D6.1

eCall BARRIERS AND ENABLERS PRELIMINARY REPORT

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</table>

Table of contents

1   Terms and abbreviations

Abbreviation	Definition
ACECAP	Association Européenne des Concessionnaires d'Autoroute et d'Ouvrages à Péage (Road Tolling Association)
ADAC	German Automotive Club
CIP	Competitiveness and Innovation Framework Programme
GIS	Geographical Information Systems
GNSS	Global Navigation Satellite Systems
EC	European Commission
EeIP	European eCall Implementation Platform
EGNOS	European Geostationary Navigation Overlay Service
EMA	the Federation of European Motorcyclists´ Associations
ENT	Eriksson Nicola Tesla
ERC	Emergency Rescue Centre
FOT	Field Operational Test
ITS	Intelligent Transport Systems (Services)
LTE	Long Term Evolution, "4G" (Radio Technology)
MSD	Minimum Set of Data means the information which must be sent to the PSAP according to the standard EN 15722
NUE	"Numero unico di emergenza europeo 112" (NUE), Italy
PSAP	Public Safety Answering Point or Public Safety Access Point means the physical location where emergency calls are first received under the responsibility of a public authority or a private organisation recognised by the national government
SIM	Subscriber Identity Module (in Mobile Phones)
TMC	Traffic Management Centre
TIM	Traffic Incident Management
TPS eCall	Third Party Service eCall

TSP	Telematics Service Provider
TÜV SÜD	Testing and Inspection Organisation in Germany

Term	Definition
Process	The method of operation in any particular stage of development of the material part, component or assembly involved.
Flag	'eCall discriminator' or 'eCall flag' means the 'emergency service category value' allocated to eCalls according to ETSI TS 124.008 (i.e. '6-eCall Manually Initiated' and '7-eCall Automatically Initiated'), allowing differentiation between 112 calls from mobile terminals and 112 eCalls from in-vehicle terminals and also between manually and automatically triggered eCalls.

2 Executive summary

Studies on collisions prove that an eCall system is expected to have beneficial effects to both the vehicle user and other stakeholder groups concerned both in the management of a rescue, and the management of the road network. This can be achieved when the penetration level for the deployment of eCall devices is reasonable; this also has a positive effect on the cost of the system. The main benefits are related to safety improvements but there are also various additional beneficial effects which are dealt with in detail in this document. Key research results show that with a 100% penetration level, eCall would save about 6% of deaths and more than 1000 fatalities annually (EU Commission 2009).

The European political commitment to eCall is promoted clearly through the ITS Implementation Plan and the eCall Directive. The ITS Directive defines eCall as a priority action, for the harmonised provision of an interoperable EU-wide eCall system, and its deployment.

However, many of the Member States have yet to define a national implementation plan for eCall for differing reasons ranging from institutional to financing.

Member States have identified national operation models for eCall depending on the current emergency rescue service systems in the country. Implementation plans should be included in the national governmental organisational policies in order to guarantee that the necessary resources for the implementation are available.

The organisation model depends on national structures and procedures and is therefore not harmonised in Member States. However, in most of the countries eCall is a part of the national emergency processes and is included in the national policy priorities. The structure of the national emergency management system defines eCall management and operations in a Member State. Most Member States have accepted eCall as a public service but there are still exceptions e.g. in Sweden.

eCall system is not an independent system that will deliver value added without good cooperation with other necessary systems in emergency situations. In rescue situations the related services include e.g. police and fire-brigade operations, medical care and ambulance operators' services take care of the necessary actions to manage the whole situation, as well as traffic management and control for reducing the risk of additional incidents and collision at the incident site.

Road operators should also have the opportunity to exchange information with TSPs'. This report therefore recommends development of a data model as the first action in the HeERO project.

For some stakeholders, the business case is yet to be proven. There are still critics to a Pan-European eCall system from the private sector, who claim that the expected results could be achieved by using a commercial business models. Models of tax and financial incentives have been presented and discussed. So far according to the studies no clear agreement has been reached.

Although eCall will bring about potential saving for society, financing the upgrading of current systems ready for eCall is a practical problem, as the benefits and the costs are generated to different stakeholder groups. Low interest of end-users (car-drivers) is expected to be a result of low awareness and inadequate own risk estimation (which is the normal attitude of drivers: "nothing will happen to me, 'as I'm a better than average driver). In general, emergency call systems for society are -free to citizens at the point of use and therefore free of charge. This expectation is also reflected in provision of in-vehicle emergency systems.

Rules on privacy and security issues are of utmost importance. Citizens and other users have to be able to trust that systems take care of privacy and security issues and deliver help and support when needed.

In discussions across member states the eCall system is also regarded as some kind of "killer solution" regarding the actions towards deployment of business oriented ITS services, the re-use of information and bundling of paid for services.

The eCall value chain is covered by a number of different legal environments and the way these are organised differs per country. The 112 operations are regulated by telecommunication laws and internal security laws (regulation for police and rescue operations etc.) and health care laws. Transport and traffic safety is typically under of the responsibility of the Ministry of Transport while the large incident and rescue operations are the responsibility of the Ministry of the Interior. Data protection and privacy issues have been mainly regulated and designed according to directives and national laws but liability issues are still open. eCall legislation has yet to be harmonised across Europe.

The eCall end-to-end process is based on a value network of different organisations of which many are public and some private. Many barriers may arise resulting in a lack of commitment by some of the necessary players, disagreement on roles and responsibilities, disagreement

on financial burdens and cost sharing, development and agreement on a business plan, issues in eCall system architecture, standards, protocols and user-interfaces.

The pan-European harmonised eCall system belongs to the priority infrastructure-related systems.

Technology covers the whole end-to-end process and barriers and enablers in the chain can exist. These can typically be found in the definition of requirements, architecture, and chosen standards, version differences PSAP system requirements, roaming from country-to-country, language handling, eCall flag handling and the availability of aftermarket systems. All these major technological issues have to be resolved order to be able to effectively deploy eCall in Member States.

In theory the key technological issues have already been resolved with standardisation and cooperation EeIP carried out by CEN and ETSI. But there will be practical issues which will occur during the piloting and implementation phase and they will have to be resolved in HeERO.

Recently also the fast development of mobile communication technologies e.g. development towards LTE is expected to bring about new issues in the transition from 2G (GSM/GPRS) & 3G based eCall and then into the new 4G based systems.

The HeERO project has been defined to illuminate many of the aforementioned issues and help with the implementation efforts of eCall in the future across Member States.

3   Introduction

3.1   Purpose of Document

Purpose of this document is to gather a first insight of the enablers and barriers to eCall implementation, and to provide input and direction for the HeERO pilot project.

A questionnaire (see appendix 1) was prepared and delivered to HeERO partners for their comments on this subject.

3.2   Structure of Document

This document D6.1 consists of a general literature review of the enablers and barriers to eCall implementation from different sources of information, feedback and insights from HeERO partners and first conclusions. D6.1 is part of the work of WP6 (figure 1).
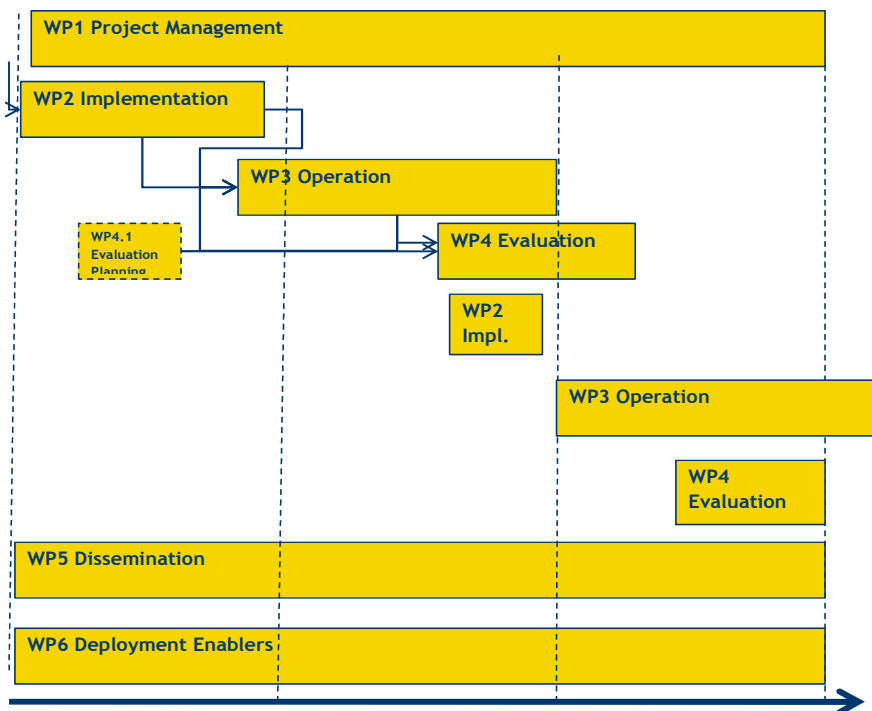

Figure 1 Figure 2: HeERO project structure

3.3   HeERO Contractual References

HeERO is a Pilot type A of the ICT Policy Support Programme (ICT PSP), Competitiveness and Innovation Framework Programme (CIP). It stands for **H**armonised **e**Call **Euro**pean Pilot.

The Grant Agreement number is 270906 and project duration is 36 months, effective from 01 January 2011 until 31 December 2013. It is a contract with the European Commission, DG INFSO.

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Any communication or request concerning the grant agreement shall identify the grant agreement number, the nature and details of the request or communication and be submitted to the following addresses:

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> Information Society and Media Directorate-General
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> Belgium
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> by electronic mail: INFSO-ICT-PSP-270906@ec.europa.eu

4 Research results on enablers and barriers

4.1 European eCall Implementation Platform (EeIP)

European eCall Implementation Platform (EeIP) assigned ASECAP to coordinate work on common protocols and to forward the information from the PSAP/eCall centres to the relevant road operators. The aim of the task force was to produce the necessary recommendations to enable this to take place. All member States were invited to contribute to this action. In addition, an internet based survey was launched. The result was that only 17 respondents submitted fully completed questionnaires (EeIP 2011a, EeIP 2011b).

EeIP remit is to work mainly with defining guidelines for implementation, the establishment of national and regional deployment platforms, special task forces, the follow-up of implementation, the exchange of best practices and potential pilot programmes (eSafety Forum 2011).

Road operators are clearly responsible for the safety of the road network they operate. Operators also have a role in the development of rescue and safety procedures. However, Fire Brigades and Police have the main responsibility on safety related tasks depending on individual Member State legislation. Road operators have to keep continuous contact with the emergency services. Information sharing and data exchange between road operators and emergency service organisations should be well organised and defined. According to the report "Communication therefore often takes place sporadically and establishing important information (such as incident location and the involvement of large goods vehicles) takes place irregularly and slowly. In addition, by using the telephone as the only means of communication, different interpretations, miscommunication and, sometimes, conflicting information may be the result".

Incident information received by the road operators may be deficient in the following area incident severity and location among other important details.

eCall alerts enhance the traffic incident management process and activities and therefore also road safety. General benefits of eCall were seen to be 1) improved response times, 2) faster implementation of the TIM process, 3) reduced secondary incidents 4) more reliable information. 5) The correct rescue resource deployed at the right time and right location. 6) A controlled restoration of normality.

Road operators' Traffic Management Centre (TMC) can support the emergency operations e.g. by immediately checking the location and other relevant incident information with their monitoring systems and informing other rescue organisations about the situation.

There is quite a lot of information in an incident situation which could be defined by the road operators. This recommendation presents almost 30 important issues that are perhaps not all well covered in the general eCall process. The respondents of the questionnaire survey supposed further consideration on system development and integration and work protocols.

Road operators should also have the opportunity to exchange information with TSPs'. This report therefore recommends development of a data model as the first action in the HeERO project.

The conclusions and recommendations are:

- Test eCall as part of the complete TIM process consisting of vehicle incident, notification to emergency call centre, response by emergency services, implementation of traffic management measures and transfer of traffic information

- Implement the solution based on the requirements expressed by the Task Force 3 of the EeIP (Task Force 3 works on a proposal of common protocols to forward the information from the PSAPs to the relevant Road Operators)

- Implement and test procedures to gather additional information to enrich the content of the Minimum Set of Data

- Test the prioritisation of types of eCall messages (manual v. automatic)

- Testing the procedures with vehicle recovery service based on the type of eCall messages

- Generate traffic information from TIM processes to other parties, based on the estimate of the severity of the eCall messages;

- Validate not only the technical but also the organisational issues in the pilot

- Implement a technical test to investigate and improve matching between GPS coordinates (provided from eCall) and used Road Database, so that incident location and direction of travel are made absolutely clear (also on parallel carriageways, connecting roads and in tunnels).

- Include the eCall information in existing GIS systems and / or Traffic Incident Management applications considering the clustering of eCall signals and the continuous update of incident information between TIM partners.

- Research the clustering of incident notification messages and the information inferred from Samaritan calls, to enable the rescue co-ordinator and the road network manager to make an accurate evaluation, of the severity of an incident.

- Design a system for the exchange of information so that all emergency services have the ability to receive that same incident information at the same time and so that new information can be added. The eCall messages could form the basis of this system, as part of the incident information is automatically generated and a unique code produced based e.g. on location and time. The archiving and logging carried out within this system could also be used to evaluate traffic safety measures as it would probably result in a more detailed traffic safety database.

- Investigate the combination of eCall information with TIM information. This means that efficient working processes have to be developed which need to be supported by smart algorithms and make use of standard exchange mechanisms.

- Investigate legal issues of the eCall system implementation on local /regional level. The eCall value chain is covered by different legal environments and the way these are organised differs per country. The 112 operations have to deal with telecommunication laws, the PSAP has to deal with criminal legislation and transport and traffic safety is typically the responsibility of the Ministry of Transport while large incidents can be the responsibility of the Ministry of the Interior. All data exchange is also subject of privacy legislation. An important legal issue to be dealt with is. the Traffic Management Centre is not an official "client" of the 112 organisational chain, which deliver their information to the PSAP.

- Define service levels for information exchange between PSAP and road operators (e.g. guaranteed speed and reliability of the eCall message)

4.2   eCall impact assessments

An impact assessment of the introduction of the eCall in Europe was published in 2008 by the European Commission (EU 2009). This study utilized both questionnaire study and in-

depth study in four MS (UK, Netherlands, Finland and Hungary). Data consisted of material from 27 EU-countries and some non-EU-countries.

Three basic scenarios were introduced: 1. Do nothing, 2. Voluntary approach and 3. Mandatory approach. The price of eCall installation was also depending on the scenario. Benefit-cost ratio was highest at the mandatory introduction scenario (in 2020: 0.53 and in 2030: 1.31). The safety benefits were mainly gained by a more rapid response to collision (average time saving). However, also many additional benefits were identified. This impact study also made a literature survey on previous research results on eCall. Beneficial effects are produced e.g. by enhanced medical intervention and medical care. Significant differences between countries were recorded on traffic management benefits and also on social benefit calculations.

Ethical issues are discussed. Road safety is a personal issue, but also a social and public issue.

Public sector is usually responsible for the safety level in Member States and therefore safety is also a matter of social equity. eCall liability questions were seen primarily related to unsuccessful or corrupted eCalls due to problems in service, delivery chain. Some privacy issues may arise but generally the legal issues are now considered manageable.

The report also includes an analysis and listing of relevant evaluation criteria (general, safety, congestion, environment, energy, incident and rescue management chain, other benefits, investment cost, other costs, financial aspects, ethical and moral issues, legal issues, institutional issues and technical issues).

EU-project eIMPACT (EU Commission 2008) has carried out a wide analysis on different vehicle systems aimed at improving traffic safety. These results show that the highest impacts would be produced by ESC and SpeedAlert reducing about 3250 and 1100 fatalities. Several other systems have a quite high potential in preventing fatalities like eCall, but it does not reduce the number of injuries. The benefit-cost ratio (BCR) of eCall has been estimated to be 1.5…1.9 in 2020 and the overall effect -5.8% for fatalities and more than 1000 fatalities in 2020 at 100% penetration rate.

The Implementation Road Maps Working Group of the eSafety Forum started its actions in 2003 and has assessed all feasible eSafety systems and produced first assessment report in 2005 and a renewed assessment in 2008-2010 dealing with systems by 2020. eCall belongs to the priority infrastructure-related systems. The general recommendations made include PSAPs' improvements, developing digital maps, standardisation, and the continuity of

services and equal level of service and business models. The report also includes special recommendations on eCall: support to the European and national platforms, to ensure the deployment of standardized public and third party supported eCall, follow-up of standardisation, solving the open legal and privacy issues, sufficient testing of functionality and industry lead time requirements.

The Implementation Working group recommendations on eCall conclude that the benefits are obvious and that mainly organizational issues should be resolved at Member State level. The finalization of the standardisation process and agreement on operational requirements is required. Voluntary approach is seen as feasible and the use of incentives is recommended. Binding commitment from the public side to create the necessary infrastructure is also required. (eSafety Forum 2011)

Detailed implementation issues for eCall were defined as follows (eSafety Forum 2011):

A. System description

eCall is targeted by the European Commission to become a harmonised European emergency service, which is based on precise satellite positioning and additional information of vehicles involved in a severe collision (vehicle identification, time of incident, eCall qualifier, and identification of service provider as described in a minimum set of data or MSD). Severity will be defined from a personal injury point of view. The generated information will then be sent to a Public Service Answering Point (PSAP) or another type of certified first level emergency centre via a mobile phone connection. It is the intention that the eCall is triggered off by dialling the European emergency number 112 either automatically (deployment of airbag or (later on) crash sensors) or manually (press of a dedicated button). When a voice connection to the next PSAP is set up, collision and vehicle related data (MSD) are transferred through mobile communications, using the same channel. In a second phase, it might be possible that when the customer has a contract with a private emergency service provider, additional information (e.g. full set of data) could be sent to this service provider, filtered, completed and made available for the responsible PSAP. As the contractual optional connection to a private service provider is flagged on the operator screen at the PSAP the operator might pull down these additional information via the Internet. A possible valuable service might be language/translation service in case the collision happens in a different country and the incident victim has no knowledge of the local language. The PSAP, the emergency centre or service provider has to be able to receive and process the voice call and data set. The information is then sent to the local emergency

authorities in order to dispatch the necessary emergency vehicles. The service should work in principle all over Europe.

B. Technology Availability

Vehicle integrated GSM/GPRS communications	only available in part of the vehicle fleet, but the percentage is slowly increasing
Roaming to overcome language difficulties	conference call via private service provider or local language. Only very large PSAPs are able to serve many languages
Low cost in-vehicle communication system	not available yet in Europe to create volume market. Mainly integrated either in embedded navigation systems or Telematics Units
Emergency call routing all over Europe	European call and SMS routing through private network only. Not available in all member states. No public crossover systems exist
PSAP receiving technology	theoretically available, however, implementation depends on E-112 roll-out. In-band-modem software provided licence free but investments needed to up-grade to receive E112 calls.
Vehicle sensors	Airbag deployment sensors used in existing applications. Might be combined later with other types of sensors.

C. Road and Information Infrastructure Need and Availability

GPS Information	available in small part of the fleet but increasing together with strong growth in embedded and nomadic navigation devices; available in most LGVs (Large Goods Vehicles)
Road infrastructure	not necessary but traffic incident information could be displayed on variable message signs to avoid secondary incidents
GSM Communication Technology	future of GSM in Europe unclear
Receiving technology in PSAP's and others	theoretically available, implementation depending on E112 roll-out map

D. Organisation requirements

Collaboration with and between all EU Member States (EU-27) and other key stakeholders of the emergency value chain in Europe

All stakeholder representatives have to get involved in detailed discussions to work out necessary plans and solve open questions, in particular solve the commercial aspects, regulatory and data protection issues. The Commission invited the signatories of the eCall MoU to start national and/or regional implementation/roll-out platforms in the beginning of 2009.

