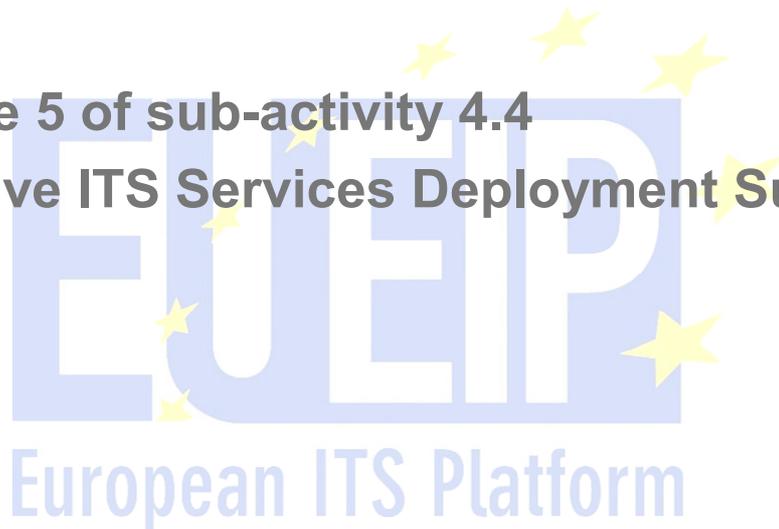




C-ITS Deployment and Evaluation Workshop

Report of the workshop
jointly organised by C-Roads and EU EIP,
ENGIE, Brussels, 05./06.11.2019

Deliverable 5 of sub-activity 4.4
(Cooperative ITS Services Deployment Support)



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Distribution

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09.10.19	0.1	Draft Workshop Programme by VTT, shared with organisation/author team (V2.3)
31.10.19	0.2	Updated workshop programme (V6), as before
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1. Purpose of the document

This document informs about the results of the C-ITS Deployment and Evaluation Workshop. Key facts about the workshop comprise:

- The workshop was jointly organised by C-Roads (WG 1 Organisational Issues, WG 3 Evaluation and Assessment) and EU EIP (Sub-activity 4.4 C-ITS Services Deployment Support).
- The workshop was hosted by ENGIE in Brussels Avenue Simon Bolivar 34) as a two-day-event on 05./06.11.2019.
- The workshop in Brussels attracted more than 100 participants from C-ITS pilots and evaluation activities around Europe, including delegates from public authorities and European services, industry, research and universities.
- More than 40 speakers presented project results and pilot status, discussed current deployment issues and moderated through the different sessions.
- Apart from C-Roads and EU EIP as organisers, presentations have covered the projects C-MobILE, CONCORDA, SOCRATES 2.0, AUTO C-ITS and CITRUS as well as the initiatives Cooperative ITS Corridor and C-ITS Operations (Task Force of Car2Car Communication Consortium).

The workshop presentations and the documentation – consisting of the programme, the summary and the minutes – have been made available online in December 2019 via the EU EIP website (<https://its.sina.co.it/news/index.php/it/home/8125100>). The purpose of this document is to unify the available documentation in one Deliverable for even better accessibility. To that end, all the documentation has remained unchanged content wise but has been edited in this single document. Some redundancy of information throughout the different chapter is in so far intended by design.

2. Workshop Programme



C-ITS deployment and evaluation workshop European ITS Platform and C-Roads Platform

Programme: Day 1 – 5 November 2019 – C-ITS Deployment organisational aspects
Location: ENGIE Tower Brussels, Avenue Simon Bolivar 34, Brussels

Time	Topic
09:00	Entrance, registration and coffee
10.00	<p>Opening & Introduction of the workshop</p> <p>Welcome words by European Commission, C-Roads Platform & European ITS Platform (EU EIP)</p> <p>Welcome by ENGIE</p> <p>Marek Scerba - C-Roads</p> <p>Holger Drees - EU EIP</p> <p>European Commission welcome words at 14.00 pm</p>
10.15	<p>Policy and strategy evolution for a harmonised C-ITS deployment in Europe</p> <p>Keywords: legal framework, a coalition of willing</p> <p>Presentations and a panel discussion</p> <p>Moderator: Eric Kenis</p> <ul style="list-style-type: none"> - C-Roads WG1 Questionnaire evaluation - short summary - European Cooperative Connected and Automated Mobility (CCAM) Single Platform - The C-ITS deployment group – making C-ITS services a reality (Martin Boehm, Austriatech, Austria) - Strengths and weaknesses – how to continue with C-ITS (H. Drees, Bast, Germany) - Harmonised C-ITS Deployment in Hungary (Verdes Máté, Hungary)
11.30	<p>Data Privacy and General Data Protection Regulation</p> <p>Latest lessons learned from data privacy and GDPR</p> <p>Presentations and Q&A</p> <p>Moderator: Marek Scerba</p> <ul style="list-style-type: none"> - C-Roads WG1 Questionnaire evaluation - short summary - German approach for data privacy (Berndt-Tolzmann, Sandro, Basst) - Czech Republic pilot's lessons in data privacy - Data privacy and GDPR in the NordicWay2 national pilots (Pedersli Per Einar, Norwegian Public Road Administration, and Michaela Sannholm, Finnish Transport and Communications Agency Traficom) - CONCORDA: Data Privacy and general Data Protection Regulation (Charlotte Ducingm, University of Leuven)
12:30	LUNCH
13.30	Day 1 program continues in the next page



