

ITS ACTION PLAN

FRAMEWORK SERVICE CONTRACT TREN/G4/FV-2008/475/01

ITS Action Plan - Action 5.2

D6 – Final Report of the Study regarding liability aspects of ITS applications and services

Berlin, 07.12.2012
2012 12 07 D6 Final Report V2 00

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VERSIONING AND CONTENT REVIEW INFORMATION TABLE

Version	Date	Author	Remarks
0.01	15.11.2012	Cornelie van Driel (RT)	Including EC comments on D2, D4 and D5 and EC suggestions during TelCo on 13.11.2012
0.02	19.11.2012	Cornelie van Driel (RT)	Including EC comments on D2 (15.11.2012) and changes after RT internal review
1.00	19.11.2012	Robert Yen (RT)	First release to the EC
1.01	03.12.2012	Cornelie van Driel, Robert Yen, Karl-Gerhard Freyer (RT)	Including EC comments on version 1.00 and EC suggestions during final presentation on 30.11.2012
2.00	07.12.2012	Robert Yen (RT)	Second release to the EC

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1. Executive Summary

The present document is the final deliverable of the study regarding liability aspects of ITS applications and services which is conducted within Area 5.2 of the European Commission's ITS Action Plan.

There is **no specific liability regime** currently applicable to the deployment of ITS applications and services. In our research **various liability regimes** in Europe (more particularly in Germany, France, United Kingdom) and the USA which might pertain to liability issues of ITS applications and services have been identified:

- Contractual liability
- Tort liability
- Product liability
- Traffic law (as a background element)

The current degree of uncertainty around liability in the field of ITS is not surprising given the wide and **rapidly developing range of (complex) applications and services** and the **highly varied liability regimes (also geographically)**. Especially the more complex and non-overridable ITS applications or services require a great deal of thought to establish a clear and transparent settlement of liability issues among all stakeholders involved.

For most of the currently applied ITS applications and services it might be stated that *in theory* the existing legal framework seems **sufficient** to rule liability issues as the chain of responsibilities is considered clear and fits in the existing legislation, although *in practice* responsibilities may be sometimes difficult to establish (esp. in case of ADAS). This latter statement was confirmed by the results of our Stakeholder Survey. According to these results, most contacted stakeholders perceive the current applicable legislative framework regarding ITS services and applications as rather **unclear**. Reasons for this – based on the stakeholders' comments – include the following:

- There are different rules for each application or service
- For future applications and services the rules have to be changed most probably
- The harmonisation of EU- or worldwide regulations is still pending
- From the perspective of the user the disclaimers and terms and conditions are mostly too difficult to understand for not legally educated users

Furthermore, the stakeholders perceive as current “obstacles” the additional effort and unpredictable time needed to go through the legislative procedures which slows down the launch process of ITS applications and services.

Liability sensitive applications will be those where in relation to the existing or foreseen liability issues no or insufficient remedial solution approaches exist by now and specific additional measures are needed. Following this approach, the following (fields of) ITS applications and services have been identified as “liability sensitive” and have been analysed and described in more detail:

- the fields of highly and fully Automated Driving
- Cooperative systems and the respective applications and services which build on cooperative systems

Automated driving means that the driver becomes partly or in full range passenger in the vehicle. The responsibility which is currently still assigned to the driver or the keeper of the vehicle (see Vienna Convention of 1968) is shifted to the manufacturer of the automated driving applications (in most cases the vehicle manufacturers). Automated driving is on the rise in the United States where, for example, Nevada already initiated respective changes in legislation (e.g. regulations authorising the operation of autonomous vehicles on highways and a driver’s license endorsement for the operation of an autonomous vehicle).

Any system which aims at helping the driver in its driving process, in particular in case of Highly or Partly Automated Driving, raises the question whether such systems would comply with the provisions of the Vienna Convention. The uncertainty about the status of such systems in relation to the Vienna Convention has been underlined in this study.

For applications and services which include several service providers or devices of other manufacturers, like **cooperative systems**, the chain of responsibilities can be quite complex. The implementation of such applications and services will only start when the rules with respect to the responsibility shift are defined and agreed upon by all parties. For example, in case vehicles are communicating to other vehicles or the infrastructure and have to react based on the exchanged messages, it is necessary for the reacting vehicle to know, whether it can trust the message. This requires the authentication of the message sending vehicle or infrastructure and the integrity of the message.

Based on the findings of the study and the feedback of the stakeholders the following **five main recommended actions** to eliminate possible barriers based on liability issues which obviate the deployment of ITS applications and services were formulated:

- (1) The more systematic use of in-vehicle **Event Data Recorders** should be further investigated in order notably to facilitate the demonstration of compliance with standards and/or regulations requirements (especially for applications such as ADAS, active safety systems, automated driving, etc.) and to develop a **sound legal framework** and **related standards** around this tool to rule out any possible ambiguity (e.g. related to the use of EDR data as proof in court and with respect to self-incrimination). Car manufacturers would be forced to provide EDRs within their vehicles which store specific standardised events generated by the different ITS applications within the vehicle. In this case no reason exists that this information

should not be accepted by the court. Furthermore it has to be regulated how to proceed with data of the EDR with respect of the criminal law as in most of the European countries nobody is obliged to accuse himself.

- (2) For **automated driving**, an adaptation of the **Vienna Convention** of 1968 may be necessary to address questions in relation to the further development in the area of highly and fully automated driving. The current activities of the WP1 (Road Traffic Safety) of UNECE Transport Division are going in the right direction and should be supported by the European Commission.
- (3) The importance of proving the **conformance/compliance to standards** in liability litigation should be strengthened. System standards and service requirements developed by ETSI and CEN should be, if and when appropriate, referred to in relevant EU/UNECE regulations.
- (4) For **cooperative systems**, the general principle that each stakeholder is only responsible for the part of the service chain which is **under his control** should be maintained. The need and feasibility of developing regulations (as for 112-eCall) aimed at notably establishing the rights and obligations of the parties with respect to the service elements they provide should be considered.
- (5) A **common information platform** (e.g. a specific ITS liability webpage/forum) which provides general principles of how to handle liability issues and which displays the specific rights and duties of each stakeholder in each member state with practical examples, would make it much easier to get a better understanding of the own liabilities.

2. Introduction to the report

The present report is the Final Report of the study on ITS liability issues conducted within the framework of the ITS Action Plan. The aim of the ITS Action Plan is to accelerate and coordinate the deployment of ITS applications throughout Europe. Within Area 5.2 of the Action Plan liability issues with respect to ITS applications and services are addressed.

2.1. Objective

The objective of this action and hence this report is to identify the ITS applications for which liability constraints or issues are the most probable and to assess how these issues can be addressed. The result of this study shall be recommended actions to eliminate possible barriers based on liability issues which obviate the deployment of ITS applications and services.

2.2. Methodology

The figure below shows the different tasks and sub-tasks identified based on the work description from the Task Specifications.

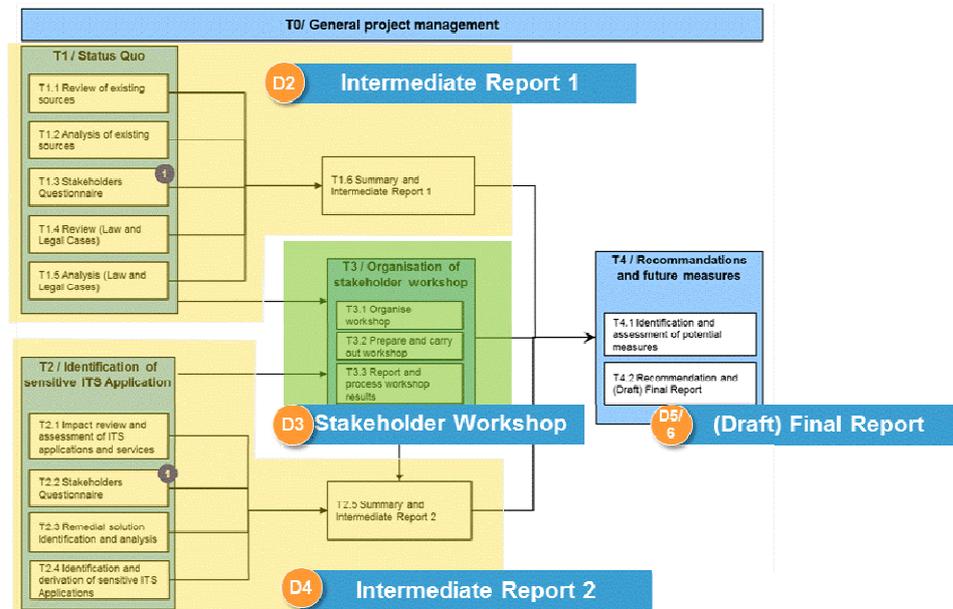


Figure 1. Tasks and sub-tasks of the study

The key questions to be answered by this study are the following:

1. What is the legal state-of-the-art concerning liability aspects (EU law, national laws, case law, contracting policies, national transport specific legislations) related to the deployment of ITS applications and services?
2. In particular, which measures, rules and procedures exist or have been applied so far to deal with the liability issues of already widely deployed ITS applications and services?
3. What ITS applications and services, or types of ITS applications and services, are the most subject or prone to liability issues, or would require specific measures to address those liability issues in order to facilitate their deployment?
4. Which specific measures (legal, technical, organisational) would be required to address liability issues in ITS applications or services?

2.3. Management section

This section shortly describes the achievement of the study objectives including all deliverables, differences between work expected to be carried out and actually carried out, an explanation of the use of the resources and any other relevant analysis or recommendation.

The main goals of the study were to answer the above-mentioned four key questions. We have succeeded in reaching these goals by applying a combination of several research methodologies, including:

- Desk research into public sources, such as legislative documents, research studies, standardisation activities and commercial agreements
- Stakeholder Survey
- Stakeholder Workshop

Our legal analysis focused on the most relevant liability regimes for Europe, Germany, France, the United Kingdom and the USA. These liability regimes have been described and compared on a high level.

It became also clear that more valuable input to answer the key questions was expected from involvement of stakeholders. Therefore, the findings of both the Stakeholder Survey and the Stakeholder Workshop were highly valued by the study team. Consequently, the study results are based on these findings and the study team's own research activities, and represent the stakeholders' view to a large extent.

Throughout the study the following deliverables were made available to the European Commission:

- D1 – Inception Report
- D2 – Intermediate Report 1: Report on the State of the Art
- D3 – Stakeholder Workshop: Organisation and Workshop Report
- D4 – Intermediate Report 2: Identification of liability sensitive ITS applications
- D5 – Draft Final Report
- D6 – Final Report

Deliverables D1, D2, D4 and D6 included PowerPoint presentations summarising the main results and recommendations of the respective deliverable. Furthermore, the study team has contributed to the preparation of the presentation held by the European Commission at the 3rd ITS Conference 2012 in Vienna¹.

2.4. Structure of the report

The report is structured according to the following chapters:

Chapter 3 describes the context of this study with respect to the ITS applications and services, the main stakeholders involved and the liability issues within the field of ITS.

Chapter 4 includes the most relevant findings of Intermediate Report 1 (D2) on the status quo concerning liability aspects based on current legal rules, opinions of ITS stakeholders and public sources.

Chapter 5 includes the most relevant findings of the Stakeholder Workshop (D3), which was held on 13 June 2012 in Brussels.

Chapter 6 includes the most relevant findings of Intermediate Report 2 (D4) on the identification of liability sensitive ITS applications.

Chapter 7 summarises the main results of this study and provides recommendations to implement potential measures that could be undertaken to address the barrier to ITS deployment posed by liability issues.

¹ Carabin, Gilles: "Study Study addressing the liability issues pertaining to the use of ITS applications", European Commission – DG MOVE, 3rd ITS Conference 2012 (Panel II), 22 October 2012, Vienna

3. Introduction to the ITS context

This chapter describes the context of this study with respect to the ITS applications and services, the main stakeholders involved and the liability issues within the field of ITS.

3.1. Overview of ITS applications and services

ITS are advanced applications which without embodying intelligence as such aim to provide innovative services relating to different modes of transport and traffic management and enable various users to be better informed and make safer, more coordinated and smarter use of transport networks².

ITS integrate telecommunications, electronics and information technologies with transport engineering in order to plan, design, operate, maintain and manage transport system³. ITS applications involve various technologies, notably: software and sensor technologies, which are commonly deployed in automated⁴ driving systems⁵; wireless communications; computing technologies; floating car data/floating cellular data and sensing technologies.

Within this study the following ITS applications and services are considered:

- In-vehicle Information Systems (IVIS)
 - Navigation System
 - Traffic Information Service
 - Traffic Management Service
- Advanced Driving Assistance Systems (ADAS)
 - Lane Departure Warning (LDW)
 - Adaptive Cruise Control (ACC)
- Active Safety Systems (ASS)
 - Electronic Stability Program (ESP)
 - Emergency Braking System (EBS)
 - Anti-lock Braking System (ABS)

² Dir. 2010/40/EU of 7-7-2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport, recital (3).

³ Dir. 2010/40/EU of 7-7-2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport, recital (4).

⁴ Automated driving means: "driving enhanced by dedicated control, existing of autonomous (sub)systems that support the driver, while he/she is in control or able to timely get back in control and which is legally responsible throughout for carrying out the driving task", in. Study report. Smart 2010/0064: Definition of necessary vehicle and infrastructure systems for Automated driving, 29-06-2011, p. 12.

⁵ Study report. Smart 2010/0064: Definition of necessary vehicle and infrastructure systems for Automated driving, 29-06-2011, p. 12, p. 4.

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- Advanced Protective Safety (APS)
 - Seat Belt Pretensioner
 - Passive Safety
 - Airbag
 - Rescue Services
 - eCall:
 - TPS-eCall: already available proprietary eCall services provided by third parties
 - 112-eCall: public eCall to be introduced EU wide as mandatory equipment of new vehicles from 2015
 - Other ITS Applications:
 - E-Tolling
 - Pay-As-You-Drive (PAYD) Insurance Service
 - Automated Driving
 - Cooperative Systems

The above structure is mainly based on the approach followed in the RESPONSE 3 project⁶. Some applications, like ABS, have been added for completeness reasons; others, like PAYD-Insurance Service, have been added due to their high relevance.

Most ITS applications and services can be classified on a time-line as characteristic time constant representing the reaction time of the driver (i.e. detection of danger to safety critical event) (see Figure 2).

⁶ Schwarz, Jürgen: "Legal problems and suggested solutions in connection with the development of Driver Assistance Systems", RESPONSE 3, at eSafety Conference, 6 June 2009

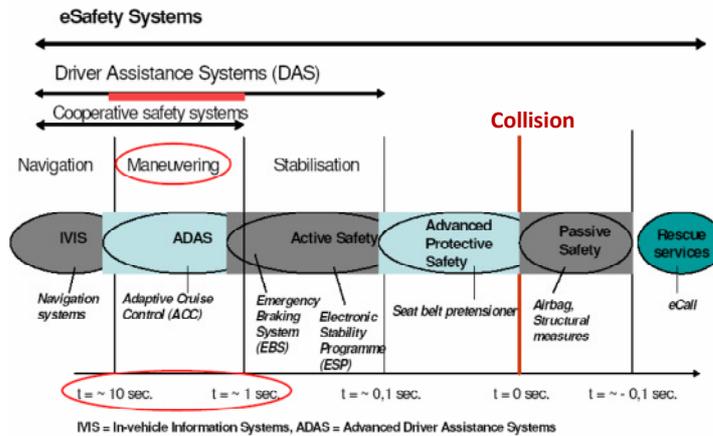


Figure 2: Overview of ITS applications and services on a time-line representing the reaction time of the driver (Figure from the RESPONSE 1 Report)

Furthermore, ITS applications and services can be classified according to the level of support (i.e. the driver’s ability to influence control over the vehicle)⁷:

- Information/warning systems: Information is evaluated by the system and leads to a suggestion or warning addressed by the system to the driver.
- Overridable intervention systems: Information is evaluated by the system, which makes a decision on how to drive the car. The driver has the possibility of overriding that decision – technically and in practice.
- Non-overridable intervention systems: Information is evaluated by the system, which makes a binding decision on how the car is driven, leaving the driver – conceptually or/and in practice – no opportunity to override this decision.

