



EUROPEAN COMMISSION

Brussels, 8.9.2011  
SEC(2011) 1019 final

Part 1

**COMMISSION STAFF WORKING PAPER**

**IMPACT ASSESSMENT**

*Accompanying the document*

**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')**

{C(2011) 6269 final}  
{SEC(2011) 1020 final}

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## BACKGROUND

### 1.1. General context

This Impact Assessment aims to find the most appropriate solutions to the implementation of the pan-European in-vehicle emergency call (eCall).

Road Safety is one of the major policy subjects within the Transport Policy of the European Union. In 2009 around 35,000 people were killed and more than 1.5 million injured in about 1.15 million traffic accidents on roads in the European Union. This represents approximately 160 billion EUR of cost for society<sup>1</sup>.

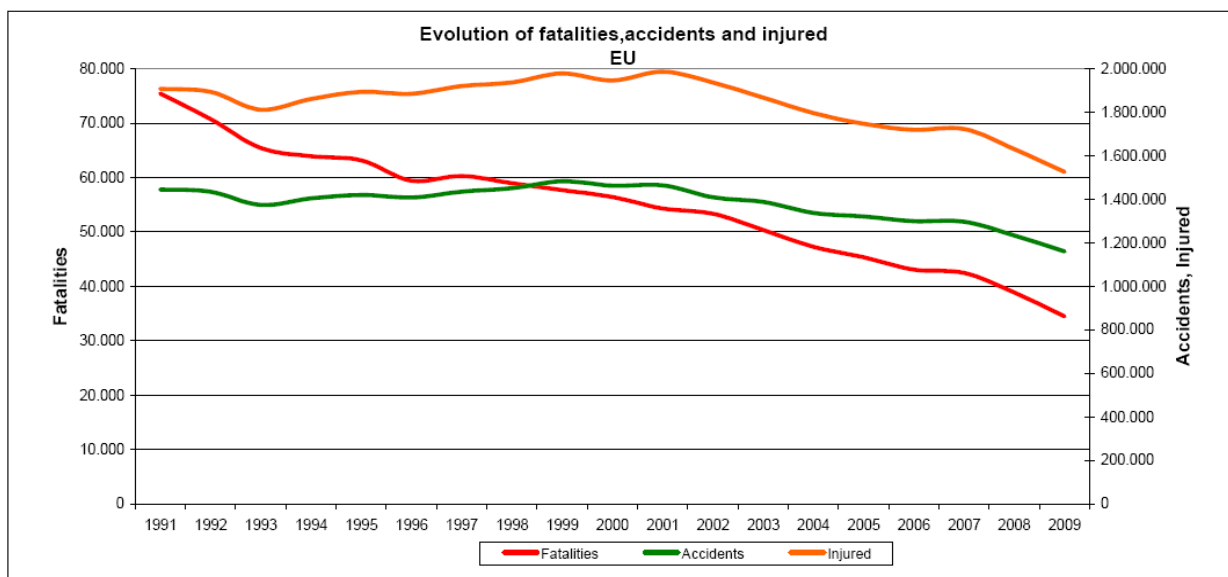


Figure 1: Road safety evolution in the EU (source: CARE database)

The EU is highly committed to reducing the number of road accidents (accident prevention or *active safety*), but also in mitigating their consequences when they occur (*passive safety*), and by improving the efficiency of the emergency services and the effectiveness of post-accident medical care (*tertiary safety*). eCall can significantly contribute to the reduction of road fatalities and alleviation of severity of road injuries.

The Commission has proposed, as priority action to mitigate the consequences of the road accidents, the introduction in all vehicles in Europe of an eCall service based on 112<sup>2</sup> and on common pan-European standards developed by the European Standardisation Organisations, ETSI and CEN, to ensure an affordable service that will work seamlessly and in an interoperable way across Europe, thus maximising its benefits.

On 21<sup>st</sup> August 2009 the Commission adopted the Communication<sup>3</sup> ‘eCall: Time for Deployment’, in which the status of the initiative to introduce eCall in Europe was explained, and a series of measures to support the voluntary introduction of the eCall service in all new road vehicles in Europe was proposed.

<sup>1</sup> COM(2001) 370 – ‘White Paper on European transport policy for 2010: time to decide’

<sup>2</sup> 112: Single European Emergency Number

<sup>3</sup> COM (2009) 434: eCall: time for deployment

The Communication indicated that if significant progress had not been made by the end of 2009, both in the availability of the eCall device in vehicles, and the necessary investment in the Public Safety Answering Points (PSAP) infrastructure, the Commission would plan to take the following regulatory measures in 2010:

A Recommendation to the Member States (MSs) targeting Mobile Network Operators (MNOs) to support the transmission of the eCalls, including the Minimum Set of Data (MSD) from the in-vehicle systems to the PSAPs

A proposal for a Regulation under the vehicle type-approval legislation for the mandatory introduction of the in-vehicle part of the eCall service in new type-approved vehicles in Europe

The assessment of a potential regulatory measure for the necessary upgrading of the PSAP infrastructure required for proper receipt and handling of eCalls

The deployment of a pan-European eCall service available in all vehicles and in all countries was one of the high priorities identified by the Working Group of experts on Road Safety at the end of 2002. The Commission included the deployment of a harmonised pan-European eCall service as one of the priorities of the eSafety initiative<sup>4</sup>, and supported the creation of an eCall Driving Group with participation of representatives of all the stakeholders, to define the requirements of such service. The Commission also funded research projects to proof the concept of a pan-European eCall services and studies to analyse the possible impact of its introduction.

The eCall Driving Group produced a Memorandum of Understanding towards the elaboration of a pan-European interoperable eCall service in Europe (eCall MoU<sup>5</sup>) in 2004, and proposed a roadmap aiming at starting the voluntary introduction of eCall as standard option in all vehicles in Europe by the end of 2009<sup>6</sup>. The eCall Driving Group issued their final recommendations, endorsed by the eSafety Forum in 2006<sup>7</sup>, and the Commission requested the European Standardisation Organisations (ETSI, CEN) the elaboration of the necessary common European standards. The Commission also held consultations with representatives of all stakeholders associations involved in the eCall value chain and with the Member States, organising technical and high level meetings.

The European Parliament has expressed on two occasions its support to the introduction of a pan-European eCall service<sup>8</sup> by overwhelming majority, asking Member States to sign the Memorandum of Understanding and the Commission to adopt necessary regulatory measures.

In agreement with the European Parliament, the Council adopted the Directive 2010/40/EU for the deployment of Intelligent Transport Systems, which includes *"the harmonised provision for an interoperable EU-wide eCall"* among the priority actions.

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<sup>4</sup> Commission Communication 2003 (542) on Information and Communications Technologies for Safe and Intelligent Vehicle -1<sup>st</sup> eSafety Communication-

<sup>5</sup> [http://ec.europa.eu/information\\_society/activities/esafety/ecall/index\\_en.htm#Memorandum\\_of\\_Understanding](http://ec.europa.eu/information_society/activities/esafety/ecall/index_en.htm#Memorandum_of_Understanding)

<sup>6</sup> EC Communication The 2nd eSafety Communication Bringing eCall to Citizens, COM(2005) 431

<sup>7</sup> See [http://www.esafetysupport.org/en/ecall\\_toolbox/driving\\_group\\_ecall/index.html](http://www.esafetysupport.org/en/ecall_toolbox/driving_group_ecall/index.html)

<sup>8</sup> European Parliament: Titley report 2005/2211(INI) and Gurmai report 2007/2259(INI)

eCall is also a measure included in the Road Safety Action Programme 2011-2020<sup>9</sup>, as a way to improve road safety. eCall will also contribute to the new target introduced in the Road Safety Action Programme of reducing the number of injuries in Europe.

20 Member States (Austria, Belgium, Czech Republic, Denmark, Germany, Greece, Spain, Estonia, Italy, Cyprus, Lithuania, Luxembourg, Malta, The Netherlands, Portugal, Romania, Slovenia, Slovak Republic, Finland and Sweden) and 4 Associated States (Switzerland, Croatia, Iceland and Norway) have signed the MoU. Other 4 Member States have expressed their support to eCall and their intention to sign the MoU as well (Latvia, Hungary, Bulgaria and Poland). Ireland has sent a letter to the Commission supporting the mandatory introduction of eCall. Interest to eCall was also declared by Russia and Croatia. United Kingdom has not signed the MoU due to cost-benefit considerations. France supports the private eCall as opposed to regulatory measures (further details in section 5.2.3).

However eCall implementation has been delayed from the initial target date of 2009<sup>10</sup>, and risks to suffer additional delays.

Major stakeholders affected by the introduction of eCall (Mobile Networks Operators, Automotive Original Equipment Manufacturers and Public Safety Answering Points) have expressed their acceptance and support to eCall, with the condition that the implementation is undertaken by the three parts in a parallel way and that lead time is allowed.

## **Consultation and expertise**

This impact assessment is based on the extensive contributions by all affected stakeholders, constantly involved in several fora such as the European eCall Implementation Platform (EeIP)<sup>11</sup>, the eCall PSAPs expert Group<sup>12</sup> and the eCall Driving Group<sup>13</sup> within the eSafety Forum.

Since 2002, when the group of high level experts on intelligent vehicle safety systems identified eCall as one of the highest priorities to deploy eSafety systems, all types of relevant stakeholders and experts (i.a.: Member States representatives, consumer associations, Public Safety Answering Points representatives, automotive industry, road operators, insurance companies, mobile network operators, standardisation organisations, telecom industry, emergency services) have been providing major inputs to the eCall initiative, and agreed on recommendations for its deployment.

Within the European Commission, the Steering Group for the eCall Impact Assessment (IASG) was set up in March 2010. It included representatives from the following Directorates General: ECHO, ENTR, INFSO, JUST, MOVE, SG and SJ (MARKT, ENV and SANCO were also invited, but they considered the topic not relevant to their competences). The IASG

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<sup>9</sup> COM(2010)389: Towards a European road safety area: policy orientations on road safety 2011-2020

<sup>10</sup> COM(2005) 431: Bringing eCall to Citizens

<sup>11</sup> The European eCall Implementation Platform (EeIP) is the coordination body bringing together representatives of the relevant stakeholders associations and of the National Platforms supporting the implementation of a pan-European in-vehicle emergency call in Europe. Support to the EeIP is one of the measures of the ITS Action Plan. <http://www.icarsupport.org/ecall/european-ecall-implementation-platform-eeip/?menu=2>

<sup>12</sup> The eCall PSAPs expert Group is a subgroup of Public Safety experts mandated by the Expert Group on Emergency Access (EGEA) to deal with eCall related issues.