Development of an agreement on a business plan before starting the system development and implementation

Development of an agreement on an implementation (roll-out) plan before starting the system development and implementation

Receiving PSAP infrastructure needs to be specified, tested and in place

eCall system architecture, standards, protocols and interfaces need to be agreed upon in advance before the development of in-vehicle systems. Simultaneously the necessary receiving infrastructure needs to be prepared.

Vehicle model cycles and starting dates for vehicle production must be considered, taking into account vehicle type-approval.

Matching of voice calls and data sets (technology).

Roaming requirements must be solved.

E. Regulatory Requirements / Barriers

Data protection and privacy issues have been solved but liability issues still open. Legislation not harmonised across Europe.

F. Security

Misuse of the systems and the data needs to be avoided. Emergency frequencies need to be dedicated and protected against manipulation.

G. Business Case / Customer Awareness and Acceptance

The interest of drivers and customers to pay for emergency call activities is rather low. As long as the customer is not made aware about the benefits of a harmonised European emergency call service he/she is reluctant to pay for this service. The current situation of different state of deployment of rescue services and gaps in rescue chains in different European countries is making it difficult to find common solutions.

There is no business model currently discussed and accepted among the different stakeholders; however this is an area of work being undertaken by the EeIP Task Force Group.

The ECDG (eCall Driving Group) has identified significant savings in the health and social cost side, which outweighs the investment required in in-vehicle systems and infrastructure.

Models of tax and financial incentives have been presented and discussed. So far no agreement has been reached. The results of the new eCall Assessment study will allow progress on the Business Case area, while European FOT should increase customer awareness of the benefits of the service.

H. Key Success Factors

The commitment of the larger EU member states, where the major traffic volume occurs, is key.

- Availability of suitable technologies in the Member States and in the vehicles

- Availability of an accepted business model by all involved stakeholders (financially, technically and organizationally) leading to positive business cases

- Availability of an accepted implementation plan by all involved stakeholders (financially, technically and organizationally)
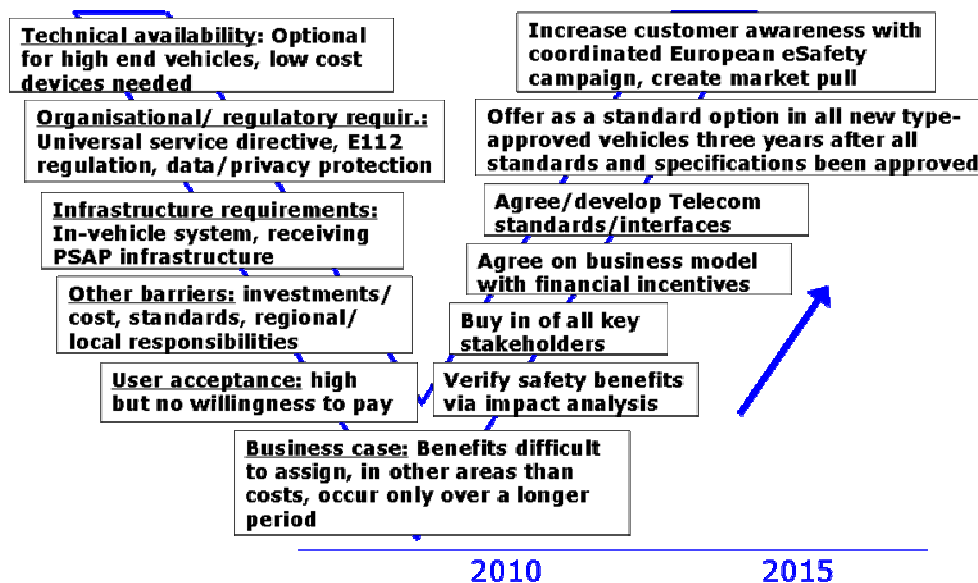
I. Feasible Deployment Strategies

Figure 2. V analysis of eCall implementation

According to the V analysis of the implementation of eCall and the roadmap produced by the eCall Driving Group, the measures identified on the roadmap which need to be taken include the following, taking into account the eCall rollout plan delay which was due to the missed deadline for MoU signatories' by June 2005:

- Verify the safety impact of eCall in European conditions with actual European collision data

- Form "eCall Net" consortium and establish financial support for it

- MoU (Memorandum of Understanding) signatures from all key stakeholders of the eCall service chain including the member states (EU Commission 2011e)

- Commission to adopt 2nd eSafety communication with actions for the member states and industry – September 2005 (EC)

- eCall Business Model prepared for decision taking by key stakeholders including insurances – June 2006 (All)

- ETSI standardization and eCall interface – starting 2006 (ETSI)

- Implementation and rollout plan prepared for decision taking – first attempt 2006 (All)

- Start system development – after standardisation is finally adopted (ACEA)

- Rollout of infrastructure in key member states – after standardisation is finally adopted (MS)

- Full-scale field test by "early adopter" member states – until Dec 2008 (EC/MS)

- Finalize infrastructure in all other Member States and staggered introduction of eCall as standard option – Sept 2010 (MS, ACEA)

- Promote customer awareness by campaigns and attempt to improve business case by incentives

The eCall Roadmap has been changed in the last years due to the delay in some of the deployment strategies, namely:

- Standardisation: new date expected for the finalisation of the standardisation work within ETSI and CEN is now 2nd quarter of 2009.

- Not all key stakeholders have signed the eCall MoU, there are some key member states that have not signed, however it is clear that there has been a change in

pace for MS signing eCall Business Model issues is being developed by EeIP Task Force

- Rollout of infrastructure only started in few MS due to lack of decision concerning standardization

Taking these delays into account, the last date communicated by EC (September 2010) for the eCall introduction as an option in all new-type approved vehicles seems difficult to achieve. According to the current status standardization and approval work will probably go on until end of 2009. Industry would then need three years to offer eCall as a standard option on all new type-approved vehicles after this date. The target year for new type approved vehicles with eCall is 2015.

The market penetration of eCall in new cars in Europe is forecasted as the following up to 2020:
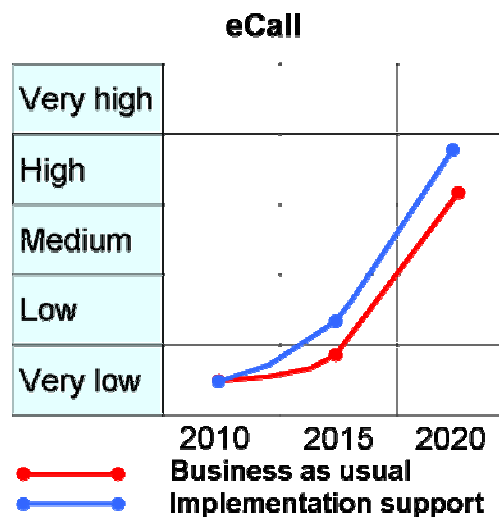

Figure 3. eCall market penetration.

4.3 Results on positioning and GNSS relevant to eCall

Current eCall standardisation calls for the sole utilisation of GPS in the position estimation for eCall. This is a part of co-ordinated EC's effort in promotion of utilisation of Global Satellite Navigation Systems in the ICT sector (EU Commission 2010).

Recent research shows that the GPS positioning performs well from the perspective of the quality of position estimation, even in urban areas. (Filjar et al. 2004; Filjar et al. 2007; Zandberger et al. 2011)

European Commission promotes the application of European satellite navigation systems and services (EGNOS and Galileo). The introduction of the additional satellite navigation systems brings benefits in increased accuracy and enhanced robustness of satellite based position estimation while providing the improved environment for satellite-based positioning, as presented in numerous EU research projects e.g. GSA. The key results of satellite navigation research under the sixth framework, is available at: Key results of satellite navigation research. Furthermore, the EC has established satellite navigation systems and services as the key component in road safety and intelligent transport system developments (EU 2010).

The acceptable GPS positioning performance depends on the necessary environmental conditions (good visibility of the sky mitigated or corrected multipath effects, quiet space weather and ionospheric conditions) (Filjar 2008), these cannot be expected to be fulfilled generally in the case of eCall utilisation. A set of critical scenarios for the GPS-based eCall-related position estimation has been identified (Filjar et al. 2011). A recent study published by the UK Royal Academy of Engineering warns of the over-reliance on satellite navigation systems as the sole method of location referencing, and the need for the utilisation of the redundant systems and services for position estimation (Thomas 2011).

4.4   Other research results and experiences

Many research results on safety and other vehicle related modern systems indicate that promoting and awareness building of both experts, politicians and general public is necessary. Therefore, the eSafety Forum has been active in launching campaigns and other promotions as "Choose ESC" (eSafety Forum 2011). The implementation support can also include other elements as tax incentives or e.g. lower insurance rates. The field operational tests (FOT) are expected to communicate the positive results to different stakeholder groups.

eCall is seen to be a complex system and requiring different institutional arrangements in each Member State due to the differences in delegation of responsibilities for managing emergency situations. There are also differences with the technological equipment at PSAP level and their capability to manage eCall data. Emergency services are common over Europe.

Common system architecture with standardised interfaces and protocols are required in order to create necessary economies of scale and allow efficient cross border services.

eCall will bring about great saving potential in the health and social cost area which appears to cover the system costs. However, a practical problem has been financing because of benefits and costs created involve different stakeholders. Low interest of drivers and customers is expected to be a result of low awareness and inadequate own risk estimation. In general, the emergency services are cost-free to citizens and therefore this free of charge expectation is also reflected to the in vehicle systems used for emergency calls.

A summary of the recommendations and regulations of the European Commission regarding the pan-European eCall was carried out by Michalski (Michalski, W. 2009). He summarized the system design and state-of-the-art of regulation and legal actions, architecture and standardisation. He concluded that many of the necessary decisions on requirements have been made but some technical issues and other problems remain unsolved. He has identified the SIM problem (required or not), eCall flag problem, embedded or brought-in solution, the bundling of services, PSAP work load, standards for MSD transmission and privacy (Michalski, W. 2009)

Professor Kulmala has been working with analysed eSafety Implementation Road Maps and reflected the barriers through the road maps and ITS deployment experiences from Finland. He summarized that general barriers may be related to public-private cooperation (quality, investments and MoU´s), business models (value for money), regulation, interoperability (generic platforms, standards), legal frameworks (charges, roles, rights etc.), privacy issues and data security.

At a National level Kulmala has seen barriers related to lack of a National master plan, defects in planning systems, inadequate funding, lack of human resources, lack of both awareness and customer orientation, poor quality of deployments and no proper publicity. He also points out that sometimes European general solutions may be heavy to a small market area. (Kulmala, R. 2009)

Several working groups and sub-working groups have been nominated and working with various eCall problems. Recommendations on eCall introduction in 2006 deal with eCall process, eCall requirements (architecture), performance criteria (eCall service chain, end-to-end performance criteria: timing, eCall generator, mobile network, PSAP), transport protocol and certification), other issues (status in implementation, eCall deployment plan, privacy,

PSAP structure and eCall business case). The recommendations include definition of necessary steps for deployment of eCall. (eSafety Forum 2006).

eCall industry position paper gives general support to eCall and states many relevant issues. The industry expects a business case which is not yet there. They see that eCall could either be a stand-alone option, an interface or part of a safety package. Industry needs sufficient lead-time, current commitments from other stakeholders are still insufficient. Vehicle manufacturer´s liability shall not extend to exceptional circumstances; infrastructure must be made available at minimum 2 years prior to introduction of eCall in many countries. The concept: system must automatically determine triggering but must also be able to manually triggered, a voice connection is necessary. (ACEA, JAMA, KAMA 2009)

eCall deployment enablers cover the whole end-to-end process and the stakeholders. Annoni has presented a list of potential enablers as follows (Annoni M. 2011):

- Mobile network independence

- In-vehicle device independence

- Level of adoption (cars/commercial vehicles; OEM/after-market)

- Gradual PSAP deployment/upgrade (i.e. timings, costs)

- Technology reliability

- Product certification

- Performance metrics

- Liability & legal aspects.

Deployment of services following active research seems to be a very complicated process and it depends on necessary further activities of many stakeholders. Meyer has defined the deployment challenge and included the various requirements to the process. This will be examined and reported in the final report of barriers and enablers.
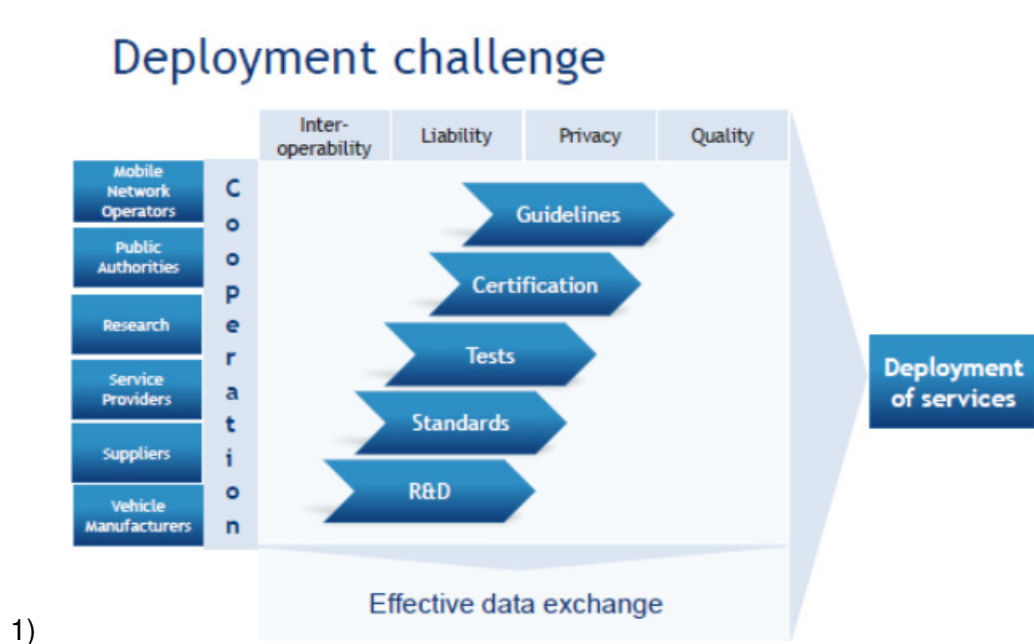
1)

Figure 4. Deployment challenges (Meyer, H. 2011).

Whilst the HeERO project is only concerned with small passenger vehicles and small goods vehicles, other road users are also looking at the implications of the eCall solution. EMA (the Federation of European Motorcyclists´ Associations) says that eCall misses the point. The organization says that the ambitions for eCall implementation of European Commission are premature and fail to take account of all road user´s needs (ITS International 2011).

The industry has noticed that the Russian eCall is taking quick steps and is working together with the EU. The Type Approval directive may have to be modified and a mandatory approach adopted. The conformance testing project is going on to ensure compatibility of all systems in the market. Open questions are related to the modification of PSAP platforms in every EU country, the legal possibility of the EU to enforce the introduction and still to business model. (Henchoz, J. 2011)

4.5 European Union and Commission regulations and reports

eCall is seen as a priority safety system in Europe by the EU Commission mainly because of the potential to reduce the number of road fatalities that is a major societal problem in Europe. The Commission has found that technology requires a lot of more attention during these years but also many other issues on e.g. eCall deployment are of major importance. The market introduction of Intelligent Vehicle Safety Systems is very complex and involves new risks to the customer, the society and above all the manufacturers in terms of product

liability and increased financial risks. These risks include human factors such as dependability, controllability, comprehensibility, predictability and misuse robustness. Commission sees that the market introduction involves policy, technology, societal, business, and legal and consumer aspects. (EU Commission 2003)

Commission made in 2006 a communication on eCall to support eCall development and deployment and to speed up the slow process. The Commission agrees that due to the long times in product development, and due to the associated costs, the automotive industry needs certainty on the implementation of the necessary infrastructure in the Member States before entering the production phase. The commitment of the telecommunication industry (MNO) is also seen as very important. Member States should pursue the necessary action for immediate roll-out.

There are some standards which required require refinement. The commission refers in this communication to the safety benefits but indicates also that the location and communications capabilities and open architecture of eCall can serve as a platform for additional public sector and commercial services.

Major timing problems in the Member States are related to roll-out of the necessary PSAP infrastructure. The remaining legal, technical and socio-economic problems should be solved together.

The location information is expected to be made automatically available to the PSAPs' by MNOs and the PSAPs are to be upgraded to handle the location information of eCall.

The commission defines that emergency call routing and handling coming from mobile terminals should work without SIM, adequate language support is provided; this is not the case across all Member States. The Member States should draw up detailed rules for MNOs. The industry should commit to the implementation of the pan-European eCall. (EU Commission 2006)

The Communication on eCall in 2009 identifies that the progress has been slow and planned actions are severely delayed. The commission sees that further measures are urgently required. The milestones reached include: CEN approval of eCall MSD, 3GPP approval of eCall flag specification, protocols for sending the MSD, and CEN approval of the core operating requirements.

The automotive manufacturers took the position that making eCall standard factory-equipped equipment in all vehicles would only be possible through regulation. Industry advocates for the proprietary eCall solutions and added-value services.

Some Member States have not signed the MoU because of costs of operation and upgrading their PSAPs may increase the tax burden. GSM Europe has nominated a Task Force for deployment strategies for MNOs.

Implementation of eCall and upgrading of PSAPs also include upgrading the emergency rescue service.

Open system architecture would enable plug and play integration of future new applications. The definition of an open in-vehicle platform is needed.