3.2. Overview of stakeholders involved in ITS

Stakeholders are institutions or organisations that have a particular role in scenarios concerning ITS applications and services. Within this study the following main identified stakeholder groups in the field of ITS are considered:

- Manufacturers of vehicles: Manufacturers of vehicles design, develop, manufacture, market, and sell motor vehicles. They are responsible for the quality and safety of the vehicle.⁸
- Manufacturers of devices or systems:

⁷ Macchi di Cellere et al. (2000) RESPONSE project, Deliverable 7.2, “National reports on existing law concerning the market introduction of Driver Assistance Systems”

⁸ Report eSecurity Working Group: Vulnerabilities in Electronics and Communications in Road Transport: Discussion and recommendations. 21-6-2010. p. 28.

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- First tier suppliers to vehicle manufacturer: Parts and components of vehicles are designed and/or manufactured by suppliers. Suppliers in the automotive industry normally cooperate closely with vehicle manufacturers as their components are highly integrated into the vehicle.
 - Aftermarket suppliers: Distinctive parts as well as complete devices are designed and manufactured by aftermarket suppliers. These components or devices can be integrated into the vehicle by specialized service workshops or by the vehicle owner/driver himself.
 - Operators of ITS systems: Operators of ITS systems offer the basic infrastructure and basic services for the provisioning of ITS service and applications (e.g. Mobile Network Operator, MNO).
 - Providers of ITS services and applications:
 - Providers of connected services: ITS service providers using some kind of communication infrastructure and provide useful applications or information to the user (e.g. the driver).
 - Providers of stand-alone services and applications: Providers of stand-alone services and applications do not need a communication link in order to provide their service to the user (e.g. the driver) (e.g. ADAS, navigation system).
 - Authorities:
 - Vehicle Approval Authorities: are the authorities of each EU Member State competent for issuing approval certificates when the new vehicles meet all the technical requirements established in the EU legislation.
 - Certification Bodies: Certification bodies are accredited testing organizations.
 - Infrastructure Providers: Infrastructure providers are responsible for road maintenance and operation.
 - Emergency Services: Emergency services are organizations which ensure public safety and health by addressing different emergencies.
 - Users (incl. vehicle holder): This stakeholder group contains the end-user (e.g. driver or vehicle holder) of a product or the consumer of a service.
 - Insurance Industry: The insurance industry in general protects insurance holders against financial losses in the case of an incident that causes damage to them.

- Global Navigation Satellite System (GNSS) Providers: Satellite systems like the US Global Positioning System (GPS), the augmentation system to the GPS in Europe (European Geostationary Navigation Overlay Service - EGNOS) or the upcoming European GALILEO system provide positioning information which allows receivers to determine their location. In the context of ITS the GNSS plays an essential role by providing a base service for most ITS services or applications that make use and process location information.

3.3. Overview of liability issues within the field of ITS

Liability can be defined as the obligation of a person to make good the damages which this person has caused to another. In relation to ITS applications and services, liability may have to deal with a wide **range of causes**, including: product/system failure, conflict between multiple products/systems (interference), driver information overload, loss of driver attention, risk compensation by the driver, incorrect interpretation of information by the driver, interaction of equipped and non-equipped vehicles, etc.

One of the most significant hurdles faced by manufacturers, industry organizations and governments seeking to develop or implement ITS based solutions is the prospect of **uncertain legal liability for losses caused or contributed to by these technologies**⁹.

This was acknowledged by the European Commission and formed the starting point for this study: Despite the many potential benefits of ITS, the rather unclear, imprecise or diversely understood legal liability regime for potential losses caused by the use of ITS applications and services may be one of the most significant barriers to wide market penetration of those ITS services¹⁰. For example, ADAS have been slow to reach the market, notably because of the risk for manufacturers if systems develop faults or are operated beyond system limits¹¹. Product Liability risks highly impact the market introduction of ADAS¹². Liability issues and other legal issues mainly limit the deployment of ADAS that completely automate a part of the driving task, and cause safety systems to be sold as comfort systems¹³.

Addressing liability issues pertaining to the use of ITS means entering a **complex world with many different stakeholders and many different ITS applications and services using a wide range of technologies and infrastructures**. Most ITS applications and services, notably cooperative systems, rely on the integration of data from different

⁹ Elliott & Stanley (2010) Liability issues with intelligent transport systems, TEC (http://www.twobirds.com/English/News/Articles/Pages/Liability_issues_with_intelligent_transport_systems_240210.aspx)

¹⁰ Task specification, specific contract No MOVE/C3/SER/2011-347/SI2.608257. p. 2.

¹¹ The institutional context for Advanced Driver Assistance Systems: A code of practice for development, TRL Ltd, UK, Department for Transport, UK, ERTICO, Belgium, p.1.

¹² Final report. Response 2: ADAS – from Market Introduction Scenarios towards a Code of Practice for Development and Evaluation, D4, 18-10-2004, p.44.

¹³ Walta (2011) Getting ADAS on the road, PhD thesis, TRAIL Thesis Series T2011/4, the Netherlands TRAIL Research School

sources. Clear responsibilities need to be set out for the provision, sharing or re-use of data and components, as well as addressing liability in the case of failure¹⁴.

Dominant is the issue of liability in case of accidents. In a situation without large-scale use of ITS applications and services, accidents are mainly evaluated in terms of responsibility of the involved road users. With the introduction of ITS applications and services, this situation has changed. If an accident can (also) be traced back to an (alleged) “malfunctioning” of the vehicle, then not only the question is raised to what extent the car driver/owner of the vehicle can be held (legally) responsible, but also which other persons such as manufacturers and road authorities may be liable for the damage¹⁵.

ITS applications and services can be classified according to the level of support they can provide the driver with (see also section 3.1): Information/warning systems, Overridable intervention systems and Non-overridable intervention systems. Figure 3 shows this classification of ITS applications and services in relation to the time constant (t) of the application.

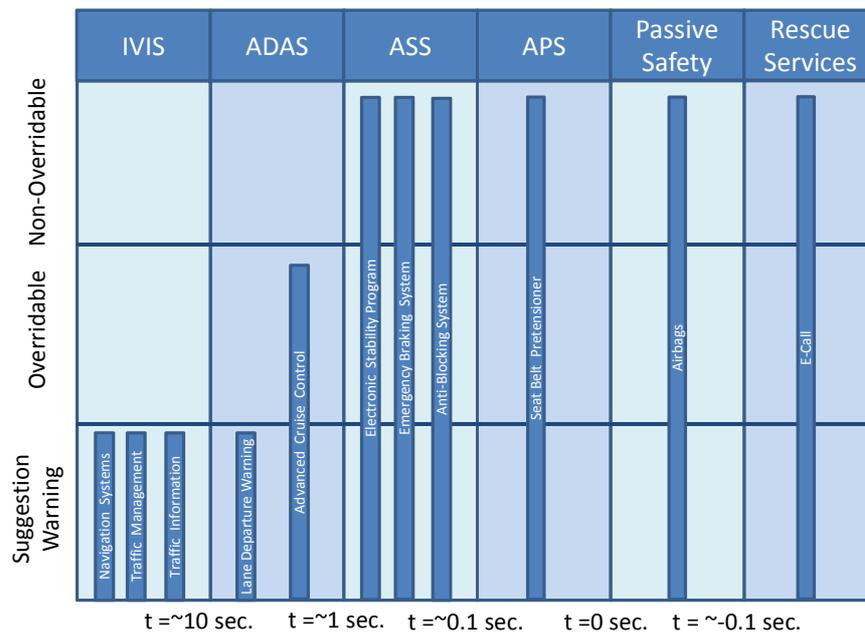


Figure 3: Classification of ITS applications and services according to time-line (i.e. reaction time of the driver) and level of support¹⁶

¹⁴ Elliott & Jennings (2009) Data protection issues with intelligent transport systems, vehicle telematics & road pricing, TEC (http://www.twobirds.com/English/News/Articles/Pages/Data_protection_intelligent_transport_systems_010709.aspx)

¹⁵ Van der Heijden & Van Wees (2001) Introducing Advanced Driver Assistance Systems: Some Legal Issues, EJTIR, 1, no. 3 (2001), pp. 309 - 326

¹⁶ E-Tolling, PAYD, cooperative systems as well as automated driving applications are excluded from this figure because ...

At least in the near future, ITS applications and services will not wholly replace the driver. Consequently, the question arises:

Whether, and to what extent, may the driver delegate his legal responsibility to an ITS application or service in case of an accident?

An answer to this question was found in the RESPONSE project and can be summarized for each of the three ITS categories as follows¹⁷.

Information/warning systems

Systems which only provide information to the driver, for example, by warning that the vehicle is too close to another, do not physically take over the driver's role in any way. The driver remains fully in control of the vehicle at all times, with no physical driving functions being assumed by the system. Therefore, where an accident occurs after a warning has been given, and the driver fails to take the appropriate action, he is likely to have breached his duty of care to other road users. Responsibility is therefore focused on the driver's care as to his driving behaviour.

However, there remains a possibility that the information provided by the system may be incorrect or inaccurate. If this is the case, the manufacturer or distributor's liability should also be taken into account. Please note, however, that in most cases, it could be difficult for the concerned parties to provide evidence of the malfunctioning of the system and then to determine the correct allocation of responsibility between the driver and the manufacturer.

Overridable intervention systems

The potential liability of the driver in negligence where the system is overridable will very much depend on the facts of each case. Important factors will include whether or not the system has inherent limitations, whether the driver takes note of and acts appropriately in relation to any warnings about the consequences of such limitations, and whether in the

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- ...the figure is focusing on ITS applications which have an impact on the driving behaviour of a vehicle or a driver;
 - ...the liability with respect to E-Tolling is a purely contractual liability between Toll Charger and Service Provider concerning the collection of toll. The OBU has no impact on the behaviour of the vehicle or the driver;
 - ...PAYD is an insurance contract (purely contractual liability) which offers an insurance rate based on driven distance, if someone accepts that a small device which collects driving related sensor data is installed into the vehicle. The PAYD device has no impact on the behaviour of the vehicle or the driver;
 - ...cooperative systems and automated driving are terms for general groups of applications which behave differently. Therefore it is not possible to allocate them within the reaction time axle. Specific applications of cooperative systems and automated driving can be allocated when they are defined.

¹⁷ Macchi di Cellere et al. (2000) RESPONSE project, Deliverable 7.2, "National reports on existing law concerning the market introduction of Driver Assistance Systems"

circumstances a reasonable person in the same situation could have overridden the system to avoid a collision.

By buying an overridable system, the driver takes on responsibility of using the function in the appropriate manner. Certain factors need to be considered such as the correct level of information and warnings released by the manufacturer about the functioning of the system. Also malfunctioning of the system may imply a manufacturer's liability, the possibility depending on whether it is possible to determine that the malfunctioning of the system caused the damaging event.

Non-overridable intervention systems

If the driver is not able to override the system, no liability (for the driver) for a breach of rules on behaviour in road traffic caused by the system arises, because such liability, as a pre-condition, requires that the driver is able to influence his driving. Therefore, where damage ensues as a result of the intervention of a system which cannot be overridden by the driver, the manufacturer will be considered liable.

However, notwithstanding that the likelihood of liability being imposed on the driver is strongly reduced in cases where damage is caused by the malfunctioning of vehicles equipped with non-overridable systems, it cannot be totally excluded. There will always be other issues to consider, such as whether or not the driver of another vehicle has been negligent. Also, if a collision occurs where the functioning of the non-overridable system has no bearing (e.g. it occurs as a result of the driver's failure to slow down, yet the system permits him to slow down), the driver may be liable in negligence¹⁸.

This particularly applies to systems, like ABS and ESP, which are intervening within a timeframe within which human beings would not be able to react in an adequate way anymore. The actions performed by such systems obviate an accident or at least reduce the damage occurred by the accident. Without the ITS application the accident would be unavoidable, so the primer responsibility for the accident and the potential damage stays with the driver¹⁹ (reaction time principle). Only in case that an erroneous working application takes actions which lead to an accident the responsibility for the damage can be allocated at the ITS application and therefore at the car manufacturer respectively at his supplier.

¹⁸ Macchi di Cellere et al. (2000) RESPONSE project, Deliverable 7.2, "National reports on existing law concerning the market introduction of Driver Assistance Systems" p. 157

¹⁹ This is assumed a well-practiced approach by the insurance industry. From their perspective, the driver is mainly responsible. Hence, they manage the responsibilities based on this argument.

3.4. Concluding remarks

Summarizing, there are different legal implications with a view to third party liability and claims against the system manufacturers and end users, if the driver is free to decide whether or not to use an ITS application or service. Other legal implications apply in respect of the users' liability and their recourse against system manufacturers or vehicle makers installing such systems, if drivers cannot override the systems. As such, the three above ITS categories each have their own specific liability issues²⁰ :

- Information/warning systems – where, broadly, liability should remain with the driver;
- Non-overridable intervention systems – the opposite extreme where manufacturers and implementers are likely to be liable;
- Overridable intervention systems – which represents a complex grey area between the other two.

However, **simplifying** the liability situation by categorizing ITS applications and services according to these three categories is very straightforward and **cannot always hold true**. Especially in case of cooperative systems, the allocation of liability is much more complicated, as these complex systems incorporate many parties, responsibilities and competences and include technical interdependencies between vehicles and between vehicles and infrastructure. The future will show how the liability situation of specific applications of cooperative systems and automated driving can be evaluated when these applications will be implemented.

²⁰ Elliott & Stanley (2010) Liability issues with intelligent transport systems, TEC (http://www.twobirds.com/English/News/Articles/Pages/Liability_issues_with_intelligent_transport_systems_240210.aspx)

4. Analysis of status quo

This chapter describes the most relevant findings of Intermediate Report 1 (D2) on the status quo concerning liability aspects related to the deployment of ITS applications and services. For more information it is referred to our Deliverable D2.

The objective of this task was to clarify the following key question:

- What is the legal state-of-the-art concerning liability aspects (EU law, national laws, case law, contracting policies, national transport specific legislations) related to the deployment of ITS applications and services?

Therefore a detailed analysis of the legal rules and case law applicable to ITS applications and services that are governing liability in Europe (more particularly in Germany, France, United Kingdom) and the USA has been conducted. Information has been derived from legislative documents, already conducted research activities and a survey among ITS stakeholders.

4.1. Status quo based on current legal rules

This section describes the status quo of liability issues in the field of ITS applications and services based on current legal rules. The legal bases applicable to ITS applications and services were described on a high level and a comparison of the different legislation on European and national level was conducted. A separate task was devoted to describing liability issues in the USA.

4.1.1. OPEN LIABILITY QUESTIONS

For most of the currently applied ITS applications and services it might be stated that *in theory* the existing legal framework seems **sufficient** to rule liability issues as the chain of responsibilities is considered clear and fits in the existing legislation, although *in practice* responsibilities may be sometimes difficult to establish. Especially for ITS applications and services with a **high level of automation and a lot of different stakeholders** within the value chain, the major questions of liabilities for potential losses for customers, users and third parties of these ITS applications and services are still quite **unclear**. Also the fact that liability is governed by various sets of rules creates uncertainty and additional burden for the actors involved in the process of selling/providing ITS applications or services.

It may be stated, that the use of ITS applications and services has **no impact** on liability issues in general and on the responsibility of the involved road users in particular **as long as there are no accidents**. However, if an accident could be attributed to the use of ITS applications and services, then things are becoming much more complicated. Then not

only the question is raised to what extent the driver or vehicle holder can be held (legally) responsible, but also which other legal entities such as manufacturers may be liable for the damage.

The **more complex or “non-overridable”** an ITS application or service is, the more complex are the related liability issues. There is a general tendency, that the driver is not held liable, if he could not control or override the application or service. However, if the accident was unavoidable and the system diminished the impact of the accident (e.g. Active Safety Systems, like ESP), the driver can be held liable.

The risk assessments of all stakeholders involved in the chain of any ITS application or service before installing it or making it mandatory have to prove that there is an extremely **high percentage of reliability**. There should be a clear and verifiable positive impact on the number of accidents and their severity. Moreover, when making ITS applications or services **mandatory**, all liability issues need to be sorted out and transparent and clear for all stakeholders involved. For example, it is assumed that the introduction of the mandatory eCall is connected with an even more transparent and clear liability situation than a non-mandatory application²¹. Among others, the process of vehicle type-approval will ensure that all regulations apply to all producers equally and that the design of the vehicle (incl. the eCall application) does not breach specific technical rules.