<sup>13</sup> The eCall Driving Group is a Working Group within the eSafety Forum composed by representatives of all relevant stakeholders to agree on common requirements for the service. [http://www.esafetysupport.org/en/ecall\\_toolbox/driving\\_group\\_ecall/index.html](http://www.esafetysupport.org/en/ecall_toolbox/driving_group_ecall/index.html)

liaised also with DG COMP. The IASG, mostly attended by ENTR, INFSO and MOVE, met 5 times<sup>14</sup> and provided both valuable contributions from the relevant policy areas and a scrutiny of the draft IA.

The IA is also based on numerous studies on the introduction of eCall that had already been conducted, notably SEiSS<sup>15</sup>, STROM<sup>16</sup>, E-MERGE<sup>17</sup>, AINO<sup>18</sup>, eIMPACT<sup>19</sup> and the "Study on the impact of the introduction of eCall in Europe"<sup>20</sup> coordinated by TRL, carried out in 2009. All studies took into due account the involved stakeholders' repercussions and opinions.

#### *1.1.1. Public consultation*

The public consultation on the implementation of eCall was open from the 19<sup>th</sup> July to the 19<sup>th</sup> September 2010.

The public consultation was conducted via the on-line Inter-active Policy Making (IPM) survey, published on the dedicated web-site "Your Voice in Europe". Information on the public consultation were extensively disseminated through stakeholders and also advertised in major websites. The English version of the questionnaire is available in Annex I.

More than 80% of respondents to the public consultation find the eCall system useful and they would like their vehicle to be equipped with eCall. 68% are in favour of the mandatory introduction of eCall and 58% prefer eCall to be handled by public authorities.

These results coincide in the major conclusions with previous consultations such as the Eurobarometer survey on the "Use of Intelligent Systems in Vehicles", in which 70% of the respondents –sample of 25,000 citizens from 25 Member States- found it useful and wanted it to have it on their next car, or the survey among more than 7,600 automobile clubs members from 12 European countries within EUROTTEST consortium on different vehicle intelligent safety technologies: eCall was considered the most useful system in the nearby future, more than 92% found it useful and 96% want to have it in their car. 64% of the respondent preferred the service to work under public infrastructure<sup>21</sup> (See Annex X).

Out of total 450 responses to the public consultation, 130 answers have been received on behalf of organisation and 14 on behalf of public authorities. The public consultation also triggered a number of extensive position papers provided by the most relevant parties, which were also integrated in the qualitative analysis.

All respondents on behalf of organisations agree on the usefulness of eCall, which is considered a valuable safety system for the reduction of road fatalities and a potential contributor to the uptake of telematics in the EU. The majority of contributors are in favour of the mandatory implementation of eCall (including MNOs, Users' and Road Safety organisation and suppliers); however other major stakeholders (i.a.: ACEA, the European

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<sup>14</sup> 19<sup>th</sup> March, 18<sup>th</sup> June, 22<sup>nd</sup> July, 8<sup>th</sup> October, 15<sup>th</sup> November 2010

<sup>15</sup> Socio-Economic impact of intelligent Safety Systems, 2005

<sup>16</sup> Stuttgart Transport Operation by Regional Management, 1991

<sup>17</sup> Pan-European Harmonisation of Vehicle Emergency Call Service Chain - Final Report, June 2004

<sup>18</sup> Aino Study on the impact of the introduction of eCall in Finland. See [www.aino.fi](http://www.aino.fi)

<sup>19</sup> Socio-economic IA of Stand-alone and Co-operative Intelligent Vehicle Safety Systems in Europe, 2008

<sup>20</sup> "Impact assessment on the introduction of the eCall service in all new type-approved vehicles in Europe, including liability/legal issues". TRL and others

<sup>21</sup> Special Eurobarometer 267

Automotive Manufacturers Association) have not taken any position on that because of issues that are not yet clear to them (i.e.: parallel commitment of all relevant parties, costs of the in-vehicle system -IVS-, etc.). Automotive Manufacturers suggest to leave the deployment of eCall to the private initiative. Independently from the policy option, most of the replies stress the importance to ensure coexistence between public and private eCall (currently in the market). It was also emphasized by some stakeholders (i.e. insurance companies) that consumer choice and free competition should be guaranteed, as none of the involved stakeholders should have a market dominant position.

Detailed report and analysis of the public consultation results are available in Annex II. Links to the position papers provided by major stakeholders are also available in Annex V.

## PROBLEM DEFINITION AND RATIONALE FOR INTERVENTION

### 1.1. Problem statement

There are too many road fatalities and severe injuries on European roads. eCall has the potential to reduce the time needed for rescue emergency services to arrive at the place of the accident, and therefore to reduce the risk of deaths and the severity of the injuries.

However, despite its potential, the take-up of the eCall service offered by private companies has been slow, due to the following problems and market failures<sup>22</sup>:

There is a lack of coordination, or collective action, between the major stakeholder groups (mobile networks operators, vehicle manufacturers and public authorities/Public Safety Answering Points). Despite general agreement, each group is waiting for the others to act first.

This results in a lack of upgraded public emergency response infrastructure to handle eCalls, i.e. an insufficient supply of public goods.

In view of these difficulties, private eCall schemes (relying on parallel infrastructures such as private call centres) have so far been very expensive. Market prices currently do not reflect the real costs and potential benefits to society.

Missing markets (service offered only in Member States with clear business case)

A summary of the main problems addressed by eCall and the respective drivers are shown in the table below:

PROBLEMS <sup>23</sup>	DRIVERS
High number of road fatalities and severe injuries	Long response time by emergency services (inter alia)
Delays in alerting emergency services	Manual notification by the vehicle occupants or third parties
Delays in reaching the accident scene	Emergency services can rely only on the indications provided by phone, accurate location of the incident is difficult to establish
Long rescue time at the accident scene	Emergency services are not aware of the vehicle type and other essential details on the accident
Secondary accidents and traffic congestions	Traffic management centres/Road operators not promptly notified

Table 1: Major problems and respective drivers that eCall can improve

<sup>22</sup> See also section 5.2.1

<sup>23</sup> For scale of the problems and drivers, cf. figures 2, 5 and 8

So far, the take-up of the eCall service offered by private companies has been slow, due to the following market failures:

Market prices for do not reflect the real costs and benefits to society;

Insufficiency upgrade of public emergency response infrastructure.

Missing markets (service offered only in Member States with clear business case)

### eCall in brief

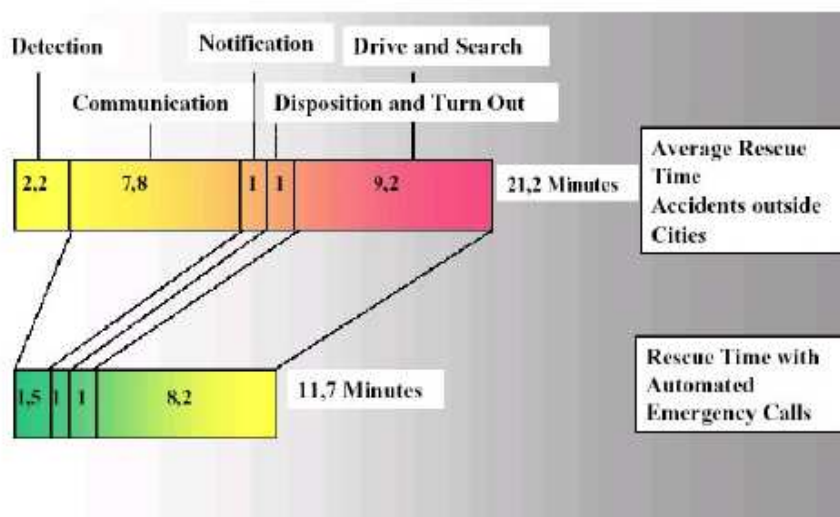
In case of a severe crash, an eCall-equipped vehicle will automatically trigger an emergency call. Even if no passenger is able to speak, e.g. due to injuries, a minimum set of data with relevant information about the incident is sent automatically, which includes, *inter alia*, the exact location of the crash site. eCall can also be activated manually. In brief, eCall:

Is triggered automatically by the in-vehicle system<sup>24</sup> in case of serious accident or manually by vehicle occupants

Creates a voice/audio link to the most appropriate PSAP (Public Safety Answering Point) and sends data message (so called Minimum Set of Data – MSD)

The MSD includes the minimum information needed to handle the emergency situation<sup>25</sup>, such as time stamp, accurate location (GNSS based) and direction of driving, vehicle identification (VIN), and other information essential to the rescue services.

The German study "STORM" (Stuttgart Transport Operation by Regional Management), showed almost 50% rescue time improvement in rural area, with a net gain of around 10 minutes. Rescue time in urban area would be improved by 40%.



Source: E-merge WP2

Figure 2: average rescue time (minutes) outside urban areas with and without eCall

<sup>24</sup> Activation e.g. by the vehicle sensors in a similar way to the airbag.

<sup>25</sup> Complying to the personal data protection principle of proportionality

The PSAPs expert Group within the eCall Driving Group confirmed that the gain in time could go up to 17 minutes<sup>26</sup> in interurban areas.

The deployment of the eCall service requires the following actions from the relevant stakeholders:

Vehicle/equipment manufacturers should include an in-vehicle system capable of triggering the eCalls and gathering and bundling the Minimum Set of Data.

Mobile Network Operators should transmit the eCalls (voice and data) to the emergency call response centres

Member States should upgrade their Public Safety Answering Points in order to handle the eCalls (voice and data)

The full benefits of the eCall service will be achieved when the service will work in all vehicles across Europe in a seamless way.

### **The cost of road casualties and injuries**

Road casualties are often not recognised as a public health problem. However eCall would allow saving of public resources (social security, public health) by reducing the severity of injuries, rehabilitation needs and hospital admission/permanence.

A road accident has a global cost for society, beside the human distress and related issues. This economic impact is a shared burden, including for example emergency operation costs, insurance costs, health costs and lost workplace / productivity costs.

This impact assessment has used for the consideration of the monetary value of road casualties and injuries the recommendations given by the European Road Safety Observatory<sup>27</sup> on the monetary valuation of road accident consequences. More details can be found in Annex IV.

With eCall, emergency services' response time would be reduced by 50% in rural areas and 40% in urban areas, leading to a reduction of fatalities estimated to be between 2% and 10%, and reduction of severity of injuries between 2% and 15%<sup>28</sup>, depending on the country considered<sup>29</sup>.

