are directly involved in. This was completed by an interpretation of other stakeholder perspectives that were deemed particularly important.

**The perspectives originate from different participants, and although they were discussed and commented by the WG, they can remain conflicting on points. Likewise the perspectives cannot and do not pretend to represent the opinion of complete stakeholder groups.**

## Public road authorities

### Introduction

After years of innovations and demonstrations, services and systems based on C-ITS technologies are now ready to become an active part of the Public authorities’ toolbox for planning and managing the transport system. Public authorities in different countries have expressed their needs related to business models. The standpoints differ, although it appears that a clustering of approaches can be made.

Once they have reached full maturity, C-ITS are likely to bring major changes to the way public authorities and road operators deal with traffic management and traffic information. C-ITS fit into a philosophy of upgrading the road networks by offering more efficient services for daily transportation.

There are obstacles when taking the next step of implementing all types of C-ITS services in the regular planning and development of the transport system. The public authorities know what they want to accomplish and they have been involved in various evaluations in different pilot projects. Knowledge of the potential of C-ITS has been captured within pilots and described in many reports, but this knowledge alone is not enough. The question remains what must be done to go from testing to accepted tools for public authorities in the development of the transport system.

The business models of Public Road Authorities (PRAs), relate directly to their mandates. PRAs have policy goals that they want to achieve, a budget, and responsibility for the operation of the road network (governance issues). Depending on the situation, the policy goals can relate to achieving a specific safety target, reducing congestion and reducing the environmental impact of road traffic.

The resources available (budget and existing traffic management equipment) determine the ability to achieve these goals. C-ITS provide an alternative for traditional infrastructure (or other traffic management) measures to carry out traffic management duties and achieve stated goals.

PRAs strive to investigate C-ITS investment decisions quantitatively, using for example Cost-Benefit analyses. The COBRA+ Tool (Ognissanto, F. et al., 2016)[[1]](#footnote-1) and other tools provide support in this effort. These analyses require calculations of societal costs, benefits and potential cost savings. The number of parameters to consider in deployment decisions is large: the choice of communication platform, equipment rates (of vehicles and roadside), the speed of deployment, and the presence of legacy systems all affect the final Benefit-Cost Ratio (BCR).

There is a large difference in realisation of (1) public, (2) mixed or (3) private business models. In the first model, the National Road Authority has control over all aspects of the deployment of equipment and service provision. In contrast, in the latter two models, the Public Road Authority does not control all of these aspects. This means that the Public Road Authority will work with other stakeholders to achieve the deployment of roadside equipment (in the hybrid implementation) and the content and service provision. To ensure commitment, each stakeholder in the chain of delivery of a service must be convinced that it has a win-win situation. To complete the chain of delivery, public-private partnerships require private investment as well.

Governance distinguishes the PRA from other partners in the chain of delivery. This has implications for the role that the PRA will play. Depending on the particular service, the PRA may place requirements on the quality, timeliness, relevance, accuracy and other characteristics in delivery of the service. The PRA will want a level playing field for all actors in the C-ITS service provision, with the end goal of scaling up service provision to achieve a high deployment level.

### France

France has developed a free-to-free solution between on-board units (OEM) and road operators based on ITS-G5.



Figure 1: Example of C-ITS service in France

Information based on CAM and DENM are processed and aggregated by road operators at different levels in the value chain (RSU, SCOOP platform, and traffic management centre).

Processed information are then stored on the national access point “Bison Futé”, according to delegated acts b and c from the ITS regulation. According to French laws, they should be enriched by any other private actor holding safety and traffic information, on the basis of a free-to-free principle.

### C-ITS Corridor

Service deployment in the C-ITS Corridor, linking The Netherlands, Germany and Austria, follows the Memorandum of Understanding (MoU) signed by the National Transport Ministers in 2013. Road Works Warning and Improved Traffic Management by Vehicle Data represent the two common services deployed on motorways in the three Member States.

Appropriate warning information on road works is communicated to vehicles via ETSI ITS G5 in the vicinity of road works and via cellular communication for the performance of strategic driving tasks. At the same time the road operator back offices (ITS Central Station) provide data to National Access Points where it is made available to service providers. The National Data Warehouse (NDW), the Mobility Data Marketplace (MDM) and Mobilitydata – Austria serve as National Access Points in the C-ITS Corridor Member States.

For enabling Improved Traffic Management, CAMs and DENMs are received by ITS Roadside Stations (e.g. road works safety trailers) where data is pre-processed and forwarded to the ITS Central Station.