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C-ITS deployment and evaluation workshop European ITS Platform and C-Roads Platform

Programme: Day 1 – 5 November 2019 – C-ITS Deployment organisational aspects

Location: ENGIE Tower Brussels, Avenue Simon Bolivar 34, Brussels

Time	Topic
13.30	<p>C-ITS ecosystem and deployment business models Keywords: Public Private Partnership (PPP), Data ownership, National Access Points, C-ITS Framework for large scale deployment, hybrid communication of long and short range communication along TEN-T and urban road networks to deliver C-ITS services</p> <p>Short presentations and panel discussion. Moderator: Eric Kenis</p> <ul style="list-style-type: none"> - C-Roads WG1 Questionnaire evaluation - short summary - Belgium pilot's ecosystem lessons (Sven Vlassenroot, Tractebel, Engie Group) - C-Mobile pilot (Giacomo Somma, ERTICO) - Finnish lessons on C-ITS ecosystems in NordicWay2 - part 1 (Ilkka Kotilainen, Finnish Transport and Communications Agency Traficom) - Madrid C-ITS pilot Calle 30 (Rosario Marchena) - C-ITS ecosystem and deployment business models (Thomas Desseilles, ERTICO, CONCORDA) - Claire Depre, European Commission, DG MOVE
15:00	COFFEE BREAK
15.15	<p>C-ITS operational aspects Keywords: from pilots to regular operations, ITS systems and Traffic Management, operational investment costs</p> <p>Short presentations and panel discussion Moderator: Anders B</p> <ul style="list-style-type: none"> - C-Roads WG1 Questionnaire evaluation - short summary - EU EIP C-ITS deployment guidelines and capitalise on initial services (Torsten) - C-ITS Corridor Operational Concept (Susanne Schulz, Hessen Mobil) - C-Roads Spain Andalusian Pilot - C-ITS Operational aspects (Angel Méndez Ruiz) - Urban Contribution from C-MoBiLE confirmed - Task Force Operations (Mario Friedrich)
16.45	<p>Conclusions C-Roads and EU EIP</p>
17:00	END OF THE WORKSHOP DAY 1
17.00-18.30	Networking reception at the workshop premises



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C-ITS deployment and evaluation workshop European ITS Platform and C-Roads Platform

Programme: Day 2 – 6 November 2019 – C-ITS Evaluation

Location: ENGIE Tower Brussels, Avenue Simon Bolivar 34, Brussels

Time	Topic
9:00	WELCOME C-Roads Secretariat - M. Böhm
9:15	Introduction to the C-Roads Evaluation approach - L. Studer
9:30	Experiences and preliminary results from C-Roads pilots Presentations: IRELAND, CZECH REPUBLIC, SPAIN, ITALY, FRANCE, AUSTRIA
11:15	COFFEE BREAK
11:30	Experiences and preliminary results from C-Roads pilots Presentations: GERMANY, BELGIUM, SLOVENIA, UNITED KINGDOM, THE NETHERLANDS, NORDICWAY
13:00	LUNCH
14:00	Evaluation of User Acceptance in C-Roads
14:15	Presentations of invited Speakers and C-ITS projects to discuss about evaluation approaches and implementations results. Presentations: C-MOBILE, AUTO C-ITS, SCOOP@F, EIP, C-ITS-KORRIDOR, CITRUS, SOCRATES ^{2.0}
15:30	Roundtable and open discussion
16:00	END OF THE WORKSHOP



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3. C-ITS Deployment and Evaluation Workshop Summary

3.1. Scope and programme

The European ITS Platform (EU EIP) and the C-Roads Platform collaborate for mutual benefits on preparing the deployment of interoperable C-ITS services and the best integration of C-ITS with the current ITS deployment. Both platforms jointly organised the C-ITS deployment and evaluation workshop on 05./06.11.2019 at ENGIE premises in Brussels. The C-ITS workshop serves as a practical milestone and enabler of further actions, following the collaboration note signed by both platforms in 2019. It also marks a successful evolution from the November 2017 C-ITS workshop at INEA premises where half of the pilots were in infancy days (C-Roads enlargement from eight to sixteen European states also in November 2017).

The program of the first day – co-organised by C-Roads Working Group 1 on Organisational Issues and EU EIP Sub-Activity 4.4 on C-ITS services deployment support – focused on organisational issues of C-ITS deployment. The overall objective aimed at consolidating the perspective of actors involved in real-life C-ITS deployments, building on feed-back from a “learning by doing” process supporting identification of good / better practices and effective experience sharing. Main topics of the workshop corresponded to the key themes of the C-Roads survey – driven by its WG 1 on Organisational Issues – for which responses were gathered from most C-Roads pilots upfront the workshop. Additional suggestions for presentation and discussion were collected from participants registering for the workshop. The main topics of interest were reflected in the program sessions:

- Policy and strategy evolution for a harmonised C-ITS deployment in Europe,
- Data Privacy and General Data Protection Regulation (GDPR),
- C-ITS ecosystem and deployment business models and
- C-ITS operational aspects.