Road accidents lead also to congestion. Due to a shorter rescue time, eCall will also reduce the congestion time, because on one side the faster arrival of rescue teams, police and towing firms enables the accident scene to be cleared more quickly, and on the other side, the quickest reporting of the incident to the traffic management centre. This would allow quicker information to other road users so that they can also take the necessary actions to avoid the incidents scene if possible.

Recent studies<sup>28,30</sup> have carried out focused investigations into the possible effects of the introduction of the eCall system in the congestion reduction. The study coordinated by TRL

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<sup>26</sup> See [http://www.esafetysupport.org/download/ecall\\_toolbox/Reports/Appendix\\_8.pdf](http://www.esafetysupport.org/download/ecall_toolbox/Reports/Appendix_8.pdf)

<sup>27</sup> [http://erso.swov.nl/knowledge/content/08\\_measures/monetary\\_valuation\\_of\\_road\\_safety.htm](http://erso.swov.nl/knowledge/content/08_measures/monetary_valuation_of_road_safety.htm)

<sup>28</sup> "Impact assessment on the introduction of the eCall service in all new type-approved vehicles in Europe, including liability/ legal issues", TRL, SMART 2008/55

<sup>29</sup> See studies available on [www.esafetysupport.info/en/ecall\\_toolbox/related\\_studies/](http://www.esafetysupport.info/en/ecall_toolbox/related_studies/).

<sup>30</sup> E-call en Verkeersveiligheidskansen

has identified a possible reduction in congestion costs in case of accidents, depending on the country, in the range from 3% -UK, 10% -Finland, 17% -The Netherlands, Hungary.

Therefore eCall would be more beneficial in remote areas and during night-time for the safety of road users, whereas in busy roads (during daytime) it would produce more benefits in terms of improving incident management and reducing road congestion and secondary accidents.

### **Justification for EU intervention – Subsidiarity and EU added value**

Road safety is a major concern across the whole of the European Union and all its inhabitants: in the 27 Member States, 500 million citizens use more than 230 million vehicles on over 5 million km of roads.<sup>31</sup>

The pan-European eCall initiative aims at introducing in all vehicles in Europe the minimum functionalities needed to ensure an adequate handling of the emergency calls by the emergency response services. Road journeys across different Member States are currently more than 100 millions annually and they are increasing due to the consolidation of the European Union (free movements of goods, people and services). Action at EU level is needed in order to guarantee interoperability and continuity of the service throughout Europe, which cannot be satisfactorily achieved by single Member States.

Private services exist now that cover several Member States, none of them ensures full EU-wide coverage of the eCall service<sup>32</sup>, so that when vehicles travel into countries where the service is not provided by the private party, the service is discontinued. Furthermore, there is not a common solution Europe wide and the take-up of the service has been slow. After more than ten years since the first introduction of the eCall private service, the market penetration is still below 0.4% of the vehicle fleet. Furthermore some of the services introduced were dismantled due to market failures, leaving the user without in-vehicle emergency call service during the lifetime of the vehicle. See section 5.2.1 for further details.

Moreover, undertaking the action at EU level using common European eCall standards approved by the European Standardisation Organisations (CEN and ETSI), will ensure the efficient provision of the emergency response service across Europe, e.g., for vehicles travelling abroad as well as avoiding market fragmentation (which may happen due to proliferation of national and/or proprietary private solutions implemented in different ways).

The EU-wide eCall, in line with the 112 and E112 deployment, has been conceived in a way to minimise the impact on all the stakeholders in the value chain and distribute it in a fair way (automotive industry, mobile network operators, Member States - PSAPs). Financial and administrative costs for national/regional authorities are foreseen to be minor and commensurate with the objectives to be achieved.

A substantial part of the implementation (organisation of PSAPs) is left to national decisions. The upgrade of the PSAPs infrastructure will be done by the Member States in the way best suited to their national/local architecture, thus respecting the specificities and circumstances applying in each Member State.

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<sup>31</sup> "EU energy and transport in figures – Statistical Pocketbook 2009", European Commission

<sup>32</sup> The eCall service is normally offered only in high-end vehicles, bundled with other services and in those countries where the market provide enough business opportunities.

eCall initiative does not exceed the competences attributed to the EU by the "Treaty on the Functioning of the European Union", stated as follows:

art. 91.1 (a) "common rules applicable to international transport to or from the territory of a Member State or passing across the territory of one or more Member States";

art. 91.1 (c) "measures to improve transport safety";

art. 168.1 "Union action [...] shall be directed towards improving public health [...] obviating sources of danger to physical and mental health";

art. 168.2 "The Union shall [...] in particular encourage cooperation between the Member States to improve the complementarity of their health services in cross-border areas";

The proposed legislative instruments have been chosen after consultation with the different services, and taking into account the opinions of the European Parliament and Council.

The proposed actions are coherent with the pan-European nature of the objectives.

### **Protection of personal data**

eCall requirements comply with the Directives 95/46/EC on the protection of personal data and 2002/58 on privacy and electronic communications. It also follows the opinions of the Article 29 Data Protection Working Party<sup>33</sup>. Unless an accident happens or an occupant presses the manual button, the in-vehicle device will be dormant. Thus, eCall will not allow a vehicle to be remotely located unless there is an accident. The call will be directed to Public Safety Answering Points (PSAPs)<sup>34</sup>, which will ensure respect of protection of personal data, as it is currently the case for emergency calls. Minimisation of data has been applied when designing the contents of the Minimum Set of Data to be transmitted.

In case the eCall in-vehicle platform is used to provide added value services other than the emergency call (optional choice by the consumer if available), these should be covered by the appropriate contract between the user and the service provider, as it happens today for telematic services offered in the market.

## **OBJECTIVES**

### **1.1. General objective**

In line with the European Road Safety Action Programme, the initiative aims at reducing the number of road fatalities in the EU and the severity of injuries caused by road accidents.

*Nota Bene: Although the immediate beneficiaries of the eCall implementation would be the EU Member States, the benefits of the eCall service are very likely to be extended to neighbour countries (e.g., Norway, Iceland, Switzerland, Croatia, Russia) as some of them have expressed their interest in eCall and in adopting the same standards to guarantee interoperable systems.*

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<sup>33</sup> Art. 29 WP Working document on data protection and privacy implications in eCall initiative. 26.09.2006

<sup>34</sup> PSAP is the physical location where emergency calls are first received under the responsibility of a public authority or a private organisation recognised by the government. The most appropriate PSAP is the one defined beforehand by authorities to cover emergency calls from a certain area or for emergency calls of a certain type (i.e. eCalls).

## Specific objectives

eCall has been identified as a service that can contribute to the reduction of fatalities in the EU and the severity of injuries, thanks i.a. to the reduction of response time by emergency services. This general objective will be achieved through the following specific objectives:

- Improvement of the operation of the emergency services in the accident scene due to the information received

- Improvement of incident/road management and therefore

  - Reduction of secondary accidents

  - Reduction of congestion and subsequent pollution from road transports

- Contribution to the Deployment of Intelligent Transport System (ITS) services and applications applied to road transports, namely in-vehicle telematics applications and services, which could share the common technical resources with eCall.

## Operational objectives

The achievements of the specific objectives will be enabled by the following **operational objectives**:

- 100% of vehicles (M1 and N1 categories)<sup>35</sup> in the EU equipped with an eCall system by 2034

- Upgrade of the Public Safety Answering Points with the technical and human resources necessary to handle eCalls in the 27 EU Member States

- Support of the eCalls by the telecommunication Mobile Network Operators

These objectives are realistic and achievable.

## Consistency with other EU policies and objectives

The deployment of a harmonized EU-wide eCall service is one of the 6 priority actions of the Directive for the deployment of Intelligent Transport Systems in the field of road transport (2010/40/EU).

The deployment of a pan-European eCall system was one of the priorities identified by the eSafety Working Group on Road Safety<sup>36</sup>. eCall objectives are part of the Intelligent Car Initiative<sup>37</sup>. They are included in the European Union Transport policy, namely in relation to the European Road Safety Action Programmes and to the deployment and use of Intelligent Transport Systems (ITS Action Plan)<sup>38</sup>. The objectives are also reflected in the Communication "Towards a European road safety area: policy orientations on road safety

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<sup>35</sup> eCall will be introduced first in passenger cars and light commercial vehicles (categories M1 and N1) for which an appropriate triggering mechanism exists, and later it may be introduced in other vehicle categories, such as motorcycles and heavy duty vehicles

<sup>36</sup> [http://ec.europa.eu/information\\_society/activities/esafety/doc/wg/esafety\\_wg\\_final\\_report\\_nov02\\_final.pdf](http://ec.europa.eu/information_society/activities/esafety/doc/wg/esafety_wg_final_report_nov02_final.pdf)

<sup>37</sup> COM(2006) 59 – 'Raising Awareness of ICT for Smarter, Safer and Cleaner Vehicles'

<sup>38</sup> COM(2008) 886 – 'Action Plan for the Deployment of Intelligent Transport Systems in Europe'

2011-2020"<sup>39</sup>, which states: *"ITS should contribute decisively to improving the effectiveness and speed of rescue, and in particular the adoption of the pan-European emergency call service fitted to vehicles, eCall"*.

According to the Directive 2010/40/EU on the deployment of ITS applications and services – including eCall – shall comply with the following **principles**: be effective, cost-efficient, proportionate, support continuity of services, deliver interoperability, support backward compatibility, respect existing national infrastructure and network characteristics, promote equality of access, support maturity, deliver quality of timing and positioning, facilitate inter-modality, respect coherence.<sup>40</sup> Further details on the eCall compliance with such principles are included in section 5.6.

## POLICY OPTIONS

In order to reach the above listed objectives, three policy options have been considered. They are briefly described below, then assessed in details and finally compared.

### 1.1. Option 1: No EU action

This option assumes no action is undertaken by the EU, thus leaving the initiative to the market, meaning to proprietary in-vehicle emergency/assistance call services (not based on the 112 emergency number). "Private eCall" services were introduced more than 12 years ago, and have shown their effectiveness<sup>41</sup>, but their penetration remains below 0.4% of the car fleet. Such services are mainly restricted to high-end cars and are not available in all EU Member States. This will be considered the *baseline scenario* currently in place

### Option 2: Voluntary approach

A second policy option consists in supporting the development of common European standards, conducting eCall awareness campaigns and waiting for the Member States and relevant stakeholders to implement eCall voluntarily, relying on the eCall Memorandum of Understanding (MoU)<sup>42</sup> and the common specifications to be approved within the Directive 2010/40/EU. This is the policy so far undertaken by the Commission. .

This bottom-up approach, supported by the Commission since 2003, has not provided significant progress so far and the progress towards eCall implementation remains limited.