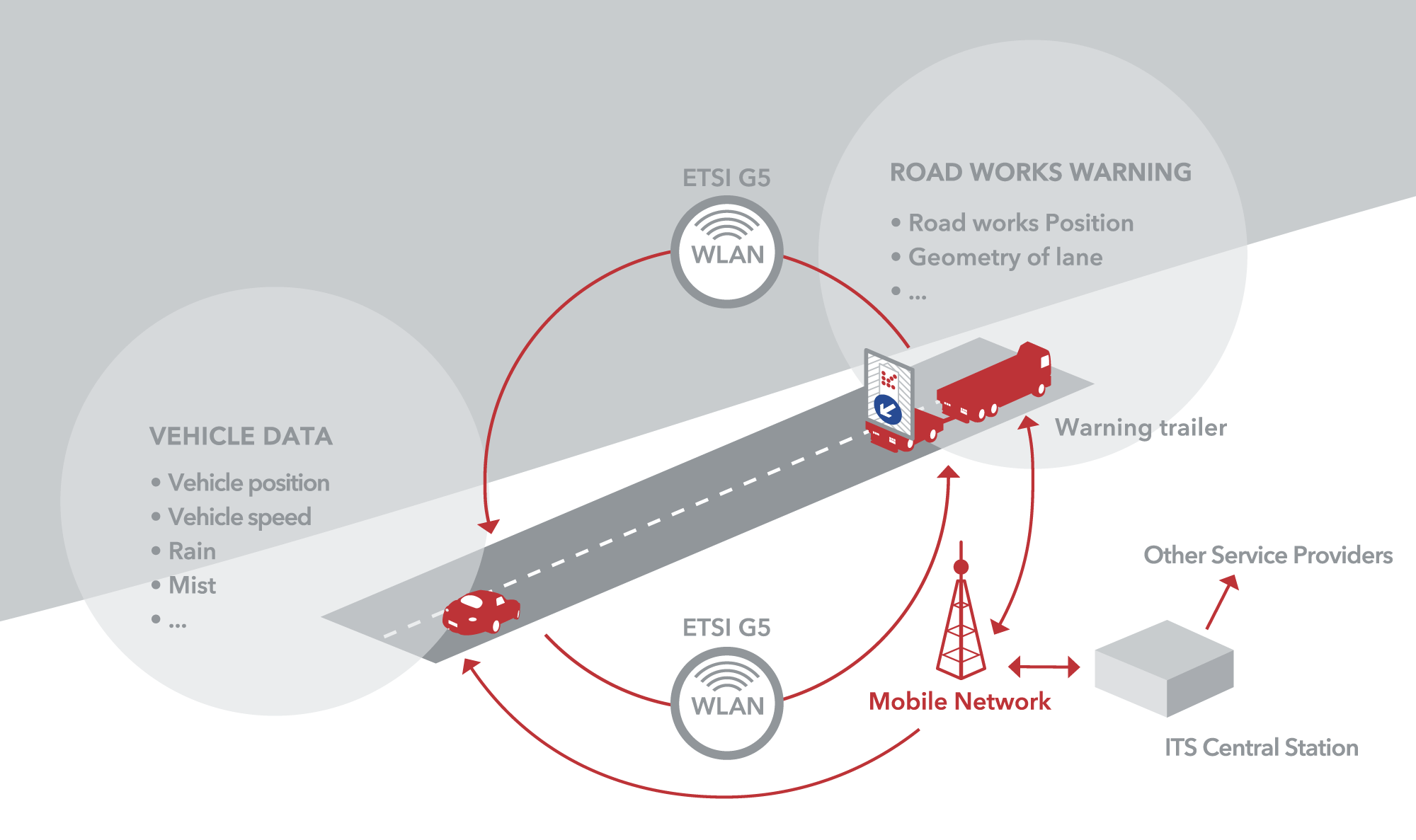


Figure 2: Example of C-ITS service on the C-ITS corridor

### NordicWay

The NordicWay project has developed a solution for an interoperable cloud-based C-ITS multi-national service illustrated in Figure 3 below.