Aftermarket equipment is expected to be developed. The vehicle manufacturers in Member States where there is an agreement to support proprietary eCall services are free to choose either proprietary or pan-European eCall system. An in-vehicle emergency call service, including voice link and provision of at least the eCall MSD, must be provided in a seamless way in all EU Member States. (EU Commission 2009b)

The ITS Directive defines eCall and the deployment as a priority action (the harmonised provision for an interoperable EU-wide eCall). Relevant specifications can be provided (Article 6). Rules on privacy, security and re-use of information are given. The Annex II defines that services evaluation has to measure objectives: be effective, be cost-efficient, be proportionate, support continuity of services, deliver interoperability, support backward compatibility, respect existing national infrastructure and network characteristics, promote equality to access, support maturity, deliver quality of timing and positioning, facilitate inter-modality and respect coherence. (EU Commission 2008b)

EU Commission has made an impact assessment of ITS Directive and summarised also the main reasons for the slow and fragmented deployment (Figure 1). Problem drivers hindering ITS take-up are listed as (EU Commission 2008b):

1.   A lack of interoperability of applications, systems and services

- Industry and private player develop ´all in one´ proprietary solutions resulting costly stand-alone applications

- Member States develop individual solutions which are deployed at a local level

- Lack of robust business models

- Market inconsistency, de-facto monopolies

2. A lack of concentration and effective cooperation among stakeholders

- No clear vision

- Lack of a strong platform for concentration and cooperation

- Limited awareness of the potential benefits of ITS

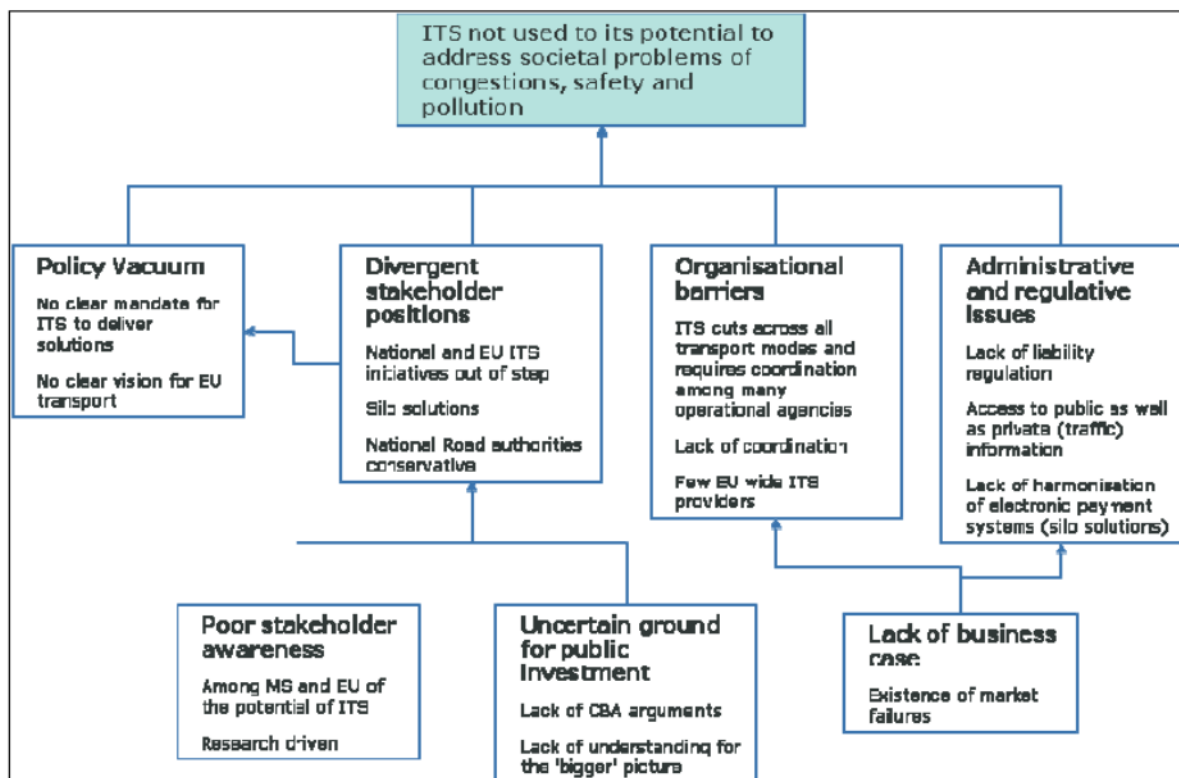Figure 5. Problems of deployment of ITS systems and services (EU Commission 2008b).

3. Unsolved privacy and liability issues

- No clear rules of legislation on privacy of data

- Unclear distribution of responsibilities, absence of agreements on service ownership

2) On 8th September 2011, the European Commission adopted a recommendation addressing the EU Member States and asking them to call on the mobile network

operators to set up their networks in a way that they correctly transmit automatic 112 emergency calls generated by cars (eCalls). The adoption of this Recommendation is the first step of a tripartite legislative process. Later on, legislative initiatives on the eCall device to be fitted into the cars and on the technical specifications of the emergency call centres will follow. The timetable of legislation is

a. eCall recommendations which address Member States and Mobile Network Operators were adopted on 8 September 2011, for the provision of the eCall Flag requirements, C(2011) 6269 refers. These recommendations have a defined consultation period between now and the end of quarter 4 of 2012 where it is anticipated that they will be adopted

b. A draft version of an amendment to the Type Approval Framework Directive 2007/46/EC was completed in quarter 2 of 2011. It is not at the internal consultation stage within the European Commission for the 3rd quarter of 2011. It is anticipated that the directive will adopted as a proposal in the quarter 1 of 2012

c. Work on the requirements for PSAPs in Member States has been progress during 2010 from 2nd quarter to the 4th quarter of 2010, with input from expert groups and Member States. This will be refined during the first 2 quarters of 2012, with a final draft expected in the 3rd quarter of 2012, with adoption anticipated in 4th quarter of 2012.

d. The common specification for eCall, which form part of the ITS directive was referred to the Member States expert group on the 13th October 2011. It is now in a consultation period with the member states, the next meeting for the Member States expert group will be held in March 2012, where it is hoped that the common specifications will be finalized.

 (European Commission 2011a)

Recommendation also states that the Member States should draw up detailed rules for public mobile network operators operating in their countries on handling eCalls. The rules should fully comply with the data protection provisions enshrined in Directives 2002/58/EC and 95/646/EC. Further, they should indicate the most appropriate public safety answering point to route eCalls (European Commission 2011a).

Member States should ensure that mobile network operators implement the mechanism to handle the 'eCall discriminator' in their networks. This should be implemented by the end of 2014. Mobile network operators should handle an eCall like any other call to the single European emergency number 112. (EC 2011) Member States should also require their national authorities to report the progress of these implementations to the Commission by April 2012. (EU Commission 2011a)

This EU recommendation also included impact assessment. The available policy options of eCall are seen as:

1. No EU action,

2. Voluntary approach

3. Regulatory measures. The impact analysis proved that a harmonised implementation of an interoperable EU-wide eCall service would deliver the best value taking also into account e.g. cost-benefit analysis. The impact assessment ended up to define that the policy option 3 (Regulatory measures) results to be the most effective and efficient, and therefore is the preferred option for the implementation of the eCall system in the EU.(EU Commission 2011b)

4.6   Organizing eCall in a HeERO partner country

4.6.1   General

Most countries have yet to define a national implementation plan of eCall for a number of reasons ranging from institutional to financial.

Most Member States currently have one common national policy and operation model on eCall. In governmental operations major implementation policies and plans have to be included in the national government implementation plans in order to guarantee that the necessary resources for the implementation are available.

The organization model depends on national structures and procedures and is therefore not harmonised in Member States. However, in most of the countries eCall is a part of the national emergency processes and is included in the national policy priorities. The structure of the national emergency management system defines also eCall management and operations in a Member State. The situation of the emergency policy and complete system organization and implementation status can also be a barrier to eCall because of major decisions that have to be in place and implemented before eCall can be deployed.

Most of the Member States have accepted eCall to be a public service, although the situation is not uniform. However, most of the Member States share the common goal of eCall as to guarantee the same safety level for all European citizens wherever in Europe they are using their cars.

There are many commercial safety related services also available delivered by business operators and funded by the clients on a voluntary basis. This is mainly due to the fact that services are effectively provided by business logic principles not by technology innovations as functions or applications only and may therefore offer also a business case for the private sector.

The eCall system is not an independent system that will deliver added value without good cooperation with other necessary systems in emergency situations. In incident situations the related systems include e.g. police, fire-brigade, ambulance operators, systems that take care of the necessary actions to manage the whole system problem as traffic management and control, medical care, rescue operations at accident site. These systems should be able to provide rapid delivery of assistance to the collision site and the restoration of normality to the traffic system.

The Pan-European eCall implementation means that eCall systems have to be installed in all new vehicles coming to the market. The eCall systems also need to be integrated to the required periodic inspection of vehicles for road worthiness. These processes require that the IVS is certified and customers are really receiving the added value of eCall with functioning systems. The organization of how to fill these requirements is still underway and needs a lot of attention during the coming years and during the HeERO-project. HeERO will provide inputs and insights also to these issues.

4.6.2 *Some examples of organizing eCall implementation in HeERO partner countries*

4.6.2.1 *Croatia*

The Croatian eCall deployment plan has yet to be devised. The implementation of eCall subsystem within the 112 system was not planned in the Strategy of the Government Programs for the period 2011-2013. The process of setting up the national integrated information-communication system 112 has been put on hold because the World Bank loan for the modernisation within planned project "Croatia Disaster Risk Mitigation and Adaptation Project" (DRMAP) which has yet to be approved".

However, the Croatian government signed the eCall MoU in 2010. In addition, the following regulatory and governmental offices actively participate to Croatian eCall Pilot activities:

- Ministry of Sea, Transport and Infrastructure (Directorate for Telecommunications and Post, Directorate of Road Transport)

- Ministry of Health and Social Welfare

- Croatian Post and Electronic Communications Agency

- Ministry of Interior

- National Protection and Rescue Directorate (NPRD)

There exists a plan for organising the national activities in international eCall processes including the VIN data delivery. Hoverer implementation problems are foreseen in regard to legislation, especially for privacy protection.

As for certification of eCall IVS no national certification is expected. It should be included in the vehicle type approval. Croatia's certification services for eCall will be ENT, (National centre for vehicle technical inspection). The annual supervisions of eCall IVS dedicated plans have not yet been developed. However, it is expected that the eCall IVS will undergo inspection during regular mandatory vehicle inspection. While the concept draft exists, the EC decision (recommendation or directive) should provide the ground for national procedure for the eCall IVS inspection.

4.6.2.2 Finland

eCall implementation is a joint decision of Ministry of Interior and Ministry of Transport and Communications, the Ministry of Interior being the executive party and Ministry of Transport is more related to traffic issues, safety impacts and development of the system.

There have been high level meetings and impact studies. Both ministries have experts in handling eCall matters, but no official procedure with regulation or direct orders for permanent eCall implementation have been made. Open issues still exist in organisation matters and financing.

The HeERO project will give inputs for this process, and upgrading work of eCall handling in the Emergency Rescue Centre's central system will be done in HeERO. In the HeERO project Ministry of Interior and Emergency Rescue Centre Administration will be in charge of the upgrading work of the PSAP central system and operator training.

4.6.2.3   Greece

Greece has not yet developed an official implementation plan for real life eCall. The reason for this is the many sided organisational issues, since eCall involves different authorities. Also there are no plans for VIN data delivery or plans for annual eCall IVS supervision. Greece feels that the certification of eCall IVS should be supra-national issue. As for the related authorities (road authorities etc.) cooperation exists: There is currently an eCall application under development to be installed on the emergency vehicles of Greek motorways, which will communicate with the Control Centre of each motorway.

However it is recognised that HeERO has an important part to play in defining the implementation plan for Greece.

4.6.2.4   Germany

Germany is a federal state and has the problems of decentralised structures. Therefore an implementation like eCall, which affected several players, is a big organisational issue. Without pressure from the EU the process will take long a long time.

In Germany the ITS Action Plan includes the eCall and the problems to be solved. The focus is to set to the process in the different states and the responsibilities of the regional governments. In addition to this a national eCall platform is being established to inform all stakeholders about the actual status of the on-going process, this will be chaired by the Ministry of Transport, Building and Urban Development (BMVBS) in Berlin.

The ITS Action Plan will be delivered by the BMVBS to the EC. To date the draft version of the documentation is under "confidential status" – the final document will be delivered when it will become public and can be used for the project documentation.

The biggest problems in implementation process are the different competences of the involved players. Clarification of different point of views will take some more time. Moreover the level of awareness is not uniform. Some players are still waiting for legal binding decisions by the EU or the German government.

For VIN and EUCARIS utilisation Germany has discussed and implemented the technical interface between the national PSAP reference system and the EUCARIS network. For this action an additional meeting with the representatives from EUCARIS took place in Braunschweig and the solution was shown in Berlin during the eCall Days 2011. This implementation will be used for the Germany deployment.

HeERO partner NavCert from German has raised issues relating to the certification of eCall IVS, that it should be based on a common standard for all member states to ensure the same quality for this safety critical system and even more importantly to assure compatibility in all member states.

In Germany NavCert offers certification services for eCall, respectively TÜV SÜD can provide these services.

In EU the plans for technical supervision of eCall IVS exist already within the EeIP, a task force which is dealing with all requirements of PTI (periodical technical inspection). NavCert is leading this task force on behalf of TÜV SÜD, one of the leading inspection organizations for the annual vehicle inspection.

The related authorities (road authorities etc.): are informed and cooperative. But they are waiting for legally binding guidelines to official commence working. Germany is discussing the actual status of eCall through the national Platform, the CeBIT fair and the eCall Days in Berlin as a continuous process.

4.6.2.5 Italy

Italy does not have a plan for real-life eCall implementation in the country. The HeERO project is expected to give useful information and guidelines for the national deployment of eCall; involved authorities and organization are now those of emergency.

NUE 112 organization. Next eCall deployment, at a national level, will be based on the infrastructure available for E112 service, complemented with required additional features for interconnection.

Italy is part of EUCARIS and it will support the eCall EUCARIS application.

The certification of eCall IVS should be national, although any arrangements for it or technical supervision have not been made.

Related authorities (road authorities etc.) have been informed of eCall, but they cooperate only on request.

4.6.2.6 Romania

eCall system will be organised as a normal e112 system as a state service. Regarding authority roles, the same structure for the 112 system will also apply for the eCall system. The 112 system falls under the responsibility of the Ministry of Communications and Information Society. The minister is the president of the Coordination committee of the 112

System. The Special Telecommunications Service (STS) is the legal governmental operator and is designated to implement and operate the 112 System.

Romania does not see any special organizational or technical problems in the official eCall implementation process.

Romania is a member of EUCARIS since 2001 and EUCARIS database for decoding the VIN will be utilized in eCall.

Romania sees that the certification of eCall IVSs should be done locally in every country, but this certification should be valid at European level. So the best solution would be that the local certification organisations should follow some general rules defined at European level. No proceedings have been made with the eCall certification; for the permanent implementation the current vehicle certification authorities will be in charge of the certification services for eCall IVSs. The eCall IVSs will probably be tested once every two years in the same periodic frequency as Romania's mandatory vehicle inspection takes place.

The only road operator in Romania (RNCMNR - National Company of Motorways and National Roads) is a partner in the HeERO project and the interface between the 112 PSAP and the National Traffic Management Centre is done during the pilot. Through this interface RNCMNR will be able to receive data about the incident that are being reported through eCall. Also, STS (the operator of the 112 PSAP) is developing an interface that will allow other interested 3rd parties to receive information about incidents reported through eCall.

4.6.2.7 Sweden

In Sweden eCall is not considered to be a public service. The service provision is expected to be solved by the market, but, in order to plan and implement the service provisioning Sweden requires member state regulation, but preparation for this has not yet started.

There are currently not any plans in Sweden to organise the national activities in international eCall processes including the VIN data delivery from Country to Country.

The Swedish Motor Vehicle Inspection Company is appointed by the Swedish Government, and is solely responsible for inspecting all vehicles registered in Sweden and as such would be the natural certification body on national level for eCall. No concrete actions or plans to include eCall IVS inspections into annual vehicle inspection processes have been made.

There has been cooperation between eCall related authorities (PSAPS, road authorities etc.).

4.6.2.8 Netherlands

There exist no official plan or regulation for eCall implementation in Netherlands, EU legislation has to be in place first. At this moment eCall is not yet a reality in terms of legislation, it is a project.

Netherlands is a member of EUCARIS.

Netherlands sees that the certification of eCall IVS should follow the model of standardisation so that it will require international standards followed by local legislation. Certification will be one service of all present certification institutes. Regarding the technical supervision of eCall IVS (connected to annual vehicle inspections) there have been initial discussions, no planning etc. All issues related to inspections will be discussed in the EeIP task force on periodical inspections and Netherlands does not wish to raise issues about it here.

Road operator (RDW) is participating in the HeERO project and plans their actions for the service.

4.7 PSAPs and eCall organisation in HeERO partner countries

4.7.1 General

A Public Safety Answering Point (PSAP), sometimes called "Public Safety Access Point", is a call centre responsible for answering calls to an emergency telephone number for police, fire fighting and ambulance services. Trained telephone operators are also usually responsible for dispatching these emergency services. Most PSAPs are capable of caller location for landline calls, mobile phone locations etc. (in some countries the answering point and dispatching the emergency services are separated, see the PSAP organisation list below).

In May the publication of "*Working paper of Implementation of the European emergency number 112*" only four Member States (Denmark, the Netherlands, Romania and Finland) have replied that 112 is their *sole* emergency number. The remaining majority of Member States have following situations:

a) five Member States (Cyprus, Ireland, Portugal, Sweden and the United Kingdom) have 112 and a single *additional* national emergency number to be used for all emergencies

b) five Member States (Belgium, Germany, Estonia, Luxembourg and Slovenia) have *one additional* national emergency number for one of the *main* emergency services.

c) the remaining 14 countries (Bulgaria, the Czech Republic, Greece, Spain, France, Italy, Hungary, Austria, Poland, Latvia, Lithuania, Malta, and Slovakia) have *specific national*

emergency numbers for each of the three main emergency services and some of them also for other services. (EU Commission 2011c and d)

Depending on the national civil protection system, the operator will either deal with the request directly or transfer it to the appropriate emergency service. In many cases, operators are able to answer in more than one language. Each Member State is responsible for the organisation of its own emergency services and the response to 112 and national emergency calls. Also the PSAP organisation varies from country to country from one-level PSAPs to several level PSAPs. The more complex the chain to handle the emergency call or eCall is the more critical is the accuracy of the message and time used to dispatch the rescue services to the location.

Figure 6 depicts the next generation of emergency calls which may be accepted in PSAPs. (EENA 2011b)
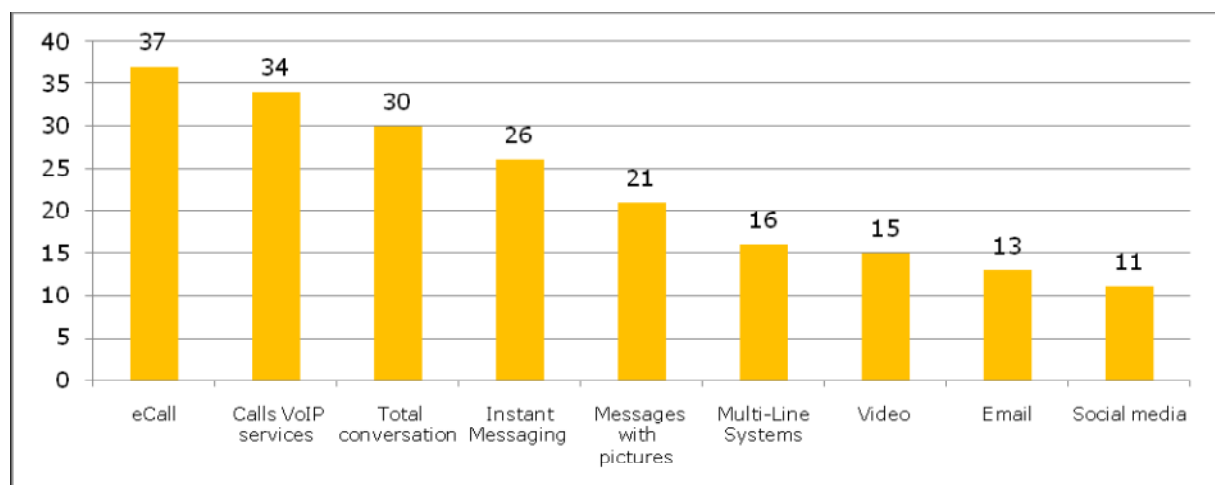
Figure 6. Future ways to contact PSAPS (EENA 2011b)

Organising eCall in HeERO project's partner countries differ in many ways:

- PSAP organisations differ
  - o interconnected local PSAPs with a common system (112 for all emergency dispatching)
  - o central PSAP (filtering PSAP) with local PSAPs (dispatching PSAPs)
  - o local PSAPs with no central PSAP, not interconnected
  - o county (areal) differences (some interconnected, some not) etc.
  - o dedicated emergency service numbers (for police etc.) other than 112 in use

- eCall is handled in one specialised PSAP

- eCall is handled in all PSAPs

The main different ways of handling eCall is outlined in following figure (figure 6).