The above conclusions are mainly valid within the context of road safety, i.e. whether a road traffic accident can be attributed to the use of ITS applications and services. However, there are also liability issues to consider outside this context, e.g. when considering **E-Tolling** and **Pay-As-You-Drive (PAYD) Insurance Service**²². Liability issues in the field of E-Tolling are, for example, overcharging or undercharging of road users and compensation claims by infrastructure providers due to toll losses. General liability and responsibilities with respect to the role allocation between service providers and toll chargers are regulated in Directive 2004/52/EC and Decision 2009/750/EC concerning the EETS. The remaining issues and specific details are handled on a contractual basis between the service provider and the toll charger. Potential liabilities related to the provision of PAYD insurance are, for example, misuse of personal data and PAYD data called into question by the policyholder or another insurer. Such liability issues are currently addressed with different forms of contractual stipulations (specific clauses and terms and conditions).

²¹ Please also note that the stakeholders of mandatory (112) and non-mandatory (TPS) eCall will not be the same.

²² See also D4 – Intermediate Report 2: Identification of liability sensitive ITS applications, the second deliverable of this study on ITS liability issues which is conducted within Area 5.2 of the European Commission's ITS Action Plan.

4.1.2. HIGH-LEVEL OVERVIEW

Liability can be incurred through **various distinct or sometimes overlapping legal mechanisms**. The most relevant liability regimes for Europe, Germany, France and the United Kingdom, being: traffic law, contractual liability, tort liability and product liability, and for the USA have been described on a high level.

The following **three questions** served as background for this high-level description and are answered below.

1. *Which are the legal rules applicable to ITS applications and services that are governing liability in Europe (more particularly in Germany, France, United Kingdom) and the USA?*

As long as accidents cannot be attributed to the use of ITS applications and services, the driver is held responsible for this traffic behaviour and has a general duty of care according to traffic law.

In Europe, manufacturers of ITS applications and providers of ITS services can be held liable on the basis of tort liability if there is no contractual relation between them and the claimants. In the case where product liability for defective products is applicable, this regime will take precedence on tort liability rules.

In the USA, the majority of the liability regimes (e.g. highway safety laws, product liability laws) is determined at the state level and varies widely from state to state. Liability of drivers is in some states fault based, in other states, there is a no-fault liability insurance scheme; in other states there is strict liability. Liability of manufacturers is governed by product liability law, which is a hybrid of tort and contract law concerned with the liability of manufacturers for their products. A product liability lawsuit will involve one or more theories of manufacturer liability attached to a specific allegation of a type of defect.

2. *Are there any differences between the different legal rules in force governing liability issues in the selected countries?*

In all **traffic law** analysed it is stated that the driver is responsible for his traffic behaviour, whether assisted or not by an ITS application or service. However, ITS applications and services which involve (partly) automated driving raise the question whether they comply with the provisions of the Vienna Convention and traffic law similar or based on this legal text (esp. regarding Article 8 (5) "Every driver shall at all times be able to control his vehicle...").

Each country has its own legal basis for **contractual liability**, often with (many) references to non-contractual liability in bordering legal areas, such as tort law. Based on our high-level overview, it is assumed that there are generally no big differences between the analysed countries. However, the need for traders to adapt to the different national

contract laws makes cross-border trade more complex and costly compared to domestic trade. A Common European Sales Law²³ could improve this situation.

There is no uniform concept of tort law at EU level and many countries have different starting points when it comes to **tort liability**. In the EU, the “fault” system is the traditional system used to determine an appropriate source for compensation for damage, for example caused by the use of an ITS application or service. However, strict liability systems have emerged alongside the fault liability system to counterbalance its inefficiencies. It appears difficult to clearly separate between these systems: in some countries more than one system co-exist, in other countries the fault system has been replaced entirely and again in other countries the fault system remains at base except that the breach of duty is predetermined (e.g. related to accidents with vulnerable road users).

Generally, many countries use strict liability rules for compensation purposes, although causation is still an issue to identify the ultimate liable party. The legal systems in Germany and the United Kingdom provide that liability will only be imposed on a driver if he acted with fault, i.e. negligently or even intentionally. In the UK liability must be proven; in Germany there is a presumption of fault. France introduced a strict (no-fault) liability whenever a motor vehicle is “involved” in an accident (Law No. 85-677 of 5th July 1985).

Although Directive 85/374/EEC on **product liability** has led to a significant harmonization of liability for products in the EU, still national differences in product liability laws exist. This applies to, for example, the notion of safety defect (e.g. in Germany from the viewpoint of the “most endangered and least informed consumer”; in France it depends on the judge’s supreme estimation) and the extent to which suppliers are imposed the same liability as the producer (e.g. in Germany and France yes; in the UK not directly).

Furthermore, the Directive and the legislation in the analysed countries require that the injured party proves the damage, the defect and the causal relationship between the two. This **burden of proof** seems a serious challenge to consumers. As suggested at the eSafety Conference in 2007, it would help if legislation would contain a presumption that manufacturers are at fault, i.e. manufacturers are required to prove that their system is not defective²⁴. Related to this, up to now there has been an ongoing debate as to the extent to which producers can use the **development risk defence**, based to Article 7(e) of the Directive²⁵ which the countries analysed have included (in own words) in their national laws. This defence would mean that: (a) one needs to establish what was objectively the most advanced scientific and technical knowledge at the relevant time, (b) the producer is presumed to have known about any such scientific and technical knowledge, and (c) the

²³ See the Commission Proposal for a Regulation of the European Parliament and of the Council on a Common European Sales Law: COM(2011) 635 final

²⁴ Botman, Wil: „Potential benefits of active driver assistance systems and the legal context“, FIA European Bureau, at eSafety Conference, 6 June 2007

²⁵ Directive 85/374/EEC, Art.7(e): The producer shall not be liable as a result of this Directive if he proves that the state of scientific and technical knowledge at the time when he put the product into circulation was not such as to enable the existence of the defect to be discovered.

producers will need to make themselves aware of what others are doing in the industry (world-wide, cross-party or even cross-sector)²⁶.

In the USA, it is suggested that the existing liability regime does not present unusual liability concerns for owners and drivers, but the liability of manufacturers is expected to increase and be problematic, especially in case of complex technologies (e.g. fully autonomous vehicles). Furthermore, it is assumed that product liability in the USA is a greater threat for the deployment of ITS applications and services than in Europe. This might be attributed to broad legal differences, such as high damage awards, the use of technical expert testimony, and the system of jury trials in the USA, rather than fundamental differences in products liability laws between Europe and the USA.

3. What measures do stakeholders use to mitigate liability risks in the field of ITS applications and services?

Ideally, the user of an ITS application or service knows its functions, handling and limits, and has familiarized himself with the system, in practice and/or by reading the user manual. The vehicle behaviour should be predictable (the same) for other road users, regardless whether the vehicle is equipped with ITS or not. Manufacturers of an ITS application often include **disclaimers** in their user manual as to mitigate liability risks. Providers of an ITS service rather include specific **terms and conditions** in their service contract. It could be that specific skills may be required for a safe operation of the system. In that case special **trainings** for the driver as to familiarize himself with the system might be offered.

ACEA²⁷ recommends the use of the European **Code of Practice (CoP)** for the development and evaluation of ADAS, drafted in the RESPONSE 3 project. This CoP helps manufacturers to systematically identify and assess possible risks, and gives advice on how to process these risks during ADAS development by applying the **controllability concept**. By applying this CoP, manufacturers show their duty of care during the development phase of ADAS. They might reduce any liability risks by thorough consideration before putting a system in production or on the market.

In the USA, it is deemed very important to ensure that consumer expectations do not exceed the limits of the available technology. Hence, more research may be needed to determine the best strategies for consumer education (e.g. manuals, videos, simulation training, in-person training, etc.). Note that with respect to driver training, in June 2011 the state of Nevada was the first jurisdiction in the USA to pass a law²⁸, which, among others,

²⁶ Macchi di Cellere et al. (2000) RESPONSE project, Deliverable 7.2, "National reports on existing law concerning the market introduction of Driver Assistance Systems"

²⁷ European Automobile Manufacturers' Association (see also: http://www.acea.be/news/news_detail/acea_endorses_response_code_of_practice_for_advanced_driver_assistance_syst/)

²⁸ Assembly Bill No. 511: http://www.leg.state.nv.us/Session/76th2011/Bills/AB/AB511_EN.pdf

authorizes the operation of, and a driver's license endorsement for operators of, autonomous vehicles.

Moreover, a nation-wide measure to be considered is the possibility of federal pre-emption of state tort suits if the U.S. Department of Transportation promulgates regulations and some of the implications of eliminating state tort liability.

4.1.3. CONCLUDING REMARKS

The current degree of uncertainty around liability in the field of ITS is not surprising given the wide and rapidly developing range of (complex) applications and services and the highly varied liability regimes (also geographically). Especially the more complex and non-overridable ITS applications or services require a great deal of thought to establish a clear and transparent settlement of liability issues among all stakeholders involved.

4.2. Status quo based on the opinions of ITS stakeholders

First-hand information has been obtained from selected stakeholders in the field of ITS applications and services to analyse the status quo on ITS liability issues from a practical point of view. To that end a questionnaire has been developed and distributed. This section describes the main findings of an analysis into the status quo of liability aspects based on the opinions of ITS stakeholders.

4.2.1. STAKEHOLDER SURVEY

A Stakeholder Survey has been conducted in February-March 2012 to collect practical information and opinions from ITS stakeholders on experiences, future expectations and recommendations with respect to ITS liability issues.

European stakeholders from different fields of ITS applications and services have been asked to complete a questionnaire, including notably the following stakeholder groups:

- (Associations of) Users
- Vehicle and Device manufacturer
- Emergency Services
- Insurance Industry
- Infrastructure Providers

These stakeholders have been invited through direct contacts, EC mailing lists and distribution of the questionnaire within identified stakeholder organisations.

The stakeholders reached have been asked for:

1. Information about known legal cases in the field to ITS liability that have been or are relevant for them;
2. Whether there is a specific national legislation (in force or pending) concerning defective products, tort liability, or existing law cases in this respect;
3. Their individual assessment of the general legal situation with respect to liability of ITS applications and services;
4. Information about the fields of ITS applications and services the stakeholders are currently involved.

The Stakeholder Survey had a large participation but no statistical representativeness. A total of 100 respondents from 22 European countries and overseas (USA, Australia) have completed the questionnaire. The (Association of) Users and ITS service providers provided most answers. Figure 4 shows the stakeholder groups with the respective number of provided replies.

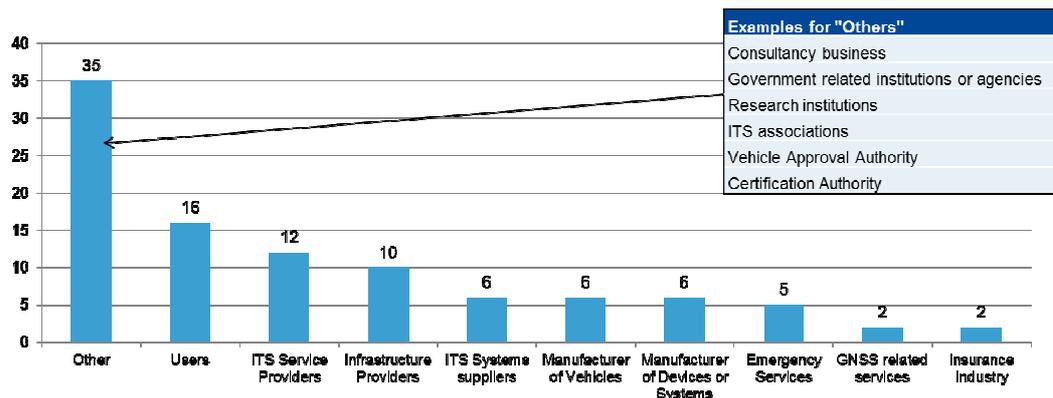


Figure 4: Distribution of stakeholders into categories

4.2.2. FINDINGS FROM THE STAKEHOLDER SURVEY

This section gives a summary of the information that has been expressed by the ITS stakeholders in the conducted survey. It contains general results of the Stakeholder Survey, the stakeholder's statements and findings regarding the current situation of ITS liability.

4.2.2.1. CURRENT ASSESSMENT OF ITS LIABILITY ISSUES IN GENERAL

Figure 5 shows that the responses to the questionnaire have revealed that

- [1] the proportion of stakeholders for whom the current ITS liability legislation had already been relevant and those who had no relevant contact with it yet is about to be balanced.**

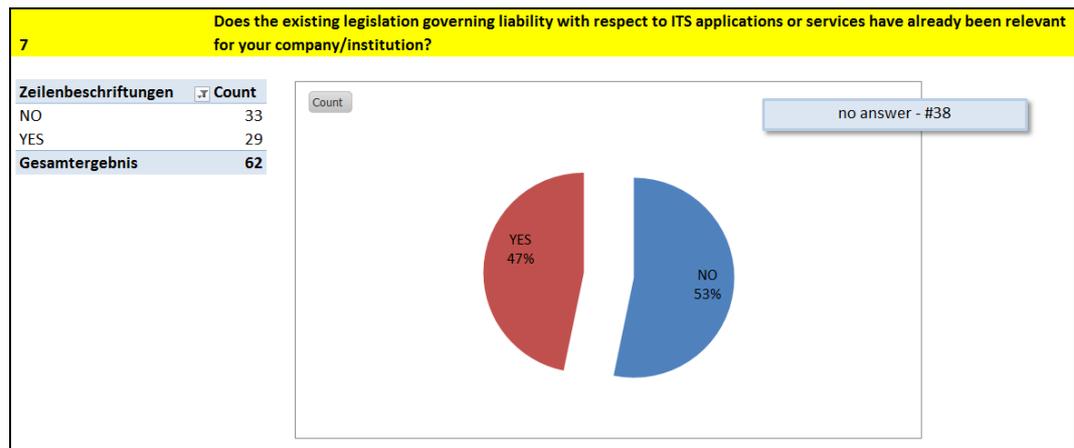


Figure 5: Does the existing legislation governing liability with respect to ITS applications or services have already been relevant for your company/institution?

This general result over all stakeholders resembles to a large extent the differentiated view of associations and all other stakeholders.

Another finding is that

- [2] the current applicable legislative framework regarding ITS services and applications is for the most contacted stakeholders rather unclear.**

The analysis of the provided answers shows, that almost half of the contacted stakeholders (44%) (totally) disagree with the statement: "The existing legislative framework governing liability for ITS applications and services (in particular the rules on the enforceability of the contractual clauses on liability) are clear and predictable to me in the States where I conduct my activities." 36% answered "Neutral" to this statement,

which indicates that the legal framework is not fully clear as well for this group of stakeholders. The comments given provide more information. Based on the comments, the reasons for the unclear legal situation are the following:

- There are different rules for each application or service
- For future applications and services the rules have to be changed most probably
- The harmonisation of EU- or worldwide regulations is still pending
- A specific ITS law which will regulate as well liability issues is expected and still missing
- From the perspective of the user the disclaimers and terms and conditions are mostly too difficult to understand for not legally educated users

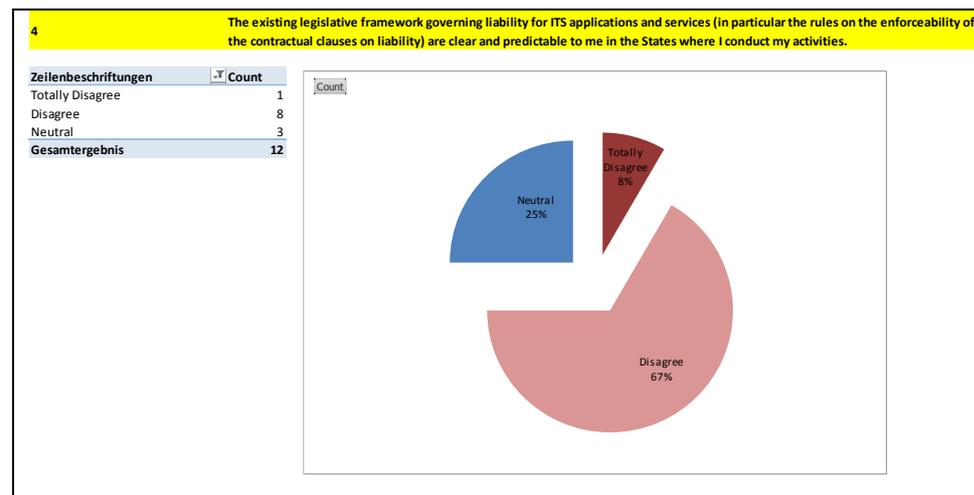


Figure 6: Associations only: The existing legislative framework governing liability for ITS applications and services are clear and predictable to me in the States where I conduct my activities.