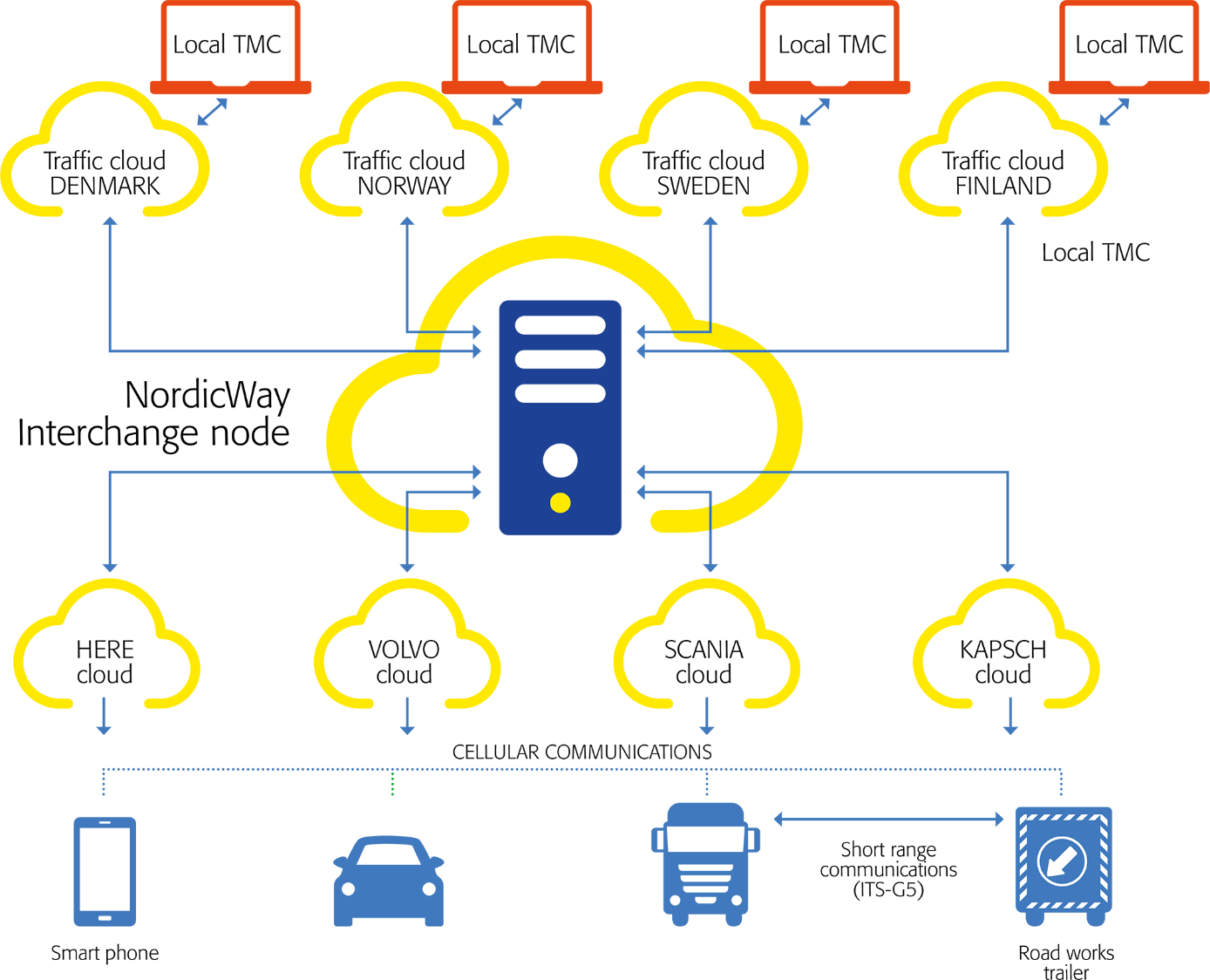


Figure 3: representation of data exchange in NordicWay

The NordicWay solution with an Interchange Node enables the private sector stakeholders to set up and maintain their own customer relationships and business models, while ensuring all of them, as well as the road authorities’ traffic management centres and national single access points, get safety-related C-ITS information in real-time with low latencies. The Interchange node is set up either by public sector stakeholders or as a public-private partnership. The node is similar with the “neutral server” concept adopted by vehicle manufacturers.

During the NordicWay project, all project partners involved have committed to provide the safety-related and traffic management-related information agreed in NordicWay to the Interchange Node, but these commitments will need to be renegotiated for the deployment phase.

### Value chain analyses

To develop insight into how services are delivered in existing pilots and projects (in terms of the partners and the roles that are fulfilled) value chain analyses were carried out (see Annex 1). These were based on actual and planned activities in NordicWay for the use case of Finland, the C-ITS Corridor for the cases of Germany and the Netherlands, and Scoop@F in France. The activity considered the services Road Works Warning (short distance), V2V local hazard warning and PVD/CAM aggregation. The activity included cellular and ITS-G5 implementations.

The value chain covered the two large blocks of “content provision”, focusing on data collection and processing, and “service provision”, focusing on content generation and the presentation of the service to the end user (driver).

The value chain analyses uncovered commonalities as well as differences in implementation. With respect to similarities, both public and private parties were involved in the three use cases examined. The content provision activity involved more roles and actors, especially in data collection, compared to the service provision, where 1 or at most 2 actors were active. The figures in Annex 1, section 4 illustrate this for several example services in Finland, France, Germany and the Netherlands. Downstream in the value chain, private parties presented the services to the drivers, but their involvement in content provision and content generation varied among the use cases.

Differences among the use cases manifested themselves, although it is not visible in the value chain. The roles are filled by different actors in different use cases. Some roles are filled in the use cases, while others are not. The point in the value chain at which data aggregation takes place also differs slightly. Finally, the back office (C-ITS-S) role is filled by a public party in one case, a private party in another, and left open in a third.

### Key Issues identified

From the public authority perspective, different business models will operate in parallel in the EU. Business models may also differ by service, for instance related to whether there are mandatory or only advisory aspects provide by the service. No single business model can be prescribed, nor the role of the market or how the roles will be filled.

The business models should reflect the different phases of deployment. The pre-deployment or pilot phase will most likely involve more innovative parties, such as investors and early adopters. The requirements in this phase will be different from the following phases. Mass deployment will involve more players, higher penetration of equipped vehicles and larger volumes of data.

Three major motivations for public authority initiative have been identified:

- Improving **road safety** and the safety of road operating agents

C-ITS is likely to improve safety by allowing vehicles to "talk" to each other and to the infrastructure so that many crashes can be avoided by exchanging basic safety data. Moreover, through I2V information directly given to the driver inside his/her vehicle, for instance on road works, rescue and recovery actions, winter maintenance, etc., it should reduce the number of casualties among road maintenance personnel, which is an important concern for road operators.

- Making **traffic management more** **efficient** and contributing to the reduction of emissions

Through the collection of data from vehicles and/or infrastructure, if possible in real time and for free, C-ITS contribute to good knowledge of the way road network and of events happening on it. This will allow:

* To reduce the delay for maintenance or emergency actors to act, and to improve efficiency and safety,
* To improve traffic management efficiency,
* and, as a consequence, to save time and increase safety for road users.

This in turn will contribute to the reduction of emissions of the transport system. Moreover, new multimodal services for sustainable mobility (such as dynamic carpooling) could be created by combining information on Park and Ride sites (locations, availability of parking spaces) with information on public transportation systems (such as locations of the railway stations, bus stations or multimodal areas).

- Optimizing infrastructure management costs

Deployment of C-ITS fits into a logic of optimisation of overall costs related to road safety and the management of existing infrastructure. Vehicles can provide speed and event information without requiring loops or cameras and in the far future one can imagine that there will be no need for VMSs anymore. Moreover, a better knowledge of travelers and haulers, of their mobility practices and issues could also allow road operators to optimize their investments in areas where they are specifically needed.