Model I: eCalls routed as 112 calls

MSD+voice

112 PSAP

Model II: all types of eCalls routed to a dedicated PSAP only for eCalls

MSD+voice

112 PSAP

Most appropriate: eCall PSAP

Model III: manually triggered eCalls and automatically triggered eCalls are routed to a different PSAP (it can be the same PSAP for 112 calls, e.g. dedicated manual eCall PSAP can be the same as 112 PSAP)

SOS

Voice+MSD

manual   eCall
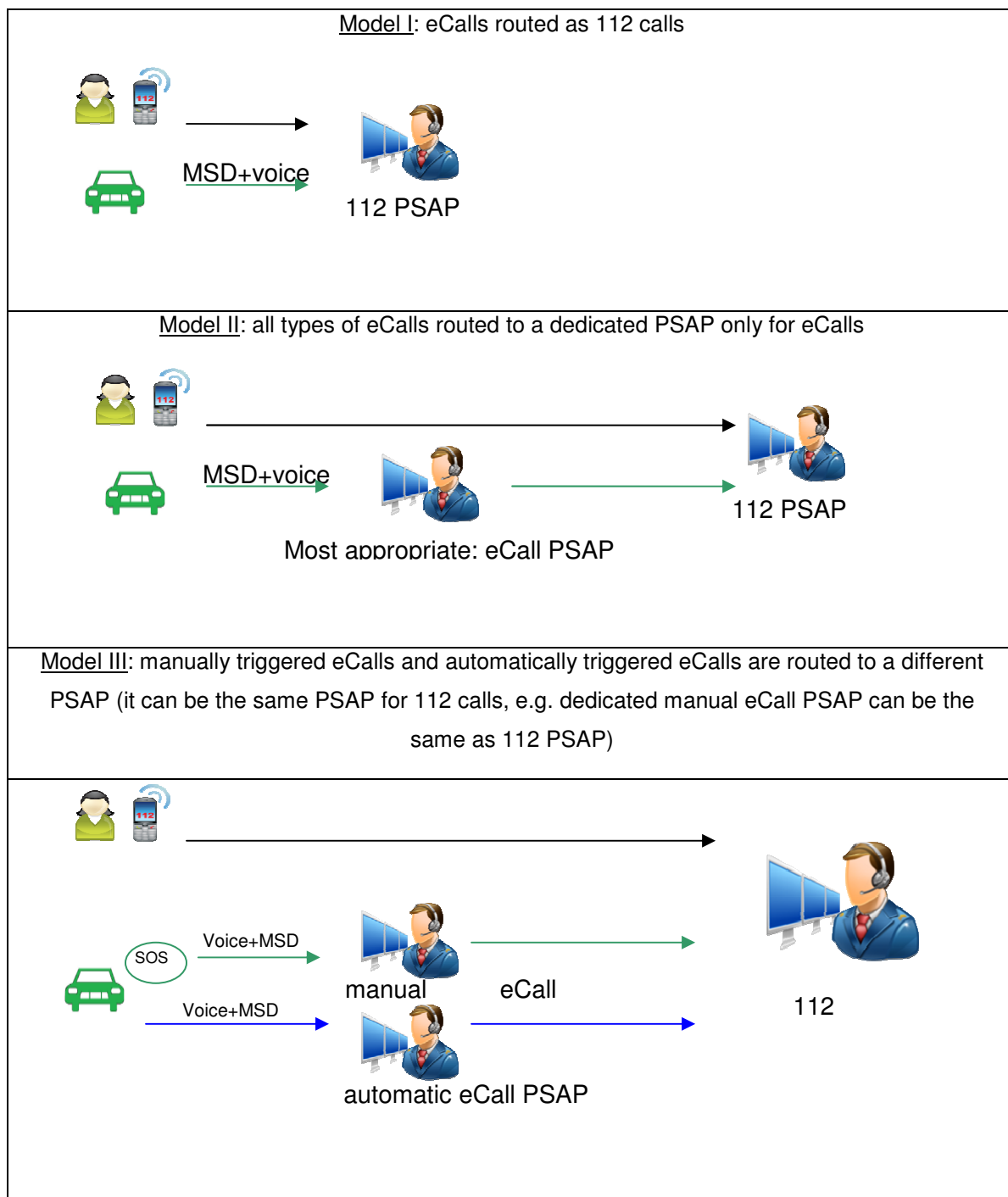
112

Voice+MSD

automatic eCall PSAP

Figure 7. Different models to route eCall (EENA 2011a)

The aforementioned cases require their own specialised planning and testing, it should be noted that almost all different cases are represented in HeERO project.

HeERO partner countries have sufficient expertise for planning, architecture creation and system development for eCall implementation and testing. ICT companies, MNOs, mobile network companies and consultants have been willing to assist in this work. Some barriers still exist: those PSAP system developers and providers which are not involved in any way in eCall research are reluctant to put effort in eCall system integration if only one country asks for that, they need pressure from several countries and EU. Also in general aspect if the PSAP system is very complex (many-layered), there can be problems in system upgrading just for eCall, there can be also other bigger system development on-going and eCall can be seen in such context as a marginal service.

All HeERO partner countries have financing for eCall pilot phase but for permanent implementation diversified situations exist. Some countries start the implementation during HeERO project, but all the costs for implementation phase are not clear (e.g. licences). Some are waiting for top-down decision making, the only way to get the needed resources for the implementation. The expectations about which parts are funded and done by public and by private sector differ. Also the awaited efforts needed for upgrading the system and training the desk-operators differ from country to country. More cooperation is wished for in many issues.

Some HeERO partner expectations of the piloting phase:

- experience of successful functioning of eCall in PSAPs and in whole chain of eCall

- piloting brings information for needed resources and expertise for implementation and future planning; convincing the regulators and top-level decision makers that eCall will be a life-saving well-functioning service, demonstration and argument for needed resources and expertise for real life implementation in PSAPs

- insights for business environment for deployment of value-added services

- usefulness of VIN and especially EUCARIS functioning; many emergency rescue forces are sceptical about information pulling through mobile messages in the middle of rescue mission

- cross-border eCall functioning (also roaming from neighbouring country to other)

- cooperation with needed stakeholders, also other than directly in rescuing services

- need for common policy and standardisation for PSAP interfaces towards the third-parties services (emergency, traffic information systems, road assistance providers, motorway operators, commercial service providers etc.)

- some ideas also for language problems.

4.7.2 Some examples of eCall in PSAP environment

4.7.2.1 Croatia

Croatia has a three level PSAP system. In 2005, Croatia initiated establishment of the emergency call system 112, based on the system prevalent in the European Union. The main centre is located in Zagreb and each county is to have an own 112 centre. The centres are responsible for logging events; coordinating the communication of commands and decisions and alerting the population of threats.

Technical architecture of National ICT infrastructure for 112 Service defines components the system needs to consist of:

- integrated ICT solution in the centres; Zagreb, Split, Sisak and Požega

- computer telephone integration solution in the centres: Dubrovnik, Šibenik, Zadar, Rijeka, Pazin, Karlovac, Krapina, Varaždin, Čakovec, Koprivnica, Bjelovar, Virovitica, Slavonski Brod, Osijek and Vukovar

- computer telephone integration solution in the National centre

Architecture of ICT infrastructure for 112 services is fully aligned with organization structure of 112 services in Croatia that is based on 3 levels.
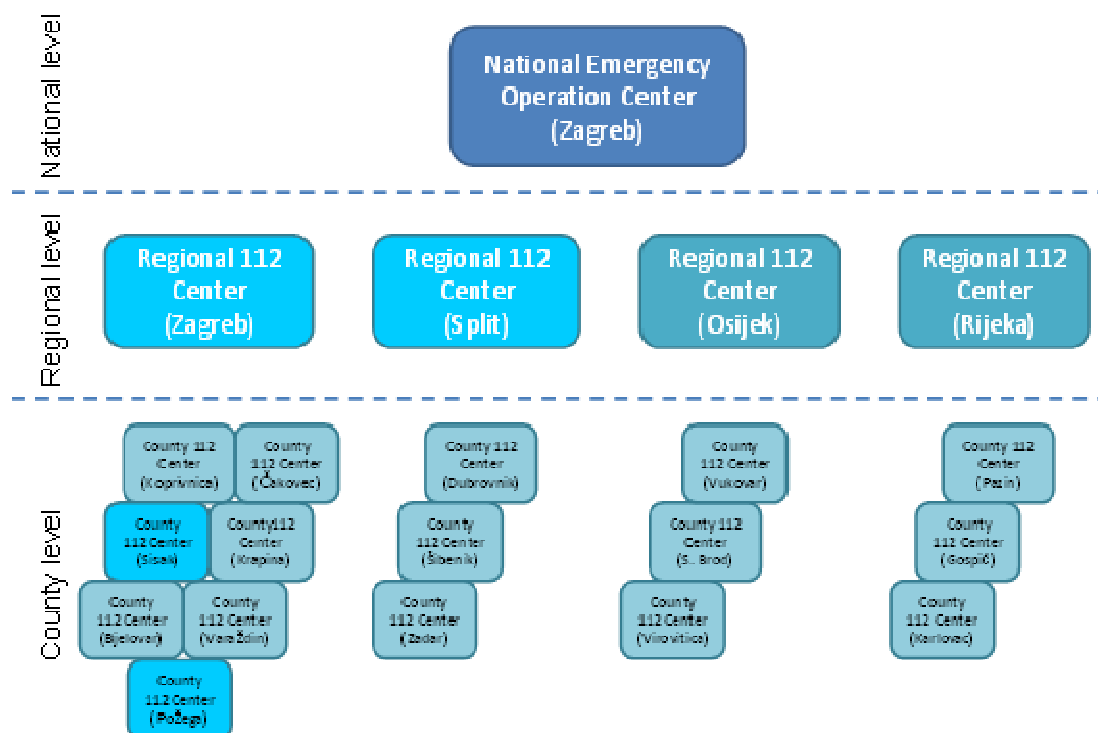
Figure 8. Organization of ICT infrastructure for 112 services in Croatia

In the centre Zagreb, Split, Sisak and Požega are implemented application Ericsson CoordCom R5.2.

Regarding the procurement, the eCall procurements are in compliance with the PSAP procurements process. And for the time being, human resources for operational activities as well as for maintenance of software and interface support for Pilot eCall are sufficient. In relation to the permanent service the implementation of eCall subsystem within System 112 was not planned in the Strategy of the Government Programs for the period 2011 - 2013. The eCall service will be planned in the Strategy of Government Programs as of 2014.

For Croatia, the main expectation of piloting is experience of successful functioning of eCall in PSAPs and the mobile networks. Furthermore the piloting brings information for future planning, Croatian government has signed the eCall MoU, and regulators will act in favour of the eCall deployment. The pilot is expected to provide the additional motivation for MNOs and demonstration and argument for needed resources and expertise for real life implementation in PSAPs and also creation of business environment for deployment of value-added services.

The main challenges in supranational eCall sending (from country-to-country) in PSAPs' point-of-view will probably be the PSAP interoperability and mutual communication (between different countries). Also Croatia sees that there can be technical challenges in voice call / MSD integration in PSAPs with the in-band modem concept and the over-all eCall quality of service.

4.7.2.2 *Finland*

In Figures 9 and 10 depict the basic functions of incident handling in Finnish PSAP system. Finland has a single-layered PSAP system, which now has 15 PSAPs (ERC = Emergency Rescue Centres) which all use the same central emergency situation handling system with connections to police and rescue forces systems and databases. So when there is an incident on the road and someone phones to the PSAP/ERC from the scene, it is directed to the nearest PSAP which takes care of dispatching the help to the spot. Currently the location of the incident is either given by the informer (address) or via mobile network cell-id. eCall handling procedure will work in a similar manner; the novelty will be the MSD bringing the exact GNSS coordinates of the location which will speed up the process at least to the help dispatching. Of course another issue is that are there e.g. doctors nearby to be brought into the spot. Finland has a lot of rural areas where the road distances are long and only way to get help quickly on the spot may be a helicopter which are not always available.
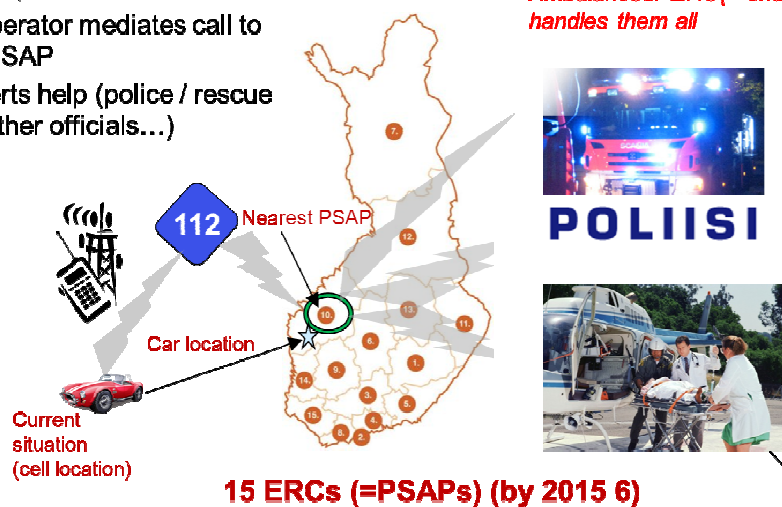
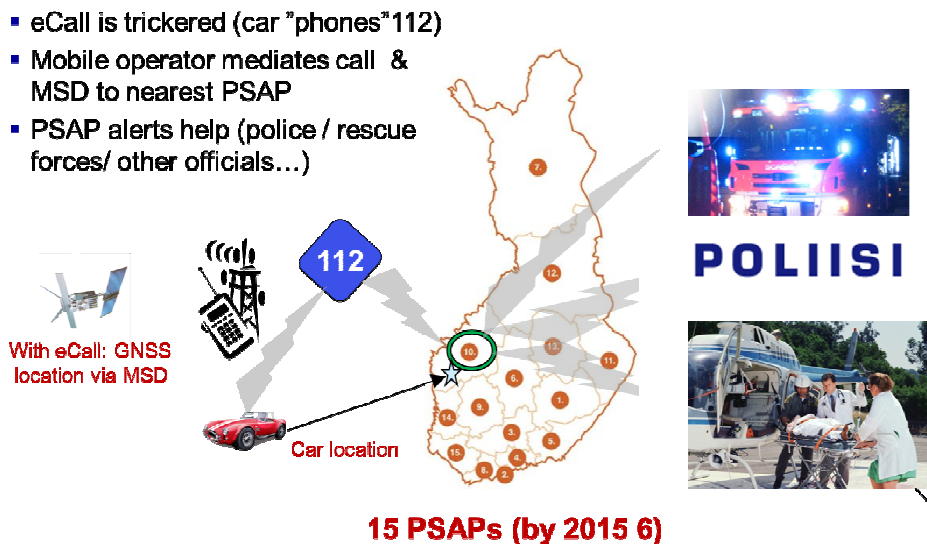Figure 9. Current PSAP procedure in case of vehicle accident (simplified)

Figure 10. PSAP procedure in case of vehicle collision after eCall implementation (simplified)

In HeERO one issue to be studied will be how the MSD and voice call are brought together onto the same operators desk in PSAP.

Emergency Rescue Centre Administration is currently renewing its central system, the provider has just been selected and the work has begun. The new system will be functioning by 2015 in the same time as the organisational consolidation from 15 ERCs into 6. eCall will be included in the new system and all eCall related specifications and standards can be taken into account. First modules will be tested by 2013. As for the current system, challenges exist for eCall implementation, because the current system provider, Siemens, is not involved in eCall HeERO or other eCall development and they are slightly reluctant to deploy upgrades for eCall especially just for one country – there should be more pressure from other countries and EU in this matter.

As for MSD mediating, as it is, to other officials' databases (police, rescue forces, border guard etc.) it will not happen. ERC will handle the MSD (extract it) and mediate the location data to other systems if needed. ERC takes care that all relevant information is mediated to the police and rescue forces as in current situation.

The Emergency Rescue Centre Administration is slightly sceptical about the usefulness of VIN data. There have been discussions about it and the Rescue Forces themselves have a very clear and trained procedure for example in cutting into the vehicle safely in case of

emergency, they feel it is a risk to wait for exploded views of vehicle body through mobile connections for cutting instructions etc. when people have to be taken out of the vehicle as quickly as possible. In MSD there is the Block no 3 which contains in bit mode the basic data of the vehicle type (M1-M3 passenger car-bus, N1-N3 van-lorry, L1e-L7e two-wheelers). This data can be used in PSAPS as basic information of the vehicle in collision, of course VIN data gives much more details when the connection and data delivery between PSAP and vehicle administration is in full service. Until then officials see it positive that eCall MSD brings data of vehicle type for help in dispatching rescue services and the exact location of course.

4.7.2.3 Greece

The plan is to have one central PSAP for the whole country, so as to have a centralised overview and handling of emergencies and for better coordination of other authorities.

As for eCall implementation in PSAP system at the moment the organisational / resources issues are the main concern. On the organisation side, it should be noted that a list of organisations are involved in the implementation of eCall. On the resources side, it is worth noting that there are indications of the rise of the emergency calls –including false alarms- once the eCall system is fully implemented. Therefore a dedicated study should be performed on National level that will direct the actual needs in terms of PSAP resources. We envision having a better understanding for the process within the course of the HeERO pilot.

The procurement for acquiring the PSAP hardware and software will start within the HeERO pilot. Even though Greece believes there will be enough resources for eCall handling, Greece wills also consider cooperation with other countries, if this will improve the time constraints.

As for problems in risk evaluations or eCall message handling compared to normal emergency requests (incident handling done by PSAP operators compared to normal 112 calls and eCall) there will be changes concerning the flow of information and actions required for handling an eCall message, compared to a 112 call.

There will also be problems with financing the permanent eCall implementation into PSAP system because there is no warranty for financing a permanent eCall implementation through public funds.

There are, however, sufficient resources and experts in Greece for eCall upgrading issues. Greece is open for new collaborations with other countries in order to exchange technical expertise and ideas.

The main expectations of piloting are experience of successful functioning of eCall in PSAPs, convincing the regulators and top-level decision makers that eCall will be a life-saving well-functioning service, demonstration and argument for needed resources and expertise for real life implementation in PSAPs. As for piloting period Greece does not have any cross-border eCall partners so there are no supranational challenges present.

4.7.2.4   *Germany*

Germany does not have a consistent organisation of PSAPs. Most PSAPs operate in a local area and work for one area municipality. But there are also bigger PSAPs that integrated several areas. It can be expected that a process of fusion of smaller PSAPs will happen in the near future.

eCall handling in Germany occurs within a multi-layered PSAP system which is still open and not clear. Germany is working on a special technical solution for the implementation of all PSAPs in Germany. Details will be published at the CeBIT 2012.

Known or predicted problems in implementing eCall to PSAP system lie in:

- The PSAPs have very different technical infrastructure, so that some PSAPs have to buy new systems and some others need only software updates.

- The PSAPs do not have the personnel resources to manage eCalls in other languages.

The PSAPs infrastructure must be able to receive and visualize the MSD. This is not realised yet. If the technical infrastructure is not available the normal emergency call is the fall back solution all over Germany. As for eCall implementation into PSAP system the scheduling of the required infrastructure and the training will be carried out during the project and has to be discussed with the BMVBS and the responsible partners of the national government. After this discussion the real budget for the upgrade will be addressed to the related PSAPs and the national governments.