### Option 3: Regulatory measures

The regulatory approach would make eCall a standard factory equipment installed in all vehicles in Europe, starting by certain categories<sup>43</sup> as well as setting up the framework for

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<sup>39</sup> COM(2010) 389 – ‘Towards a European road safety area: policy orientations on road safety 2011-2020’

<sup>40</sup> Directive 2010/40/EU on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport, Annex II

<sup>41</sup> BMW, Peugeot and Citroën have received in October 2010 the EuroNCAP special award for their eCall services

<sup>42</sup> Memorandum of Understanding for the realisation of an interoperable in-vehicle emergency call system in Europe, released on 2005 and signed to date by 20 Member States, 3 other States and more than 100 organisations

<sup>43</sup> Initially eCall could be mandated into passenger cars and light commercial vehicles (below 3.5t) for which appropriate triggering mechanism exist. Later its mandatory introduction may be extended to other categories.

handling eCalls in the telecommunication networks and PSAPs. This approach would make eCall available to all citizens in Europe as an EU-wide service, accelerate the take-up and encompass the full potential of eCall to save lives and mitigate the severity of injuries.

## ANALYSIS OF POTENTIAL IMPACTS AND COMPARISON OF POLICY OPTIONS

### 1.1. What eCall can improve

eCall does not prevent accidents from happening, but improves the efficiency and effectiveness of rescue emergency services.

When emergency services are promptly notified of an accident and they know the exact location of the crash site, they can provide assistance within the "golden hour"<sup>44</sup> and therefore reduce the risk of deaths and the severity of the injuries.

The first minutes are the most critical for recovery and severity of injuries. Earlier studies<sup>45</sup> show that approximately 50% of fatalities occur within minutes, 30% within a couple of hours and 20% during the following days and weeks.

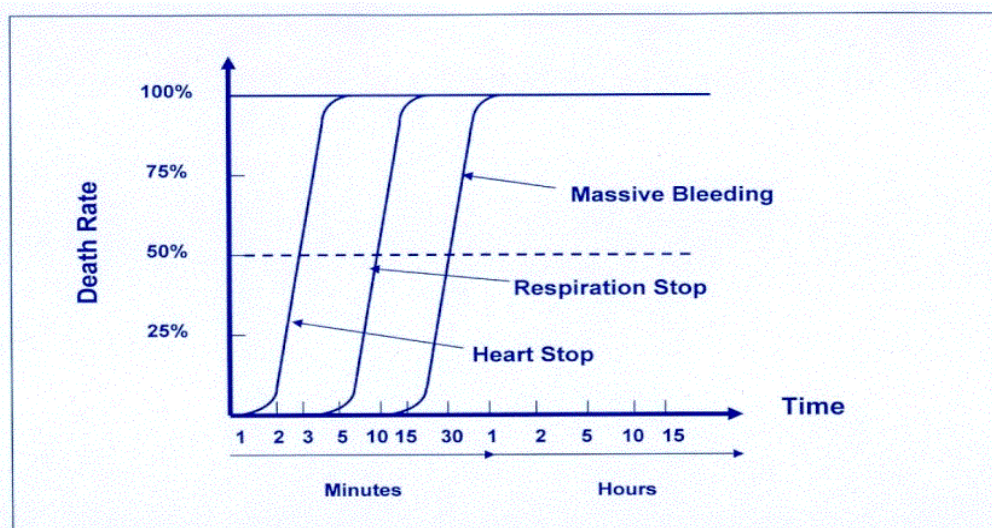


Figure 3: The "Golden Hour" principle<sup>46</sup>

However, emergency services are currently alerted by the people involved in the accident or by third parties that happen to know about the accident. This method often causes unacceptable delays in emergency services notifications. Although the Universal Service Directive<sup>47</sup> requires telephone network operators to make the best possible caller location information available to emergency authorities, severe delays are still encountered because:

<sup>44</sup> "In emergency medicine, the golden hour refers to a time period lasting from a few minutes to several hours following traumatic injury being sustained by a casualty, during which there is the highest likelihood that prompt medical treatment will prevent death". [*American College of Surgeons (2008)*]

<sup>45</sup> Akella M, Bang C, Beutner R, Delmelle E, Batta R, Blatt A, Rogerson P, Wilson G (2003) Evaluating the reliability of automated collision notification systems. 35:349–360

<sup>46</sup> Source: Dr. Maurice Cara, 1981

<sup>47</sup> See Directive 2009/136/EC amending Directive 2002/22/EC

Long time might elapse from the crash until somebody makes a phone call to the emergency rescue services.

The "best possible caller location" is not always automatically provided to the PSAPs in case of mobile phone calls, but needs to be requested for each emergency call ("pull" method). Furthermore, the "best possible caller location" is not accurate enough in several Member States (e.g.: in France it is the postal code of the Base Transmission Station receiving the call and the PSAP operator is able to get the information within around 10 minutes during working hours and within 30 minutes during night and holidays).<sup>48</sup>

The emergency rescue services are alerted with severe delays especially if:

- people involved in the accident are unconscious, in state of shock or unable to contact emergency services. This is particularly relevant in case of accidents involving Powered Two Wheelers (PTW)
- the accident occurs in rural or lowly populated areas (56% of fatalities occurred on rural roads in 2008)<sup>49</sup>
- the accident involves only one vehicle (ex.: in Belgium 40% of road fatalities are caused by single-vehicle accidents<sup>50</sup>)
- people contacting the emergency services are unable to provide information on the accident location (especially on inter-urban roads and when travelling abroad)
- the accident occurs during night time

Statistics about the above described scenarios are available in Annex VI.

An additional significant figure for accidents occurring at night is the one showing the "Saturday night fever" effect, which repeats in all Member States.

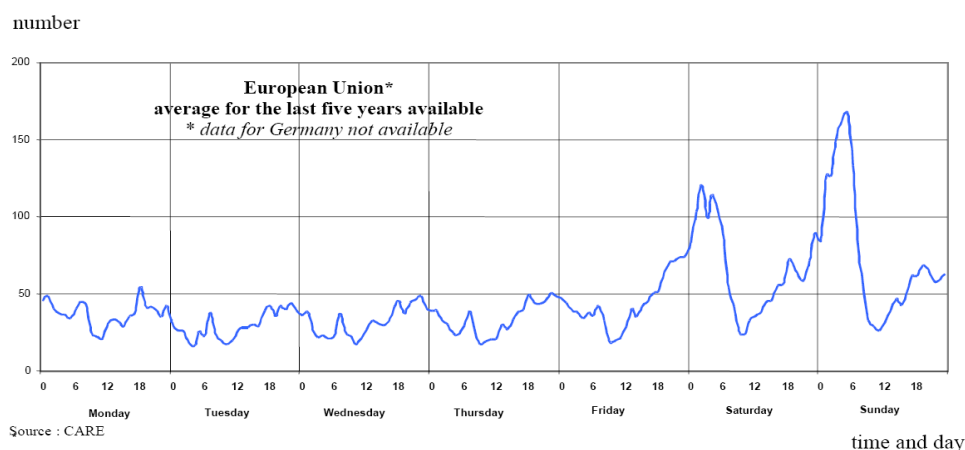


Figure 4: Number of people between 18 and 25 killed in road accidents by time and day - annual average<sup>51</sup>

Such emergency situations become even more critical for those travelling abroad, as most people do not know which number to call in case of emergency or their exact location, as shown in the figure below.

<sup>48</sup> Results of the COCOM 2008 questionnaire

<sup>49</sup> COM(2010) 389 – 'Towards a European road safety area: policy orientations on road safety 2011-2020'

<sup>50</sup> "Statistiques de sécurité routière 2008", IBSR, Observatoire pour la sécurité routière, Bruxelles, 2010

<sup>51</sup> CARE database

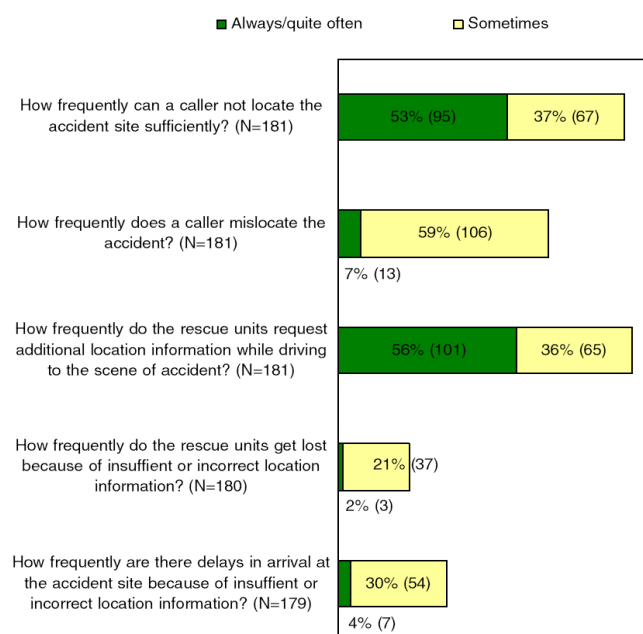


Figure 5: Assessment by PSAP operators of the received location information<sup>52</sup>

In 53% of the cases the caller cannot locate the accident site sufficiently, and in some 56% of the accidents this results into need or request of additional information. In exceptional cases this may lead into sending the units to wrong locations. All this results into additional delays for the emergency services to arrive to the incident scene that could be avoided with the eCall system.

*"eCall provides benefit to road users travelling abroad who may be unfamiliar with the roads and their exact location. eCall also allows emergency calls to be made without language difficulties by virtue of the digital data. This is likely to reduce misunderstanding and stress."*<sup>53</sup>

There are over 100 million cross-border road trips per year in the EU which will benefit from an interoperable eCall service working seamlessly across the EU Member States. Citizens travelling abroad will profit more of the eCall service benefits, such as the transmission of the exact location of the accident, as it is more probable that the occupants of the vehicle ignore it. Problems with local languages would also be reduced by the harmonised use of the Minimum Set of Data.

### Description of Option 1: No EU action

Private in-vehicle emergency call services started to be introduced in Europe by 1999. Most of them are bundled to other telematics services (i.e., breakdown calls, assistance, navigation and guidance). These services use private call centres to handle the calls, which will contact the PSAPs in case of identifying an emergency case. Therefore, when a private in-vehicle emergency/assistance call is triggered – manually or automatically – the in-vehicle system calls a private number of a private service provider. Data are normally sent using SMS.