The program of the second day focused on evaluation and assessment topics which are the scope of C-Roads Working Group 3. The objective was to share and compare evaluation approaches, best practices and evaluation results among partners and with external stakeholders. The aim was to gather experts, researchers and stakeholders dealing with the issue of C-ITS impact assessment, to increase the awareness and the effectiveness of the activities of evaluation and assessment. During the workshop the approaches defined in C-Roads Evaluation and Assessment Plan were presented and shared C-ITS services are expected to provide increased road safety, new means of optimizing traffic flow and thereby improving the functionality of the entire transport system. Day 1 services and applications (i.e. hazardous location notifications and signage applications) constitute an important development of the road transport system. Day 1 services and their applications provide information and warning services which support foresighted driving with a potential to provide noticeable effects on traffic safety, efficiency and travel comfort.

3.2. Key figures and impressions

The workshop in Brussels attracted more than 100 participants from C-ITS pilots and evaluation activities around Europe, including delegates from public authorities and European services, industry, research and universities. More than 40 speakers presented project results and pilot status, discussed current deployment issues and moderated through the different sessions.

This input provided broad insight on C-ITS being at the brink of deployment in Europe. On the first day the interim results of the C-Roads questionnaire on organisational issues embraced the different sessions. The presentation input was complemented by lively debates where presenters/panellists interacted with the audience. Programme, presentations and minutes from the workshop are accessible from both websites, EU EIP and C-Roads, see hereafter <https://its.sina.co.it/news/index.php/it/home/8125100>.

While the contribution of EU EIP and C-Roads experts as workshop organisers were essential, representatives from EC (co-)funded projects on C-ITS (C-Mobile, AUTOCITS, CITRUS, CONCORDA, SOCRATES 2.0) and deployment initiatives (C-ITS Corridor) provided valuable insights on a range of issues which cross-fertilised the lessons learned and the debate, including e.g. urban mobility innovation, business modelling and value network, companion services for truck drivers.

3.3. Outcomes and next steps

While the main intention of the workshop – the exchange of knowledge and current challenges in C-ITS deployment – was achieved successfully, some next steps to elaborate on the challenges have already been proposed or initiated. They can be summarised according to the different topics:

- Concerning the **policy and strategy evolution**, the Delegated Act on C-ITS not entering into force has not stopped the further deployment of C-ITS services based on ITS G5. Cooperation has even been strengthened as it can be seen with the newly formed C-ITS Deployment Group. Apart from that, the work on harmonised specifications for a parallel transmission of C-ITS messages via cellular network is pursued with intensified effort and new evolvments in technology evolution are constantly monitored.
- With regard to **data privacy**, legislature could facilitate the processing of C-ITS messages. Even the C-ITS Delegated Act would not have led to legal certainty automatically. As no new legislature is being expected in the near future, a common approach for C-ITS services building on the law in force, e. g. on GDPR should now be followed. In a dedicated workshop, this topic is planned to be tackled by the experts of different Member States beginning of 2020.

- The **C-ITS ecosystem** is constantly evolving. While the exchange of C-ITS messages via short-range and long-range communication has long been developed separately, the C-Roads Platform has taken up the coalescence of both types to a hybrid communication. The workshop itself also enabled and started knowledge exchange with C-ITS projects outside C-Roads like C-Mobile and CONCORDA. The presented **C-ITS deployment business models** will be integrated in the considerations of Working Group 1 Organisational Issues of the C-Roads Platform enriching the collection of business models for the deployment of C-ITS services.
- Once more, it has been shown that the **regular operation of C-ITS services** will bring new permanent tasks to all the different actors. Daily operation is not only influenced within the single entities of actors but also cross-organisational cooperation has to be maintained in order to incorporate modifications and revisions into the systems mutually. This is currently being done in the Task Force Operations where amongst others the cooperation between C-Roads and the Car2Car Communication Consortium comes alive and which has been promoted to be expanded.
- **Evaluation** of the C-ITS pilots is essential to supporting and boosting further roll-out of C-ITS services. The presented evaluation approaches and results already show that harmonisation in the C-Roads Platform is effective. Despite very different pilot environments, similar properties have been measured. Thus the workshop has encouraged the next steps of Working Group 3 Evaluation and Assessment being comparable assessment and cost-benefit analyses. In addition to the mostly simulated ex-ante evaluations, evaluations of deployments on larger scale are expected eagerly with the roll-out of C-ITS in production vehicles.



4. Minutes of the C-ITS deployment and evaluation workshop

4.1. Introduction to the C-ITS workshop

European ITS Platform (EU EIP) and C-Roads Platform organized in collaboration the C-ITS workshop. The aim of the workshop was to gather experts to share knowledge, issues and solutions on key topics today for the C-ITS deployment and evaluation. While the C-ITS deployment is underway in Europe and technical specifications are currently being prepared, the workshop concentrated on organizational and governance issues, as well as evaluation approaches and results, and open issues requested by the C-ITS pilots. This will valuably contribute to recommendations for the continuation of the C-ITS rollout.