The main expectations of piloting (percentages represent the weighting of research subjects)

- Experience of successful functioning of eCall in PSAPs: 50 %

- Convincing the regulators and top-level decision makers that eCall will be life-saving well-functioning service: 35%

- Demonstration the argument for required resources and expertise for real life implementation in PSAPs: 15 %

- NavCert sees that the main challenge in supranational eCall sending (from country-to-country) in PSAPs' point-of-view is support of different languages and identifying the proper language.

- ADAC was concerned of the possibility of false alarms from eCall equipped vehicles. This issue was reported to ADAC from the German HeERO PSAPs involved in HeERO. PSAPs already today regularly suffer from automatically triggered false alarms, e.g. from fire detection systems. In ADAC's opinion, the issue of false alarms needs to be examined in HeERO and who pays for costs arising from false alarms needs to be clarified.

4.7.2.5 Italy

Italy has several PSAP levels in the country:

Centralized Deployment Model

In this model, a 1st level PSAP collects the calls and, after a proper analysis, distributes both voice and data to a 2nd level PSAP (Police, Carabinieri, Fire Department, Health Service, Civil Defence) through digital lines.

Italian pilot plans to use this model in Varese operating central.

Integrated Deployment Model

This model has been implemented in Salerno. The model plans a PSAP composed by a Police control centre interconnected to a Carabinieri control centre, that receive 112 NUE calls equally distributed 50% each; both the control centres are connected to the 2nd level PSAP (Fire Department, Health Service) trough digital lines; both voice and MSD will be transmitted both voice and MSD to them.

Distributed Deployment Model

This model corresponds to the Carabinieri control centre that receives 112 NUE calls; they are connected to the other PSAP (Police, Fire Department, and Health Service) through analogue or digital lines.

There is plan for dedicating a centre for handling eCall: 1st level PSAP in the Centralized Deployment Model. The main reason is that these centres will be few (3 – 4 per region).

Permanent eCall service procurements will be done later and there exist plenty of experts for these issues as well as for operating and maintenance of eCall functions in PSAPs.

The possible financing problems may be related to the 112 NUE first model deployments; the gap to upgrade to eCall is very small.

What are Italy's main expectations of piloting?

- Experience of successful functioning of eCall in PSAPs: 30%

- Convincing the regulators and top-level decision makers that eCall will be a life-saving well-functioning service: 50%

- Demonstration and argument for needed resources and expertise for real life implementation in PSAPs: 20%

- As for supranational eCall sending (from country-to-country), eCall will be always national, NUE 112 provides multi-language features.

- Special challenges with eCall message handling compared to normal emergency requests may lie in silent eCall (silent Call after a call back (people gone out of the car) and Samaritan calls.

4.7.2.6 Romania

Currently Romania has 40112-PSAPs (one for every county) and 2 in Bucharest (one that also serves Ilfov County and one for backup). The 112 system is decentralized: all the 112 emergency calls are received in the county PSAP where the caller is located, and the PSAP operator has the ability to transfer the call to the local emergency agencies: Police, Ambulance, Fire Rescue, Gendarmes. At the same time, in case of need, the Bucharest PSAP has the ability to answer emergency calls from any part of the country. All the PSAPs and emergency agencies use the same software.

For eCall, Romania will use a centralized system: all eCalls will be routed to the Bucharest PSAP, with the Braşov PSAP acting as a backup in case something happens with the Bucharest one. The Bucharest PSAP operators will be able to transfer the calls directly to the county emergency agencies. The main reason for using a centralized system is the reduced impact that this will have on the current 112 infrastructure. Routing all the calls to the Bucharest (and Braşov) PSAP also means that Romania will only have to train the operators

in these 2 PSAPs. At the same time the implementation costs will be significantly lower, because there is no need for installing eCall modems in every county PSAPs (could mean more than 80 modems). At this moment there are no problems regarding the financing for the permanent implementation of eCall especially because of the centralized solution.

All the equipment is purchased already during the pilot phase and all the developed software will be used for the permanent eCall service. Romania does not see problems in acquiring the needed resources because STS (who is the operator of E112 system in Romania) will provide all the resources needed for operation and maintenance for the eCall service in the PSAPs.

There are no known problems regarding the implementation at PSAP level. An indirect problem could be the eCall flag which, if not implemented, will result in further problems at PSAP level. As for risk evaluation in PSAPs the information provided through the MSD will only help the operators in the risk evaluation process. All the specific needed hardware for PSAPs (eCall modem) will be developed in Romania. All the necessary software updates will also be developed in Romania. The HW and SW updates will be developed by STS (the national 112 operator) either using their own experts, or through subcontracting.

Main challenges in supranational eCall sending (from country-to-country) in PSAPs' point-of-view may lie in sending the MSD data from one country to another. The voice part of an emergency call to another country will not be very difficult.

4.7.2.7 Sweden

Sweden has one centralised system: SOS Alarm handles 112 for the whole country. And all call centres will handle eCall alarms, so there will be no eCall dedicated centre.

Sweden sees no known or predicted problems in implementing eCall to PSAP system. Sweden uses Ericsson's CoordCom system and Ericsson is involved in the Swedish pilot. For the permanent eCall system Sweden has to buy a license for eCall in CoordCom.

Sweden does not see any problems in having extra human resources for eCall. The only minor risk seen is in eCall message handling if the in-band transfer delays the 112 speech call, but the advantage of having a correct position outweighs this risk.

The cost of the license from Ericsson is still open. But otherwise Sweden does not see any problems in eCall procurement processes which would require international cooperation.

The main expectations of piloting are experiences of functions, getting all stakeholders together; getting knowledge about what is needed and missing for an implementation.

Sweden does not see any challenges in supranational eCall sending (from country-to-country) in PSAPs' point-of-view. The PSAPs will have enough information for rescue forces also for handling foreign vehicle incidents in Sweden (although Sweden is not implementing VIN).

4.7.2.8   Netherlands

Netherlands has a three layer PSAP system:

- PSAP 1str level: 1 PSAP for all mobile 112, 22 112PSAP for fixed lines (out of scope)

- PSAP 2nd level: 22 co-located regional emergency rooms, police, fire, ambulance.

- TPS eCall: some car manufacturers have their own eCall TPS in our country (Volvo) others operate from abroad. Not connected to first level PSAP's

About dedicating certain PSAP centres to eCall the Netherlands case is following:

- Automatic eCall will be handled by regional PSAP's.

- Manual eCall will be handled by 1st level PSAP. After validation it will be transferred to regional PSAP

Known or predicted problems in implementing eCall to PSAP system are following:

- Actual situation: No infrastructure to send data to 2nd level PSAP's. In 2012 such the infrastructure will be realised. PSAP 1st level: Implementation planned in Year-3.

- Decisions about the infrastructure between 1st level and 2nd level PSAP are not part of this project. To be decided by (political) authorities.

- There are actual problems in receiving and process DTMF data probably caused by (de)compression in networks and/or IP-PBX. (Under investigation)

The permanent eCall service procurements (dedicated eCall related updates for PSAP hardware and software) will be done in project Year 3. Until then the pilot is stand alone in a look-a-like application.

Cooperation with other countries is needed for resources and experts (Human Resources) for operating and maintenance of eCall functions in PSAPs. But in risk evaluations of eCall does not cause additional effort, because the call taking process will not be changed as eCall is adapted from the present process. False calls may, however, be an issue.

There can be problems with financing the permanent eCall implementation into PSAP system, because the changes needed in the 2nd level Netherlands PSAP system are out of range of the project. This will require decisions to be made by authorities.

As for requiring resources and experts for procurement of hardware and software updates there seems to be enough expertise among subcontractors which offer enough resources.

As for main expectations of piloting, success is dependent on how automotive are going to use the pan-European eCall. This is out of influence of the project. Our main goal is to realize optimal support of the PSAP-process. Convincing the regulators and top-level decision makers that eCall will be life-saving well-functioning service is not an issue. But demonstration and argument for needed resources and expertise for real life implementation in PSAPs will be important: authorities will be informed and asked to take necessary decisions. That also includes input for Traffic Management and sharing information with other traffic management chain related parties.

The main challenges in supranational eCall sending (from country-to-country) in PSAPs' point-of-view will be international roaming, access to VIN related information, interpretation of optional data in MSD (as standardised interpretation) reflects Netherlands.

Also there may be technical challenges in voice call / MSD integration in PSAPs in DTMF.

In supranational eCall mediating in PSAP point-of-view the legislation may be a more determining factor than technical aspects.

4.8 Technical issues *[standards, research, IVS, ICT, MNO, VAS] brought up by HeERO Members*

4.8.1 General

The technical issues brought up as eCall barriers and enablers vary. Some matters which others take as a real challenge do not concern other partners. As in the framework (see Chapter 5) the technical issues (mainly related to applications, Human-Machine-Interface and communications) intermingle also with operations and business.

Here are commonly notified technical issues brought up by HeERO partners:

- **standardisation** is a key element – standardisation of eCall chain elements has been extensive but there are still open and/or non-standardised elements e.g. in IVS. several different versions of standards which are not compatible with each other. As many IVS providers already started their development, many different IVS-versions

are existing, which causes several problems. Interoperability and compatibility are threatened by wrong interpretations and implementations of the standards. Today no reference implementation neither IVS nor PSAP exist.

- **eCall triggering**: multiple triggering and different collision sensors, cancelling the triggering, dependable after-market device triggering etc.

- **eCall after-market devices** as such: no standardisation, missing guidelines, dependable eCall false calls, reliability, cost of devices.

- **In-Band Modem**: a) is the transmission time less than 4 seconds b) licensing (for eCall free of charge, with other services licence fee etc.) c) can and should In-Band Modem be replaced by another solution;

- **mute other audio paths** bypassing speech processing interfaces (including Bluetooth**);** during in-band data modem transmission. The voice channel between the IVS and the PSAP must not be blocked for more than 4 seconds. Both the PSAP and the IVS in-band modem implementations should guarantee this

- **voice channel quality** deterioration of the call during the transmission(s) of MSD messages;

- **Unification of data and voice** getting both eCall voice call and MSD into the same operator desk;

- **Two-way communicating**: security and encryption of message, no outside data into CAN etc.

- **Careful assessment of 2G/3G support** is necessary; plan for migration from GSM network to more advanced radio technologies such as UMTS.

- **Location quality** needed minimum location quality, use of different GNSS systems

- **Powered 2 wheel** eCall applications for two-wheelers, other vehicles etc.

- **Manual and/or automated eCall**? Challenges in HMI related issues lie in cancellation of false alarms; this feature should be available only for manually generated eCalls. The time between the initiation of an eCall, and the time the 112 operator answers the eCall will be short in the majority of cases (5 or 6 seconds).

- **Vehicle aging – IVS functionality**; securing of a stable communication link to the PSAPs in any case. IVS is part of a vehicle but depending on the outside world

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opposed to all other (safety critical) components in a vehicle. Due to the aging of a frozen IVS compared to the continuous change in the outside world (mobile network, PSAP), the on-going interworking of the whole chain has to be continuously monitored.

- **Annual testing** of eCall must be established, this includes both IVS and PSAP receiving environment

- **Additional services**: Should the eCall be a separate function or can it be included into a set of In-Vehicle functions (e.g. connected to insurances, Pay-As-You-Go taxation etc.) -interconnections and interactions between various vehicle electronic devices and control units. eCall will be implemented a) as a stand-alone service function in the vehicle but also b) eCall service complemented with other additional services. From commercial point of view, it would make sense to use the eCall in-vehicle system for additional services. The conditions for this integration being: 1) the availability and reliability of the in-vehicle eCall service function needs to be ensured at any time and must not be affected by additional service offerings or their usage. 2) If eCall in-vehicle systems are used for offering additional (value added) services, the systems need to be accessible (respectively open) for independent service providers, not just limited to OEM-related service providers. If the in-vehicle system is accessible/open for independent service providers, there is broader choice for consumers. If consumers can choose their service provider of preference, this will drive competition and innovation and hence will stimulate the overall telematics market significantly. To enable this, open platforms with standardized interfaces for voice and data communication are required.

- "The main technical challenges in updating the MNO network systems for eCall implementation nationally: the needed extensions in signalling have been already standardized and the TLC providers are already developing their pre-commercial releases. The integration of such software upgrades in the operational mobile network will likely follow the consolidated operational and deployment methodology. It allows the MNO to continuously upgrade their network without impacting on the end-to-end service availability. Once the routing strategy for the eCalls will be established at national level, the roll-out phase in the Mobile Network is not expected to be critical."

4.8.1.1 Croatia

Croatia takes part in standardisation work of telematics, but not directly to eCall. Croatia's key messages for standardisation work are following:

- Include the standardisation of the IVS in a vehicle homologation process.

- HeERO participants should delegate the HeERO standardisation representative to CEN and ETSI eCall standardisation groups in order to promote and clarify HeERO arguments for the eCall standards development and modifications.

There is active research work indirectly related to eCall in Croatia about segments utilised for eCall. Key research areas that should be further activated related to eCall are a) In-band modem vs. alternatives that overcome in-band modem concept's drawbacks and b) position estimation for eCall (sole utilisation of GPS is not sufficient and may become misleading with tragic consequences).

Croatia has its own vehicle industry and the Croatian pilot co-operates with foreign vehicle manufacturers. Cooperation exists between authorities and industry about eCall matters. Issues that have been raised from discussions are that the vehicle industry needs clear specifications, standards and deadlines for the IVS provision to allow for related R&D activities.

In relation to competing commercial or private emergency or rescue services (bCall etc.), several stakeholders (vehicle manufacturers, insurance companies) have expressed interested in introduction of private emergency and post-accident assistance services. Any plans for a common in-vehicle platform which include several services and 112-eCall do not exist.

The Croatian view is that it is essential to have more coordinated pan-European cooperation between eCall activities and vehicle industry.

The most difficult technological challenges lie in interconnections and interactions between various vehicle electronic devices and control units. Croatia also sees that the certification process must comprise clear definition of the technical requirements and standards. It must be related and to be in compliance to the vehicle homologation process.

As for the retrofitted eCall units for older cars Croatia believes that this question is very sensitive and since there still is a high share of the old vehicles that do not have the appropriate sensors that can send signal for the eCall trigger the IVS, the retrofit can be very expensive and technically demanding.

Croatian eCall Pilot has agreed the provision of the eCall IVSs supplied by several IVS manufacturers. The issues and problems brought to discussions related to eCall among IVS providers are as follows a) the In-band modem concept which has had significant drawbacks b) need for utilisation of GPS+EGNOS/GLONASS combined receiver as a standard for eCall position estimation (for all markets) and c) need of flexible length of MSD message.

Challenges related to HMI related issues Croatia wants to point out

- Multiple eCall triggering (resulting from reduced consciousness of the people involved, for instance)

- Integration of various accident detector sensors to recognise traffic accident more reliably using dedicated algorithms

Croatia sees that the main concern between IVS – MNO may be the deterioration of the voice channel quality during the transmission(s) of MSD messages.

As for related software there is a need for standardisation of PSAP interfaces towards the third-party services (emergency, traffic information systems, road assistance providers, motorway operators etc.)

Positioning accuracy is also considered by the Croatian pilot. The sole GPS utilisation almost certainly does not satisfy requirements for accuracy and continuity of position estimation, at least in certain critical environments. Furthermore, different requirements of certain markets (EU and Russia, for instance) may yield the common agreement for standardised utilisation of the combined GPS+EGNOS/GLONASS receivers, with benefits for all users not regarding the market. Finally, advanced system integration methods are to be challenged for provision of continuing and accurate position estimation for eCall.

Croatia sees that there are no problems in activating the MNOs for future eCall duties. MNOs' regulated duties depend on EU regulation recommendations.

In regard to the financing MNO eCall upgrading: Croatia believes that HeERO MNO tests should be funded by MNOs through provisioning of equipment and man hours. The permanent eCall implementations in MNOs will be financed also by MNOs if eCall service will be regulated mandatory.

The main expectations of HeERO project/piloting for MNOs: MNOs are focused on successful implementation of eCall features in their core network, with no impact on existing services. Croatia sees no special threats in SIM matters or in voice call/MSD integration. At this point challenges are not foreseen. The MNOs are co-operating with an equipment

manufacturer which provides solution for the eCall service. The main technical challenge in updating the MNO network system is in the updating process. Various tests need to be performed before the update can be released in live network environment. Additional resources are expected mainly in form of men-hours. The main technical challenges are expected in relation to supranational interoperability issues caused by multi-vendor environment.

In regard to the SMS issue Croatia also believes that based on the existing proposal for In-Band-modem solution, the eCall SMS or the other alternatives should be discussed as possible substitute for In-Band-modem, or as an additional service.

Croatia sees that eCall should be a separate service, and safety-related telematics may be combined within the eCall units, but the other services should be based on separate in-vehicle systems. The main benefits for separate eCall are provision of non-interrupted and dedicated safety-related service and preserving the privacy.

The retrofitted common in-vehicle platforms which include several services, maybe even the112-eCall have been also under discussion in Croatia:

The following pre-conditions have been foreseen as the necessary framework for the related integration:

- standardised interfaces between PSAP and third-parties services

- IVS modifications in support of the proposed integration (standardisation needed)

- eCall SOP modification

The main benefit of eCall in the Republic of Croatia is the improvement of the System 112 feature by means of integration of all current and future eCall services.

In this way the information collection as well as the analysis of obtained information and urgent calls and adequate response to the needs of all participants in the system of protection and rescue or local community will be raised to an efficient level in the equal manner in all parts of the country by means of single European emergency number 112.

In addition, the enhanced situation awareness (provision of more accurate traffic information) and opening market for the other related services (tailored insurance plans, for instance) are foreseen as the additional benefits of the eCall integration with the other services.

Services which could be connected to eCall are vehicle insurance management, traffic information service, and efficient incident scene management proper deployment of the eco-tax.

Croatia prefers to emphasise that the end-users are not presented as stakeholders in this questionnaire. Several groups (motorcyclists, for instance) have already expressed their concerns in regard to segmented implementation of the eCall services.

4.8.1.2   *Finland*

Finland has several experts involved in ITS and eCall standardisation.

Finland has had a test bed for eCall IVS testing several years now, and it has been used by both national and international testers. Test bed in VTT (more information www.ecall.fi)

Finland does not have its own car industry but Finland has active mobile device and in-vehicle device industry. Currently there have been several projects on-going where In-Vehicle Platforms have been studied; the idea is to combine different transport related services into a common platform; services can be commercial services, work related and transportation aiding services and regulated services like Pay-As-You-Go taxing and insurances, mobile inspections (e.g. for OBD2 related data) and also different security and safety services. There have been discussions also can eCall be part of a common In-Vehicle Platform. And while Finland doesn't have car industry the efforts lie mostly in retrofit platforms and devices, but of course also services for vehicle industry. While Finland also has quite a lot of older cars, there should be more research in retrofitted eCall IVS for older cars, especially regarding the reliability of triggering and simple but reliable mounting of devices into vehicles.

Finland has three main mobile operators and they are all present in a common board connected to Emergency Rescue handling. eCall has been discussed with them, but of course they feel that either regulation or preferably financing is needed for eCall flag implementation. Ministry of Transport and Communications is the mobile operator regulator and the discussions are under their control. The Emergency Rescue Centre Administration sees that the flag is very important function and it must be tested in HeERO.

Also more research should be put to service business models and the whole business case and open architecture and interfaces.

Finland will be testing multi-functioning GNSS: DGPS and GLONASS (maybe also others). There may also be tests for dual-SIMs.