<sup>52</sup> "In-depth evaluation of the effects of an automatic emergency call system on road fatalities", European Conference of Transport Research Institutes (ECTRI) 2009

<sup>53</sup> "Impact assessment on the introduction of the eCall service in all new type-approved vehicles in Europe, including liability/ legal issues", SMART 2008/55, page 245

Private in-vehicle emergency/assistance call services have so far reached a penetration of ~0.4%.

Vehicle Manufacturer	Brand	Private eCall available
<b>BMW</b>	BMW	√
	Mini	
	Rolls-Royce	
<b>Chrysler</b>	Chrysler	
	Jeep	
<b>Daimler</b>	Maybach	
	Mercedes-Benz	
	Smart	
<b>Fiat Auto</b>	Alfa Romeo	√
	Ferrari	
	Fiat	√
	Lancia	√
	Maserati	
<b>Ford Motor Company</b>	Ford	
	Mazda	
	Volvo	√
<b>General Motors</b>	Cadillac	
	Chevrolet	
	Opel	
	Saab	
	Subaru	
	Vauxhall	
<b>Honda</b>	Honda	
<b>Koream Brands</b>	Daewoo	
	Hyundai	
	Kia Motors	
	Ssang Yong	
<b>PSA – Peugeot Citroen</b>	Citroen	√
	Peugeot	√
<b>Porsche</b>	Porsche	√
<b>Renault – Nissan</b>	Nissan	
	Renault	
<b>Tata Motors</b>	Jaguar	
	Land Rover	
<b>Toyota</b>	Lexus	
	Toyota	
<b>Volkswagen Audi Group</b>	Audi	
	Bentley	
	Seat	
	Skoda	
	Volkswagen	

Table 2: Brands of vehicle manufacturers offering private service eCall in Europe<sup>54</sup>

<sup>54</sup> "The complete guide to Telematics in Europe and the USA" SBD, 2010 (SBD/TEL/2900)

### 1.1.1. Cost of implementation

The main costs for the introduction of a private eCall service are as follows:

Setting up (if not already done) and maintaining private call centre(s) with staff trained in emergencies handling and all the other services offered, offering 24 hours service, 7 days /week. The personnel of the service providers has to ensure that they have the right "long" numbers (E.164) and the geographic boundaries of all the PSAPs regularly operating in the country. These private call centre(s) normally serve also to attend other calls related to added value services (e.g., breakdown calls, real time navigation).

Data are normally transmitted by SMS in Europe (in USA they are transmitted by in-band modem) and thus, appropriate procedures need to be used to ensure their timely delivery, (e.g. extracting the SMS from the mobile telecom networks before arriving to the mobile switching centres), following a different path. This may imply additional private parties.

Decoding and matching the data with the phone calls for the operator. This may imply additional private service providers.

The communication costs to the Mobile Network Operators (normally annual fees).

To ensure a full deployment of eCall in the EU, the private service providers should create a similar infrastructure in all Member States, as normally the PSAPs accept only calls coming from the same country (with some exceptions, i.e.: Belgium, Luxembourg and the Netherlands are all served from a common centre for the PSA system).

<b>Manufacturer</b>	<b>eCall coverage</b>		
	<b>Telematics service provider</b>	<b>Number of countries where eCall is sold</b>	<b>Number of countries with additional roaming coverage</b>
<b>BMW</b>	ATX	4	2
<b>Fiat</b>	TIM	3	-
<b>PSA</b>	IMA	9	-
<b>Volvo</b>	WirelessCar	11	3

Table 3: European coverage of Private eCall<sup>55</sup>

If the eCall service would be deployed based on private solutions, to ensure that all the vehicles are equipped and served, every vehicle manufacturer (PSA, Volvo, BMW, Daymler, Renault, Toyota, VW Group, etc.) may need to deploy the whole infrastructure, as they do not normally share call centres.

<b>FIAT</b>	<b>BMW</b>	<b>Citroën-Peugeot</b>	<b>Jaguar</b>	<b>Volvo</b>
Blue&Me nav	Assist&Teleservice	eTouch	Watch	onCall
700€ <sup>56</sup>	820€ <sup>56</sup>	290€	930€ <sup>56</sup>	1580€

<sup>55</sup> Source: SBD, 2008. Other private eCall schemes are offered by companies other than OEMs (e.g.: insurance companies, user clubs) based normally on an initial price for aftermarket equipment plus annual subscription.

<sup>56</sup> The annual subscription over lifetime of the vehicles should be added to this initial amount.

Table 4: Pricing models for Private eCall<sup>57</sup>

Due to the high maintenance costs, some private eCall services have been dismissed in Europe (i.e., Renault – *Odysline*, Ford/Opel – *OnStar*, Daimler – *TeleAid*).

These developments have shown a market failure issue, as:

- Market prices are in general affordable to a limited number of users
- No EU-wide coverage (private services not available in all Member States)
- Difficulty to maintain PSAPs databases with the emergency response call centre phone numbers (E.164) and geographical areas served<sup>58</sup>.

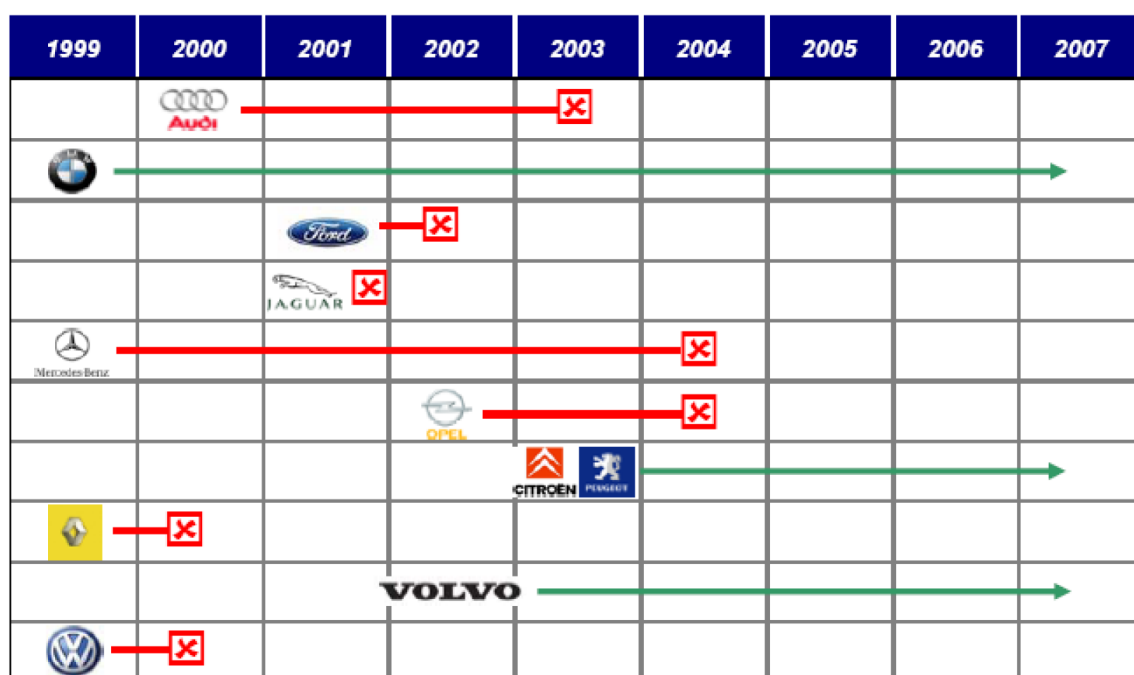


Figure 6: Implementation and interruptions of private eCall service in Europe<sup>59</sup>

### Advantages

The main advantage of these services is the provision of added value services usually provided by the private service providers. It should be noted that for the other two options the same or other service providers may provide the same or different/additional services also by keeping the call centres to provide the added value services (for which they get revenues) while migrating the private eCalls into 112 eCall service, so saving resources and avoiding liability issues.

<sup>57</sup> "The complete guide to Telematics in Europe and USA", SBD/TEL/2009

<sup>58</sup> E.164 is an ITU-T recommendation which defines the international public telecommunication numbering plan. Private Call Centres cannot contact the PSAPs by dialling 112 –e.g., the private call centre may be placed in a different geographic area than the PSAP serving the accident location-, thus they need to use the "long" E.164 number of the most appropriate PSAP.

<sup>59</sup> Source: SBD, 2008

The private call centres may filter the calls and transfer only the real emergencies to the PSAPs (it should be noted this may also be done through intermediate call centres – PSAPs 1 – in case of public 112 eCalls) for the other two options.

The occupants may be served in their local language (normally the language of the country where the vehicle is registered)

The use of SMS for the transmission of the data will imply less transmission power (control channel), thus better coverage.

### *Limitations*

Using SMS implies that the coverage may be limited to the home network to which the SIM is registered and to those networks with roaming agreement. In other networks timely delivery may not be ensured.

For the time being, Mobile Network Operators do not have a problem with the limited number of SMS extracted from the networks that are needed for the limited fleet of vehicles equipped with the private eCalls that follow special paths, but it is not clear that this approach could be followed when introduced in millions of vehicles needed for full penetration of eCall. SMS suffer access restrictions when outside the home network (i.e., international roaming). The delays in roaming conditions to deliver SMS may be multiplied. The introduction of one or several intermediate call centres introduces delays in the handling of the calls.

The operators from the private call centres that need to make the first qualification of the call may not be trained to handle emergency situations in the same way than the PSAP operators.

It should be noted that the different countries are establishing different rules for the PSAPs to receive the information about the accident from the private call centre. For example, in the United Kingdom the data should go via the private call centre whereas the call should reach directly the UK PSAP1. In other countries the data are communicated to the PSAPs operator via phone call, and confirmed via fax or email, the type of data depending on the country.

The emergency call will not reach the PSAP if the in-vehicle system is outside GSM coverage of the Mobile Network Operator providing the service or the Mobile Network Operator with roaming agreement in case of travelling outside the home country of the vehicle.

There is a concern regarding safeguarding privacy (handling of private data by third party service providers, permanent tracking of the device), as shown by the replies to the public consultation.

Furthermore, appropriate measures in case of failure (e.g., bankruptcy) of one of the private partners in the value chain need to be considered.

The answers to the eCall public consultations have shown that the representatives of users advocate for universal services in all vehicles in line with the right of all citizens to road safety and public health.

### **Description of Option 2: Voluntary approach**

Policy option 2 would consist in the voluntary deployment of a pan-European eCall service by the concerned stakeholders, supported by the signatures of the eCall Memorandum of Understanding and the adoption of the common specifications within the Directive

2010/40/EU. This service would piggy-back on the E112 service and the common standards developed by the ESOs (ETSI and CEN)<sup>60</sup> and may coexist with eCall proprietary services.