The Session on 05 November was jointly set up by C-Roads Platform WG1 'Organisation & Institutional issues' and EU EIP activity 4.4 'C-ITS Deployment support' working groups. First results of the Survey launched by C-Roads WG1 were used as a starting point, and have been commented at start of each block.

The overall objective was to consolidate the perspective of actors involved in real-life C-ITS deployments, building on feed-back from a "learning by doing" process supporting identification of good /better practices and effective experience sharing. Main topics of the Workshop corresponded to the key themes of the C-Roads WG1 C-ITS survey - for which responses were gathered from most C-Roads pilots upfront the workshop whereas additional suggestions were collected from participants registering for the workshop.

The workshop Day 1 C-ITS deployment organizational aspects main interest were policy and strategy evolution for a harmonized C-ITS deployment in Europe, data privacy and General Data Protection Regulation (GDPR), C-ITS ecosystem and deployment business models as well as C-ITS operational aspects (see chapters 4.2-4.6).

The C-Roads Working Group 3 "Evaluation and Assessment" organized the Day 2 of the workshop. The objective was to share and compare evaluation approaches, best practices and evaluation results among Partners and with external stakeholders. The aim was to gather experts, researchers and stakeholders dealing with the issue of C-ITS impact assessment, to increase the awareness and the effectiveness of the activities of evaluation and assessment. During the workshop the approaches defined in WG3's Report "Evaluation and Assessment Plan" were presented and shared.

Overall, 109 participants from pilots and C-ITS evaluation activities around Europe took part in the joint C-ITS workshop, including delegates from public authorities and European services, industry, research and universities.

All presentation material is shared on the EU EIP webpage.

EU EIP and C-Roads are European Union Connecting Europe Facility (CEF) funded projects.

4.2. Opening & Introduction of the workshop

Welcome by ENGIE by Alexandre Vanhulle

Engie welcomed all participants to the facilities. Engie “zero carbon as a service” offer with B2B and B2G solutions including transport and mobility. Besides C-ITS, Engie works with hydrogen storages, heating & cooling systems and smart mobility. Focus on cities and urban development: Urban design & development, buildings & complex structures, transport & mobility, environment & climate change. Combining expertise in different areas, e.g. cities, airport, etc. assessed. Strategic focus: integrated projects, quality & innovation, strong client orientation.

Welcome by C-Roads Platform, WG1 C-ITS Organisation by Marek Scerba

C-Roads Platform partnerships enlarged from 2016 to 2019 to 18 European States. Now 43 European cities starting with C-ITS as well. C-Roads links European C-ITS deployments including international associate members. Aim of C-Roads is to provide C-ITS technical specifications, cross-testing, system tests and hybrid communication. Governance structure includes five working groups as well as five task forces (www.c-roads.eu). C-Roads Working group 1 ‘organisational aspects’ covers for supportive documents in the field of legal and organizational structure(s) for C-ITS operation, C-Roads pilots, privacy, business models, and cooperation. Current activities include C-ITS survey of ongoing of pilot experiences, workshop and other projects/Cities involvement – concludes to reporting on lessons learned.

Welcome by EU EIP - European ITS Platform, sub-activity for cooperative ITS by Holger Drees

EU EIP is a platform where national ministries, road authorities and road operators collaborate in order to foster ITS deployment in Europe. It links five ITS corridors, contributes to their successful performance and it promotes one common standard - DATEX II. The corridors are aligned with the TEN-T core network and linked to national programs. The deployment of ITS supports the delegated regulations under the ITS Directive. 26 beneficiaries from most Member States.

Corridors support EU EIP and vice versa. Best practices being collected. Interaction between expert groups related to different services. Evaluation is also an important topic in EU EIP.

The core of the platform is harmonization. Benefits of harmonization have been identified for short-term and mid-/long-term. The short-term benefits include e.g. quality of services, and long-term ones e.g. facilitation of automated driving.

Collaboration established between EU EIP and C-ROADS (collaboration note).

4.3. Policy and strategy evolution for a harmonised C-ITS deployment in Europe

Moderated by Eric Kenis

Relevant results from the WG1 Survey collected and processes upfront the workshop were presented by **Marek Scerba** (see slides). For example, road works warning was rated highest in priority but there were regional differences in the priorities. Lack of funding and a missing legal framework were seen as key barriers whereas an effective legal framework and collaboration were identified to be key enablers.

Martin Böhm, Austriatech, gave a presentation on C-ITS deployment becoming reality.

- C-ROADS platform now includes 18 Member States and associated members outside Europe. C-ITS requires everyone to work together. Many have committed to work done in C-ROADS: Platform aims to harmonise the services that are provided to the vehicles. Cross-border continuity of services is important.
- City services and harmonization of services in urban environments is challenging due to high number of stakeholders (and cities) but essential. 43 cities have accepted the invitation to C-ROADS. By the end of this year 6000 km of safety critical roads have been promised to be covered by C-ITS services based on shortrange communication and 100 000 km of roads by hybrid communication. We won't achieve this because delegated act was not accepted. Now uncertainty on how to continue.
- C-ITS Deployment Group was established and a declaration was handed over to Commissioner Violeta Bulc in ITS WC 2 weeks ago. The group includes more than 50 supporters to deploy C-ITS. This makes EU in lead position globally for the deployment of C-ITS. The solution will be mix of short-range, long-range and cellular connectivity.
- VW has announced Car2X technology in its Golf passenger cars based on ITS G5. Now, these drivers will expect services being provided for them. Infrastructure side will be needed. Collaboration is needed for this. Other OEMs will follow very soon on connected cars.