In case of the addressed associations²⁹ 75% do not think that the existing legislative framework governing liability of ITS applications and services are clear and predictable in their domestic country (see Figure 6). None of the 12 associations thinks that there is no need to improve the availability of useable information about legal frameworks governing liability of ITS applications and services.

The view of all other stakeholders is with respect to the availability of usable information about legal frameworks not as negative as the view of the associations. Only 38% of the

²⁹ Types of associations: (1) Users, e.g. ADAC, ARC, RACC, FDM, Autoliitto, ÖAMTC, SATC, AvD, Royal Dutch Touring Club, (2) Logistics/haulier, e.g. IRU, UK Road Haulage Association, Transport en Logistiek Nederland, (3) Public transport, e.g. VDV, UITP, (4) Car manufacturer, e.g. ACEA and (5) ITS association, e.g. ITS Slovakia.

answering all other stakeholders are of the opinion that information is not available respectively legal frameworks governing liability of ITS applications and services are not clear and predictable. For 23% the legal framework is clear and predictable. Quite a big group of 39% has a neutral position to the availability of legal information concerning liabilities in the area of ITS applications and services.

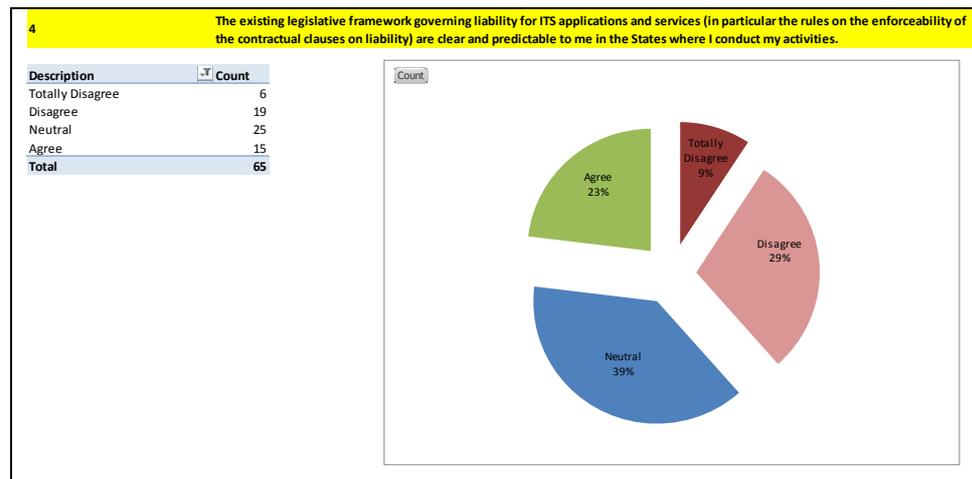


Figure 7: All other stakeholders: The existing legislative framework governing liability for ITS applications and services are clear and predictable to me in the States where I conduct my activities.

The finding, that the legal framework regarding ITS liability is unclear to many stakeholders is supported by a clear majority of respondents giving no answer and indicating that they do not know the set of legal rules that are applicable to ITS applications and services in the countries where they are active (see Figure 8). Furthermore, it can be seen that liability for (defective) products or services is considered more applicable than specific legislation on ITS liability.

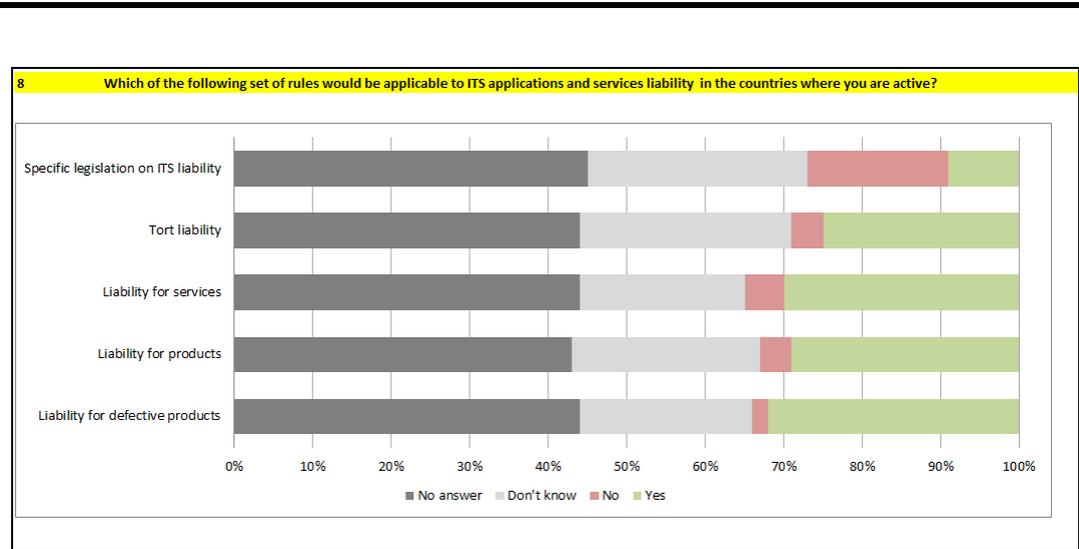


Figure 8: Which of the following set of rules would be applicable to ITS applications and services liability in the countries where you are active?

Figure 9 shows that

[3] almost 50% of the given answers indicated as well, that the unclear legislative framework regarding ITS applications and services constitutes an obstacle for the business activities.

Furthermore the comments provided by the stakeholders describe in most cases that the current “obstacles” are the additional effort and unpredictable time needed to go through the legislative procedures which slows down the launch process of ITS applications and services.

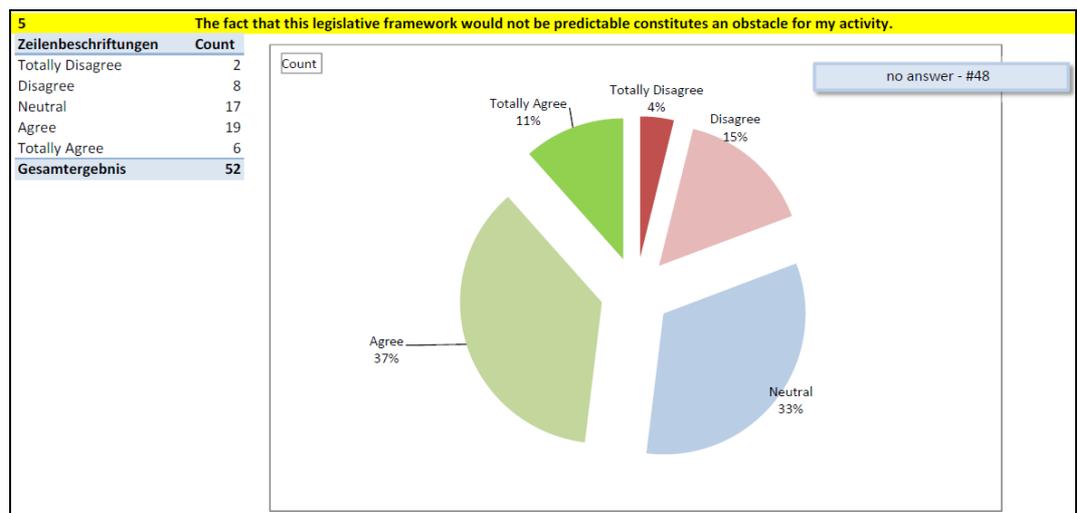


Figure 9: The fact that this legislative framework would not be predictable constitutes an obstacle for my activity.

However, only a very small group of the contacted stakeholders indicated to have already gained any experience with legal cases in the field of ITS liability. In this respect it must be noted, that the contacted industry stakeholders in general has been very reluctant regarding the provision of information about their liability cases. Only two stakeholders stated to have been involved in a liability case. Those stakeholders came from the automotive supplier industry and the area of toll collection.

4.2.2.2. CURRENT INVOLVEMENT OF STAKEHOLDERS IN ITS APPLICATIONS AND SERVICES

The provided answers in Figure 10 show that

[4] 74% of the respective stakeholders are already active in the field of ITS applications and services.

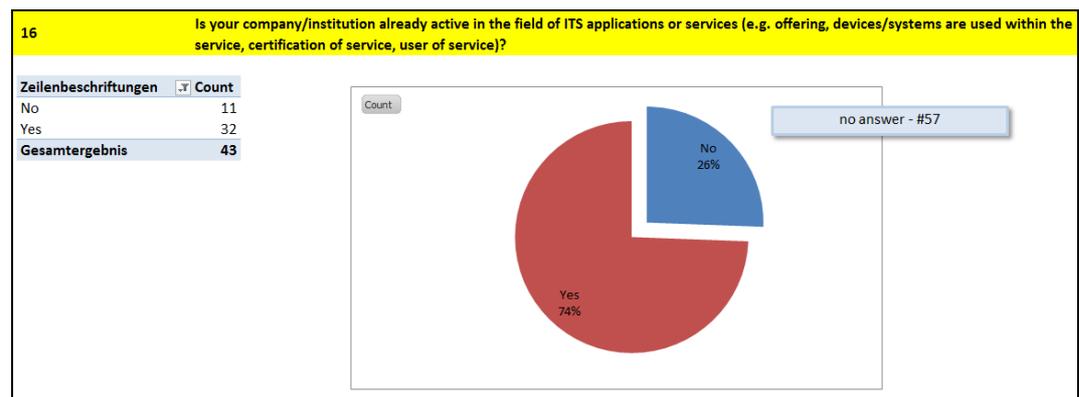


Figure 10: Is your company/institution already active in the field of ITS applications or services?

[5] Most of the stakeholders have been active in the fields of “Traffic Information Services” and “Traffic Management Information” and least of the stakeholders are active in the field of “Automated Driving” (see Figure 11).

The provided comments for the involvement in the field of “Cooperative Systems” show that the involvement is mainly the conduction or participation in respective trials and field operating tests.

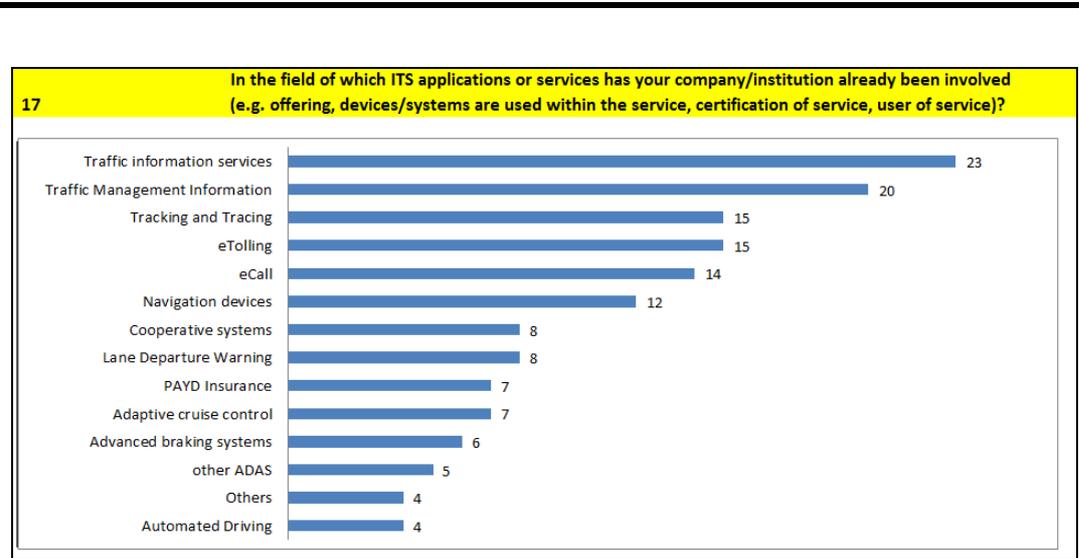


Figure 11: In the field of which ITS applications or services has your company/institution already been involved?

Figure 12 shows that the responses to the questionnaire further reveal that

[6] eTolling and eCall have been the applications which raised the most liability issues so far.

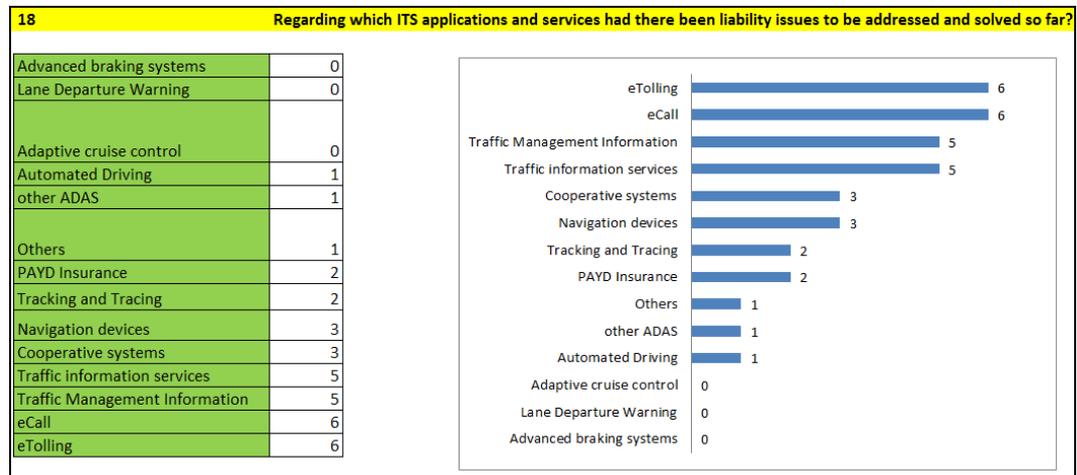


Figure 12: Regarding which ITS applications and services had there been liability issues to be addressed and solved so far?

The stakeholders from the tolling area indicated that currently all liability issues are regulated in contracts between toll service providers and toll chargers.

Some stakeholders pointed out that they cannot provide information about liability issues due to confidentiality reasons.

4.2.3. CONCLUDING REMARKS

An important finding of the Stakeholder Survey is that most contacted stakeholders perceive the current applicable legislative framework regarding ITS services and applications as rather unclear. For example, from the perspective of the user, the disclaimers and terms and conditions are mostly too difficult to understand for not legally educated users. Furthermore, especially manufacturers and service providers perceive as the current “obstacles” the additional effort and unpredictable time needed to go through the legislative procedures which slows down the launch process of ITS applications and services. The results from the Stakeholder Survey have been further used for the identification of liability sensitive ITS applications, see also chapter 6.

4.3. Status quo based on public sources

This section describes the status quo of liability issues in the field of ITS applications and services based on public sources. The following categories of potential sources for information on liability issues in the field of ITS applications have been defined and analysed:

- Existing studies, projects and research activities
- Standardisation activities (CEN, ISO, ETSI)
- Commercial agreements or contracts (e.g. disclaimers of navigation devices)
- Other relevant material

4.3.1. EXISTING STUDIES, PROJECTS AND RESEARCH ACTIVITIES

Within this category statements and findings of previous work and research in the field of ITS applications and services have been analysed. The sources came mainly from previous work that have been conducted within EU funded research projects, studies or working groups.

It has shown that questions of liability between the partners involved as an issue regarding the introduction of ITS applications and services have been identified in many of the analysed sources. However, until now there has not been any dedicated project which focused on this subject.