The following key issues for public authorities have been identified:

* Finances:
  + Can the investment be financed?
  + How does C-ITS deployment align with your organisation’s goals? What are the benefits?
  + What do you need to achieve deployment?
  + What are the crucial choices?
  + What are the costs over time?
  + What is the most suitable technology depending on the service (ITS G5/cellular)?
* Address different phases of deployment:
  + The pre-deployment or pilot phase will most likely involve more innovative parties, such as investors and early adopters. The requirements in this phase will be different
  + Second phase: “mass production”, with more players, higher penetration of equipped drivers, larger volume
* Role (Governance issues?) of the Road Operator and consistency with the Business model with respect to requirements placed on:
  + Safety in the value chain/ chain of delivery
  + Level playing field for participants / actors
  + Scaling up of the services
  + Use of standards
* Identify “building blocks” needed given key strategic choices of Service, Technology, Operations and Finance:
  + What are the possible business models and the roles that parties can fulfil?
  + Develop a process for the parties to come to a business case.
* Optimized value chain:
  + How to optimize the price of services for the driver?
  + How to compensate the costs of road side equipment for the road operator? (free access to data, other financial compensation?)
  + How to take into account the benefits of the confirmation of an event by the road operator?
* Access to data:
  + Safety-relevant data generated by vehicles of e.g. incidents, events and hazards need to be shared openly on equal terms with other vehicles as well as the relevant traffic management operators in real time directly or via back office
  + In the spirit of ITS Directive Priority Action c), the safety-related information based on the data should be provided to road users free of charge; for eight information types specified in the related delegated act, this is an actual requirement
  + Access to and pricing of other than safety-related information based on vehicle generated data is to be determined by the stakeholders owning the data (driver/vehicle manufacturer/service provider/etc.)
* Operational Framework
  + Roles and responsibilities of actors have to specified, negotiated and agreed for their part of contribution to the operation of C-ITS services. Some core actors (e.g. OEMs, road operators) or those performing support functions are part of every service whereas other actors are only involved in specific services (e.g. actors related to weather information).
  + Guidance for high level architectural considerations are provided by ITIL V3 and ISO 17427 on roles and responsibilities.
  + An appropriate way of laying down roles and responsibilities is to produce operational frameworks and operating manuals. An example of the C-ITS Corridor (German part) which is highlighting the interfaces is illustrated in the figure below.
* Articulation of local and national scales should be considered:
  + How to tackle the urban/interurban interface (different TMCs)
  + Data provision from cities to the NAP (if priority zones)
  + Access to the NAP from cities