Holger Drees, BAST, gave a presentation on strengths and weaknesses and how to continue with C-ITS (see slides). SWOT analysis showed that unclear cooperation is a threat. A strength on the other side is that stakeholder framework and structures have already been established. A weakness is that the benefits and costs are still unclear and that the deployment is complex and time-consuming. Global harmonization and investments may not be quick enough. If cooperation between relevant stakeholders is established, this will enable new services. Yet, it is important to keep an eye outside our C-ITS bubble.

Máté Verdes gave a presentation on harmonized C-ITS deployment in Hungary (see slides). Interoperability with the neighboring countries is very important for Hungary. Mobility platform established for collaboration. C-ITS deployment started in 2015. Until 2018 based on ETSI ITS G5 communication, from 2019 hybrid. Important to choose wisely in what to invest. Proving ground set up in Zalazone for testing. Safety is important and C-ITS is used to improve the safety of the road workers.

Eric Kenis elaborated on the objectives of the Commission's CCAM platform and the underpinning of a proposed European Partnership (see slides).

- According to the Commission Services C-ITS constitutes an elementary step on the road to vision zero, whereas evolving technology enabling Co-operative and Automated mobility will contribute even better. Safety indeed is a key benefit but traffic efficiency follows.
- Focus for research should be on SAE level 4 (or 5), with short-range connectivity as a key enabler. The Commission Services suggest to focus on zones where SAE 4 would be possible whereas larger scale tests and related demonstrations / show-cases are required to have users involved and to gain their trust. For this, digital infra is needed. Defining ODD is the first step. To bring all actors together and to jointly address challenges at stake the EC has established the 'single platform on CCAM'. A prime objective is to establish a common R&D agenda as part of a 'partnership on CCAM' focussing on short-term resolution of (research) gaps in line with long-term investments to strengthen EU industry. The CCAM platform includes 6 working groups and is to provide advice and support to the Commission's Services.

During the **panel discussion** it was highlighted a learning phase is needed in order to understand what services and information are needed by the vehicles and drivers. This is part of preparing for automated vehicle introduction. It must be defined how accurate does the high-accuracy map need to be.

Cooperation is crucial. The User is also important. Hungary has launched a survey on acceptance of C-ITS. People seem to trust more the road operators than other stakeholders for e.g. provision of route information. It is about expectation management. The user should profit from the services. Therefore the services should be promoted and the first connected car users can get the services to increase the awareness and experiences.

How to get the Eastern European countries involved? They are taking part in the corridor projects. A challenge is that they do not have funds for deployment even though some funding instruments have been set up for them. Basic traffic management systems are being set up in those countries, and C-ITS can be part of these.

Is there such a service that would really get the public acceptance? Such single service does not exist yet. Also the proof of the benefits is needed. For the safety systems, the acceptance is little different that for the infotainment as it does not have to be fun but it may still be beneficial. Suggestion from the audience that C-ITS should be linked with MaaS. Trust is key element for users but also for all stakeholders to enable the services.

4.4. Data Privacy and General Data Protection Regulation

Moderated by **Marek Scerba**

Marek Scerba told as introduction that Finland and Czech Republic have established collaboration on how to deal with GDPR and privacy in practice. These results are reflected in NordicWay 2 and in Czech. These will be presented today along with presentations from other regions.

Sandro Berndt-Tolzmann on the German approach for data privacy (see slides).

- Information can be shared as anonymous information or as personally identifiable information. Privacy impact is different but so is the usability of data. Pseudonyms is a halfway solution. C-ITS delegated act draft did not include privacy.
- There are many requirements set by GDPR: consent, clear description of the purpose of the data collection, consent can be withdrawn. Germany has published two documents: Protection profile and Blueprint for federal states for information security systems.

Michail Nulicek and Tomas Pospisil presented personal data protection approach for Czech Republic (see slides).

- Challenges faced included long-term location tracking, there is no legal obligation to perform processing of personal data in C-ROADS project, and the nature of collection and sharing of personal data among the project members. Solutions include that there is a limited number of entities processing personal data and that the data subjects are in the project on voluntary basis with consent.
- Legal basis includes the consent, and that the task is of public interest and local authority vested in the controller. GDPR related contractual roles have been assigned to the project partners: joint controller, controller and processor. Challenges include unlimited numbers of data subjects and controllers, how to inform the data subjects to ensure their exercise of rights, and that only applicable legal basis would be legitimate interest. Thus, there is need for a change of legislation.
- A workshop to discuss these topics is suggested to be organized in Prague in 2020.

Per Einar Pedersli, NPRA, presented the results of the GDPR workshop in Norway under NordicWay 2 project (see slides). Lawyers need to be introduced to C-ITS services and ecosystem behind the services. The data collection was discussed. Clusters of sensors were also investigated to see the big picture. Actor roles were defined. Lawyers were able to give good feedback when they understood the issues. Single pilots were then looked into and risk assessment and agreements were made. This was a good practical way to identify data privacy issues.