4.8.1.3 Greece

Greece has experts from the country involved in standardisation work from the ICCS department of the National Technical University of Athens (N.T.U.A.) participate in the CEN TC278/ WG15.

The key messages for standardisation work:

"*We consider that standardization work should focus on the resolution of the current version, maintaining back compatibility when possible, defining testing procedures for the IVS, implementing eCall functionality on different platforms/technologies e.g. Smartphone's/IP networks.*"

There is also active research work related to eCall: the national pilot project called "eKLISI", which will develop and evaluate an eCall application. ICCS, COSMOTE (major telecom operator) and Space Hellas are co-partners.

There is no vehicle industry in Greece and there are also no competing commercial or private emergency or rescue services (bCall etc.). Greece feels also that there should be more coordinated supranational or EU-wide cooperation between eCall activities and vehicle industry because it would ease the eCall deployment.

As for technological challenges Greece points out the electromagnetic compatibility (EMC), in compliance to the EC directive; also eCall trigger functioning (including the manual eCall mode), the vehicle aging and the annual testing are issues that should be addressed in a coordinated way.

Greece sees that as a minimum, the certification should include the issues addressed in the standards.

As for retrofitted eCall devices for older cars Greece sees that the eCall functionality should be made available for older cars as well. The main challenge may come out of the fact that as the vehicle signals that are essential for the eCall functionality (e.g. eCall triggering, MSD message) are not open, the work should be handled by a certified network. Careful assessment of 2G/3G support is necessary; plan for migration from GSM network to more advanced radio technologies such as UMTS.

Greece does not have eCall In-Vehicle System providers in the country. As for IVS Greece points out that bypassing speech processing interfaces (including Bluetooth); mute other audio paths during in-band data modem transmission. The voice channel between the IVS

and the PSAP must not be blocked for more than 4 seconds. Both the PSAP and the IVS in-band modem implementations should guarantee this.

IVS – MNO two-way communicating? MSD sending/cancelling for false alarm? Both issues mentioned above are important. Also dual mode IVS should be pursued while the MNO should provide security (e.g. bit encryption – no threat to CAN).

Greece sees also that there should be more coordinated supranational or EU-wide cooperation between national eCall activities and international ICT or service companies which offer PSAP systems (like Siemens etc.). There may also be challenges in location accuracy and maps: the required accuracy of the location information and the needed coverage implicate the use of GNSS, using GPS and in the near future the European Satellite Navigation Systems Galileo which will offer even greater accuracy and availability. PSAPs and the emergency rescue services should have the necessary infrastructure for handling the location information received.

MNO and flag issue Greece feels that the MNO duties should be regulated by law at European level.

Regarding financing the HeERO MNO tests in Greece: they are not applicable for Greece. Currently there are no MNOs present. The permanent eCall implementations in MNOs will be financed by both the private and public. There is an expectation for European regulation for MNOs. MNOs should support the ITS directive objective.

The MNOs will carry out the required routing changes & updates in mobile switches. eCall in an MNO perspective is an additional public safety telecom service that requires the establishment of a reliable channel to deliver data and voice. As any telecom service it has to be interoperable (device and MNO independent), reliable and testable. MNO specific topics analysed and discussed by GSMA to identify possible work items to be addressed.

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About Value Added services / Services related to eCall: Integration of eCall with other ITS public utility and/or commercial services is an open issue, in the sense of Cost / Business models that could be enabled by the introduction of eCall.

4.8.1.4   Germany

Germany has several experts from different stakeholders involved in eCall processes from Germany. NavCert key message for standardisation work is "Standardization of safety related topics should be done faster."

Germany has also other that HeERO research work on-going in the country, mainly general ITS related. The key research areas that should be further activated related to eCall are technical and organisational issues which are both important for example to enlarge eCall to other road users and in NavCert's opinion the availability of GNSS signals for position accuracy and availability of mobile networks for communication purposes at critical locations.

German has a large car industry (i.e. Audi, BMW, Daimler, Volkswagen etc.) and there are discussions regarding eCall. The car industry and related stakeholders e.g. different insurance companies also have commercial services available in the market. There is no official eCall related cooperation between the vehicle industry and national traffic safety authorities and PSAPs. NavCert sees that there should be a more EU-wide cooperation between eCall authorities and vehicle industry.

NavCert sees that the most difficult challenges in the eCall system in cars are to get a stable communication link to the PSAPs in any case. IVS is part of a vehicle but depending on the outside world opposed to all other (safety critical) components in a vehicle. Due to the aging of a frozen IVS compared to the continuous change in the outside world (mobile network, PSAP), the on-going interworking of the whole chain has to be continuously monitored.

There are competing commercial or private emergency or rescue services in Germany e.g. BMW and PSA Peugeot and also some other OEMs are operating a private solution to assist the users/drivers of a car. This is also the case for ADAC, AvD/Allianz, Steiger Stiftung etc.

About the discussions or plans for vehicle industry driven common in-vehicle platforms which include several services and 112-eCall or private emergency services, the German vehicle industry is guarded on this issue except BMW. They are not talking officially about those systems where eCall is implemented. BMW has its own experience with the BMW Connected Drive System. This system is currently not in line with the EU-wide eCall of the HeERO project, the opportunity to introduce a common system solution is discussed.

Of the technological challenges the most difficult ones connected to eCall system in cars are trigger functioning and annual testing and after-market installations.

The certification must show the compatibility of the system components to the applicable standards and the interoperability for all member states and all PSAPs. This includes ALL issues mentioned within the standards (by NavCert)

As for the retrofitted eCall devices for older cars an additional challenge is the proper installation and integration into the vehicle which has to be validated on a per vehicle base.

The main challenge is the triggering function and the connection to a PSAP after a collision. Safety functional implementation and installation into the cars must be guaranteed also by a certified and standardised process to get the same quality in relation of functionality as systems implemented by the OEMs.

German has its own eCall IVS providers. The issues raised by NavCert in the first tests in real life, have shown several challenges concerning the correct implementation of the Qualcomm modem and the connection via the mobile network.

An issue in standardization is that there are currently several different versions of standards which are not compatible with each other. As many IVS providers had already started their development, many different IVS-versions exist which causes several problems. Interoperability and compatibility are threatened by potentially incorrect interpretations and implementations of the standards. Today there is no reference implementation for either IVS or PSAP, it is anticipated that this will be addressed by HeERO

Regarding HMI, NavCert believes that buttons and displays are clearly defined and there will be nearly "the same" look and feel in different cars. The manual alarm to trigger a test call has to be standardized to allow in the PTI the proper handling by the inspector, it is anticipated that this will be addressed by HeERO

The challenges in location accuracy and maps exist. If maps are too old and/or the location is not covered by GNSS (right now mainly GPS) in a sufficient manner which might be a problem. There could also be problems from the geographic area (big buildings, deep forest, very rural area or high mountains), it is anticipated that this will be addressed by HeERO

The challenge with the use of SIM cards is to identify which test number will be dialled to set up a call to a test centre and how to change this number.

The main problems between IVS – MNO is still under discussion and not evaluated yet. It could be the two-way communicating or MSD sending/cancelling in a false alarm or something else.

The project has identified that there could be a delay in the introduction of the eCall Flag because of planned maintenance cycles for MNO's. Germany has no comments currently about MNO duties to be regulated by law or the financing of MNO upgrading or other MNO related issues.

Concerning Value Added services / Services related to eCall, Germany believes that eCall could be integrated to other services. The conditions for this integration should be that the

use of eCall must be free of charge. The other services must not affect the eCall service. The main benefit for integration of services is that the eCall in-vehicle system becomes more attractive for the end customer who demands e.g. a break-down service. This generates a business model for the car manufacturers and potentially other stakeholders, which leads to a faster implementation and gives the EU an advantage in the field of ITS innovations.

The services which could be connected to eCall are e.g. other regulated services like road-tolling or traffic insurances, delivery of dangerous goods etc. and also to infotainment and other unregulated services.

A view point from ADAC points out that In-Vehicle Platforms are not separate from the vehicle, they should be handled as mounted accessories of vehicle not as separate devices or services.

Value Added services and services related to eCall, the question of eCall as a stand-alone service, ADAC says that as a basic version, eCall will be implemented as a stand-alone service function in the vehicle. The question, whether eCall service will be complemented with other additional services, is basically in the responsibility and decision of every individual vehicle manufacturer.

This report believes that this decision is a strategic decision for each vehicle manufacturer. From the commercial point of view, it would make sense to use the eCall in-vehicle system for additional services. Examples: Breakdown service, real-time traffic information, stolen-vehicle tracking.

The conditions for this integration are:

1. The availability and reliability of the in-vehicle eCall service function needs to be ensured at any time and must not be affected by additional service offerings or their usage.

2. If eCall in-vehicle systems are used for offering additional (value added) services, the systems need to be accessible (respectively open) for independent service providers, not just limited to OEM-related service providers. If the in-vehicle system is accessible/open for independent service providers, there is broader choice for consumers. If consumers can choose their service provider of preference, this will drive competition and innovation and hence will stimulate the overall telematics market significantly.

To enable this, open platforms with standardized interfaces for voice and data communication are required.

ADAC points out that the EeIP Task Force "OPEN" has dealt with the subject of using the in-vehicle eCall platform for other services and how additional services could contribute to an overall positive business case. (Task Force OPEN Final Report v1.0.)

If there is an open platform/system in the vehicle, eCall can be seen as but one service among a variety of services. However, the 112 eCall service is mandatory and must not be deleted or de-installed from the drop-down menu and kept available at any time.
The kind of services which could be paired with eCall is in two categories:

- private additional services, which can be free of charge or paid.

- additional public services/benefits which are preferably free of charge.

Private additional services are usually offered by commercial service providers, automobile clubs, insurers etc. Examples: breakdown service, real-time traffic information, stolen vehicle tracking, pay-as-you-drive car insurance schemes, remote diagnostics service.

Public additional services or benefits can be offered by public authorities or others. Examples: Dangerous goods information, rescue sheet data (vehicle-specific information for rescue services how to open cars safely and properly after crashes)

During the compilation of this report the ADAC identified that user awareness and user acceptance may well be an issue. These issues will be looked at in the barrier and enablers element of the HeERO report for WP6

4.8.1.5   Italy
Italy's MNO's and the TLC system suppliers are continuously active in standardization in the frame of 3GPP. The key messages for standardisation work: "*Start from pragmatic and verified operational requirements. Take into account the deployment issues from an end-to-end system perspective.*"

There is no active research work, apart from HeERO, in Italy now. The future efforts should be in the organizational domain where the eCall deployment is based on pre-existing (legacy) infrastructure and processes. The results of such analysis should be used to properly plan and address the national investment required to fully deploy the service and to make it available to a significant portion of the automotive population. During the early stage of the operation deployment, some impact/effectiveness and technical performance analyses might also be advisable to tune-up the overall system.

Italy does not see problems in eCall research: vehicle industry and IVS producers are both actively related to eCall. The technological challenges are in e.g. eCall trigger functioning, vehicle aging, annual testing and eCall activation and message transmission timing constrains. The problems with IVS exist especially in IVS Pan EU requirements compliant which are still prototypes and it is very complex to test the whole chain because many actors are needed. Also in Italy there already exist common in-vehicle platforms which include several services, e.g. including bCall services.

Italy sees that a more coordinated supranational or EU-wide cooperation between national eCall activities and international ICT or service companies which offer PSAP systems (like Siemens etc.) should exist and also standardization is needed on the HMI related to manual activation and to driver signalling

MNO duties will be regulated by law; at least at national level eCall MNO duties must be considered an extension of the E112 call and regulated accordingly. MNOs will finance the HeERO MNO tests themselves with some costs partly covered in the frame of the HeERO contract. As for the permanent eCall implementations in MNOs, the financing is unclear at the moment. Specific costs are very difficult to isolate from those originating from other operational and routine activities. It is assumed that an approach similar to that adopted for E112 deployment will apply.

The main expectations of HeERO project/piloting for MNOs is the possibility to bring together all national actors involved in the deployment of the eCall to establish a stable Working Group that will be able to support adequately the actual deployment. The pilot will bring up demonstration of the technical adequacy of the standardised technology.

The overall process extension and re-organization at national level for the public emergency calls processing is complex. A number of new processes and procedures will have to be identified to allow the correct and lawful processing of the eCall.

As for challenges in contracts between MNOs' SIM/USIM releasing & IVS providers will be the commercial issues (such as SIM/USIM provisioning for IVS devices implementing public pan-European eCall service) need to be addressed and negotiated among the parties based on the established regulatory framework.

The main technical challenges in updating the MNO network systems for eCall implementation nationally: the needed extensions in signalling have already been standardised and the TLC providers are already developing their pre-commercial releases. The integration of such SW upgrades in the operational mobile network will likely follow the

consolidated operational and deployment methodology. It allows the MNO to continuously upgrade their network without impact on the end-to-end service availability. Once the routing strategy for the eCalls will be established at national level, the roll-out phase in the Mobile Network is not expected to be critical.

No eCall SMS for 112 eCall, but, however, it might be an implementation option for other commercial Value Added Services.

As for Value Added services Italy feels that eCall can be integrated to other in-vehicle services, but the conditions for this integration is security (must work after crash) and priority (all other services are interrupted when an eCall starts). The benefits of integrating eCall to other services lie in shared man machine interface, costs, business model etc. The services naturally connected to eCall are e.g. bCall, fleet management, stolen vehicle tracking etc.

4.8.1.6 Romania

The Romanian Standards Association is involved in the definition of the CEN standards. Romania also sees that enforcing the standards in HeERO project for the first time should take into account in the reporting of the results of the HeERO project.

As activities in research and development of eCall system, there has been in Romania a study on current eCall technologies and developing an IVS prototype in the "Politehnica" University from Bucharest. A Romanian company is also currently developing an IVS module which will be tested in the HeERO pilot. They are also plans for commercial modules once the eCall service will be implemented at European level. Romania still sees needs for future impact studies of the implementation of eCall.

Romania has its own vehicle industry, but there has been no eCall related cooperation between the vehicle industry and national traffic safety authorities and PSAPs. There are no competing commercial or private emergency or rescue services like bCall in Romania. There have been some discussions about open in-vehicle platforms in general terms but not connected to eCall. For EU-wide interoperability of eCall there should be more common activities between eCall stakeholders and the vehicle industry.

As for technological challenges at this moment Romania believes that the infrastructure needed for testing and certification of all the offered IVSs will be the main problem. One important issue is the manner in which these tests will be conducted without affecting the 112 system. The certification for IVSs should include the main eCall functionalities: establishing an emergency call, sending the MSD etc. The industry should be responsible for the sensors

installed in the vehicle and the triggering of these sensors. The industry should also be responsible for all the physical tests of the IVS unit (resistance at shocks, vibrations etc.) and other requirements for a module installed on board a vehicle.

As for retrofitted eCall devices for older cars the main challenge will be the cost of the units. Many users will be more receptive to a device that is already installed in the vehicle when you purchase it than to a device that they have to buy and install separately. From a technical point of view there will be difficulties in accessing the security systems of a vehicle for triggering purposes.

Challenges in HMI related issues lie in cancellation of false alarms which will be a delicate matter. First of all, Romania believes that this feature should be available only for manually generated eCalls. Secondly, the time between the initiation of an eCall, and the time the 112 operator answers the eCall will be really short in the majority of cases (5 or 6 seconds).

Romania believes that the permanent implementation of eCall would benefit from EU-wide coordinated software development, but at this moment, especially in the testing and piloting phase most countries have started developing their own software for handling eCalls.

As for location accuracy and maps considering that at this moment the E112 service uses cell ID for the positioning of the incident, we believe that the presence of GPS coordinates will be a great improvement, regardless of the accuracy.

In activation the MNOs for future eCall duties there have currently been some discussions regarding the eCall flag implementation in Romania, but no operator has currently implemented the eCall flag. All the major operators usually have a parent company and they can't take any decisions without consulting them first. In Romania the MNO duties probably won't be regulated by national law, unless this will happen at European level. If the eCall flag will be implemented for the pilot tests, the MNOs will support all the costs for the necessary updates. It's too early to speculate who will finance the permanent eCall implementation of the MNOs. If the eCall flag will be regulated at European level, probably the MNOs will support the costs.

For the pilot, Romania will use regular SIM cards, but for the permanent implementation this will not be feasible. Dedicated numbers will have to be assigned for the SIM cards at European level, because the full scale implementation of eCall will mean a huge amount of SIM cards, and the operators won't have enough numbers. As for the contracts between MNOs' SIM/USIM releasing the IVS providers or maybe even the vehicle manufacturers will be responsible for these contracts.

As for voice call / MSD integration there will be no problems as long as the eCall flag will be implemented, the MNOs will handle the eCall like they would handle any emergency call. But MNOs will need extra resources for the necessary software updates for handling the eCall flag. Updating the MNO network systems for eCall implementation supranational will require SIM cards with roaming capabilities. This condition should also apply for the pilot tests, as we need to test the interoperability of the system, and cars from every country will have to travel to other countries to test their IVSs.

In Romania, at this moment, we have not discussed the implementation of value added services that will use the eCall platform.

4.8.1.7   Sweden

As for standardisation and research work related to eCall Sweden has an expert involved in eCall standardisation work (Jan Arfwidsson). The key message of Sweden for standardisation and development of eCall service is in short: "*Let Pan-EU eCall and TPS eCall co-exist for quickest market introduction*". HeERO is the most important current research work related to eCall in Sweden. It will answer several acute issues related to eCall implementation.

Sweden has vehicle industry which has cooperation with national traffic safety authorities and PSAPs. The industry has also own commercial emergency/rescue services: Volvo On Call supports bCall supported in all counties. The bCall systems used are mostly Allianz - Global Assistance (previously named Mondial Assistance but recently merged with Allianz). Falck is used as a subcontractor for commercial services in Sweden.

There have been also discussions and plans for vehicle industry driven common in-vehicle platforms which include several services and 112-eCall or private emergency services. Volvo Car wants to keep Volvo On Call system alive and supports eCall with a Third Party Solution setup.

Sweden sees that more coordinated supranational and EU-wide cooperation should exist. Especially coordination is required for EU towards ERA GLONASS, to get a seamless eCall working at crossing the border into Russia or even Belarus and Ukraine.

The technological challenges which are connected to eCall system in cars (or other vehicles) are not seen as real issues. The requirements for eCall triggering have been known for a long time and they are not very complicated. Challenges may lie in systems that are activated by pressing a button. There should be coordinated testing of different systems also

outside Europe. On the other hand the infrastructure settlement for a TPS needs a lot of work.

Sweden thinks that the certification should include complete loop verification with MSD and acknowledgement by establishing a call setup with voice message to be verified to give acceptable quality. Also position given by vehicle should be certified.

Retrofitted eCall devices for older cars are seen as a very difficult and not a reliable in an incident scenario.

Sweden has also own In-Vehicle System providers in the country. Sweden sees the licence fees of Qualcomm for proprietary systems or aftermarket systems (where more services than eCall are provided) problematic: In-Band Modem for eCall will be supported for free according to Qualcomm but the question is how it will be verified that other services do not use the licensed software of Qualcomm. It will be a clear risk that Qualcomm will require licence fees for eCall when bundled with other services, which was not the intention from the beginning.

About HMI matters (malfunctioning, driver cancellation of false alarm etc.) Swedish Volvo uses buttons located practically at hand and hardwired directly to the IVS. And Volvo does not have any eCall system malfunctioning today apart from some fault codes presented in the display stating that customer should contact Volvo Service. Volvo has a possibility to cancel a manually triggered eCall within 10 seconds. After that all cancellation must be handled by Volvo's call centre.