#### *1.1.1. Cost of implementation*

For Option 2, while the eCall implementation costs to upgrade the mobile phone networks and to upgrade the PSAPs infrastructures will be the same as for the Option 3, the benefits will be reduced significantly, as only a portion of the car fleet will be equipped.

#### *Advantages*

Using the 112 number ensures EU-wide coverage. 112 calls enjoy priority in the mobile phone networks. In case of insufficient coverage in the home network, the device will normally register in whatever network is available. The emergency calls go immediately to the PSAPs operators, specialised in dealing with emergency situation, and applying strict privacy protection protocols. The devices are not permanently tracked.

The Commission requested ETSI MSG and the 3GPP to standardize the eCall service. For the eCall data transfer, an in-band modem solution has been identified by ETSI as the most suitable technology that fulfils all eCall requirements<sup>61</sup> after having analysed different possible technologies<sup>62</sup>.

Data is received by the same operator that receives the voice call. There is no problem to maintain the PSAPs databases.

The MoU has been signed by 20 Member States, 3 associated States and more than 100 organisations, including ACEA and GSMA Europe. The voluntary approach will not require regulatory procedures, thus continuing the bottom-up approach.

#### *Limitations*

The voluntary approach maintained up to now has not shown the expected progress towards the introduction of the pan-European eCall service in all vehicles. Vehicle manufacturers have not changed their position and are only willing to offer eCall as an option in some models, while they wait for the Member States to move first, and fearing fragmentation of the market if some Member States refuse to upgrade their PSAPs. On the other hand, Member States do not want to invest in upgrading their PSAPs if it is only to offer services to a limited number of vehicles, normally high-end vehicles. This may reduce the benefits of economies of scale drastically. Mobile Network Operators have declared their willingness to support public eCall provided that car manufacturers and Member States will equip their vehicles and PSAPs to handle the eCalls.

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<sup>60</sup> See list of pan-European eCall related standards in

[http://ec.europa.eu/information\\_society/activities/esafety/doc/ecall/annex\\_standard.pdf](http://ec.europa.eu/information_society/activities/esafety/doc/ecall/annex_standard.pdf)

<sup>61</sup> Options for eCall MSD signalling - 21 April 2006 (GSMA Europe) and Liaison Statement M-07-065 from ETSI MSG regarding suitability of proposed eCall solution.

<sup>62</sup> The following options were considered: SMS, CS Data, UUS, USSD, DTMF, and in-band Modem, being in-band modem the solution retained as the one satisfying the eCall requirements and that could be implemented in a cost-efficient way. ETSI MSG evaluated more in depth other two technologies on top of the in-band modem. The first solution was based on the use of SMS, which could not guarantee to meet the timing requirement (although it was recognized that the SMS technology is used by existing private solutions). The second solution was based on CTM and could not meet the timing of 4 seconds for the reception of the full MSD by the PSAP.

It is difficult to ensure parallel action from the main three stakeholders (vehicle manufacturers, mobile network operators and Member States/PSAPs). Some Member States may refuse to equip their PSAPs to handle eCall, in that case only the voice call would be received. The reasons why some Member States refuse to sign the MoU may vary, for instance:

France: The official position is that the private emergency call, currently offered in France, is sufficient to the national needs of rescue services and the obligation of exclusive use of a pan-European eCall is considered inefficient, expensive and contradictory with the principles of the Directive 2010/40/EU<sup>63</sup>;

UK's decision is depending on the cost-benefit analysis of the system, as explained in the official position<sup>64</sup>;

Ireland is in principle in favour of the mandatory introduction;

Some organisations (including major stakeholder like ACEA – see Annex V), despite the signature of the MoU and the declared full support to the eCall initiative, are reluctant in undertaking important steps, as they wait for higher commitments from other stakeholders and/or more certain implementation of eCall in the near future.

The emergency call will not reach the PSAP if the IVS is outside GSM coverage. In this regard, GSM Association Europe has declared a GSM geographical coverage of 99% of the EU territory with at least one operator.

eCall as an option does not offer the same level of economies of scale as Option 3, thus increasing the price of the in-vehicle system<sup>65</sup>, reducing its demand and slowing down its penetration.

### **Description of Option 3: Regulatory measures**

This option will mean parallel regulatory measures to mandate the introduction of eCall systems in all new type-approved vehicles starting by certain categories, to ensure the support of the mobile network operators to the eCalls, and to ensure appropriate handling of the eCalls by the PSAPs in the Member States, as indicated in the Communication 'eCall: Time for Deployment' (COM (2009) (434). This service would piggy-back on the E112 service and the common standards developed by the ESOs (ETSI and CEN)<sup>60</sup> and may coexist with eCall proprietary services. The regulatory measures would consist of:

1. New regulation to include an additional requirement within the motor vehicle type-approval regulatory framework<sup>66</sup>; this will imply mandatory introduction in new vehicle types, taking into consideration Art. 114 of the TFEU.

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<sup>63</sup> As stated in the letter of 26/04/2010 from D. Bussereau to Commissioner S. Kallas

<sup>64</sup> "We are supportive of technologies that improve road safety, but the benefits of each technology have to be measured against the cost of their implementation. In the case of eCall we have not been able to establish a positive benefit to cost case for mandatory deployment in the UK"

<sup>65</sup> TRL study, estimated cost of in-vehicle system in case of option 2, ~ 450 €

<sup>66</sup> Directive 2007/46/EC establishing a framework for the approval of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles

2. Recommendation to Member States targeting Mobile Network Operators for the support of the eCalls in their networks within the framework of the Universal Service Directive;<sup>67</sup> taking into consideration Art. 114 of the TFEU.
3. Approval of common specifications and, if necessary, a proposal for a Directive on the implementation of eCall, addressing mainly the necessary upgrade of the emergency response services, within the framework of the Directive on ITS implementation<sup>68</sup>, taking into consideration Art. 91 of the TFEU.

The eCall regulatory measures would mean:

The provision of eCall service to all EU road users, in all EU territory (and where possible at its external borders) and in all classes of vehicles (starting by certain categories).

The public investment to upgrade the PSAPs will provide service to all European citizens.

The support of the Mobile Networks Operators to the eCall service.

Different sub-options could be envisaged regarding the above mentioned regulatory approach, such as mandating only the upgrade of the PSAPs and the support of the eCalls by MNOs, while leaving it up to the buyer whether to opt for an eCall service (public or private). However the representatives of the respective major stakeholders (automotive manufacturers, MNOs and PSAPs) have rejected this solution, calling for a parallel action of the three of them for an effective implementation of the eCall service; otherwise it may lead to investments from some stakeholders without actual implementation of the service. Furthermore this could also lead to staggered introduction of the eCall service, with the risk of market fragmentation.

#### *1.1.1. Cost of implementation*

For option 3, the implementation costs can be summarised as follows:

Cost for upgrading the PSAPs and their operation, charged to Member States

Cost for implementing the eCall discriminator<sup>69</sup> and handling the calls, charged to mobile network operators

Cost to equip all type-approved vehicle with eCall system, charged to automotive industry and therefore to the user

#### *Advantages*

Using the 112 number ensures EU-wide coverage. 112 calls enjoy priority in the mobile phone networks. In case of insufficient coverage in the home network, the device will normally register in whatever network is available. The emergency calls go immediately to the PSAPs operators, specialised in dealing with emergency situation, and applying strict privacy protection protocols. The devices are not permanently tracked.

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<sup>67</sup> Directive 2002/22/EC on universal service and user's rights to electronic communication networks and services

<sup>68</sup> Directive 2010/40/EU on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport

<sup>69</sup> Approved by 3GPP, the eCall discriminator ('eCall flag') is included in Release 8 of the technical specifications with which the mobile telecommunications systems must comply. The eCall discriminator will differentiate between 112 calls made from mobile phones and eCalls, and also between manual and automatically triggered eCalls.

The Commission requested ETSI MSG and the 3GPP to standardize the eCall service. For eCall data transfer, an in-band modem solution has been identified by ETSI as the most suitable technology that fulfils all eCall requirements after having analysed and tested different possible technologies<sup>70</sup>.

The standard solution developed by ETSI (use of in-band modem technology) for the transmission of the eCall data and voice (simultaneously) can be run in different automotive telematic platforms, allowing vehicle/equipment manufacturers to propose their own technical solutions. This technology can also be used to provide some added value services<sup>71</sup>; however equipment/vehicle manufacturers are free to choose which technological solution they want to use for their added value services (SMS, GPRS, 3G, etc.). Both solutions can run in the same platform with a minimum additional cost (in-band modem for eCall and other technologies for added value services).

Using the common standard solution developed by ETSI the data from the vehicle is received by the same operator that receives the voice call. There is no need to maintain and update the PSAPs contact number and geographical boundaries databases.

The maximum impact in terms of reduction of fatalities, severe injuries and congestions will be achieved sooner.

Economies of scale are achieved at maximum level. There is no risk of fragmentation of the markets.

Mandatory introduction of eCall through regulation may improve the business case of automotive industry on in-vehicle telematic services. It might be an opportunity for the European industry, as having the eCall system in all vehicles will enable both vehicle manufacturers and private service providers to share common technical resources with the eCall platform and/or to offer added value services, provided that their deployment does not imply that competition with other service providers is distorted.

This prospect will help the EU to gain a competitive advantage over other geographical regions in the in-vehicle telematics sectors. The reason is that eCall would include some of the basic functionalities of a telematic system, which could allow automotive industry to include more connected-car functionality.<sup>72</sup>

Connected car applications are rapidly emerging as drivers and passengers increasingly expect mobile communication services to be available in the car. The US region is currently leading in the deployment of connected car or telematics applications with about 50% of autos sold having telematics, while most of the automotive manufacturers have not deployed such system within the EU. However, the eCall regulation is likely to improve the EU's position. Most automotive manufacturers are likely to build more services on top of the eCall systems, which will provide better opportunities for telematics hardware and software systems suppliers in Europe. The eCall regulation will provide the impetus for automotive manufacturers to implement applications such as remote Electronic Control Units diagnostics and remote software management. It will also provide a platform for private and public operators to implement intelligent transport services applications and services, such as

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<sup>70</sup> Options for eCall MSD signalling - 21 April 2006 (GSMA Europe) and Liaison Statement M-07-065 from ETSI MSG regarding suitability of proposed eCall solution.

<sup>71</sup> Some vehicle manufacturers (e.g.: Ford, BMW) are using in-band modem solutions in their in-vehicle telematic services in the USA.

<sup>72</sup> "The competitiveness of the European automotive embedded software industry", Joint Research Centre – Institute for Perspective Technological Studies, 2010

electronic tolling, hazardous goods tracking, digital tachograph, pay-as-you drive, dynamic navigation, stolen vehicle tracking systems, etc<sup>72</sup>.