Michaela Sannholm, Traficom, presented the Finnish case in NordicWay 2 (see slides). Project is aiming for deployment of C-ITS services in Finland on basis of 3 different ecosystems and 7000 (real) users with 6 apps in app stores. The services are based on different data sources and data sharing models. As lot of personal data (locations) is being collected, authorities wanted to know how they treat personal data and support the compliance with GDPR. The work is not ready yet. Yet we see that public-private collaboration was needed to solve issues. Right kind of expertise is also key. Lawyers, technical expertise and user communication are all needed. Collaboration would be needed on EU level. The work will continue as there are still open questions to be answered. The presenters agreed on the need to address this issue at European level, because it is not possible for different rules to be applied differently in different countries and the second important aspect is the need to create a unified system together without unnecessary duplication (especially personnel).

Charlotte Ducuing, University of Leuven, gave a presentation on GDPR topics in CONCORDA. Interface between C-ITS regulation and NIS directive is important, as it is also all about security. If sector specific legislation is valid then NIS does not apply. Charlotte raised questions based on which we can assess if specific regulation is needed for C-ITS. It is a challenge that different terminology is used for NIS directive and C-ITS directive. This should be clarified for future regulation on C-ITS. Another challenge is that there is a mixture of security related topics and technical topics in the C-ITS regulation. Level of detail is different for C-ITS regulation and NIS directive as they have different regulatory angle. Being dynamic is needed for risk management regulation.

4.5. C-ITS ecosystem and deployment business models

Moderated by **Eric Kenis**

Marek Scerba presented the survey results (see slides). Standardisation was seen to be on satisfactory level but further work on it is still needed.

Sven Vlassenroot, Tractebel, presented Belgium pilot's ecosystem lessons (see slides). Lack of quality of the provided content and complexity of ecosystems makes C-ITS provision challenging. Relation between mobility and telecom is challenged by two different worlds having their own language.

Giacomo Somma, ERTICO, presented C-MOBILE (see slides). Project has developed business model method (SDBM/R) to assess the ecosystem. C-MOBILE provides 20 services bundled together. 12 business models have been developed bringing different stakeholders together.

Ilkka Kotilainen, Traficom, presented lessons on C-ITS ecosystems in NordicWay 2 (see slides). More detailed results will be presented tomorrow by Petri Mononen. Lessons learned: start with what you have, i.e. enable existing ecosystems and their interoperability.

Leave room for new innovations. There is market driven competition and business models are needed with agreements on data licenses. Technology neutral ecosystems are the fittest, potential to scale up is beneficial which required cost-efficiency. Commonly used technologies benefit ecosystems. Public authorities can support ecosystems but they should not select winners.

Rosario Marchena presented Madrid C-ROADS pilot Calle 30 (see slides). Urban motorway, M30 ring road. C-ROADS pilot implementation including also simulations. Appr. 30 km covered with some day 1 and day 1.5 services. They have identified as risk if car manufacturers are not involved in the C-ITS deployment. Standardisation is a general concern.

Thomas Desseilles, ERTICO, presented CONCORDA (see slides). Challenges are related to the technology and the actors. Thomas showed the business model on service dominant radar. Benefits and related costs were discussed from the viewpoint of all actors. To enable a transfer of liability, the transfer of data needs to be fast, reliable and liable. Critical whether all actors are able and willing to take responsibility.

Claire Depré, DG MOVE, presented the Commission's view. It is important to talk about evaluation. Broad awareness and awareness raising are important. C-ITS is also to ensure the safety of other and to prepare for automated driving. Cooperative safety is much more than active and passive safety. Let's focus on good services which are already there but that should be seen as only beginning. We also need to go into city and rural environment. C-ROADS has done good job in bringing pilots also to cities. Everything we have put in place has safety built into it, incl. cooperation mechanisms. Even though the delegated act is not there, this has seemed not to stop the development. Problems are solved today. Interoperability is a factor that matters. It would be good to progress as quickly as possible with as many services as possible.

4.6. C-ITS operational aspects

Moderated by **Anders Bak Sørensen**

Marek Scerba presented the survey results (see slides). For example need for standardisation and collaboration especially with cities were risen again.

Torsten Geissler, BAST, gave a presentation on EU EIP deployment guidelines and on capitalization of initial services (see slides). ITS has traditionally been deployed to solved local problems. European dimension needed to ensure continuity of services cross-border. ITS services important for the TEN-T core corridors. ITS deployment guidelines is a heritage of road operator collaboration. Projects like EasyWay, EIP and EIP+ worked on them during the last more than a decade. Mapping exercise was made between deployment guidelines and different C-ITS services. Aim is to maintain operational excellence via handbook.

Susanne Schulz, Hessen Mobil, presented the C-ITS corridor operational concept (see slides). Challenges include all federal operators having different requirements for deployment. Often resources are missing to implement an operation of new systems. Hessen Mobil has offered to operate the system but also decentralized operation is possible. A framework is needed for an operational concept to define e.g. tasks and processes, roles and actors, processes and interfaces and to specify structures and contents.