Sweden sees major problem between IVS – MNO especially because of the In-Band Modem connection, although it is not a problem for Sweden.

There have been plans for retrofitted common in-vehicle platforms in Sweden: some OEM will use basic eCall in their vehicles. Some will use the eCall as a platform to get connected to all customers and offer a wider spectrum of value added services.

If there is or will be coordinated supranational or EU-wide cooperation between national eCall activities and international ICT or service companies which offer PSAP systems (like Siemens) it is important that it´s on equal terms for all to compete

About the location accuracy and maps, there is a clear lack of any description of requirements of location accuracy more than "high" and "low" Sweden welcomes more precise description and maybe how the accuracy shall be described on a map.

Sweden also points out that there is no defined configuration management of standards and implementations of IVS, network adaption's and PSAP's. In a couple of years there will be a large number of versions in use in the growing numbers of cars equipped with eCall. It must be defined how these versions will be managed and controlled to ensure interoperability, and to make sure that any new version in backward compatible with existing old version still in use.

Sweden also points out that there is no clear specification of how interaction between Third Party Solutions Providers (TPSP) and PSAP's will work. Both low/technical level and high/operational level need to be agreed and approved.

How often test eCalls will be triggered needs to be investigated. For example, how often will Bilprovningen (the Swedish Motor Vehicle Inspection Company) trigger and send an eCall to certify that the function is working. There is a concern that test eCalls are only identified through MSD. Thus, a test eCall will for a short moment look identical to a real eCall, until MSD has been decoded, and if MSD is corrupt the eCall will not be identified at all as a test eCall, it is anticipated that this will be addressed by HeERO in future deliverables In eCall issues with MNOs Sweden does not see any real challenges, updating or upgrading MNO systems to handle eCall is straightforward work. But there will be maintenance in keeping the PSAP number list up to date. Also part of the duties may be enforced by law, maybe related to 112 directives (question: Are they part of the spectrum licence?)

The question of who will finance the HeERO MNO tests? In Sweden for Telia-Sonera this is part of the tasks for Ericsson = 50 % EU - 50 % Ericsson. Telenor also 50-50.

The question of who will finance the permanent eCall implementations of MNOs? In Sweden the answer is that no one knows, But in all probability the MNOs, if this is regulated by law.

The main expectations of HeERO project/piloting for MNOs? What issues they see as the most important that the pilot will bring up? The Sweden's answer is the reliability of In-Band modem in the end to end path. The modem is known to be sensitive to "In path equipment" and IP-lines, Verification that eCall flag work correct. The SIM card issue is not a problem. The SIMs will be released depending on contracts between MNOs and the car industry (not?) the IVS providers. Anyhow there are no problems during the trials, but in a commercial realization SIM card contracts will be part of a commercial agreement. Uncertain regulatory aspects might affect the setup.

There may be challenges with voice call / MSD integration. [See GSMA EMP#82011-05-17 Washington DC presented by Karl Hellwig, Ericsson, *AV: not available in web]*. The main

benefit for the MNO is that the in-band modem is transparent and no additional implementation is required except the eCall flag and routing of calls. In Sweden for the HeERO trial both Telenor and Telia networks are upgraded nationwide. But there are several other operators not involved at this stage. Current MNO flag implementation is straightforward procedure. Telenor has enabled this functionality nationwide. It uses traditional voice calls and no additional infrastructure is needed. The supranational eCall implementation is handled in the normal E112 regulation between MNOs. Sweden sees that the eCall SMS should be included in service. It should operate side by side implemented (outside the HeERO project); eSMS will be tested in the Telia network and the results compared with In-Band modem.

eCall is more complex for the mobile operator to implement and maintain. IP infrastructure between MNO and PSAP needs to be established and passing traffic through firewalls will increase the risk of functionality problems.

Sweden thinks other Value Added services should exist, but separately to 112 eCall. Other services should not be named eCall, "eCall is by definition only eCall". Technically eCall can be part of other in-vehicle services, If not called eCall services can include also infotainment and other commercial services.

4.8.1.8   Netherlands

In Netherlands there is expertise in standardisation work (RWS Jan van Hattem, leader of HeERO Dutch project team, participates in CEN 278, WG 15 on eCall and leads the work item on dangerous Goods). The key message for standardisation is: *"Without standardisation there is no interoperability."* Netherlands also wants to point out that there is a need to standardise the extended eCall dataset.

Current research work related to eCall (in addition to HeERO) is involving the getting of data on truckloads into the eCall message. The key research areas that should be further activated related to eCall especially for permanent eCall services is full chain performance using the eCall data in the whole chain of emergency help and road management and using eCall for Dangerous goods. Private sector should also be involved in the use of Pan EU eCall or similar TPS eCall services.

Netherlands does not have its own vehicle industry. Therefore there are no activities between NL eCall authorities and vehicle industry.

Other vehicle safety services also exist (e.g. Road Assistance) and these are TPS services. Officially there have not been discussions or plans of in-vehicle platform incorporating also eCall (or similar system), but car manufacturers are operating in the Netherlands with their own safety related value-added-services. Netherlands think that there should be more coordinated supranational or EU-wide cooperation between eCall activities and vehicle industry for anticipating the future operational situation, "It is a MUST".

Netherland sees that the most difficult technological challenges lies in the eCall trigger functioning in connection with vehicle ageing, annual testing and standards. There are also open questions with TPS access (although they are not connected to 112-eCall): What happens when car changes owner? What TPS do after end of subscription period? Will TPS reprogram modems to Pan European eCall?

The certification should include guarding quality of offered services and periodical check-ups. In retrofitted eCall devices Netherland sees challenges in guarding quality of offered services and performance, e.g. how can the consumer trust these devices, what rules and certification apply, is all allowed and how will this affect the quality of the calls towards 112?

Netherlands have their own eCall In-Vehicle System providers in the country. Almost all international companies have offices or affiliates in the Netherlands. Netherlands sees also issues and problems connected to standardisation of software and systems e.g. the Qualcomm modem: especially in DTMF (Dual Tone Multi-Frequency) and the correct version of the software, how to deal with backwards compatibility.

About HMI the driver cancellation of false alarm should be available: disconnection code should be sent to PSAP. And HMI should be as standardised as possible in order to prevent user mistakes.

About discussions or plans for retrofitted common in-vehicle platforms which include several services, it is not active yet but there will be such services sharing the same in-car platform

Netherlands also wants to point out that the 112 organisation made a restriction to the eCall implementation to handle pan-European eCall by TPS.

Idea of coordinated supranational or EU-wide cooperation between national eCall activities and international ICT or service companies which offer PSAP systems (like Siemens etc.) appeals Netherlands: "it would help the take up of eCall considerably".

About Netherlands MNOs: only one of three MNO's is willing to implement eCall flag. One problem is also that there may be possible costs to MNO's of handling non-emergency calls

(wrong call, test calls etc.). KPN-NL and Vodafone-NL will not implement eCall-flag voluntarily; there will be negotiation with authorities. If MNO duties will be regulated by law, it will happen only when it will be initiated on European level.

Financing the HeERO MNO tests will be done by T-Mobile itself (their own costs). A request for a financial governmental contribution has been submitted. About the question of who will finance the permanent eCall implementations in MNOs, the answer is unknown.

The main expectations of HeERO project/piloting for MNOs are the correlation of data with 112 PSAP. As for upgrading MNO network systems for eCall implementation MNO's in Netherlands have given information that networks don't need to be upgraded. And in 2012 there will be two new MNO's on the market (ZIGGO and UPC), Anyway general understanding is that eCall implementation needs legal obligation otherwise there will be problems.

eCall SMS is not needed in view of Netherlands.

Netherlands also thinks that eCall should be a separate, stand-alone service (benefit being the channelling of call flow). The eCall service is a separate service, but it may share technical resources with other applications as long as eCall has first priority over these services. But eCall should be functioning apart from critical car functions like motor management ABS, track control. Idea is not to integrate the function but use same resources, in this way costs will be saved, and resources will be tested during the use of the other applications. The platform can be available to any private or public service as long as the eCall service is separate and has priority.

5 Framework for systematic identification of barriers and enablers

5.1 General

There are at least four layers to consider and deal with in successful implementation of any ITS service, this also applies to eCall:

- **Policy layer** (eCall policies and implementation, national policies and implementation, general regulation e.g. privacy and safety).

- **Business layer** (all administrative, financial and organisation issues, regulation, issues related to user - needs and feedback, functional and service architecture etc.).

- **Application layer** (technical architecture of the service, interfaces between systems, technical service quality, user interfaces and devices etc.).

- **Network layer** (all communication between systems and stakeholders, interoperability, shared communication protocols and physical components of the system, the mobile communication infrastructure).

Policy layer is the basis for eCall implementation and the Pan-European eCall introduction. Policy layer is responsible for the general policy objectives fulfilment that direct e.g. to safety, sustainability and competitiveness and bringing well-being to the citizens of Europe. Therefore, eCall is expected to especially support the reaching of general traffic safety targets and saving lives.

Member States are willing to invest on eCall implementation and commit themselves if they are convinced that the introduction is really generating added value. Therefore, eCall has to be integrated into priority policies at European and at national levels and Member States. At national level the commitment also has to be reflected at the national governmental decisions and funding programmes guaranteeing the necessary resources for institutional and technology investments.

Major business layer challenges related to eCall are:

- Differences in the organisation of PSAPs

  - One or two or more levels of PSAPs

  - One PSAP receiving all requests or several sector-specific ones?

  - aforementioned issues leading to different technical and communication solutions

- Differences in regulation and responsibilities; e.g. regulated duties for MNOs, outsourcing parts to commercial services or a totally state operated system etc.

- General challenges related to markets and business models

  - Different market situation in different member states (some countries already have private emergency assistance services available on the market while others do not)

- o Chicken and egg problem; not one of the stakeholders (car industry or member states) has been ready to move first

- o Uncertainty and limited knowledge on socio-economic costs and benefits of deployment

Major challenges related to application layer for eCall are:

- Need for interoperable solutions at European level

    - o All eCall in-vehicle systems have to be compatible with all eCall-ready PSAPs in Europe, therefore centralised approach to standardisation was seen necessary

    - o Changes needed in safety-critical systems at PSAPs

    - o Large number of PSAPs to be equipped in some member states

- Common understanding of the quality of service to be provided

    - o What level of reliability should be expected (accident detection / communication / reception / visualisation of MSD etc.)?

- Management of dependencies between systems

Major challenges related to network layer for eCall are:

- The available technologies do not match the requirements for data transmission between vehicle and PSAP

- Implementation of the 'eCall flag' requires changes to mobile and fixed-line networks; the costs and resourcing can be an issue

- There can be problems synchronising MSD and voice calls

- Slow implementation of E112 (network-based positioning of calls to E112 emergency number) in some countries

- Delivery of emergency messages in public Internet (IETF) is under research but the quality of service (Qi's) in public internet is still "best effort"

- Issues related with SIM cards

5.2 Framework for HeERO

The framework for HeERO can be divided into five layers:

1.   Policy layer

2.   Business layer – Administrative layer

3.   Operative layer – PSAPs, service providers etc.

4.   Technological layer – including hardware and software, applications, communications

5.   User layer – end users

6 Identified enablers and barriers

6.1 Policy layer

No clear mandate for Intelligent Transport Systems such as eCall to deliver solutions to traffic problems. This aspect has been a relevant barrier but gradually after the cooperation with Member States and Commission a general understanding of the usefulness of eCall has been reached.

The political commitment is fostered also through the new ITS Action Plan and ITS Directive. The ITS Directive defines eCall (the harmonised provision for an interoperable EU-wide eCall) and the deployment as a priority action. Relevant specifications can be provided (Article 6). Rules on privacy, security and re-use of information are given.

Although many countries have signed the MOU of eCall the national administrative and/or regulative actions have yet to be made.

Most countries have not defined a national implementation plan of eCall for various reasons e.g. institutional reasons or financing. Most Member States currently have one common national policy and operation model on eCall. In governmental operations major implementation policies and plans have to be included in the national government implementation plans in order to guarantee that the necessary resources for the implementation are available.

The organization model depends on national structures and procedures and is therefore not harmonised in Member States. However, in most of the countries eCall is a part of the national emergency processes and is included in the national policy priorities. The structure of the national emergency management system defines also eCall management and operations in a Member State. The situation of the emergency policy and complete system

organization and implementation status can also be a barrier of eCall e.g. because of major level decisions that have to be in place and implemented until the eCall has its order.

Most of the Member States have accepted eCall to be a public service, although the situation is not very clear. However, most of the Member States share the general goal of eCall as to guarantee the same safety level for all European citizens wherever in Europe they are using their cars.

The eCall system is not an independent system that will deliver added value without good cooperation with other necessary systems in emergency situations. In accident situations the related systems include. police, fire-brigade and ambulance operators' systems that take care of the necessary actions to manage the whole system problem as traffic management and control, medical care, rescue operations at incident site.

The Pan-European eCall implementation means that eCall systems have to be installed in all new vehicles coming to the markets. The eCall systems also have to be integrated to the periodic inspection of vehicles. These processes require that IVS are certified and customers are really receiving the added value of eCall with proper and functioning systems. The organization how to fill these requirements is still underway and needs a lot of attention during the coming years and during the HeERO-project.

Some concluding remarks

- eCall MOUs exist, common understanding of eCall usefulness, eCall is in strategies but

- Very few or none detailed or resourced plans of Government exist for real life implementations

- Common EU regulation is needed e.g. for national transposition and also for MNO system upgrading

6.2   Business layer

6.2.1   Impacts and business case

Studies on impact prove that the eCall system is expected to have beneficial effects and when the penetration level is reasonable also the system as such is cost effective. The main benefits are related to safety improvements but also have various additional beneficial

effects, let alone the system effect e.g. being a driver for larger service market development. (see Table 1).

The business case is not yet very clear according to some articles. There are also a lot of critics on Pan-European eCall system implementation partly from the point of view of private industry and its capability to produce the same results based on private business models (TPS). These dedicated systems are already in the market in some countries. A European wide system may also be deemed too inflexible and increase system and its component costs.

Today there is no business model discussed and accepted among the different stakeholders. The ECDG (eCall Driving Group) has identified significant savings in the health and social cost side outnumbering the investment needs in in-vehicle systems and infrastructure. Models of tax and financial incentives have been presented and discussed. So far no agreement is reached. The results of the new eCall Assessment study will allow progress on the business case area, while European FOT should increase customer awareness of the benefits of the service.

Rules on privacy and security issues are of outmost importance. Citizens and other users have to be able to trust that systems take care of privacy and security issues and deliver help and support when needed. In many countries the discussion of the eCall system is also seen as some kind of killer solution regarding the actions towards deployment of business oriented ITS services, re-use of information and bundling of services.

Table 1. eCall cost and benefit assessment as judged by the European Commission (Miethe 2010)

Key Stakeholders	
Mobile Network Operators	Costs only
Automobile Manufacturers	Mainly costs, some hardware revenues
European Member States	Cost savings, less investments
Public Service	Only costs paid by public authorities and insurances
Service Operators	Revenues for service, cost operation
Minor Stakeholders	
Customer	Lives saved
In-vehicle Hardware/Mobile Phone Producer	Revenues
IT Service/ Infrastructure Provider	Revenues
Insurance Companies	Revenues & Cost savings

6.2.2 Legal issues

Data protection and privacy issues have been solved but liability issues are still open. Legislation is not harmonised across Europe.

The eCall value chain is covered by different legal environments and the way these are organised differs by country. The 112 operations have to deal with the telecom laws, the PSAP has to deal with police laws and transport and traffic safety is typical the responsibility of the Ministry of Transport while the large disturbances can be the responsibility of the Ministry of the Interior. All data exchange is also subject to the privacy regulations. Important legal issues to be dealt with are e.g. the data exchange agreement between Traffic Management Centre and PSAP and between national EUCARIS point and PSAP etc.

6.3 Operational layer

6.3.1 Organisational issues

The European Commission recommendation states that the Member States should apply the harmonised conditions and principles to the making of emergency calls manually or automatically by an in-vehicle telematics terminal to public safety answering points via the single European emergency call number 112 (EC 2011).

eCall end-to-end process is based on a value network of different organisations of which many are public and many also private. Managing incidents requires emergency care and medical operations but also managing incident and traffic situations in order to minimize accumulating risks. Therefore, many barriers may arise e.g.:

- Lack of commitment of some of the necessary players

- Disagreement of roles and responsibilities

- Disagreement on financial burdens and cost sharing

- Development of an agreement on a business plan before starting the system development and implementation

- Development of an agreement on an implementation (roll-out) plan before starting the system development and implementation

- Receiving infrastructure in PSAPSs needs to be specified, tested and in place

- eCall system architecture, standards, protocols and interfaces need to be agreed in advance before the development of in-vehicle systems. Simultaneously the necessary receiving infrastructure needs to be prepared.

- Vehicle model cycles and starting dates for vehicle production must be considered, taking into account vehicle type-approval.

- Matching of voice calls and data sets (technology).

- Roaming requirements must be solved

- PSAP work load (in some cases can be also positive impacts)

- Missing certification procedures

- Availability of proprietary eCall services.

6.3.2 *Economic and financial matters of operations*

eCall will bring about savings potential in the health and social cost area which seems to cover the system costs. However, a practical problem has been financing because benefits and costs created involve different stakeholders. Low interest of drivers and customers is expected to be a result of low awareness and inadequate own risk estimation. In general, the

emergency systems are cost-free to citizens and therefore this free of charge expectation is also reflected to the in-vehicle emergency systems.

Commission agrees that due to the long times in product development, and due to the associated costs, the automotive industry need certainty on the implementation of the necessary infrastructure in the Member States before entering the production phase.

Some Member States have not signed the MoU because of costs of operation and upgrading their PSAPs may increase the tax burden.

- PSAP systems vary a lot from country to country and inside the country

- Commercial services / 112-eCall??

- In-vehicle platforms and eCall??

- eCall and additional services: open systems versus proprietary systems

6.4 Technological layer

eCall belongs to the priority infrastructure-related systems. Technology issues cover the whole end-to-end process and barriers and enablers include:

- Definition of requirements

- Architecture definitions

- Standardisation, missing procedures, version differences and inadequate harmonisation

- IVS technology and standards

- PSAP system requirements, receiving technology, upgrading

- Vehicle sensors

- Roaming and language

- Accurate and reliable position estimation regardless of local environment

- Availability of suitable digital maps

- eCall triggering

- The SIM problem (required or not),

- eCall flag problem, embedded or brought-in solution

- Mobile communications future – how are the enabling mobile communication developing compared to current definitions (LTE / GSM, GPRS) and in what timeline

- Interoperability (generic platforms, standards)

- Data security

- Performance metrics

- Availability of aftermarket systems

- Open in-vehicle platform.

Some remarks from questionnaires

- Periodical vehicle inspections are important

- Standardisation and certification are important

- IVS is not standardised >> difficult to certificate?

- Insecurity of retrofit functioning

- eCall is preferred to be a separate system (not in a common in-vehicle platform)

- Whole chain functioning, in-band modem problems, satellite navigation accuracy, map reliability, MNO duties, HMI of IVS etc.

6.5 User layer

Customer awareness and acceptance

The interest of drivers and customers to pay for emergency call services is rather low. As long as the customer is not made aware about the benefits of a harmonised European emergency call service he/she is reluctant to pay for this service. The current situation of different state of deployment of rescue services and gaps in rescue chains in different European countries is making it difficult to find common solutions.