The following studies, projects and research activities touched the issue of liability with respect to ITS applications and services:

Studies, projects and research activities
PREVENT/ RESPONSE 3
RESPONSE, RESPONSE 2
CVIS
COOPERS
EVITA
SMART 2008/55 (report)
SMART 2010/64 (report)
COMeSafety – D 13. Legal Aspects (deliverable)
eSecurity Working Group: Vulnerabilities in Electronics and Communications in Road Transport: Discussion and Recommendations (report)
E-Frame: Extend FRAMEwork architecture for cooperative systems

ITS applications and services have been divided into three major categories by most research projects (e.g. RESPONSE 3) in this field. The categories are the following (see also section 3.1):

- Information and warning systems
- Intervention systems which the driver can override (Overridable intervention systems)
- Intervention systems which the driver cannot override (Non-overridable intervention systems)

The following main statements or questions regarding ITS liability have been raised by previous projects or studies and have been considered to be relevant for this study:

Major statement / question regarding ITS liability	Source
How can be proved, that the product is reasonably safe?	Response 3
How can be proved, that the manufacturer has fulfilled his duty of care?	Response 3
Actors should only be required to be liable for what they can control.	CVIS
Questionnaires showed that there is awareness that liability issues need proper consideration; however questionnaires did not reveal that liability concerns are generally perceived as a threat to the involvement	SMART 2008/55

in the deployment of eCall.	
Liability usually arises in a situation in which something has "gone wrong". Afterwards it is important to find someone responsible (person, organisation) and take remedial actions.	E-Frame
It is important to establish which organisation has ownership (or more specifically legal liability) for the correct functioning of each element of an ITS application.	E-Frame
The end user is unlikely to be aware that the service being provided is the product of a number of distinct systems or modules each owned and managed by different organisations.	E-Frame
Most integrated ITS implementations have components and communications links that are owned and managed by more than one organisation, important issues are there <ul style="list-style-type: none"> - command and control - ownership of equipment and data - and priority in the use of communications links 	E-Frame

4.3.2. STANDARDISATION ACTIVITIES

Within this category ongoing standardisation activities in the field of ITS applications and services have been analysed whether liability issues are considered or which of the discussed concepts might have a link to liability. The examined sources have been:

Standardisation in the field of ITS applications and service
ISO Technical Report– Privacy Aspects in ITS standards and systems (No. 12859)
Study on “Third party liability for Global Navigation Satellite System Services “ by UNIDROIT (International Institute for the Unification of Private Law)
eCall-related standardisation activities
Ongoing standardisation activities in CEN/ETSI in the context of mandate 453

Questions of liability are primarily of a legal and commercial nature. Hence to address liability is not the core of standardisation activities, which are mainly focussing on technical aspects.

Except for the pan-European eCall Operating Requirements (PEOR) standard CEN EN 16072 which contains a special section on liability³⁰, the analysed sources from the

³⁰ In order to claim compliance with this European Standard an actor therefore cannot and does not carry the requirement for the quality of total service provision, but is required to be able to demonstrate that he has met all specified conformance requirements in respect of the part(s) of the system under his design and/or control.

standardisation category do not contain direct references to liability in general. Nevertheless some of the gathered information has a connection to liability. For example, areas with high attention in the ongoing ITS standardisation activities by CEN and ETSI are data security and privacy aspects in order to reduce risks of malfunctions and damages in cooperative systems and increase the trust. Thereby liability is indirectly addressed as cases where liability issues occur are dependent on the number of malfunctions and damages that occur while using the applications or services.

4.3.3. COMMERCIAL AGREEMENTS OR CONTRACTS

Within this category examples of existing terms and conditions and the user manual of a vehicle equipped with ADAS have been analysed. Individual contracts regarding ITS applications and services between business partners have not been made available by the stakeholders due to confidentiality reasons.

The following sources have been analysed:

COMMERCIAL AGREEMENTS AND CONTRACTS
BMW: End-user Terms and Conditions regarding the Connected Drive Services
Volvo: Owner's Manual of Volvo S60 (Model year 2012)
Dolphin Technologies: Terms and Conditions regarding Telematics Services
Deutsche Assistance Telematik GmbH: Terms and Conditions regarding technical services for PAYD Insurances in Germany

The terms and conditions of the analysed OEM and telematics service providers include the following (liability) limitations of the provided services:

Limitations of service included in Terms and Conditions	Source
The telematics support services by the OEM are offered with regional limitations, e.g. if the available mobile network does not support specific functional features (e.g. transmission of caller-id) the service provider might not be able to provide the service with all its features	BMW T&C
OEM excludes liability for damages resulting from the transmission of in-correct or out-to-date information to the driver if this is not caused by intent or rough negligence.	BMW T&C
OEM excludes liability in case services do not function correctly due to non-availability of mobile communication services or problems resulting from external factors influencing the positioning (e.g. bridges, high buildings, atmospheric conditions)	BMW T&C

ITS service providers (tracking/tracing services and emergency call) exclude liability for damages resulting from the non-availability and the incorrect functioning of the own services, if basic prerequisites (that are outside the control of the provider) are not present:	
1. Correct operation of the Global Positioning System	Dolphin, Deutsche Assistance Telematik
2. Correct operation of mobile communication network	Dolphin, Deutsche Assistance Telematik
3. Correct operation of internet-connection to provider's server and to the servers of the emergency centre	Dolphin
4. Correct installation and functioning of the on-board equipment incl. its SIM-card	Dolphin

The analysis of the owner's manual of a vehicle equipped both with warning and intervening ADAS has shown that warning disclaimers are used extensively in the vehicle's owner manual in order to describe unambiguously the limitations of the vehicle's ADAS and to emphasize that the responsibility for driving remains at all circumstances with the driver.

Disclaimers used in the owner's manual section describing the ADAS of the Volvo V60	#
Number of warning disclaimers which clarify the limitations of the vehicle's ADAS systems	19
Thereof number of warning disclaimers which explains the need for driver intervention and that the responsibility for driving remains under all circumstances with the driver	12

4.3.4. OTHER RELEVANT MATERIAL

In this category other relevant sources have been analysed. These have been e.g. working papers by the European commission, the ITS Action Plan itself and other public documents that includes information from previous ITS research activities.

Other sources
Scientific article: Service Modelling and Engineering in the Telematics Industry
COMMISSION STAFF WORKING PAPER: IMPACT ASSESSMENT on the implementation of the harmonised EU-wide in-vehicle emergency call
Whitepaper: Deployment Challenges for Cooperative Systems
International Harmonized Research Activities (IHRA): Working Group on ITS
Action Plan for the Deployment of Intelligent Transport Systems in Europe
Impact Assessment ITS Action Plan, Commission Staff Working Document SEC(2008)3083 and Summary SEC(2008)3084
TRL Study: UK eCall Impact Assessment 2010

The main statements regarding the status quo of ITS liability issues can be summarized as follows:

Main statements regarding ITS liability	Source
A service level management needs to be organised which constitutes distinctive responsibilities and liabilities and the agreed SLAs must be clearly communicated between the legal parties for each telematics service that is built out of different parts provided by different partners.	Scientific article: Service Modelling [...] & Whitepaper: Deployment Challenges [...]
Cooperative systems are complex systems incorporating many parties and responsibilities. These growing technical interdependencies between vehicles and between vehicles and the infrastructure may lead to system failure; and there are questions of financial compensation of losses of road users or other third parties which are governed by non-contractual law.	Whitepaper: Deployment Challenges [...]
The reason why liability is one major point that is seen as a barrier for the successful introduction of ITS in Europe and has to be addressed is that currently cooperative systems are accompanied by unclear distribution of responsibilities and absence of agreements on service ownership	Impact Assessment ITS Action Plan

4.3.5. CONCLUDING REMARKS

Liability questions related to the introduction of ITS applications and services and between the partners involved have been identified in many of the analysed sources. However, until now there seems not to be any dedicated project which focused on this subject. Although liability is not the core of standardisation activities, some of the gathered information related to ongoing standardisation activities has a connection to liability. Furthermore, warning disclaimers are used extensively in commercial agreements and contracts (e.g. the vehicle's owner manual) in order to describe unambiguously the limitations of the respective ITS applications and services (e.g. navigation devices, ADAS) and to emphasize that the responsibility for driving remains at all circumstances with the driver.

4.4. Conclusions

This section contains a summary of the main findings regarding the status quo described in the previous sections.

There is no specific liability regime currently applicable to the deployment of ITS applications and services. Currently applicable legal regulations on liability issues in the field of ITS applications and services have been identified in the following liability regimes:

- Contractual liability
- Tort liability
- Product liability
- Traffic law (as a background element)

The fact that liability is governed by various sets of rules creates uncertainty and additional burden for the actors involved in the process of selling/providing ITS applications or services. Contrary to tort liability, contractual liability applies as far as a contract has been concluded and is related to the sale or performance of a service. Limitation of liability clauses are admitted by national legislations but are subject to legal restrictions. Finally product liability regime will take precedence over other liability regimes in case its conditions of application are met. In this respect, the concepts of "duty of care" and of "reasonable safety" of the product are crucial concerning the application of such regime to ITS applications and services and may impact the deployment of such technologies in Europe.

With respect to the already existing ITS applications and services the major questions of liability are at least in Europe clear. Despite the potential benefits of the application of ITS systems and services with a high level of automation and a lot of different stakeholders within the value chain, the major question of liabilities for potential losses for customers, users and third parties of these ITS systems and services is still quite unclear.

The different applicable legal basis for liability, different jurisdictions on the European and national levels and the different national laws in the European countries make the current legislative framework complex. Accordingly the survey results showed that for most contacted stakeholders in the field of ITS the legislative framework is neither clear nor predictable. For example, the stakeholders stated that (a) there are different rules for each application or service, (2) the disclaimers and terms and conditions are mostly too difficult to understand for the user and (3) the additional effort and the unpredictable time needed to go through the legislative procedures slow down the launch process of ITS applications and services.

Liability between the partners involved as an important issue regarding the introduction of ITS applications and services has been identified in almost all sources that have been analysed for this study. Besides the complexity of the legislative framework, another reason why liability is one major point that is seen as a potential barrier for the successful introduction of ITS in Europe is, that cooperative ITS systems consisting of different service components provided by different partners are currently accompanied by unclear distribution of responsibilities and absence of agreements on service ownership.

E-Tolling and eCall³¹ are the ITS applications which raised the most liability issues so far according to the stakeholders' information. This is not surprising as these (at least eTolling) are (1) already widely deployed ITS services which in case of malfunctions contain (2) large potential for damages. For both services the implementation and harmonisation process is managed at European level. Regarding the introduction of the European Electronic Toll Service (EETS) the respective legal framework for the service and respective rights and obligations of the different parties involved have been set at European level (Directive 2004/52/EC and Commission Decision 2009/750/EC) and are currently implemented by the Member States. In the past and currently liability issues are regulated individually by contracts between the toll service providers and the (national) toll chargers.

At present stakeholders in the field of ITS applications and services manage their liability issues by applying disclaimers towards users, specific contract clauses and terms and conditions. Disclaimers with respect to, for example, vehicle's ADAS or navigation devices are used extensively by OEMs (car manufacturers) in order to clarify the limitations of technical systems and to explain the need for driver intervention and that the responsibility for driving remains under all circumstances with the driver.

It can be stated that to the extent that the driver is able to override an ITS application or service at any time, he remains legally responsible for compliance with the rules on behaviour in road traffic. However, vehicles in which the driver does not have fully control raise a number of legal questions. As long as the driving behaviour of the driver causes a situation in which a non-overrideable system (e.g. ASS) takes control over the vehicle and is not able to avoid the collision, the driver stays responsible. The responsibility for driving behaviour might be shared between drivers and (for example) manufacturers in the area

³¹ Please note that in the survey no distinction was made between 112-eCall and TPS-eCall.

of civil liability, both in terms of contractual and tort liability in case that the system is not working properly.

The currently available ITS applications are not in contradiction with the Vienna Convention and the traffic laws mentioned in this section based on the reaction time principle, even in case of non-overrideable ITS applications. The situation changes strongly if automated driving should be introduced.

Questions of liability are primarily of both legal and commercial natures. Hence liability is not the core of current ongoing standardisation activities. Nevertheless there are specific standardisation activities (e.g. under the mandate 453 to CEN/ETSI) which have a positive impact on ITS liability issues as they are aiming at making the ITS concept itself and the operation of ITS services and applications more transparent (e.g. common definitions and terminology) or as they are setting basic technical specifications indicating the proper functioning of a cooperative system (e.g. Cooperative Awareness Message, Decentralised Environmental Notification Message).

5. Stakeholder Workshop

This chapter describes the most relevant findings of a Stakeholder Workshop (D3), which was held at 13 June 2012 in Brussels. For more information it is referred to our Deliverable D3.

5.1. Objective and content of workshop

The Stakeholder Workshop aimed at informing the ITS stakeholders of preliminary results, collecting additional inputs from them and gathering their opinions on key issues and possible recommended actions and potential specific measures to eliminate ITS deployment barriers based on liability. In total 59 persons participated in the workshop.

The workshop included:

- A presentation and discussion of the preliminary results regarding the status quo on ITS liability as presented in the Intermediate Report 1 (D2)
- Presentations of specific experiences and expectations regarding ITS liability
- Panel discussion to:
 - elaborate specific key questions regarding ITS liability
 - develop concrete approaches to solve liability issues
 - identify expectations towards the European Commission concerning regulations on an European Level

The Stakeholder Workshop was structured into three parts:

Part 1: Status Quo

This part comprised a session with the description of the **intermediate results** of the study regarding the actual management of liabilities in the area of ITS applications and services. One presentation described the context and applicable legislation regarding ITS liability from a European and national perspective and the other presentation reported the findings and results according to the analysis of commercial agreements and contracts and the results of the Stakeholder Survey made by the author of the study.

After the presentations a **panel discussion** took place in which the study team and experts from different fields of ITS participated. From the perspective of the users not so many issues with respect to ITS applications and services can be identified. It was assumed that more complex systems with a moving change of responsibilities could raise new issues as a clear allocation of responsibility at the interfaces and the handover from one service provider to another could be difficult.

Part 2: Specific experiences and expectations regarding ITS liability

Part two included presentations from different stakeholders **from the industry**. In the panel discussion in which a lot of participants of the workshop were involved the following topics were discussed:

- Are the current legal framework sufficient for the existing ITS applications and services as well as for cooperative systems with a much higher complexity?
- What is needed to introduce automated driving from a legal perspective?
- How can the industry prove that their systems were implemented in a correct way?
- What are the main approaches to reduce liability risks within the industry?

Part 3: Conclusions

Within part 3 the main conclusions out of the workshop were presented, see next section.

5.2. Conclusions

The following conclusions can be considered the result of the Stakeholder Workshop:

- In general it was confirmed from the OEM side that legal cases concerning new ITS and ADAS are rare, as they always try to find a settlement between the involved parties prior bringing liability cases to court. With respect to well-established ADAS, such as Adaptive Cruise Control (ACC), information to relevant legal cases has been provided. Although the complicated issue of determination of responsibilities still remains, these legal cases have been handled by applying the existing liability regulations, which means mainly tort liability and product liability.
- Currently there are no legal issues with respect to liabilities for the existing ITS applications and services. Most cases can be solved by applying the existing legal framework (tort liability, product liability, contractual liability, disclaimers etc.).
- If the value chain includes a mixture of applications and services and probably different service providers in different countries, international standards and certificates are required. This is one of the main areas of improvement.
- The RESPONSE project has shown that the development of a “code of practice” is a supportive instrument to get more predictability of legal decisions with respect to liability. The application of a code of practice to other ITS fields than ADAS has been seen possible and appropriate.
- From a technical perspective methodologies and in a further step standards have to be developed to secure the handover of responsibility from one entity to the other and its

documentation e.g. within a log file to have evidence that each process step was executed correctly.

- Some design and process principles should be applied when it comes to cooperative systems to allocate responsibilities and liabilities between the involved partners. These are (1) continuous monitoring, (2) sender/receiver principle with acknowledgement mechanisms and (3) following a specific staging process for developing, testing and operation of new services.
- Examples like eCall have shown that for some ITS services it is difficult to provide and assign a guarantee for the E2E-service as the involved parties can only be made responsible and liable for the part of the service they can control. For example is the promise of eCall not that in case of an accident the user will be recovered within a certain time. The promise of eCall is to have better chance to be recovered in time.
- For the actual ADAS a change of the Vienna Convention of UN is not necessary, as the systems come only into action and overrules the manipulation of the driver, when the driver is not anymore able to react in an accurate way.
- In case of full automated driving the Vienna Convention has to be adapted, road traffic regulations have to be changed, new codes of practice, additional standards and certificates etc. have to be developed and implemented.
- There is a trend that users want to shift their responsibility to the automotive industry or the public authorities. With a higher level of automation of driving car manufacturers take more responsibility that means more liability risks. These risks will have a strong impact on the price of such applications. However it will be still required to have a liable driver in some situations.
- One question of the discussion was how to secure the reliability of information and what liabilities exist in case of provisioning of wrong information (e.g. a truck damages a bridge due to wrong geographical information provided by a map provider or fleet management system). In the workshop the importance of this issue was highlighted but no solutions have been discussed. In this respect the finished study “Availability of Public Data for Digital Maps”³² (Action 1.3 of the ITS Action plan) published in December 2011 provides more information on the topic. Related to the liability of public authorities for digital map data, the following statements/recommendations can be given:
 - In early ITS deployment the *availability of map data in digital form* is considered more important than imposing strict quality certification of all public authority value chains for digital map information and data.
 - A clear *definition of quality levels for digital map data* is needed per road data type per ITS application area, in particular for safety-related ITS applications.