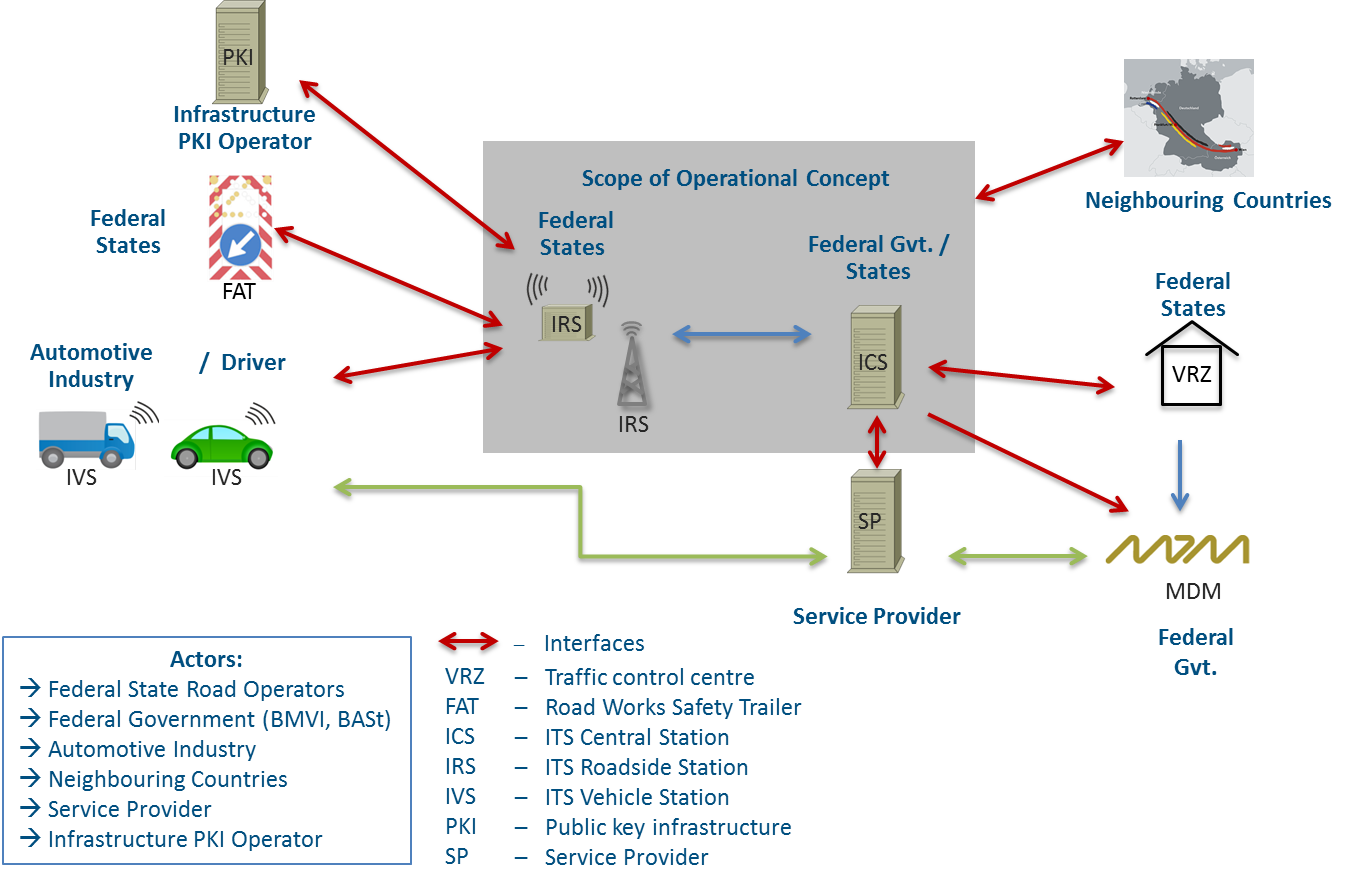


Figure 4: interfaces between stakeholders in the German part of the C-ITS corridor

## Private Road operators

**Perspective based on contribution from France**

Private road operators generally have similar stakes as public authorities, with the added possibility that their contribution (data provision, RSU deployment…) could be not for free.

More precisely, private road operators consider C-ITS as part of a whole information chain, which allow:

* To collect information on traffic (vehicles speed, time journey), and on road events (incidents, accidents, queues, weather, obstacles, etc.) in real time, thanks to vehicles communicating with infrastructure;
* To warn vehicles of events, to better anticipate difficulties in front of them and to slow down. If the information is given rather early, vehicles will be able to adapt their itinerary, to choose an alternative transportation solution, or to make a break on an adapted resting area.

Information collected are processed and centralized by road operators. Then they are aggregated with information coming from other sources. Such consolidated information is then communicated widely, using all media available.

Private road operators will choose the systems they consider the best for their needs and those of users. Such systems could be financed by existing road tolls and savings on actual investments (e.g. embedded loops, "VMS" panels for road signage). However, a complementary toll for “premium service” could be considered.

Road operators will exchange information with other road operators in order:

* to ensure a good traffic management at the connection of two networks operated by two different actors,
* to inform users of traffic conditions beyond its own network.

Above all, C-ITS will allow to improve safety by informing users of events situated upfront such as obstacles, stopped vehicles, end of queue. This information will be collected with V2V/V2I and consolidated with I2V. So, one event emitted by one vehicle will be broadcasted several hundred meters away, and all vehicles behind it will be informed and be able to adapt their behavior in consequence. This will allow avoiding accidents.

C-ITS will help personnel operating on roads (road works, winter maintenance vehicle …) to work in a safer way. C-ITS will allow to save lives.

Some issues still need to be addressed:

* C-ITS require both vehicles and roads to be equipped with consistent technologies. Vehicle makers and road operators should coordinate in the best possible way for C-ITS to be operational as early as possible. The deployment plans still have to be made and discussed;
* Road operators still have to consolidate their business model. The price for extended data needed to develop services is not known yet.

## City Authorities

In addition to the perspectives developed by working group members, the Working Group considered it also important to reflect the issues of other concerned stakeholder groups in the analysis. **The subsequent section reuses the city authorities perspective established in CODECS D2.2** (Berndt et al. 2016)[[2]](#footnote-2)**.**

"As traffic manager, infrastructure owner and operator, transport operator (e.g. buses, trams) and information service provider, city authorities are important users and therefore buyers of ITS. C-ITS can certainly add to the existing ITS mix. However, cities will only invest in cooperative technology where they see a benefit. ITS deployment in cities is increasingly policy-responsive, which is why the last decade or so has seen a significant growth in ITS investments to promote public transport (bus priority at traffic lights, bus countdown information) and multimodality (Smartcards and journey planners), among others.

It is important to underline that urban areas are very different to the motorway environment. A motorway is by definition a home for vehicles whereas city roads play host to diverse functions and multiple modes. Furthermore, city authorities themselves are comparatively complex structures – strongly policy driven and generally risk-averse.

When discussing C-ITS with cities, the typical questions and comments that are raised time and time again tend to be of a strategic nature:

* “How will C-ITS help me deliver my policies?”
* “Why is a C-ITS solution better than the ITS I have already?”
* “How much will it cost to install, operate and maintain?’
* “How can C-ITS build on existing investments?”
* “Who is liable if technology failure leads to an accident?”
* “C-ITS is for car drivers and highways”

As C-ITS developments have been driven largely by the car manufacturers and technology providers, many of the Day One C-ITS services (as agreed by the Amsterdam Group) are not necessarily aligned with the urban transport policy goals of modal shift, multi-modal transport, safety of all road users and mobility efficiency (as opposed to traffic efficiency), rather they are more suited to the motorway environment for vehicles running at high speed and for which safety and traffic efficiency are paramount. The C-ITS community seems to have acknowledged this and is now in the process of developing new services that do respond to some urban transport priorities (public transport and vulnerable road user safety).

While ITS may be widely used in cities to monitor and manage traffic, locate and manage fleet movements and provide travel information among other functions, there are some application domains which C-ITS may be better equipped to deliver for efficiency, quality and/or cost reasons.

One key application is traffic data (to support traffic management), which today is typically gathered from embedded loops and supplemented by other data sources such as ANPR or third parties (probe vehicle, GSM or GPS data). In some European cities, loops are no longer replaced once they break down due to the expense. A future whereby traffic managers can obtain traffic data directly from the vehicles (aggregated CAM) is indeed very appealing for cities. This particular case describes how C-ITS can respond to a specific problem/need, of which there are many in the urban transport and ITS domain. Such an approach will certainly aid the broader deployment of C-ITS in cities.