Automotive suppliers, including also software suppliers, have called for the mandatory introduction of eCall as the opportunity to kick-start the big scale deployment of in-vehicle telematics services in Europe.

A great variety of GNSS applications can today be found in transport and this is expected to significantly increase. Just to name two, traffic management is improved through GNSS road tolling and real-time travel information is provided directly to the driver to avoid congested areas. The introduction of the eCall system in the vehicles could also contribute significantly to the deployment of a European market for GNSS applications, widely promoted by the European Commission which has recently (June 2010) adopted an Action Plan for the development of the applications of GNSS. Intelligent Transport System for Road is one of the main focus of this Action Plan.

### *Limitations*

The system operates with the single European Emergency number, 112, which means that in principle the system might not function outside the EU territory in those countries that do not recognise 112 as an emergency call; however if the networks recognise a standardised emergency call number (e.g., 911) they may recognise 112 as well<sup>73</sup>.

Driving through different countries may mean that the PSAP operator connected in the event of an accident may not speak the same language as the vehicle occupants, although multilingual handling in the 112 service is being reinforced in the EU; moreover, the Minimum Set of Data will provide electronic data about the accident, which will be displayed in the PSAPs operator language.

The emergency call will not reach the PSAP if the IVS is outside GSM coverage. In this regard, GSM Association Europe has declared a GSM geographical coverage of 99% of the EU territory with at least one operator.

The PSAPs may receive an increased number of false calls, mainly from manual calls. However, this is a normal situation to the PSAPs, as the volume of possible false calls can be assumed in the standard operation of the PSAPs (see Annex III). Moreover, the eCall can be received on specialised call centres under public delegation (PSAP1) that will filter the false calls. On the other hand, as the PSAP will be able to identify the vehicle in distress, it may reduce the number of adjacent calls (i.e. it may accumulate several calls related to the same accident into the real emergency call).

### **Assessment of policy options against criteria**

**Regarding the option of not intervening** (policy option 1), the proprietary in-vehicle emergency call services have proved their benefit, but their market penetration is very slow, restricted mainly to high-end cars (due to its high price) and only certain countries in Europe (where business case is higher). Moreover the emergency response services will need to interface with different proprietary services, adding complexity to the service. All vehicle

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<sup>73</sup> Nota Bene: A 112 call is recognised by a mobile phone network as TS12 emergency call. Mobile phone networks complying with 3GPP standards may recognise 112 calls as emergency calls in countries using emergency numbers other than 112, and handle them like local emergency calls.

manufacturers will need to implement their own private call centres and assume liability of handling the emergency calls.

**The voluntary approach** (policy option 2) would lead to the introduction of the eCall service in Europe, but at slow speed. The commitment of industry to offer eCall as an option in all vehicles of certain categories is a positive step forward, and would, with time, increase the penetration rate of the service. However, by making eCall only an option there would not be the same economies of scale, which could increase its price, reduce demand and curb its penetration and consequently its benefits.

There is a risk of market fragmentation, as it is not ensured that all Member States will upgrade their emergency services to handle eCalls at the same time; not all the citizens will benefit from the costs of upgrading, but only those that will buy the option. Upgrade of the telecom networks in all the countries cannot be ensured either.

**The regulatory approach** (policy option 3) would mean making eCall standard factory fitted equipment installed in all new vehicles in Europe, starting with certain categories<sup>74</sup>, and would provide a framework for handling eCalls in telecommunications networks and PSAPs, based on existing regulations and common European standards and specifications.

This approach would make eCall available to all citizens in Europe, accelerate take-up and unlock the full potential of eCall to save lives and mitigate the severity of injuries. Furthermore it is expected that the certainty created by the regulatory approach will accelerate the introduction of eCall systems by automobile/equipment manufacturers, thus fostering the introduction of the service even before it becomes compulsory, and at the same time stimulating the telematic services market and incorporation of GNSS/Galileo receivers in Europe, which would lead into indirect benefits.

As explained in the COM (2009) 434, the mandatory introduction of eCall would not mean that the private proprietary eCall services need to be dismantled. EU-wide eCall based on 112 and private eCall services (also known as TPS-eCall) can coexist. In Member States where there is an agreement to support proprietary eCall services in line with the quality of service of the pan-European eCall (as described in the relevant standards), the vehicle manufacturer would be free to provide their private service. In any case, the provision of the EU-wide eCall service, based on 112, must be ensured when the vehicle enters into a Member State where there is no agreement to support that proprietary eCall service.

Whether or not a buyer of a vehicle opts for the private eCall solution, the vehicle must be equipped with the 112 eCall service to ensure continuity of the service EU-wide along the lifetime of the vehicle.

When eCall is fully deployed across Europe, the providers of proprietary eCall services can also migrate to using the pan-European eCall, i.e. in-vehicle system will call the 112 number for emergencies while all other services provided stay intact, calling the service provider. This means that, in case of option 3, there will not be distortion of the competition as the vehicle manufacturers and the service providers will still be able to provide added value services, either adding eCall to their offer (in agreement with the concerned Member States) or separating eCall (routed to 112) from the added value services.

The eCall public consultation showed that the majority of respondents (57%) advocate for

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<sup>74</sup> eCall will be introduced first in passenger cars and light commercial vehicles (categories M1 and N1) for which an appropriate triggering mechanism exists, and later it may be introduced in other vehicle categories, such as motorcycles and heavy duty vehicles.

legislative measures while 24% consider that there is no need for legislative measures. Furthermore 68% of the respondents consider that eCall should be mandatory in all vehicles, while 19% disagree with this statement.

	<u>Policy Option 1</u>	<u>Policy Option 2</u>	<u>Policy Option 3</u>
	No EU action	Voluntary approach	Regulatory measures
<b>Scale of implementation</b>	0 (0) Limited penetration (normally to high range vehicles)  (0) Benefits for those buying the option (less than 0.4% penetration of the EU car fleet after 10 year)  (0) Penetration only in major markets	+	++ (++) Full scale.  (++) Benefits for all users, (available in all class of vehicles starting with certain categories -passenger cars and light commercial vehicles-).  (++) eCall available in all EU Member States.
<b>Speed of implementation</b>	0 Very slow: weak business case.	+	++ Fast, as all stakeholders are bound by the same legislation.
<b>Risk(s)</b>	0 Lack of willingness of users to pay  Different proprietary systems in each Member State  Private parties may decide to stop the service  Some Member States may refuse to implement it	0 Lack of willingness of users to pay  Market fragmentation.  Unbalanced commitment from the different stakeholders  Some Member States may refuse to implement it	++ Delay in the application of the EU legislation  .
<b>Costs implementation</b>	0 (0) None for public authorities.  (0) None for Mobile Network Operators.  (0) Very high for individual users.	- (-) Upgrade of the PSAPs for public authorities in Member States supporting the service.  (-) eCall flag in all MNOs networks  (+) High for individual users (high economies of scale not attained)	- (-) PSAPs upgrade for public authorities  (-) eCall flag in all MNOs networks  (++) Low for individual users due to economies of scale.

NOTE: + means less risks

NOTE: - means more costs

Table 5: Assessment of policy options against criteria

*Note: The policy option 1 is considered the baseline scenario and attributed a 0. The impacts for the other 2 options are considered negative (-,--) or positive (+,++) in comparison with the baseline scenario*

## Overall impact of policy options

	<b>Policy Option 1</b> <b>No EU action</b>	<b>Policy Option 2</b> <b>Voluntary approach</b>	<b>Policy Option 3</b> <b>Regulatory measures</b>
<b>Impact on operational objectives:</b> - 100% eCall penetration; - % of PSAP upgraded to handle eCalls;	(0) Lowest penetration (eCall as option in some type of vehicles) (0) Only minor upgrade of the PSAPs needed. (0) Different protocols (0) Handling of the data normally by traditional methods (phone call, fax)	(+) Reduced penetration (eCall offered as an option) (-) Some countries may not upgrade the PSAPs to receive the eCall. (+) Same European protocols (+) Electronic Handling of the data <i>(but stakeholders (OEMs, MNOs) may wait for the upgrade of the PSAPs before upgrading their infrastructure)</i>	(++) Full penetration in passenger cars and Light Duty Vehicles within 16 years (+) All PSAP infrastructures upgraded in all MSs (+) Same European protocols (+) Electronic handling of the data
<b>Impact on specific objectives:</b> - Reduction of road fatalities - Reduction of severe injuries - Reduction of congestion	(0) Lowest penetration, lowest impact on the 3 specific objectives	(+) Reduced penetration, mid impact on the 3 specific objectives	(++) Highest penetration, highest impact on the 3 specific objectives
<b>Economic impact</b>	(0) Highest price for consumers for the in-vehicle device (0) Market segmentation (0) Lowest price for the PSAPs and MNOs (0) Reduced introduction of new services and applications (0) Competitive position of automotive and telecom EU industry offering the service	(+) Less economies of scale: higher price for consumers (+) Possible market segmentation (MSs not supporting eCall) (-) Compliance costs imposed to PSAPs and MNOs (+) Facilitate the introduction of new services and applications (+) Competitive position of automotive and telecom EU industry	(++) Lowest price for consumers (++) Full EU coverage (-) Compliance costs imposed to PSAPs and MNOs (++) Facilitate the introduction of new services and applications (++) Competitive position of automotive and telecom EU industry
<b>Social impact</b>	(0) Unequal access to automatic in-vehicle emergency call services. Only a limited number of citizens will benefit from the service (0) Emergency call in own national language (of the country where the vehicle is registered) (0) Additional delays to reach the emergency services (0) Handling of emergency calls by private operators (0) Personal data controlled by private parties (0) Provision of proprietary	(+) Unequal access to automatic in-vehicle emergency call services. Only those that will buy the eCall option will benefit from them (-) Linguistic handling of emergency call as any 112 call (more or less effective depending on the country/region) (+) Direct access to PSAPs (+) Handling of emergency calls by public safety trained operators (+) Personal data controlled by Public authorities (+) Interoperable and harmonised provision of seamless service	(++) Access to automatic in-vehicle emergency call services for all (-) Linguistic handling of emergency call as any 112 call (more or less effective depending on the country/region) (+) Direct access to PSAPs (+) Handling of emergency calls by public safety trained operators (+) Personal data controlled by Public authorities (++) Interoperable and harmonised provision of seamless service EU-

	services in covered countries (0) Improved prevention of fire, explosions and accidents (limited scale)	wherever supported by MSs (+) Improved prevention of fire, explosions and accidents (reduced scale)	wide and beyond (++) Improved prevention of fire, explosions and accidents <sup>75</sup>
<b>Environmental impact</b>	(0) Improved incident management (limited scale) (0) Reduction of energy consumption and CO2 emissions (limited scale)	(+) Improved incident management (reduced scale) (+) Reduction of energy consumption and CO2 emissions (reduced scale)	(++) Improved incident management <sup>76</sup> (++) Reduction of energy consumption and CO2 emissions <sup>77</sup>

Table 6: Overall impacts of each policy option

## Analysis of policy options on the principles of the ITS Directive

The principles for the selection and deployment of ITS applications and services are listed in the Annex II of the Directive on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport (Directive 2010/40/EU). These measures shall:

- (1) Be Effective – make a tangible contribution towards solving the key challenges affecting road transportation in Europe (e.g. reducing congestion, lowering of emissions, improving energy efficiency, attaining higher levels of safety and security including vulnerable road users);

The deployment of eCall service will contribute to attain higher levels of safety including vulnerable users and reduction of congestion. The Option 3 will be the one producing higher effects, as the penetration of the eCall service will be the higher, followed by Option 2 and Option 1.