³² See Final Report of ITS Action 1.3, http://ec.europa.eu/transport/its/studies/doc/2011_12-availability-public-data-digital-maps.pdf

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- Public authorities cannot be held liable for any possible damages resulting from errors in provided road map data, which should be accomplished by including a *disclaimer in the common license agreement* that waivers any liability of the public data source.
 - Map providers should be *obliged to warn the end-user* that the map data can contain errors and that the public authorities cannot be held liable for such errors.

In summary, the Stakeholder Workshop provided valuable stakeholders' opinions on key issues and possible recommended actions and potential specific measures to eliminate ITS deployment barriers based on liability. The results have been further used for the identification of liability sensitive ITS applications, see also chapter 6.

6. Identification of liability sensitive ITS applications

This chapter describes the most relevant findings of Intermediate Report 2 (D4) on the identification of liability sensitive ITS applications. For more information it is referred to our Deliverable D4.

The objective of this task was to clarify the following key questions:

- In particular, which measures, rules and procedures exist or have been applied so far to deal with the liability issues of already widely deployed ITS applications and services?
- What ITS applications and services, or types of ITS applications and services, are the most subject or prone to liability issues, or would require specific measures to address those liability issues in order to facilitate their deployment?
- Which specific measures (legal, technical, organisational) would be required to address liability issues in ITS applications or services?

Therefore existing and potential measures, rules and procedures to address liability issues have been described and allocated to different (fields of) ITS applications and services. These measures, procedures and solution approaches have previously been collected within a Stakeholder Survey (see also section 4.2) and during a Stakeholder Workshop (see also chapter 5).

6.1. Overview of measures to address liability issues

This section contains an overview of the potential measures which can be used to address liability issues. First, the measures are listed; second, they are allocated to the ITS applications and services where they can or have already been applied in an appropriate way by ITS stakeholders.

6.1.1. OVERVIEW OF POTENTIAL MEASURES

The following potential measures may be used to address liability issues:

1. Disclaimers towards users while provisioning the application/service
2. Use of Model Contracts
3. Specific contractual clauses
4. Terms and Conditions
5. Vehicle/product approval or certification
6. Insurance of financial liability risks
7. Training of Users

8. Follow a Code of Practice/Guidelines
9. Follow national and European standards or regulations in the field of ITS applications services
10. Use of Event Data Recorders (black box in vehicle)
11. ITS authentication scheme (like for SIM-cards or credit cards)

These measures have been described in detail in Deliverable D4, together with an overview of the allocation of these measures to categories of ITS applications and services (current and future situation; see also section 6.1.2).

It must be borne in mind that the validity of the first four measures is subject to not being considered abusive, which would render them void.

The main result from the Stakeholder Survey is that ITS service providers obviously have found their way to handle liability issues by applying and using measures in the field of contractual stipulations. Further clear trends or general findings could not be concluded due to the facts that either the total number of provided answers has been low or the distribution of the answers to specific stakeholder groups has been too undetermined.

6.1.2. ALLOCATION OF MEASURES TO ITS APPLICATIONS OR SERVICES

In this section the measures are allocated to ITS applications or services if they are seen appropriate to address the liability issues in this specific context. The allocation is based on the findings from the Stakeholder Survey, the Stakeholder Workshop and the study team's own research activities, but it mainly represents the stakeholders' view.

In the Stakeholder Survey the following questions have been asked regarding the current and future use of remedial solution approaches:

Current:

Which remedial solutions/approaches do or did you use so far to anticipate or address liability issues regarding specific ITS application and services?

Future:

Which remedial solutions/approaches would you see appropriate to address new liability issues regarding the specific ITS application and services in the future?

The following figures show the established allocations:

Category	In-vehicle Information Systems (IVIS) and other Information Systems
Examples	Navigation Systems
	Traffic Information and Management Services
<p>With respect to In-vehicle Information Systems (IVIS) and other Information Systems the stakeholders apply a lot of different measures to deal with liability issues. Measures applied the most are disclaimers and all measures related to the contract with the user (specific contract clauses, terms and conditions and model contracts).</p> <p>These measures are applied at the moment and are seen also appropriate for future developments in this field of ITS. Furthermore it is seen important to follow national and European standards in future.</p>	

Category	Advanced Driving Assistance Systems (ADAS)
Examples	Lane Departure Warning (LDW)
	Adaptive Cruise Control (ACC)
<p>With respect to Advanced Driver Assistance Systems (ADAS) the stakeholders see application of disclaimers, a code of practice [e.g. as defined by RESPONSE 3] and the existing procedures for vehicle/product approval (EC regulations) most appropriate to deal with liability issues. Our own research activities confirm this statement. E.g. a lot of warning disclaimers indicating the limitations of ADAS are normally included in vehicle owner's manuals³³. Furthermore training of users is perceived as an appropriate measure to educate the users/drivers about both the functionality and the limitations of the systems to avoid liability issues.</p> <p>For the future developments in the field of ADAS the stakeholders indicate that the use of Event Data Recorders, following national and European standards or regulations and insurance of financial liability risks will play a more important role to handle upcoming liability issues.</p>	

³³ E.g. Volvo V60 owner's manual: 19 warning disclaimers which clarify the limitations of the vehicle's ADAS systems; thereof 12 warning disclaimers which explains the need for driver intervention and that the responsibility for driving remains under all circumstances with the driver

Category	Active Safety Systems (ASS)
Examples	Electronic Stability Program (ESP)
	Advanced Emergency Braking Systems (AEBS)
<p>With respect to Active Safety Systems (ASS) only the example of Advanced Braking Systems have been included in the Stakeholder Survey. Measures which are seen appropriate to address liability issues at present are the application of disclaimers and the following of the existing procedures for vehicle/product approval (EC regulations).</p> <p>With respect to future developments the usage of Event Data Recorders will play a more important role to address upcoming liability issues according to the Stakeholder Survey.</p>	

Category	Advanced Protective Safety (APS)
Examples	Seat Belt Pretensioner
<p>The category of Advanced Protective Safety (APS) has not been part of the Stakeholder Survey as it is not referred to be part of ITS. Therefore no information from the stakeholders can be provided for this category. Besides it shall be noted that APS like e.g. seat belt pretensioners if they are applied in vehicles have to follow the related procedures for vehicle approval or product certification which are settled in EC regulations. E.g. in the field of seat belts conformity to the following EC regulation has to be proved: Directive 77/541/EEC on safety belts and restraint systems of motor vehicles; Directive 76/115/EEC on anchorages for motor-vehicle safety belts.</p>	

Category	Passive Safety
Examples	Energy absorbing bars & Airbags
<p>The category of Passive Safety has not been part of the Stakeholder Survey as it is not referred to be part of ITS. Therefore no information from the stakeholders can be provided for this category. Besides it shall be noted that specific Passive Safety systems like energy absorbing bars & airbags are not mandatory vehicle equipment. Anyway it is mandatory to achieve a minimum level of protection of vehicle occupants in the cases of frontal and side impacts. This performance is tested and evaluated in accordance with Directive 96/79/EC for frontal impact and Directive 96/27/EC for side impact within the EC type approval procedure established in the EU legislation for motor vehicles.</p>	

Category	Rescue Services
Examples	eCall
<p>With respect to Rescue Services the example of eCall has been included in the Stakeholder Survey.</p> <p>Measures which are seen appropriate to address liability issues at present, where TPS-eCall is provided as a third party service are mainly the conclusion of contracts which include specific contract clauses or terms and conditions to stipulate liability issues. Furthermore the usage of Event Data Recorders and insurance of financial liability risks have been mentioned.</p> <p>With respect to future developments, where public 112-eCall becomes mandatory in new vehicles the usage of Event Data Recorders and the application of national and European standards³⁴ will play a more important role to address the upcoming liability issues according to the Stakeholder Survey. Some stakeholders indicated that from their perspective the usage of model contracts, the procedures for vehicle/product approval or certification and following a code of practice might be useful instruments in the future too according to the Stakeholder Survey.</p>	

Category	Other field of ITS Applications
Examples	E-Tolling
<p>The example of the E-Tolling service has been included in the Stakeholder Survey. Measures which are seen appropriate to address liability issues at present are mainly the conclusion of contracts which include specific contract clauses or terms and conditions³⁵ to address liability. Furthermore the application of national and European standards has been mentioned as an approach to address liability.</p> <p>With respect to future developments mainly the same measures as for the present are seen relevant whereas the application of model contracts will have a higher weight in the future to deal with upcoming liability issues according to the Stakeholder Survey.</p>	

³⁴ A list of current standards in the field of 112-eCall can be found under : http://ec.europa.eu/information_society/activities/esafety/doc/ecall/standards/annex_list_status.pdf (05.10.2012)

³⁵ Examples for the terms and conditions of the German HGV-toll service provider Toll Collect can be found under : <http://www.toll-collect.de/en/general-terms-and-conditions.html> (25.09.2012)

Category	Other field of ITS Applications
Examples	Pay-as-you-Drive Insurance
<p>The example of the PAYD-insurance service has been included in the Stakeholder Survey. A measure which is seen appropriate to address liability issues at present is the conclusion of contracts which include specific contract clauses.</p> <p>With respect to future developments the current contractual measures are expanded as furthermore mainly the usage of model contracts and terms and conditions are seen relevant according to the Stakeholder Survey.</p>	

Category	Other field of ITS Applications
Examples	Automated Driving
<p>The field of automated driving has been included in the Stakeholder Survey. For the present situation there are no approaches estimated to be appropriate to address liability issues which are connected with automated driving. This results probably from the facts that (a) the development and deployment of automated driving applications is still in its beginning and (b) that the field of automated driving is too large and might include too many different categories and forms of applications to have specific measures in mind.</p> <p>With respect to future developments in this field the stakeholders see it appropriate to follow respective vehicle/product approval or certification procedures or a specific code of practice. Insurance of the financial risks which are connected with automated driving and the continuous monitoring of automated functions by using an Event Data Recorder are estimated to be useful as well.</p>	

Category	Other field of ITS Applications
Examples	Cooperative Systems
<p>The field of cooperative systems has been included in the Stakeholder Survey. A measure which is seen appropriate to address liability issues in the present situation is the conclusion of contracts which include specific contract clauses. These contracts could e.g. be derived from standardized model contracts.</p> <p>With respect to the future developments the stakeholders see it essential to follow the respective national and European standards³⁶, to apply Event Data Recorders and to insure occurring financial liability risks. In contrast to the current situation the contractual possibilities (model contracts, specific clauses, terms and conditions) are not seen as so relevant, which is consequential as the contributing partners and the involved participants within a cooperative system do not necessarily have a contractual relation at all.</p> <p>Furthermore it was pointed out at the Stakeholder Workshop that the implementation of an ITS authentication scheme is seen as a prerequisite to address liability issues as the nodes (e.g. vehicles) within a cooperative system can only be made responsible and liable for damages if the information exchange between the nodes is safe and trustworthy and if every node within a cooperative system can be definitely identified.</p>	

6.1.3. CONCLUDING REMARKS

Regarding the current situation contractual stipulations are the main instrument to address liability issues. It must be borne in mind that the validity of contractual stipulations is subject to not being considered abusive, which would render them void. The application of contractual stipulations has been seen most appropriate for the following services:

- Navigation and Traffic information/management services
- (TPS)-eCall
- E-Tolling
- PAYD-Insurance

The usage of disclaimers, following vehicle type approval procedures (mandatory equipment/ITS applications) or product certification (not-mandatory equipment/ITS applications) which are settled in EC regulations are the main instruments in order to be prepared for liability issues for the following fields of ITS:

- Advanced Driving Assistance Systems (ADAS)

³⁶ Mainly the standardisation activities under the EC mandate 453 which are conducted by ETSI and CEN focusing on cooperative systems

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- Active Safety Systems (ASS)
 - Advanced Protective Safety (APS)
 - Passive Safety

Regarding cooperative systems not many measures have been applied by the stakeholders so far. This is not surprising as experiences regarding cooperative systems are still only collected in field tests and trials and not from a wide market introduction.

Regarding automated driving no remedial solution approaches are applied currently by the consulted stakeholders which as well is not surprising as automated driving is still in a research stage. Nevertheless the developments in other parts of the world show that respective legal changes have been made, (e.g. The US states Nevada and Florida already initiated respective changes in legislation, whereby e.g. Nevada initiated regulations authorising the operation of autonomous vehicles on highways and established a driver's license endorsement for the operation of an autonomous vehicle³⁷. Nevertheless, these regulations currently require the presence of a driver in the vehicle who can take control of the vehicle when necessary).

Regarding the future remedial approaches the following trends have been shown in the Stakeholder Survey:

- The usage of Event Data Recorders will increase in the future but respective privacy concerns have to be considered well.
- Following and adopting ITS standards will become more important.
- The application of model contracts will spread further in the areas of Navigation and traffic information/management services, E-Tolling, TPS-eCall and PAYD-insurances.

6.2. Identification and analysis of liability sensitive ITS applications

This section contains the identification and analysis of liability sensitive ITS applications and services. Liability sensitive applications will be those where in relation to the existing or foreseen liability issues no or insufficient remedial solution approaches exist by now and specific additional measures are needed.

³⁷ USA: Nevada legislation regarding autonomous vehicles – B511,
http://www.leg.state.nv.us/Session/76th2011/Bills/AB/AB511_EN.pdf

6.2.1. IDENTIFICATION OF LIABILITY SENSITIVE ITS APPLICATIONS

The following criteria have been applied to identify whether an ITS application or service can be considered “liability sensitive”:

1. **Already introduced in the market:** A wide distribution of an ITS application or service implicates that there are no major liability issues preventing the application/service from being accepted by the customers and is therefore an indicator for a “not liability sensitive” ITS application or service.
2. **Transparent liability situation:** If the responsibility for damages resulting from the usage of an ITS application or service can be clearly allocated in the most adequate way it is an indicator for a “not liability sensitive” ITS application or service.
3. **Measures to address liability issues exist:** The existence of measures/approaches to address and solve liability issues (according to the Stakeholder Survey, the workshop and own research activities) is an indicator for a “not liability sensitive” ITS application or service,

The criteria are evaluated in a qualitative way, with the following meanings:

- 2 = “Criteria applies fully”
- 1 = “Criteria applies partly”
- 0 = “Criteria do not apply”

ITS applications or services **where two or more criteria do not apply (= 0) are classified to be liability sensitive**. Based on this approach, the following two ITS categories were considered to be “**liability sensitive**”:

- the fields of highly and fully Automated Driving
- Cooperative systems and the respective applications and services which build on cooperative systems

In the next section the above-mentioned (fields of) ITS applications and services are analysed and described further.

6.2.2. FURTHER ANALYSIS OF AUTOMATED DRIVING

Automated Driving is a field of ITS which is still in its beginning but will evolve without doubt. Existing driver assistance systems become more sophisticated and more widespread and the ongoing research activities (e.g. the US DARPA Grand Challenge since 2004) demonstrate that higher levels of automation in the driving function become feasible and attractive. Automated driving is on the rise in the United States where, for example, Nevada already initiated respective changes in legislation (e.g. regulations authorising the operation of autonomous vehicles on highways and a driver's license endorsement for the operation of an autonomous vehicle).³⁸

Automated Driving is as well a field of ITS which is promising as it might be an attractive customer function, it could help on traffic flow management and contribute to CO₂ savings and as human error is the major reason of accidents it might even help to prevent accidents in the long run.

To get ahead in the field of Automated Driving technological research and development and the creation of the boundary conditions (e.g. the legal conditions) must be tackled in parallel. Significant challenges have to be addressed in both areas. As Automated Driving is a very broad term it is important to categorize and cluster this field in order to bring transparency into the discussion and to ensure that the appropriate level of automated driving is addressed. An appropriate categorisation has been done by an expert group initiated by the German federal highway institute (BASt) which differentiate between the **categories** partly, highly and fully automated driving functions which are defined as follows:

1. Partly automated

The driver needs to permanently supervise the automated functions. He cannot carry out any non-driving related activities.

2. Highly automated

The system will recognize its performance limits and request the driver to take over the control with sufficient warning time. Activities which are non-driving related can be carried out by the driver to some degree.

3. Fully automated

The system can cope with all driving situations and need no supervision by the driver. Non-driving related activities can be carried out and even a driving vehicle without a driver is imaginable.