Regulation of personal data and the protection of privacy in the electronic communications sector require that the privacy and data protection rights of individuals should be fully respected and adequate technical and organisational security measures should be implemented for that purpose. However, it allows the use of location data by emergency

services without the consent of the user concerned. In particular, eCall recommendation states that Member States should ensure that there are transparent procedures governing the way in which a provider of a public telecommunications network and/or service may override the absence of consent by a user to the processing of location data, on a per-line basis for organisations that deal with emergency calls and are recognised as such by a Member State. (EC 2011)

Users need to be made aware of the advantages and potential benefits of the eCall system, but also on the technical limits (when it does work and when not).

6.6   Moral and ethical issues

Moral and ethical issues are related to policies and reflected through policy actions. Some of these actions also relate to legal actions guaranteeing e.g. privacy and safety issues.

Main principled moral and ethical issues consider citizens' rights. Traffic safety and safety as a whole is a basic requirement of all of the citizens. Traditionally, the providing of general safety level in a society is a social responsibility and should be offered to all of the citizens. However, supporting actions provided by other than public organisations are of course also allowed.

7   Conclusions

The European research results have clearly proved the positive impacts of e Call system in Europe. Major reduction on fatalities and also some other closely related societal benefits can be expected especially if a large penetration level of the system is realized.

The research review and completed first questionnaire study summaries the major enablers and barriers for harmonised Pan-European eCall system deployment. Main enablers and barriers are related to political, business, operational, technology and user layers of the eCall system development and implement activities.

The eCall status is high in the main EU-level policies today. In Member States, however, the development of eCall and real commitment when taking also financial matters into account still seems to vary. HeERO-project is in a key position when solving the remaining problems and guaranteeing the implementation and deployment of eCall.

Discussions on the business case and the role of the private sector on eCall deployment are still continuing. For this there are many reasons: the on-going change and initiatives in vehicle-industry from conventional vehicle production into more widened service delivery for

the whole vehicle life cycle, activities in after-market in-vehicle platforms and services (same possibilities for safety services should be available also for older vehicles), the complexity in various emergency organisations etc.

Some key findings from the first HeERO's enables and barriers study:

- the level of the political commitment for eCall varies in EU Member States. Harmonised regulation of eCall implementation is needed for several parts of end-to-end performance for increase both political and private participation (e.g. mobile operator duties, financing, political commitments etc.)

- complex organisation of emergency rescue operations in MS can influence eCall implementation and performance

- business case for eCall should be beneficial/tolerable for all stakeholders

- there are many technical issues and uncertainties in end-to-end performance which must be studied and tested in HeERO and other tests

- end-user awareness is an important part of the success story of eCall

 The interest of drivers and customers to pay for emergency call services is rather low. As long as the customer is not made aware about the benefits of a harmonised European emergency call service, he/she is reluctant to pay for this service. The current situation of different state of deployment of rescue services and gaps in rescue chains in different European countries is making it difficult to find common solutions.

Regulation of personal data and the protection of privacy in the electronic communications sector require that the privacy and data protection rights of individuals should be fully respected and adequate technical and organisational security measures should be implemented for that purpose. However, it allows the use of location data by emergency services without the consent of the user concerned.

Main principled moral and ethical issues are considering citizens' rights. Traffic safety and safety as a whole is a basic requirement of all citizens. Traditionally, providing a general safety level in a society is a social responsibility and should be offered to all citizens. However, supporting actions provided by other that public organisations should of course also be allowed.

The analysis of enablers and barriers is continuing during the entire HeERO-project. The project is monitoring the pilot implementation and operation phases and recording all of the

major enablers and barriers during these phases. The project is also following what kind of effects are borne on the already identified enablers and barriers reported in this first study and phase.

8 References

ACEA, JAMA, KAMA 2009. eCall Industry Position. August 2009.

Annoni M. 2011. Interoperable eCall service. A Mobile network Operator´s Perspective. TELECOM Italia. 8th ITS European Congress – Lyon, 6-9 June 2011.

EEIPEEIP 2011a. Proposal of common protocols to forward the information from the PSAP/eCAll centres to the relevant road operators, including agreements at national/regional level. Deliverable of Task Force 3. Version 1.0. 01/03/2011 Brussels.

EEIPEEIP 2011b. Summary of current actions held by EEIPEEIP Task Forces. 14.10.2011 http://www.icarsupport.eu/assets/Uploads/Documents/eCall/EeIPEeIP-TFupdate-March-2011.xls

EENA 2011a. EENA Operations Document. 112 service chain description. 10-06-2011. http://www.eena.org/ressource/static/files/2011_06_10_1_1_1_servchain_v1.0.pdf

EENA 2011b. Results for Next Generation 112: Emergency services operational requirements survey. Version: 1.2. 08-09-2011. http://www.eena.org/ressource/static/files/2011_09_08_ng112opreqsurvey_v1.2.pdf

EU 2002. Directive 2002/58/EU of the European Parliament and the Council on privacy and electronic communications concerning the processing of personal data and the protection of privacy in the electronic communications sector. Official Journal of the European Union 31.07.2002.

EU 2009. Directive 2010/40/EU of the European Parliament and the Council on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport. Official Journal of the European Union. 6.8.2010.

EU 2010. Directive 2010/40/EU of the European Parliament and the Council on the framework for the deployment of Intelligent Transport System in the field of road transport and for interfaces with other modes of transport. Official Journal of the European Union. 7.7.2010.

EU Commission 2003. Communication from the Commission to the Council and the European Parliament. Information and Communications Technologies for Safe and Intelligent Vehicles. Brussels 15.9.2003. COM (2003) 542 final.

EU Commission 2006. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Bringing eCall back on track – Action Plan. Brussels 23.11.2006. COM(2006) 723 final.

EU Commission 2008. Final Report and Integration of Results and Perspectives for market introduction of IVSS. Version 2.0 Socio-economic Impact Assessment of Stand-alone and co-operative Intelligent Vehicle Safety Systems (IVSS) in Europe. eIMPACT. Deliverable D10. 11.08.2008.

EU Commission 2008b. Commission Staff Working Document. Impact Assessment Brussels 16.12.2008. SEC(2008) 3083.

EU Commission 2009. Impact assessment on the introduction of the eCall service in all new type-approved vehicles in Europe, including liability/legal issues. Final report, Issue 2. SMART 2008/55. European Commission November 2009.

EU Commission 2009b. Communication from the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. eCall: Time for deployment. Brussels 21.8.2009. COM(2009) 434 final.

EU Commission 2010. Communication from the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Action Plan on Global Navigation Satellite System (GNSS) Applications. COM(2010)308.

EU Commission 2011a. Commission recommendation on support for an EU-wide eCall service in electronic communication networks for the transmission of in-vehicle emergency calls based on 112 ('eCalls'). 8.9.2011.
http://ec.europa.eu/information_society/activities/esafety/doc/ecall/recomm/recomm.pdf

EU Commission 2011b. Commission staff working paper. On the implementation of the harmonised EU-wide in-vehicle emergency eCall, eCall. Impact assessment. Brussels, 8.9.2011. SEC1019/2011.Final.

EU Commission 2011c. COCOM10-38. Communications committee DG INFSO/B2
Working Document. Subject: Implementation of the European emergency number 112 .
Results of the fourth data-gathering round. Brussels, 2.5.2011

EU Commission 2011d. COCOM10-38. ANNEX to document COCOM10-38 'Report on the Implementation of 112'. 2.5.2011

EU Commission 2011e. eCall Memorandum of Understanding. http://ec.europa.eu/information_society/activities/esafety/doc/library/mou/list_of_signatures.pdf. 14.10.2011

eSafety Forum. 2008. Recommendations of the DG eCall for the introduction of the pan-European eCall. Version 2.0. eCall Driving Group. April 2006.

eSafety Forum. 2011. Implementation Road Map. iCarSupport Deliverable 3.1. 30 June 2011. The Implementation Road Maps Working Group.

Filjar, R., Dešić, S., Huljenić, D. 2004. Satellite positioning for LBS: A Zagreb field positioning performance study. *Journal of Navigation*, 57, pages 441-447,

Filjar, R., Bušić, L., Kos, T. 2007. A Case Study of DGPS Positioning Accuracy for LBS. *Automatika*, 48(1-2), pages 53-57.

Filjar, R, G Segarra, I Vanneste, P Britvic, K Vidovic 2011.. Satellite positioning for eCall: An assessment of GPS performance. Presentation in 8th European ITS Congress. Lyon, France.

ITS International 2011. eCall misses the point. James Foster – News Editor. ITS International. July 2011.

Henchoz, J-M. 2011. A Call to arms. Thinking Highways Vol6 No2.

Kulmala, R. 2008. Overcoming barriers to ITS Deployment. 15th World Congress on ITS, November 16-20, 2008, Jacob K. Javits Congress Centre, New York City, NY, Executive Session 12: Overcoming barriers to ITS Deployment. ITS America.

Mayer, H. 2011. From cooperative systems to mobility services. Executive Session 03. ERTICO. 8th ITS European Congress – Lyon, 7 June 2011.

Michalski, W. 2009. Recommendations and Regulations of the European Commission regarding the Pan-European eCall. Journal of Telecommunications and Information Technology. 4/2009.

Miethe, Christiane. 2010. The Logic of Access to European Commission Expert Groups: Assessing the Delay of the eCall Project. http://www.spaef.com/file.php?id=1303 retrieved 26.9.2011.

Thomas, Martyn 2011. Global Navigation Space Systems: reliance and vulnerabilities. The Royal Academy of Engineering. London, UK. http://bit.ly/feFB2i 13.10.2011

Zandbergen, P A, S J Barbeau. 2011. Positional Accuracy of Assisted GPS Data from High-Sensitivity GPS-enabled Mobile Phones. *J of Navigation*, **64**, pp 381-399)

Appendix 1. Questionnaire

Objectives of the WP6 (Deployment enablers)

WP6 gathers inputs and experiences about barriers and enablers of eCall implementation. Barriers can exist in stakeholder relations, in technology, in chosen standards, in implementation processes, other services related to eCall etc.

The in-vehicle eCall is an emergency call generated automatically via activation of in-vehicle sensors (or in some cases manually by vehicle occupants). The eCall trigger is transmitted over the vehicle specific bus (CAN, MOST or other) to the in-vehicle system. The in-vehicle system aggregates the MSD as specified and agreed by the eCall stakeholders (based on MoU). When activated, the in-vehicle eCall system will establish a 112-voice connection directly with the relevant PSAP (Public Service Answering Point) (either a public or a private eCall centre operating under the regulation and/or authorization of a public body). At the same time, a minimum set of data (MSD) will be sent to the eCall operator.
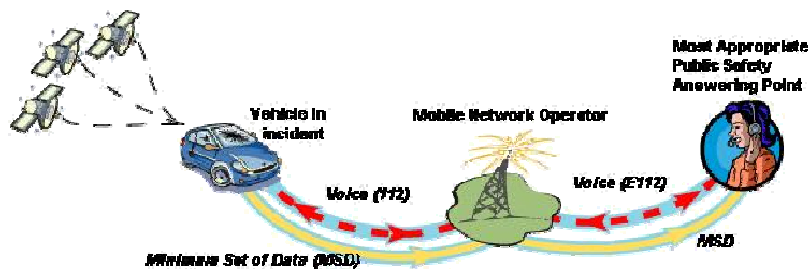
Vehicle Industry	ICT Industry Device Manu- factures	MNO	Service Providers	Research Institutes Standardisa tion bodies	PSAP Emergency Rescue forces	State Authorities
Vehicles	IVS Back-end HW SW	Communi- cations	Value-Added Services In-Vehicle platforms	Research R&D Standardi- sation	PSAP functions Rescue Functions	Policies Adminis- tration
eCall Triggering Vehicle sensors In-vehincle communication	Devices and software Back-end systems Mobile phone systems	Radio networks Mobile communication PSAP phone centres and services eCall "Flag"	eCall business models Other related services	Impacts Effects Technical performance studies standards	Emergency call and data receiving Rescue force dispatching	Strategies Regulation Resources Coordination

Figure. eCall value chain and main stakeholders and domains

It is vital to analyse all possible bottlenecks in end-to-end service chain and find the key-enablers for a successful and unbroken service chain.

The first questionnaire aims to **find out the key questions** for the HeERO pilot to give the answers, examples of possible key questions are:

- For **administration process**: what will be the optimal process to enforce eCall service in an EU country? (views from ministries, state authorities, vehicle administration etc.)

- For **PSAP processes**: what are the key barriers to overcome in PSAPs processes related to eCall? Is it technology, fear of false alarms, procurement issues etc.?

- For **technology provision**: Is the quality of end2end performance the main thing to concentrate on now or e.g. business models for vehicle industry, IVS, MNO, service providers etc. for eCall implementation?

Stakeholders / eCall domains

State authorities (ministries, regulatory authorities, departments)

2.1.1. Is there a plan (or possibly already approved) top-down "marching order" / subordination for eCall implementation in the country (e.g. planned regulation, supervision, authority roles, implementation procedures etc.)? Yes/No

2.1.1.a) If yes, attach a plan/sketch of a top-down subordination diagram (related authorities) or stakeholder list of eCall process in the country.

2.1.1.b) If not, what are the known most discussed issues (organisational or technical or other) hindering the official process?

2.1.2. Is there a plan for organising the national activities in international eCall processes including the VIN data delivery from country to country?

2.1.3. Should the certification of eCall IVS be national / supranational?

2.1.4. Are there interested parties in your country to provide certification services for eCall?

2.1.5. Are there already plans for technical supervision of eCall IVS (connected to annual vehicle inspections etc.)? Yes/no

2.1.5.a) If yes, is there issues you want to rise about this supervision organisation?

2.1.6. Are the related authorities (road authorities etc.) informed and cooperative in eCall issues?

Any other issues related to state organisation?

PSAPs

Organisational issues

2.2.1 Are there many PSAP –levels in the country (e.g. national level / local level / TPS-eCall service centres)? Yes/no; if yes, short description:

2.2.2 Is there a plan for dedicating a certain PSAP centre (or a few PSAP centres) for centralist handling of eCall in the country/area (=eCall messages are sent to a certain PSAP)? If yes, why?

2.2.3 Are there known or predicted problems in implementing eCall to PSAP system? What are those?

2.2.4 Are the permanent eCall service procurements (dedicated eCall related updates for PSAP hardware and software) done later as a separate acquisition? Or will the pilot start the procurement process in PSAPs?

Resources (both HR & Finance)

2.2.5 Will there be enough resources and experts (Human Resources) for operating and maintenance of eCall functions in PSAPs? Or is there a need for cooperation with other countries in this matter?

2.2.6 Do you see any problems in risk evaluations or eCall message handling compared to normal emergency requests (incident handling done by PSAP operators compared to a normal 112 call and eCall)? What?

2.2.7 Will there be any problems with financing the permanent eCall implementation into PSAP system?

2.2.8 Are there enough resources and experts for procurement of needed hardware and software updating because of eCall for PSAP system? Or is there a need for cooperation with other countries in this matter?

Operation and techniques

2.2.9 What are the main expectations of piloting?

    2.2.9. a) Experience of successful functioning of eCall in PSAPs?

    2.2.9. b) Convincing the regulators and top-level decision makers that eCall will be life-saving well-functioning service?

    2.2.9. c) Demonstration and argument for needed resources and expertise for real life implementation in PSAPs?

    2.2.9. d) Or other?

2.2.10 What are the main challenges in supranational eCall sending (from country-to-country) in PSAPs' point-of-view?

2.2.11 Are there technical challenges in voice call / MSD integration in PSAPs?

2.2.12 Are there technical challenges in supranational eCall mediating in PSAP point-of-view?

2.2.13 Other issues?

Standards and research

2.3.1 Are there experts from the country involved in standardisation work?

2.3.2 What are your key messages for [future] standardisation work?

2.3.3 Is there active research work related to eCall in the country?

2.3.4 What are the key research areas that should be further activated related to eCall (in technical performance / in organisational issues / in impacts and impressiveness) especially for permanent eCall services?

2.3.13 Other issues?

Vehicle industry

2.4.1 Is there vehicle industry in the country? Yes/no

2.4.2 Is there eCall related cooperation between the vehicle industry and national traffic safety authorities and PSAPs? Yes/no.

2.4.2 a) If there is, are there any problems risen to discussions related to eCall?

2.4.3 Are there competing commercial or private emergency or rescue services (bCall etc.) in the country?

2.4.4 Are there discussions or plans for vehicle industry driven common in-vehicle platforms which include several services and 112-eCall or private emergency services?

2.4.5 Should there be more coordinated supranational or EU-wide cooperation between eCall activities and vehicle industry?

2.4.6 What technological challenges are the most difficult ones connected to eCall system in cars (or other vehicles)? E.g. eCall trigger functioning, vehicle aging, annual testing etc.

2.4.7 What issues should the certification include? What should be left to industry?

2.4.8 How do you see the retrofitted eCall fitting of devices for older cars? What are the main challenges?

2.4.9 Other issues?

In-Vehicle Systems, device manufacturers, ICT industry / software production?

2.5.1 Are there eCall In-Vehicle System providers in the country? Yes/no

2.5.2 Are there special issues and problems raised to discussions related to eCall among IVS providers? Do you see any challenges in eCall IVS? E.g. in standardisation of software and systems, in Qualcomm modem etc.?

2.5.3 Do you see any challenges in HMI related issues: airbag trigger / manual trigger / driver alert of eCall system malfunctioning / driver cancellation of false alarm?

2.5.4 What are the main problems between IVS – MNO? Two-way communicating? MSD sending/cancelling if false alarm?

2.5.5 Are there discussions or plans for retrofitted common in-vehicle platforms which include several services, 112-eCall or private emergency services?

2.5.6 Other issues?

ICT industry / software production

2.6.1 Should there be more coordinated supranational or EU-wide cooperation between national eCall activities and international ICT or service companies which offer PSAP systems (like Siemens etc.)?

2.6.2 Do you see any challenges in location accuracy and maps?

2.6.3 Other issues?

MNOs

2.7.1 Are there known problems in activating the MNOs for future eCall duties? E.g. in eCall Flag implementation?

2.7.1 Will the MNO duties be regulated by law?

2.7.1 Who will finance the HeERO MNO tests?

2.7.1 Who will finance the permanent eCall implementations in MNOs?

2.7.1 What are the main expectations of HeERO project/piloting for MNOs? What issues they see the most important that the pilot will bring up?

2.7.1 Do you see any challenges with the use of SIM and USIM cards?

2.7.1 Do you see challenges in contracts between MNOs' SIM/USIM releasing & IVS providers?

2.7.1 Do you see special issues/challenges in voice call / MSD integration?

2.7.1 What are the main technical challenges in updating the MNO network systems for eCall implementation nationally? Are there new resources needed in this?

2.7.1 What are the main technical challenges in updating the MNO network systems for eCall implementation supranational? Need of roaming SIMs?

2.7.1 Should also the eCall SMS be included in service?

2.7.1 Other issues?

Value Added services / Services related to eCall

2.8.1 Should eCall be a separate, stand-alone service? Yes/no

2.8.1a) If yes, what are the main benefits for separate eCall?

2.8.2 Or should eCall be connected to other in-vehicle services? Yes/no

2.8.3 What are the conditions for this integration (if any)?
2.8.4 What are the main benefits of integrating eCall to other services?

2.8.5 What kind of services could be connected to eCall? E.g. to other regulated services like road-tolling or to traffic insurances, delivery of dangerous goods etc.? Or also to infotainment and other unregulated services??

2.8.6 Other issues?

Any other comments, feel free!