Despite the reservations held by cities generally, C-ITS deployment is starting to happen in a number of cities across Europe. In many cases, EU funding for demonstrations and pilots has been instrumental. While this is not a sustainable business model for the rest of Europe, EU projects are valuable in terms of raising awareness of C-ITS and in understanding the main issues surrounding deployment – e.g. Copenhagen’s experience of implementing the Compass4D services, from which emerged a number of technical and organisational challenges, is a good case in point."

## Service Providers

**Perspective based on contribution from HERE & Ericsson**

In the context of mobility, C-ITS is a potential fast and low cost option to respond to global trends and needs to bring more safety and sustainability to roads. C-ITS is also making mobility more predictable by orchestrating data. Storing data is not enough: raw mobility data must be translated into location intelligence via analytical capabilities. Location intelligence provides more accurate and relevant mobility information to road users and authorities, creating better awareness of fuelling options for alternative fuel vehicles, road works warnings, weather conditions, safety and efficiency-related use cases.

The most important raw data elements for implementing such services are:

1) Safety Related Traffic Information (SRTI), like real-time traffic information, accidents, road works warning, road weather and traffic jam information,

2) Traffic light raw data and/or Signal Phasing and Timing (SPaT) data,

3) Dynamic and static road network information such as speed limits,

4) Variable Message Signs (VMS) and other traffic management data,

5) Public transit time schedule and location data.

New mobility services are and will be powered by data. This approach has some challenges. Since we have few physical borders in Europe, people, goods and data-related services can easily travel from one member state to another. This means that regardless of the country a consumer is in or the type of device that consumer is using, he should be able to receive the same service under the same terms and business model.

However, this may be problematic, since parts of the raw mobility data is owned by member states and cities, each of which may have their own terms, licenses and practices regarding how the data may be accessed and ingested, and terms and conditions may only be available in the local national language.

C-ITS service providers and markets would benefit greatly from having unified and common pan-European wide terms and license agreement for using raw government mobility data adopted by every member state of the European Union. Reviewing and adapting on many terms, is complex and costly for service providers.

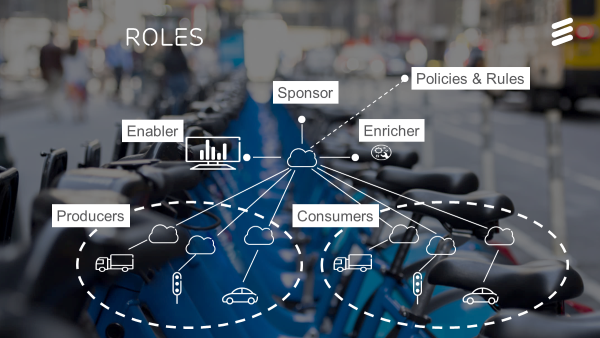
Likewise, as envisioned by the Digital Single Market, Europe should be considered as one market area, meaning mobility data collected from one EU country could be used and merged with data collected from another EU country, regardless of the technology used to generate, collect and provide the data (e.g. ITS G5/Cellular).

There has been a lot of discussion on data ownership. Since the new services are fuelled by data, it is important to agree basic principles on ownership. Companies are ingesting raw data and translating it into enriched information. Each company should make an independent decision whether to open enriched information or not. As a default, enriched information could be owned by data creators.

The system level interfaces should be open and everyone should be able to build services by using common interfaces. Second, there is a need to move away from fragmented data content formats between cities, regions and national governments.

With regard to business models, there are different roles in the systems. There are ***producers*** of data/information, who should somehow be rewarded. There are ***consumers***, who should somehow pay for their usage. There are ***sponsors*** who want some information to be subsidized or free. The sponsors will also have to inject the start-up investment until the system is big and rich enough of valuable data to be self-sustaining. There are ***enablers*** who set up the system, keep it running and handle rights to data and payments. There are ***enrichers*** who aggregate data to information and knowledge on a higher level.

There must be policies and rules for the system. To handle different jurisdictions and different sponsorship setups, and to avoid vendor lock in, a federated network of systems is envisioned.



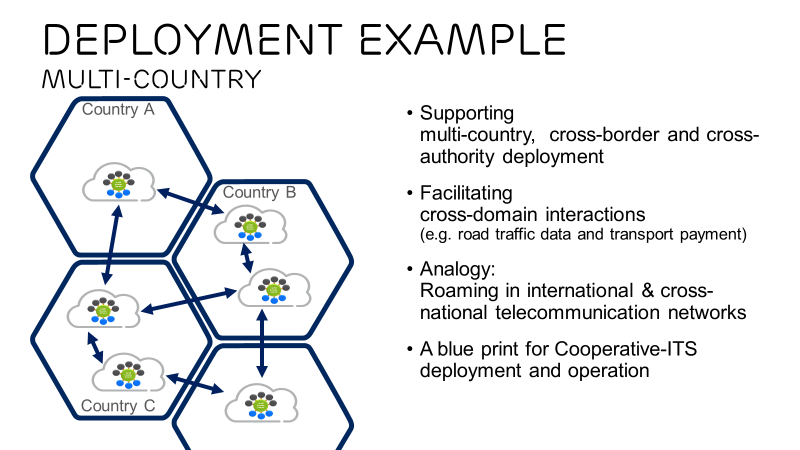


Figure 5: Example of federated network

New mobility services and data, either captured by a vehicle or a Smartphone, will make a difference to road safety and other initiatives in Europe. They bring benefits and should be made available to all road users (future vehicles, existing fleet, pedestrians etc.). The ITS Directive states that safety messages must be made available for consumers free of charge (at no extra cost for the end users at the point of use, Regulation EU 886/2013, Art. 2 (p)). At the same time, there are cost factors which should be covered (with a margin to cover taxes and future investments) such as data ingestion from vehicles and Smartphones, hosting and normalizing data, transforming data to richer information and delivering information to users.