³⁸ USA: Nevada legislation regarding autonomous vehicles – B511,
http://www.leg.state.nv.us/Session/76th2011/Bills/AB/AB511_EN.pdf

Furthermore the field of automated driving has been structured according to the **application range** of automated driving functions:

1. Low speed manoeuvring

The automated functions are carried out at low speeds (e.g. < 10kph) and cause only a minimal risk of injuries (e.g. automated parking)

2. Manoeuvres of limited duration

The automated functions can be accomplished within few seconds. (e.g. lane change or passing a single vehicle)

3. „Permanent“ driving

The automated function stays in operation for a longer period of time (e.g. longitudinal + transversal control on highway)

The following figure shows examples for the different categories and application ranges:

Application range / Category	Low speed manoeuvring	Manoeuvres of limited duration	„Permanent“ driving
Partly automated	Parking assistant <ul style="list-style-type: none"> • Driver-initiated automated parking. • Driver needs to supervise continuously, • must interrupt if necessary. 	Passing assistant <ul style="list-style-type: none"> • Driver-initiated automated passing (single manoeuvre) • Highway only • Driver needs to supervise continuously and retain control as necessary 	Construction site assistant <ul style="list-style-type: none"> • Automated longitudinal and transversal control • construction sites on highways only • Driver needs to supervise continuously and retain control as necessary
Highly automated		Lane change chauffeur <ul style="list-style-type: none"> • Driver-initiated automated lane change • Highway only • Driver does not need to supervise 	Highway chauffeur <ul style="list-style-type: none"> • Automated longitudinal and transversal control • Highway only • Driver does not need to supervise, will be requested to take over control in due time
Fully automated	Parking pilot <ul style="list-style-type: none"> • Automated valet parking. • No driver resp. driver goes away from vehicle 	Automated emergency stop <p>Automatically bringing the vehicle to a safe state if driver becomes unconscious etc.</p>	Highway pilot <ul style="list-style-type: none"> • Automated longitudinal and transversal control • Highway only • Driver does not need to supervise, no need to take over control

Figure 13: Automated Driving - Matrix of categories with examples³⁹

The BAST-expert group analysed furthermore the legal challenges for the three different categories. It came to the conclusion that partly automated driving remains in consistency with today’s law (e.g. Vienna convention on road traffic for those countries who signed it, national road traffic regulations) as the driver is obliged to supervise all automated functions permanently and has still the control over the driving situation.

³⁹ Presentation by Dr. Jürgen Schwarz, “Designing Safe Automated Driving Functions - Challenges from the legal framework”, Page 6, EC ITS Liability Workshop, 13th June 2012

In comparison to that a driver would breach his obligations according to current traffic regulations with respect to high and full automated driving as there will be driving situations in which the driver is out of control. To address this situation a change or at least reinterpretation of the Vienna Convention on road traffic as the basis for national road traffic regulations, is needed. Chapter 2 of the Vienna convention on road traffic says about General Traffic Rules:

- Art. 8 p. 1: Every vehicle or combination of vehicles proceeding as a unit shall have a driver
- Art. 8 p. 5: Drivers shall at all times be able to control their vehicles [..].
- Art.13 p.1: Every driver of a vehicle shall in all circumstances have his vehicle under control so as to be able to exercise due and proper care and to be at all times in a position to perform all manoeuvres required of him. [..]

Regarding highly and fully automated driving functions a paradigm shift is needed, as the role of the “driver” of a vehicle will develop in direction of a “passenger”, and the Vienna convention on road traffic and the respective national road traffic regulations have to be revised accordingly.

With respect to the current situation of road traffic liability the driver of a vehicle is liable in case he behaves incorrectly or faulty. This form of driver liability cannot be applied anymore in case of highly and fully automated vehicle operation. This means that damages which occur during highly and fully automated operation mode would lead to liability of the vehicle manufacturer based on his product liability obligations (in case the accident/damage is not solely caused by ill-driving on the side of a third party)

During the Stakeholder Workshop other issues which are estimated to be important to support the evolution of automated driving have been named, besides the challenges of the legislative framework which is not prepared for highly and fully automated driving functions. These have been the creation of corresponding vehicle regulations, e.g. EC regulations and extensions of vehicle type approval procedures, and the definition of basic safety requirements which have to be met by all automated driving functions.

Automated driving is an ITS field which presents at the moment the biggest challenges in the legal and liability field:

- Paradigm shift: The role of the driver of a vehicle might develop in in direction of a passenger.
- Regulatory law: Road traffic which contains vehicles “without drivers” (or drivers that are out of control) is a blank field in regulatory traffic law.
- Liability: The burdens of vehicle manufacturers in terms of product liability increase massively.

6.2.3. FURTHER ANALYSIS OF COOPERATIVE SYSTEMS

The challenge for cooperative systems is that services which are provided based on these systems incorporate different parties with different responsibilities and that there might be no contractual relations between those parties.⁴⁰ The service users in the end will unlikely be aware that the service being provided is the product of a number of distinct systems or modules each owned and managed by different parties.⁴¹

In case damages incur due to the malfunction of a service part or component of a cooperative system the issue could be handled along the chain of responsibility. For the end user the responsibility will not be clear on first view which might result that he claims his vehicle manufacturer to remunerate the damages. If so it is important that technical and procedural prerequisites have been created which enable the courts to finally identify the responsible party.

To tackle the situation two main approaches should be followed in parallel. On the one hand liability should already be considered in the development and introduction phase of cooperative systems and appropriate measures should be taken to prepare them or to reduce the risk of future liability issues. On the other hand specific measures have to be prepared to address and solve liability issues which occur during the operation phase of cooperative systems.

Measures to consider in the development and introduction phase of cooperative systems

In the Stakeholder Workshop three design principles have been discussed which should be applied consequently in the design phase of cooperative systems in order to prepare them for future liability issues.⁴²

1. Design principle „measuring / logging“

All nodes within a cooperative system should always know their condition. Therefore they must permanently measure and record relevant parameters in their storage. This must be both a physical logging which includes e.g. all parameters of the node's interfaces and a functional logging which could include parameters like e.g. quality of signal (QOS) parameters to measure the level of trust of received position data.

2. Design principle „monitoring/reporting“

All nodes within a cooperative system should monitor their condition with respect to certain quality levels. In case relevant quality levels are not fulfilled the node has to report

⁴⁰ cf. Whitepaper: Deployment Challenges for Cooperative Systems (CVIS, SAFESPOT, COOPERS)

⁴¹ cf. E-Frame: Extend FRAMEwork architecture for cooperative systems - Deployment and Organisational Issues for Cooperative Systems

⁴² cf. presentation by Dr. Johannes Springer "Liability of ITS services for connected cars from the perspective of a service provider", EC ITS Liability Workshop, 13th June 2012

this situation to any other node to which it is transmitting data which enables the other node to interpret the information accordingly, e.g. dismiss the information.

3. Design principles „sender/receiver receipt“

All communication procedures and data transmission processes must be designed according to the sender/receiver receipt principle. This means that each data transmission can be clearly assigned to one sender and one receiver. An acknowledgement mechanism have to be in place to ensure and prove that information have been received by the receiver.

By consequently applying those design principles it is ensured that a node in a cooperative system knows its own condition, reports this conditions to other nodes in case it does not meet certain quality levels and that this communication can be verified.

With respect to the introduction of cooperative systems former projects and studies (e.g. COOPERS, ComSafety – D 13. Legal Aspects) have seen the importance of mandatory certification of cooperative systems and its subsystems. In the Stakeholder Workshop the participants discussed furthermore the need for an end-to-end certification of the services which are provided based on cooperative systems in order to certify the conformity to minimal functional requirements and e.g. to verify that the design principles mentioned above are applied along the whole process chain by all involved parties. Respective regulations and test procedures for service certification do not exist yet and should be developed.

Measures to consider in the operation phase of cooperative systems

In order to ensure that participating partners, nodes or systems can communicate safe and secure within a cooperative system appropriate technical protection and authentication measures will be needed. Therefore unique IDs, keys and certificates for the participants should be managed and distributed at a central place. Safe and trustworthy information exchange can only take place if every participant can be definitely identified. To find the responsible system or node that assumes the liability in case something have gone wrong is as well only possible with unique IDs, that can't be denied.

During the Stakeholder Workshop this prerequisite for cooperative systems has been discussed under the topic “ITS authentication scheme”.

Former studies identified the need for such mechanism as well. E.g. the eSecurity Working Group on Vulnerabilities in Electronics and Communications in Road Transport identified the need for *PKI⁴³ authorities* which are defined as “[...] organisations [who] are responsible for managing basic security-related services for the telematics infrastructure. Examples are keys, certificates, and their related identities”. The report came to the

⁴³ PKI: Public Key Infrastructure

conclusion that such mechanisms are needed but the appropriate structures still have to be clarified as e.g. the operational, financial and organisational challenges of running a PKI scheme for millions of vehicles in Europe and even beyond must not be underestimated.

Another measure which is seen needed as a prerequisite for well-functioning cooperative systems are the creation of and the agreement about performance standards and service and quality levels. According to the project SAFESPOT such a service level management has to be organised to constitute distinctive responsibilities and liabilities during the operation phase which could reduce the risks of liability cases for service providers and system operators.⁴⁴

For the clarification of liability issues the existence of service and quality levels is essential in order to identify that a party failed to comply with its obligations and because it is the prerequisite that the design principle “monitoring/reporting” can be applied and a node informs its communication partners about a relevant non-conformance with its service/quality levels which might exculpate the responsible operator of this node from his liability.

6.2.4. CONCLUDING REMARKS

Liability sensitive applications will be those where in relation to the existing or foreseen liability issues no or insufficient remedial solution approaches exist by now and specific additional measures are needed. Following this approach, the following (fields of) ITS applications and services have been identified as “liability sensitive” and have been analysed and described further in the previous sections:

- the fields of highly and fully Automated Driving
- Cooperative systems and the respective applications and services which build on cooperative systems

⁴⁴ Cf. SAFESPOT / SP 6 BLADE and Scientific Paper “Service Modelling and Engineering in the Telematics Industry - The View from the Perspective of a Toll Service Provider”

6.3. Conclusions

This section contains a summary of the main findings regarding the identification of liability sensitive ITS applications, including appropriate measures on how these liability issues could be addressed.

The main findings can be summarised as follows:

- (1) As a result of the report it can be concluded that for the most analysed fields of ITS applications and services the current and foreseen liability issues can be handled within the existing legal framework and appropriate remedial solution approaches to address their liability issues exist. From the viewpoint of liability no specific actions regarding these ITS applications and services are required. The following (fields of) ITS applications have been categorised as being “**not liability sensitive**”:
 - In-vehicle Information Systems (IVIS) and other Information Systems (e.g. Navigation Systems, Traffic Information and Management Services)
 - Advanced Driving Assistance Systems (ADAS) (e.g. Lane Departure Warning, Adaptive Cruise Control)
 - Active Safety Systems (ASS) (e.g. Advanced Emergency Braking Systems, ESP, ABS)
 - Systems in the field of Advanced Protective Safety (APS)
 - Systems in the field of Passive Safety
 - Both types of eCall, which means the current TPS-eCall, provided by third parties and the upcoming pan-European 112-eCall which will be introduced in 2015
 - E-Tolling services
 - Pay-as-you-Drive Insurance services
 - Partly automated driving functions within the field of Automated Driving
- (2) For ITS applications which are considered to be “not liability sensitive” and whose liability issues are mainly addressed in contractual stipulations (contract clauses, terms and conditions, disclaimers) it is assumed that they would be considered to be “not abusive” by the courts in order to be effective for litigation. In case future contractual stipulations will be assessed to be void the classification of affected ITS applications with respect to their liability sensitiveness might be evaluated differently.
- (3) Furthermore the report comes to the conclusion that the following (fields of) ITS applications and services need to be categorised to be “**liability sensitive**”:
 - the fields of highly and fully Automated Driving

- Cooperative systems and the respective applications and services which build on cooperative systems

The analysis in the two “liability sensitive” areas of ITS applications and services regarding their liability issues and appropriate measures to encounter them came to the following conclusions:

Automated Driving

- (4) In all further discussions about liability a clear definition of automated driving is needed (e.g. the categories of the BAST expert group) as the category “partly automated driving” can be categorized as “not liability sensitive” and has to be considered as a category of its own. For partly automated driving functions conclusion No. (1) applies.
- (5) For the field of highly and fully automated driving functions new liability issues will occur and at the moment no appropriate remedial solution approaches exist. But the challenges in this field are even deeper and affect law. Due to the paradigm shift that the role of the “driver” of a vehicle will develop in direction of a “passenger” the foundation of existing road traffic regulations are touched which means that the Vienna convention on road traffic and all national road traffic regulations might need a fundamental revision or additional amendments.
- (6) For vehicles equipped with highly and fully automated driving functions it shall be assessed the need and feasibility of developing, at international level, safety and test requirements in the corresponding vehicle regulations, e.g. UNECE or EC type approval regulations.
- (7) Basic safety requirements which have to be met by all automated driving functions should be defined with the participation of the stakeholders, aiming at achieving a maximum consensus among the stakeholders.

Cooperative Systems

- (8) Liability issues of cooperative systems are mainly related to the existence of numerous parties which contribute to a well-functioning service.
- (9) Service level agreements or regulations are needed to constitute the rights and obligations of the parties with respect to the service elements they provide. Non-conformance to service levels might result in liability claims.
- (10) Existing service levels are the prerequisite that the design principle “monitoring/reporting” can be applied and a node informs its communication partners about a non-conformance with its service/quality levels which could be the prerequisite to at least partly exculpate the responsible operator of this node from his liability.

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- (11) Some design principles should be applied when it comes to cooperative systems to allocate responsibilities and liabilities clearly and traceable between the involved partners. These are (1) continuous measuring and logging, (2) continuous monitoring and reporting and (3) consequent consideration of the sender/receiver receipt principle with acknowledgement mechanisms.
 - (12) The implementation of an ITS authentication scheme which is used to manage basic security-related services (management and distribution of keys, certificates, related unique identities) is a prerequisite for the widespread operation of cooperative systems in order to be prepared for arising liability issues. Through the implementation of an ITS authentication scheme it must be ensured, that participating partners, nodes or systems can communicate safe and secure and that there is trust between them. The identification of the responsible system or node (e.g. in a court case) that has to assume the liability in case something have gone wrong is only possible with unique IDs.

7. Conclusions and recommendations

7.1. Conclusions

The conclusions of this study are summarised below and give an answer to the following first three key questions:

1. What is the legal state-of-the-art concerning liability aspects (EU law, national laws, case law, contracting policies, national transport specific legislations) related to the deployment of ITS applications and services?
2. In particular, which measures, rules and procedures exist or have been applied so far to deal with the liability issues of already widely deployed ITS applications and services?
3. What ITS applications and services, or types of ITS applications and services, are the most subject or prone to liability issues, or would require specific measures to address those liability issues in order to facilitate their deployment?

7.1.1. LEGAL STATE-OF-THE-ART CONCERNING LIABILITY ASPECTS

There is no specific liability regime currently applicable to the deployment of ITS applications and services. Currently applicable legal regulations on liability issues in the field of ITS applications and services have been identified in the following liability regimes:

- Contractual liability
- Tort liability
- Product liability
- Traffic law (as a background element)

The fact that liability is governed by various sets of rules creates uncertainty and additional burden for the actors involved in the process of selling/providing ITS applications or services. Contrary to tort liability, contractual liability applies as far as a contract has been concluded and is related to the sale or performance of a service. Limitation of liability clauses are admitted by national legislations but are subject to legal restrictions. Finally product liability regime will take precedence over other liability regimes in case its conditions of application are met. In this respect, the concepts of “duty of care” and of “reasonable safety” of the product are crucial concerning the application of such regime to ITS applications and services and may impact the deployment of such technologies in Europe.

With respect to the already existing ITS applications and services the major questions of liability are at least in Europe clear. Despite the potential benefits of the application of ITS

systems and services with a high level of automation and a lot of different stakeholders within the value chain, the major question of liabilities for potential losses for customers, users and third parties of these ITS systems and services is still quite unclear.

The different applicable legal basis for liability, different jurisdictions on the European and national levels and the different national laws in the European countries make the current legislative framework complex. Accordingly the survey results showed that for most contacted stakeholders in the field of ITS the legislative framework is neither clear nor predictable. For example, the stakeholders stated that (a) there are different rules for each application or service, (2) the disclaimers and terms and conditions are mostly too difficult to understand for the user and (3) the additional effort and the unpredictable time needed to go through the legislative procedures slow down the launch process of ITS applications and services.