Angel Mendez Ruiz, Ferrovial, presented the Andalusian pilot (see slides). 10 RSUs, 5 OBUs, ITS-G5 for the Day 1 services. DATEX II used to map C-ITS services to Kapsch systems. Challenges faced so far are the coverage of RSUs which was less than expected. There were limitations for choosing the location of RSUs. There were quality issues with power supply. Connections to onboard devices had some issues. Technical issues included also lack of integration between technology components, IT security, procedures for GDPR and hybrid technology testbed. Common data model achieved for Spain. Missing some data or source for some. Organizational obstacles included e.g. business processes and organizational changes. It is important to collaborate with cities even though there is no direct connection between the corridor and cities.

Evangelos Mitsakis, CERTH-HIT, presented the urban contribution from the C-MOBILE project (see slides). Compared to previous projects, C-MOBILE has higher number of users and services in more locations in 8 cities. Interoperability with shared interfaces for both 4G and ITS G5. Interoperability across sites was ensured in large testbeds. With thousands of users activities with them had to be carefully planned. C-ITS enabled traffic management center was a novelty of this project. Services bundled with certain logic taking into account the traveler and the role of traffic management. A tool was provided for TMCs. The project developed a user interface that provides all the services to the end-user as one app. In Copenhagen, service was also provided for the cyclists which contribute 49% of trips made (compared to 27% by car). Training model developed and will be published.

Mario Friedrich presented CAR2CAR communication consortium's task force operations (see slides). 20 years has been used to development but it is not ready yet. Long-awaited deployment has become reality for some services. Now positive user experience is crucial to pave the way for fast deployment of the services. TF operations has a vision to handle and facilitate resolution for common operational issues for cooperative services in a cooperative manner. TF is also supporting deployment and implementation of C-ITS in cooperative manner to ensure interoperability on topics which lack standardization. Slides show the different activities done under the TF operations. TF operations is a layer between ETSI, ISO, C-ROADS etc. and different stakeholders doing implementations and operation. Common process steps are needed for seamless cooperation. C-ROADS is welcome to participate to the work.

The **panel** discussed that seems that the trust in someone else's data is bigger issue than the access. How to move for real deployment if this is an issue. Quality of data should be analysed and documented if data is shared between stakeholders. Data sharing should be built into the architecture in the first hand.

Are cities different from the motorways? Yes, as cities may not have connections with each other. Also, regulation is more related to highways than to urban context. For example, the case of traffic lights is different from the applications made for highways. The volume of data is also different as there are so many events in cities. Latency may be a key topic to consider.

What is ready for deployment? Concepts for operational issues are ready, missing anymore only the link to OEMs. If more stakeholders are wanted, an operational model is needed to show their role and interrelations in detail. Legal framework would have been nice to make collaboration easier. Another type of cooperation is now needed and starting. If added value is provided to the end-users, this can help in developing the market development.

4.7. Conclusions (for first day)

Marek Scerba and **Holger Drees** made the final remarks thanking everyone for the participation to this day. The workshop has reassured the importance and the width of organisational issues relevant for C-ITS deployment. As a matter of cross-validation, key messages from the presentations have been found in line with the presented analysis of the underlying questionnaire by C-ROADS WG 1 on organisational aspects.

Follow-up activities emerged from or reconfirmed at the workshop comprise amongst others the organisation of C-ITS deployment driven by a coalition of the willing in absence of a legal framework on EU level, the elaboration on privacy issues of C-ITS, the stimulation of the C-ITS ecosystem and the need for collaboration on operational level.

The workshop continues tomorrow with evaluation topics.

4.8. Welcome and Introduction to the C-Roads Evaluation approach

C-Roads Working Group 3 evaluation welcome by Luca Studer

Luca Studer welcomes the audience and provides the introduction to the second day of the workshop, aimed to share methods, experiences and updates about evaluation and assessment of C-ITS.

C-Roads Secretariat welcome by Martin Böhm

Martin Böhm introduces the C-Roads Platform, presenting numbers & figures about the project. Updates are provided about the C-ITS deployment group and the news about C-ITS from the automotive sector. About evaluation: ex-ante showed positive results while ex-post results are expected.

Introduction to the C-Roads Evaluation approach by Luca Studer

Luca Studer presents the general approach of C-Roads in terms of Evaluation and Assessment, developed within the C-Roads WG3, and introduces the speakers from C-Roads Pilots.

4.9. Experiences and preliminary results from C-Roads pilots - I

IRELAND

Presentation provided by Tom D. Allen. Activities just started, an overview of the planned work and how it will be developed is presented.

CZECH REPUBLIC

Presentation provided by Zdenek Lokaj. Activities developed in 5 Pilot sites, focused on User Acceptance and Functional & Technical Validation. Pilot will involve urban areas and also railway crossing.

SPAIN

Presentation provided by Josep Aymami, Eva García and Marta Miranda. First part of the presentation about the effort on simulation as a means for evaluation of C-ITS. Number related to KPIs are already available and under process. Simulations also provide suggestions for the fine-tuning of the system. Second part of the presentation about the Pilots deployed in Spain, involving also urban environment. Even from Pilots numbers are available. The last part deals with the characterization of drivers and their perspective about the C-ITS. Results about this investigation are encouraging.