The business case must be positive for the private sector to enable innovations and secure future investments. Service providers such as HERE will make data available under FRAND terms (fair, reasonable and non-discriminatory).



Figure 6: High-level architecture for cloud based services. (Source: HERE)

The high-levelC-ITS cloud based architecture (Figure 7) aims to connect all road users (pedestrians, cyclists, drivers, public transport users) and road elements (traffic lights, road side units, etc.). The architecture must be open with well-defined interfaces, and support third party and OEM clouds, which can also provide services.

Another key element in the architecture is the traffic management centre (TMC) which both provides data to the C-ITS cloud, and receives data/services from it. Furthermore, it provides data to the National Access Point as defined by the ITS Directive’s Delegated Acts.

At the heart of the architecture is the C-ITS cloud. It executes the following core processes:

1. Ingests various forms of data sources (e.g. incidents, events, weather, traffic flow),
2. Processes, enriches and stores ingested data to provide analytical capabilities, and
3. Distributes location aware road information to the applications and services.

Connectivity establishes a data transport link between cloud and services.

HERE considers that for C-ITS use cases (vehicle to vehicle and vehicle to infrastructure), Europe should let markets to develop the best communication technologies and solutions, considering there is no need to mandate a single technology for C-ITS communication, as long as seamless communication is ensured when crossing borders. Due the benefits of C-ITS services to safety and sustainability, we need to ensure that also existing fleets and consumers can benefit without investing in new technologies.

## Vehicle Manufacturers

In one of the Working Group meetings, the WG invited representatives from ACEA to discuss the perspective of vehicle manufacturers. The perspective below was developed by the Working Group based on that discussion.

Vehicle manufacturers look for sustainable business cases building on novel technologies – especially in the field of Automated Driving. Broad co-operation and in particular a supportive, stable legal (minimum EU-wide) framework are key. Incentives stimulating ‘desired behaviour’ would speed up effective deployment.

Vehicle manufacturers admit access to/ re-use of data to be pivotal, and are conscious that especially the data generated in/ by the vehicles themselves are of interest.

At the same moment they warn for potential safety, security or integrity risks resulting from inappropriate access or use, whereas a number of principles must be respected in case access would be obtained. These principles relate among others to customer consent and choice; privacy and data protection; security & liability; interoperability (e.g. standardised interfaces & procedures) and return on investment.

Furthermore it should be clear that one has to distinguish data categories, and that not all data will become accessible – in particular those that have a clear commercial interest. Subsets of data sets and clearly defined access rights are therefore necessary.

Building on all these elements ACEA, the umbrella organisation has developed a proposal incorporating:

* types of interfaces enabling access to selected data sets, in function of access rights granted
* ‘neutral’ servers in addition to the proprietary vehicle manufacturers servers enabling access to set specified data sets in a controlled way, and providing means to monitor data downloading.

**Perspective based on contribution from SCOOP@F**

The SCOOP@F business model is a result of a compromise between stakeholders. To reach such a compromise, OEMs had to consider different stakes related to data.

The first of them concerns data security and privacy

* Only the “just necessary” data is extracted from vehicles, according to use cases,
* Data transfer and data exchange is secured,
* Data is anonymised, thanks to vehicle pseudonyms changing frequently,
* Data extracted from vehicles is quickly aggregated by road operators along the process from the vehicle to the national access point, according to privacy considerations but in compliance with the delegated acts b and c expectations. As a consequence, no raw mobility data is available.
* OEM support a high level of responsibility according to data risks, as they design the vehicle which produces a large amount of the data C-ITS services are based on.

The second stake concerns the cost of data exchange

The ITS-G5 bandwidth being free access, it looked more interesting to base C-ITS technology on it in a free-to-free model since:

* TELCO costs would have been supported by OEMs to send DENM and also CAM (up to 10 times a second),
* ITS-G5 technology will be implemented on automated vehicles to communicate together, independently from C-ITS considerations.

Security and privacy costs due to the PKI solution may also be a real issue for OEMs. It will depend on the frequency vehicles will have to change pseudonyms because of:

* Costs of pseudonyms themselves,
* Cellular costs to download pseudonyms in the vehicles.

The third stake concerns the business potential of data

OEMs consider that as they invest in technologies allowing to generate the data, these data can’t be totally open and free. For any other data than safety-related information coming from vehicles, a direct negotiation for access and pricing should be done with the OEM, in compliance with EU 2016/679 Directive expectations.

One could consider that the current SCOOP solution (for time critical safety data) doesn’t embrace economic and innovation considerations through the potential of data. These could be addressed by complementary business models for other types of data (for example an extended vehicle solution; see ISO 20077 standard for more detailed information), which could address:

* The safety of people, through the protection of the vehicle against the risks of cyber-attacks or dysfunctions linked to competing data flows with multiple operators,
* The necessity for the OEM to guarantee data security,
* The potential of data according to economic and innovation considerations,
* The privacy considerations, i.e. the possibility for the customer/consumer:
  + To decide which data can be transferred and stored;
  + To control his data (modification, suppress);
  + To decide which third-parties such as service providers he accepts to share his data with.