Liability between the partners involved as an important issue regarding the introduction of ITS applications and services has been identified in almost all sources that have been analysed for this study. Besides the complexity of the legislative framework, another reason why liability is one major point that is seen as a potential barrier for the successful introduction of ITS in Europe is, that cooperative ITS systems consisting of different service components provided by different partners are currently accompanied by unclear distribution of responsibilities and absence of agreements on service ownership.

E-Tolling and eCall⁴⁵ are the ITS applications which raised the most liability issues so far according to the stakeholders' information. This is not surprising as these (at least E-Tolling) are (1) already widely deployed ITS services which in case of malfunctions contain (2) large potential for damages. For both services the implementation and harmonisation process is managed at European level. Regarding the introduction of the European Electronic Toll Service (EETS) the respective legal framework for the service and respective rights and obligations of the different parties involved have been set at European level (Directive 2004/52/EC and Commission Decision 2009/750/EC) and are currently implemented by the Member States. In the past and currently liability issues are regulated individually by contracts between the toll service providers and the (national) toll chargers.

At present stakeholders in the field of ITS applications and services manage their liability issues by applying disclaimers towards users, specific contract clauses and terms and conditions. Disclaimers with respect to, for example, vehicle's ADAS or navigation devices are used extensively by OEMs (car manufacturers) in order to clarify the limitations of technical systems and to explain the need for driver intervention and that the responsibility for driving remains under all circumstances with the driver.

It can be stated that to the extent that the driver is able to override an ITS application or service at any time, he remains legally responsible for compliance with the rules on behaviour in road traffic. However, vehicles in which the driver does not have fully control

⁴⁵ Please note that in the survey no distinction was made between 112-eCall and TPS-eCall.

raise a number of legal questions. As long as the driving behaviour of the driver causes a situation in which a non-overrideable system (e.g. ASS) takes control over the vehicle and is not able to avoid the collision, the driver stays responsible. The responsibility for driving behaviour might be shared between drivers and (for example) manufacturers in the area of civil liability, both in terms of contractual and tort liability in case that the system is not working properly.

The currently available ITS applications are not in contradiction with the Vienna Convention and the traffic laws mentioned in this section based on the reaction time principle, even in case of non-overrideable ITS applications. The situation changes strongly if automated driving should be introduced.

Questions of liability are primarily of both legal and commercial natures. Hence liability is not the core of current ongoing standardisation activities. Nevertheless there are specific standardisation activities (e.g. under the mandate 453 to CEN/ETSI) which have a positive impact on ITS liability issues as they are aiming at making the ITS concept itself and the operation of ITS services and applications more transparent (e.g. common definitions and terminology) or as they are setting basic technical specifications indicating the proper functioning of a cooperative system (e.g. Cooperative Awareness Message, Decentralised Environmental Notification Message).

7.1.2. MEASURES, RULES AND PROCEDURES TO DEAL WITH LIABILITY ISSUES

In general, providers of ITS applications and services have found their way to handle liability issues by applying and using measures in the field of contractual stipulations. The following potential measures and remedial solution approaches may be used to address liability issues:

1. Disclaimers towards users while provisioning the application/service
2. Use of Model Contracts
3. Specific contractual clauses
4. Terms and Conditions
5. Vehicle/product approval or certification
6. Insurance of financial liability risks
7. Training of Users
8. Follow a Code of Practice/Guidelines
9. Follow national and European standards or regulations in the field of ITS applications services
10. Use of Event Data Recorders (black box in vehicle)
11. ITS authentication scheme (like for SIM-cards or credit cards)

Furthermore, an allocation of the above-mentioned measures to categories of ITS applications and services (current and future situation) has been made, mainly representing the stakeholders' view based on the findings from the Stakeholder Survey and the Stakeholder Workshop.

Regarding the current situation contractual stipulations are the main instrument to address liability issues. It must be borne in mind that the validity of contractual stipulations is subject to not being considered abusive, which would render them void. The application of contractual stipulations has been seen most appropriate for the following services:

- Navigation and Traffic information/management services
- (TPS)-eCall
- E-Tolling
- PAYD-Insurance

The usage of disclaimers, following vehicle type approval procedures (mandatory equipment/ITS applications) or product certification (non-mandatory equipment/ITS applications) which are settled in EC regulations are the main instruments in order to be prepared for liability issues for the following fields of ITS:

- Advanced Driving Assistance Systems (ADAS)
- Active Safety Systems (ASS)
- Advanced Protective Safety (APS)
- Passive Safety

Regarding cooperative systems not many measures have been applied by the stakeholders so far. This is not surprising as experiences regarding cooperative systems are still only collected in field tests and trials and not from a wide market introduction.

Regarding automated driving no remedial solution approaches are applied currently by the consulted stakeholders which as well is not surprising as automated driving is still in a research stage. Nevertheless the developments in other parts of the world show that respective legal changes have been made (e.g. The State of Nevada initiated regulations authorising the operation of autonomous vehicles on highways and established a driver's license endorsement for the operation of an autonomous vehicle⁴⁶. Nevertheless, these regulations currently require the presence of a driver in the vehicle who can take control of the vehicle when necessary).

⁴⁶ USA: Nevada legislation regarding autonomous vehicles – B511,
http://www.leg.state.nv.us/Session/76th2011/Bills/AB/AB511_EN.pdf

Regarding the future remedial approaches the following trends have been shown in the Stakeholder Survey:

- The usage of Event Data Recorders will increase in the future but respective privacy concerns have to be considered well.
- Following and adopting ITS standards will become more important.
- The application of model contracts will spread further in the areas of In-vehicle Information Systems (e.g. navigation systems, traffic information/management service), E-Tolling, TPS-eCall and PAYD-insurances.

7.1.3. ITS APPLICATIONS AND SERVICES MOST SUBJECT TO LIABILITY ISSUES

The main findings can be summarised as follows:

- (1) As a result of the report it can be concluded that for the most analysed fields of ITS applications and services the current and foreseen liability issues can be handled within the existing legal framework and appropriate remedial solution approaches to address their liability issues exist. From the viewpoint of liability no specific actions regarding these ITS applications and services are required. The following (fields of) ITS applications have been categorised as being “**not liability sensitive**”:
 - In-vehicle Information Systems (IVIS) and other Information Systems (e.g. Navigation Systems, Traffic Information and Management Services)
 - Advanced Driving Assistance Systems (ADAS) (e.g. Lane Departure Warning, Adaptive Cruise Control)
 - Active Safety Systems (ASS) (e.g. Advanced Emergency Braking Systems, ESP, ABS)
 - Systems in the field of Advanced Protective Safety (APS)
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 - Both types of eCall, which means the current TPS-eCall, provided by third parties and the upcoming pan-European 112-eCall which will be introduced in 2015
 - E-Tolling services
 - Pay-as-you-Drive Insurance services
 - Partly automated driving functions within the field of Automated Driving
- (2) For ITS applications which are considered to be “not liability sensitive” and whose liability issues are mainly addressed in contractual stipulations (contract clauses, terms and conditions, disclaimers) it is assumed that they would be considered to be “not abusive” by the courts in order to be effective for litigation. In case future contractual stipulations will be assessed to be void the classification of affected ITS

applications with respect to their liability sensitiveness might be evaluated differently.

- (3) Furthermore the report comes to the conclusion that the following (fields of) ITS applications and services need to be categorised to be “**liability sensitive**”:
- the fields of highly and fully Automated Driving
 - Cooperative systems and the respective applications and services which build on cooperative systems

The analysis in the two “liability sensitive” areas of ITS applications and services regarding their liability issues and appropriate measures to encounter them came to the following conclusions:

Automated Driving

- (4) In all further discussions about liability a clear definition of automated driving is needed (e.g. the categories of the BAST expert group) as the category “partly automated driving” can be categorized as “not liability sensitive” and has to be considered as a category of its own. For partly automated driving functions conclusion No. (1) applies.
- (5) For the field of highly and fully automated driving functions new liability issues will occur and at the moment no appropriate remedial solution approaches exist. But the challenges in this field are even deeper and affect law. Due to the paradigm shift that the role of the “driver” of a vehicle will develop in direction of a “passenger” the foundation of existing road traffic regulations are touched which means that the Vienna convention on road traffic and all national road traffic regulations might need a fundamental revision or additional amendments.
- (6) For vehicles equipped with highly and fully automated driving functions it shall be assessed the need and feasibility of developing, at international level, safety and test requirements in the corresponding vehicle regulations, e.g. UNECE or EC type approval regulations.
- (7) Basic safety requirements which have to be met by all automated driving functions should be defined with the participation of the stakeholders, aiming at achieving a maximum consensus among the stakeholders.

Cooperative Systems

- (8) Liability issues of cooperative systems are mainly related to the existence of numerous parties which contribute to a well-functioning service.

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- (9) Service-level agreements or regulations are needed to constitute the rights and obligations of the parties with respect to the service elements they provide. Non-conformance to service levels might result in liability claims.
 - (10) Existing service-levels are the prerequisite that the design principle “monitoring/reporting” can be applied and a node informs its communication partners about a non-conformance with its service/quality levels which could be the prerequisite to at least partly exculpate the responsible operator of this node from his liability.
 - (11) Some design principles should be applied when it comes to cooperative systems to allocate responsibilities and liabilities clearly and traceable between the involved partners. These are (1) continuous measuring and logging, (2) continuous monitoring and reporting and (3) consequent consideration of the sender/receiver receipt principle with acknowledgement mechanisms.
 - (12) The implementation of an ITS authentication scheme which is used to manage basic security-related services (management and distribution of keys, certificates, related unique identities) is a prerequisite for the widespread operation of cooperative systems in order to be prepared for arising liability issues. Through the implementation of an ITS authentication scheme it must be ensured, that participating partners, nodes or systems can communicate safe and secure and that there is trust between them. The identification of the responsible system or node (e.g. in a court case) that has to assume the liability in case something have gone wrong is only possible with unique IDs.

7.2. Recommendations

The recommendations of this study give an answer to the following final key question:

4. Which specific measures (legal, technical, organisational) would be required to address liability issues in ITS applications or services?

The **five main recommended actions** to eliminate possible barriers based on liability issues which obviate the deployment of ITS applications and services can be summarised as follows:

- **Event Data Recorders** may have a big potential in the future to address liability issues of many ITS applications and services. However, for this technical tool to be valuable, there needs to be a **sound legal framework** around it with clear legislation to rule out any possible ambiguity, for example regarding the identification and allocation of responsibilities. A particular focus should be on the clarification of the following two issues: (1) the acceptance of EDR data as proof in court and (2) the issue of self-incrimination in criminal law.

The more systematic use of in-vehicle Event Data Recorders should be further investigated in order notably to facilitate the demonstration of compliance with standards and/or regulations requirements (especially for applications such as ADAS, active safety systems, automated driving, etc.) and to develop a sound legal framework and related standards around this tool to rule out any possible ambiguity (e.g. related to the use of EDR data as proof in court and with respect to self-incrimination). Car manufacturers would be forced to provide EDRs within their vehicles which store specific standardised events generated by the different ITS applications within the vehicle. In this case no reason exists that this information should not be accepted by the court. Furthermore it has to be regulated how to proceed with data of the EDR with respect of the criminal law as in most of the European countries nobody is obliged to accuse himself.

- Any system which aims at helping the driver in its driving process, in particular in case of Automated Driving, raises the issue of whether such systems would comply with the provisions of the **Vienna Convention**. The uncertainty about the status of Automated Driving in relation to the Vienna Convention has been underlined in this study.

For Automated Driving, an adaptation of the Vienna Convention of 1968 may be necessary to address questions in relation to the further development in the area of highly and fully automated driving. The current activities of the WP1 (Road Traffic Safety) of UNECE Transport Division are going in the right direction and should be supported by the European Commission.

- Conformance to **standards** can be a way to prove that sufficient safety levels have been met and can be used as defence against potential claims. It may lead to the presumption that a product is not defective and/or that the manufacturer has observed the necessary duty of care. However, a standard is not binding for the provider of a service or a system manufacturer.

The importance of proving the conformance/compliance to standards in liability litigation should be strengthened. System standards and service requirements developed by ETSI and CEN should be, if and when appropriate, referred to in relevant EU/UNECE regulations.

- For applications and services which include several service providers or devices of several manufacturers, like **cooperative systems**, the chain of responsibilities can be quite complex. The implementation of such applications and services will only start when the rules with respect to the responsibility shift are defined and agreed by all parties.

For cooperative systems, the general principle that each stakeholder is only responsible for the part of the service chain which is under his control should be maintained. The need and feasibility of developing regulations (as for 112-eCall) aimed at notably establishing the rights and obligations of the parties with respect to the service elements they provide should be considered.

- Our survey has shown that most of the stakeholders perceive a **lack of know-how** concerning liability issues of ITS applications and services. The diversity of national legal frameworks and the high complexity of the topic, the missing availability of information and the missing guidelines to get a better understanding of the specific rights and duties of each stakeholder make it nearly unfeasible for non-legal experts to approach this topic.

A common information platform (e.g. a specific ITS liability webpage/forum) which provides general principles of how to handle liability issues and which displays the specific rights and duties of each stakeholder in each member state with practical examples, would make it much easier to get a better understanding of the own liabilities.

Other recommended actions to eliminate possible barriers based on liability issues which obviate the deployment of ITS applications and services can be summarised as follows:

- For most of the currently applied ITS applications and services it might be stated that *in theory* the **existing legal framework** seems sufficient to rule liability issues as the chain of responsibilities is considered clear and fits in the existing legislation, although *in practice* responsibilities may be sometimes difficult to establish (esp. in case of ADAS). This latter statement can be confirmed by the fact that in Europe the national legislations concerning liabilities **differ** strongly from each other. Also, most stakeholders in the Stakeholder Survey indicated to perceive the current applicable legislative framework regarding ITS services and applications as rather **unclear**.

The harmonisation of the different laws would make the understanding of the legal framework much easier and it would strengthen the position of the consumers as they would have the chance to understand their own rights. A new specific ITS law on liability – as proposed by some stakeholders in the Stakeholder Survey – would be nice to have, but such law is considered not feasible. However, it might be more plausible that a Common European Sales Law will be developed. This could make available a uniform set of contract law rules to be applied in contractual agreements regarding the deployment and use of ITS applications and services.

- When vehicles are **interconnected** with and **dependent** on the input from other service providers, other vehicles or the infrastructure and have to react based on exchanged messages, it is of utmost importance to know if such messages can be **trusted** and to have a **common understanding** about interfaces, communication protocols, identities, performance requirements, etc.

System standards and service requirements on an international level (ISO/CEN/ETSI) have to be further developed. Moreover, the use of an ITS authentication scheme which is used to manage basic security-related services in cooperative systems should be further investigated.

- In this study most ITS applications (esp. ADAS) could be classified according to **three levels of support** (information/warning, overridable, non-overridable systems) and analysed based on the reaction time to make the allocation of responsibilities between driver and vehicle keeper on one side and the manufacturer of systems and applications on the other side more transparent.

In all discussions about legal and liability implications of automated driving it should be very clear what level of automated function is addressed. The above mentioned classification model has to be enhanced for the specific situation of automated driving applications and the applications have to be assessed based on this classification model.

- **Automated driving** means that the driver becomes partly or in full range passenger in the vehicle. The **responsibility** which is currently still assigned to the driver or the keeper of the vehicle (see Vienna Convention of 1968) is shifted to the manufacturer of the automated driving applications (in most cases the vehicle manufacturers). Although the first trials are actually executed in USA (Google, Nevada) international safety and test requirements are missing.

The need and feasibility of developing at international level safety and test requirements for vehicles equipped with highly and fully automated driving functions should be considered.

- A European **Code of Practice** (CoP) for the development and evaluation of ADAS has been developed in the RESPONSE 3 project. This CoP helps manufacturers to systematically identify and assess possible risks, and gives advice on how to process these risks during ADAS development by applying the **controllability concept**. By applying this CoP, manufacturers show their duty of care during the development phase of ADAS. They might reduce any liability risks by thorough consideration before putting a system in production or on the market.

Manufacturers of ITS applications and providers of ITS services are recommended to use the CoP. Respective associations of manufacturers and

service providers should distribute the CoP among their members and should push for the usage of it. It is recommended that existing CoPs are maintained and updated and further CoP for all types of cooperative systems and automated driving are developed.