ITALY

Presentation provided by Serio Agriesti. Peculiarities are represented by the systems Truck Platooning and Highway Chauffeur. These are evaluated as stand-alone systems as well as jointed implementation with CITS. It is highlighted the issue of upscaling and getting to the expected impacts on mobility, relying also on modeling and simulation.

FRANCE

Presentation provided by Gerard Chaloub. Focus on simulation effort in C-Roads France and on two Use Cases (GLOSA and whatever Alert UC). Numbers are coming out from the modeling activity, both from the “mobility” point of view (speed and fuel consumption) and the “technological” one (G5 vs LTE).

AUSTRIA

Presentation provided by Martin Böhm. Presentation oriented to present the Pilot deployed in Austria. Beside the infrastructure on motorways in the surroundings of Vienna, a mobility lab offers testing opportunities. A strong commitment is granted for the deployment of C-ITS. ALP.Lab test area was created to test and evaluate different systems, even considering the surroundings. On-road tests were developed during the beginning of October. Results will come soon.

The presentation from Austria concludes the first session of Day 2.

4.10. Experiences and preliminary results from C-Roads pilots - II

GERMANY

Presentation provided by Jan Schappacher. Two Pilot sites are deployed, involving urban areas too. Currently the focus is on functional testing of the services. Evaluation results are expected by mid 2020. User Acceptance too is investigated.

BELGIUM – Flanders

Presentation provided by Rudi Tegenbos. Service is in operation since June 2019. The functional validation was performed too. A very deep and specific focus is oriented to the analysis of User Acceptance and its barriers.

UK

Presentation provided by Gary Crockford and Jonathan Mann. “Connected Corridor” along A2 and M2 as Pilot. The experience from INTERCOR contributed to the evaluation approach for C-Roads. Technical validation and User Acceptability/Acceptance were also faced. IVS and GLOSA were tested in August and September 2019.

NETHERLANDS

Presentation provided by Henk Jan Kwakernaat. Services tested from summer 2018 to summer 2019. Collection of data on the Dutch C-ITS Corridor, with Services RWW and IVS. User Acceptability and Acceptance investigated too (results available). Results of impact evaluation based on naturalistic drivers are already available and presented.

NORDICWAY 2

Presentation provided by Petri Mononen. Focus on Ecosystem Evaluation with a qualitative analysis. Data collection also via 2 sets of workshops. First workshop in autumn 2019 and the second in spring 2020. First outcomes of the first workshop are coming, but analysis just started.

This presentation concludes the works for the morning.

Evaluation of User Acceptance in C-Roads

Sven Vlassenroot presents the approach adopted within C-Roads to assess User Acceptance (see presentation slides).

4.11. Invited presentations

The afternoon session is aimed to share experience from other invited Projects. It contains presentations of invited speakers and C-ITS projects to discuss about evaluation approaches and implementation results. The session is moderated by Gary Crockford. Presentations from:

SOCRATES 2.0

Presentation by Tiffany Vlemmings. Practical collaboration of public and private partners on harmonised traffic management and navigation services. Currently pilots in four European cities: Amsterdam, Antwerpen, Copenhagen, Munich. A multiple-level evaluation framework has been developed. Evaluation comprises organisational, functional and technical aspects, also cross-pilot aspects, maturity and scalability.

AUTO C-ITS

Presentation by Rodrigo Castineira Gonzalez. Project focus on Day 1 services for connected and automated vehicles. Tests of C-ITS equipped roads in three European capitals (Lisbon, Madrid, Paris), even with automated vehicles. Project has just finished and the project results are available.

C-MOBILE

Presentation by Jos van Vlerken. Report on the Copenhagen pilot site with focus on subjective evaluation, in particular short questionnaires answered by participants at multiple points in time via mobile devices.

C-ITS CORRIDOR

Presentation by Susanne Schulz and Torsten Geissler. Presentation has focused on evaluation of trial operation and cost-benefit assessment for Road Works Warning in the German part of the C-ITS Corridor.

EU EIP

Presentation by Torsten Geissler. Presentation has featured the work on information quality frameworks within EU EIP that has recently been extended to C-ITS. A series of workshops is to be expected in 2020.

CITRUS

Presentation by Sven Maerivoet. Main goal is to develop a 'companion app' for truck drivers in order to increase traffic safety and lower emissions. Evaluation comprises impact assessment (e. g. speed patterns) and user acceptance surveys.

4.12. Conclusions

Luca Studer and Gary Crockford thanked the speakers, the hosts and the participants for the fruitful day and close the workshop. The presentations and the related discussion have demonstrated that the C-ITS pilots can come up with rich evaluation results on a number of aspects. Evaluation and assessment makes use of a methodological toolbox that comprises subjective evaluation (e. g. user acceptance), functional testing (enabled by data logging in deployed C-ITS devices) as well as simulation studies (in order to derive large-scale impacts that can not be directly measured). The evaluation workshop has confirmed the similarity of evaluation challenges and thus has cross-fertilised the work of evaluation practitioners.