Experimentations on such complementary business models are ongoing. An example is the AUTOMAT European project which experiments with one possible architecture for web design services ([*http://automat-project.eu/*](http://automat-project.eu/)):

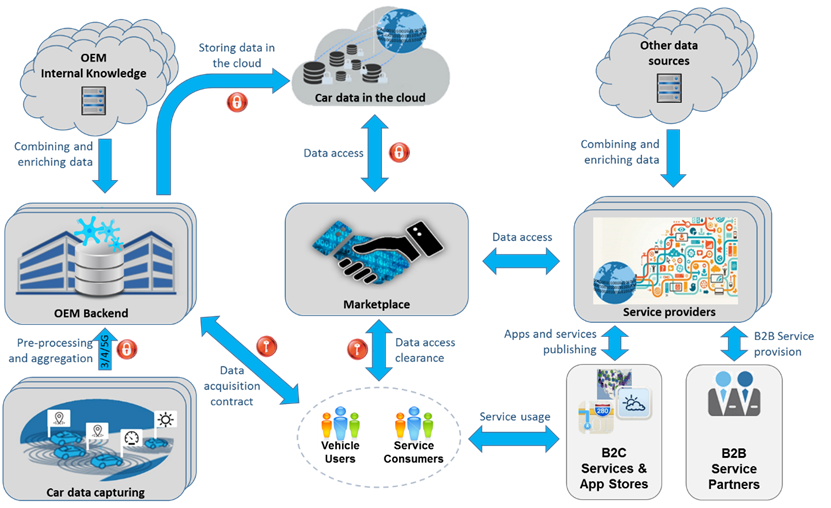


Figure 7: Automat project architecture

## End Users

In addition to the perspectives developed by working group members, the Working Group considered it also important to reflect the issues of other concerned stakeholder groups in the analysis. **The subsequent section reuses the user perspective established in CODECS D2.2** (Berndt et al. 2016)**.**

"Along the whole value chain, the actors who have greater influence in enhancing the massive development of C-ITS systems are public administrations and other private actors such as automakers but the end users will be one of the main beneficiaries of the C-ITS deployment in the future. At this end of the value chain, the involvement and influence of this stakeholder group is relatively low, but obviously, as C-ITS deployment will increase, end users will be of major importance for the success of C-ITS.

Drivers or road users in general will be the users of the systems and ultimately be the largest recipients of the benefits that C-ITS development can bring. Therefore they will be the ones to decide which services are of interest and for which of these services they might be willing to pay – hence their interests will heavily influence the definition of business models. Additionally, the end-users must participate in the future development, contributing with their vision in terms of usability, definition of requirements (both technical and business model) and participating in the validation process of the services.

Finally, end-users have the key to promote the deployment of C-ITS by acquiring vehicles and requiring roads properly equipped with the systems needed for the C-ITS services.

So the main challenge is to get this actor group interested and involved in C-ITS, ideally by understanding the road users needs and requirements and supporting those.

For users the C-ITS is an opportunity to gain major benefits when driving:

On the one hand, the development of C-ITS systems is presented as a, if not the only, opportunity to continue working on improving road safety. In recent years all countries throughout Europe have made great efforts to reduce road fatalities. One example of this is the evolution of the number of death road users in Europe in recent years, along with the definition of new policies, done by the administrations, with the ultimate goal of the “Vision Zero”, i.e. to reach a number of zero victims on the roads. So far policies have mostly addressed the driver’s behaviour, but a point of stagnation in the improvement of accident figures has been reached, which makes it necessary to consider alternatives to continuously get closer to the zero target. C-ITS deployment is a clear response to this need. The selection of primary Use Cases related to road safety is a clear demonstration of this objective.

So as a main benefit, road users will get an improvement in road safety as a first and foremost benefit. Looking at the longer term, the development of C-ITS also offers very important benefits while driving for drivers, and society in general, such as a more efficient, economical and sustainable transport.

Finally, the development of C-ITS is the prelude to autonomous driving that will provide an exponential increase in driver comfort, especially on long trips and interurban environment. This anteroom will provide value-added services that gradually will increase comfort and driving pleasure for users.

On the other hand, there are also some issues that definitely have to be taken care of, since they might severely limit the road user’s enthusiasm for cooperative systems and services. The main concerns that end-users have with regard to C-ITS deployment are:

* Security: C-ITS systems and services should guarantee the security of the communications and, in general, of all services that users would get. This especially holds true when looking at the future automated systems and the coexistence of different vehicles with different technologies sharing the road network.
* Privacy: Privacy of the user’s data is one of the main concerns about C-ITS (and future automated) systems; and the main topic in which end-user associations are concerned and focussing their efforts (e.g. FIA). All end-user data used in the different applications should be anonymized and end-users must have knowledge and control about which data is generated by the car, to whom it is sent, for which purpose etc. Also the user must have the possibility to manage all these aspects in an easy and efficient way.

Reliability: C-ITS offers a set of different applications that are based on information, usually generated by third parties. In order to achieve that end-users will be adopters of C-ITS applications and demanders of the C-ITS deployment from the beginning, it is very important to guarantee the quality and reliability of all information."

1. Ognissanto, F., Hopkin, J., Malone, K., Soekroella, A., Erdelean, I., and Nitsche, P., 2017, COBRA+ Tool and User Guide, Deliverable no. 3.2, ANACONDA Consortium [↑](#footnote-ref-1)
2. Berndt, S., et al., 2016, State-of-the-Art Analysis of C-ITS Deployment, CODECS D2.2. [↑](#footnote-ref-2)