- (2) Be Cost-efficient – optimise the ratio of costs in relation to output with regard to meeting objectives;

The analysis made in this impact assessment provides the cost-efficiency of the different options

- (3) Be proportionate – provide, where appropriate, for different levels of achievable service quality and deployment, taking into account the local, regional, national and European specificities;

All the 3 options allow Member States to design the PSAP infrastructure in the way the best suited to their local, regional and national specificities. This is attained in Option 1 by agreement on protocols between private service providers and PSAPs at national level, whereas for Options 2 and 3 this is achieved through the implementation of the eCall discriminator, allowing Member States to design the infrastructure of the emergency call response centres that will receive the eCalls taking into account their local, regional and national specificities (e.g., incorporating filtering centres as those existing in the private services, or receiving the eCalls in the same PSAP receiving the 112 calls)

<sup>75</sup> Since the Minimum Set of Data sent by the vehicle includes the propulsion mean of the vehicle (natural gas, fuel, electric, etc.), rescue services can operate more safely and prevent further accidents and explosions.

<sup>76</sup> Incident management will be improved thanks to the immediate notification of the accident from the eCall In-vehicle System to public authorities and traffic management centres

<sup>77</sup> Energy consumption and CO<sub>2</sub> emissions will be reduced thanks to the improved traffic management and the consequent reduction of traffic congestions caused by road accidents.

All the options can support additional levels of service.

- (4) Support continuity of services – ensure seamless services across the Union, in particular on the trans-European network, and where possible at its external borders, when ITS services are deployed. Continuity of services should be ensured at a level adapted to the characteristics of the transport networks linking countries with countries, and where appropriate, regions with regions and cities with rural areas;

This is attained automatically in the option 3 and in the option 2 for the countries having upgraded their PSAPs to handle eCalls –otherwise only the voice call will be received, not the data-, as the use of 112 ensures continuity of the service across Europe and at its external borders. In the case of Option 1, this is only achievable by multiplying the number of private call centres and ensuring that the databases with the long phone numbers of the PSAPs and their boundaries are maintained updated, so that all countries will be served, multiplying the costs.

- (5) Deliver Interoperability – ensure that systems and the underlying business processes have the capacity to exchange data and to share information and knowledge to enable effective ITS service delivery;

Complete interoperability is achieved automatically in Option 3, in Option 2 only for those having equipped the vehicles and the PSAPs (for those countries having equipped the vehicles and not the PSAP, there will be only interoperability in terms of voice call, not for sending and handling the data), and for Option 1 only by multiplying the private call centres by countries and by all the vehicle brands, as well as defining protocols for the communication between the PSAPs and the private call centres in all the countries.

- (6) Support backward compatibility – ensure, where appropriate, the capability for ITS systems to work with existing systems that share a common purpose, without hindering the development of new technologies;

Option 1 supports backward compatibility, as the systems implemented will be based on existing ones.

Options 2 and 3 will support backward compatibility as well. It is foreseen that those private services providing a similar level of service that the harmonised interoperable EU-wide eCall could continue delivering the service. As normally all existing services are based on communication via phone call and/or fax, they can continue providing the data in the same way to the PSAPs, or deploying other interfaces in agreement with the PSAPs.

None of the options will hinder the appearance of new technologies. On the contrary, all the options will foster the development of added value services which could share common technical resources with eCall, although the Option 3 will attain a bigger impact in this sense<sup>78</sup>.

- (7) Respect existing national infrastructure and network characteristics – take into account the inherent differences in the transport network characteristics, in particular in the sizes of the traffic volumes and in road weather conditions;

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<sup>78</sup> The Competitiveness of the European Automotive Embedded Software Industry, IPTS, 2010.

All the 3 options respect the existing national infrastructure of the PSAPs. None of the 3 options will have any impact on the transport networks, with the exception of Option 3, which may lead to the reduction of the SOS systems in the roadside.

- (8) Promote equality of access – do not impede or discriminate against access to ITS applications and services by vulnerable road users;

Option 3 will attain the higher impact in terms of promoting the equality of access to all road users.

## Cost-benefit analysis

### 1.1.1. *External expertise*<sup>79</sup>

Several external studies have analysed the possible benefits and costs for the introduction of eCall in Europe<sup>80</sup>. Three studies, the SEiSS, eIMPACT and "TRL" have analysed the cost-benefit case of the introduction of eCall service at European level. eIMPACT also looked into the break-even point of different in-vehicle safety systems

The SEiSS<sup>81</sup> study analysed the costs and benefits of the introduction of eCall in case of mandatory introduction in all vehicles (Option 3) analysing costs and benefits in the most optimistic and worst cases. The study concluded that even in the most pessimistic case (highest costs and fewest benefits), the cost-benefit ratio for the introduction of eCall in Europe would be 1.3, whereas in the most optimistic case it would be 8.5. eIMPACT<sup>82</sup> identified possible cost-benefits ratios for eCall between 1.9 and 2.7, depending on the penetration rate. eIMPACT also concluded that eCall was the system with best break-even point, along with the Electronic Stability Control (ESC). The study coordinated by TRL<sup>83</sup> considered policy options equivalent to the Options 1, 2, 3, looked into all the costs, focusing on four country cases and extrapolating to the rest, and in benefits arising from reduction of fatalities and mitigation of injuries, and concluded that the only positive cost-benefit ratio will be for Option 3 (between 1.31 and 2.48). The other 2 Options resulted into ratios under 1.

This impact assessment has considered the outcomes of the several studies that have analysed the costs and benefits of the introduction of eCall in Europe (cf section 5.7). The results of the studies have been taken in consideration through critical analysis of the basis of their scientific methodology and relevance. See also annex IV for more details on the methodology.

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<sup>79</sup> Studies are publicly available and they have been scrutinised by experts in a number of occasions, namely in the European eCall Implementation Platform. Hyperlinks to the studies have been provided together with the public consultation.

<sup>80</sup> See [http://www.esafetysupport.org/en/ecall\\_toolbox/related\\_studies/](http://www.esafetysupport.org/en/ecall_toolbox/related_studies/)

<sup>81</sup> Exploratory Study on the potential socioeconomic impact of the introduction of Intelligent Safety Systems in Road Vehicles. 2005.

<sup>82</sup> Socio-economic Impact Assessment of Stand-alone and Co-operative Intelligent Vehicle Safety Systems (IVSS) in Europe. TNO and al, 2008

<sup>83</sup> "Impact assessment on the introduction of the eCall service in all new type-approved vehicles in Europe, including liability/ legal issues", TRL, SMART 2008/55, 2009

## *Analysis of Main costs*

### 1.1.1.1. In-vehicle systems costs

Triggering mechanism (mostly based on existing systems) –all options-, Communication module –all options-, in-band modem (Option 2 and 3, software, licence free), electronic control unit (processing, memory) –all options-, positioning system (e.g.: GNSS) -all options-.

Suppliers have quoted 50-60€ for the full eCall in-vehicle system if deployed in *all vehicles* due to economies of scale (Option 3). A multiplication factor by 2, usually used in impact assessment studies, to consider the integration costs, overheads, etc. into the vehicles would result into 100-120€. A multiplication factor by 3 to consider all additional possible OEMs costs would mean 150-180€. (See Annex IV for more details on vehicle costs calculations).

If eCall is offered as optional (Option 2), the same level of economies of scale cannot be reached, thus the cost may go up to 290-600€. This option will add also marketing costs.

Current proprietary systems (Option 1) range in the level of 800€ - 2000€ (price to customer), considering installation and device costs plus subscription<sup>84</sup>. It should be noted that there is no "eCall only" service currently offered by proprietary systems. On the other side proprietary systems are expected to produce benefits from the additional services bundled to eCall.

For all the options it is important to highlight that due to the progress of Information and Communication Technologies, economies of scale, and maturity of integration processes, the related in-vehicle costs will not increase with time, but rather stay constant or decrease. Moreover, market trends indicate that most vehicles are likely to be equipped with GNSS units in the forthcoming years, independently from the deployment of eCall.

### Communication costs

For options 2 and 3, the transmission of 112 based eCall is transparent to the network operators, which will deal with it like with any other 112 call. eCall based on 112 is free for the user, no call/roaming costs. Moreover if there is weak coverage from the home operator, in most of the countries it will roam automatically in other operators' network, increasing coverage. For option 1, the costs for the calls to the private call centre and for the calls between private call centres and PSAPs will be charged at the normal rate.

For options 2 and 3, the implementation of the eCall flag (discriminator) will need an upgrade of the Mobile Switches Centres (MSC) in order to identify manually and automatically triggered eCalls (MIeC & AIeC) within the Table 10.5.135d, which provides the Emergency Service Category Value. The eCall discriminator is part of the Release 8 of the 3GPP standards (3GPP TS 24.008) with which the mobile phone networks need to comply with.

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<sup>84</sup> According to the latest SDB study on eCall, PSA will start offering a new eCall/bCall service (eTouch) for 290 € and no subscription costs.

This will mean an upgrade of the Tables already existing in the MSCs used to route the emergency calls depending on their category (e.g., police, ambulance, fire brigade, marine guard, mountain rescue). Normally this would be a software upgrade (even if the Release 8 of the GSM standards is not implemented in the MSCs, the tables can be upgraded using a patch).

The upgrade of the MSC tables is done on (semi)regular basis to include the routing directions of the PSAPs as specified by the Member States Authorities.

The costs for implementing the eCall flag will depend from country to country, namely on the complexity of the networks and on the decisions of the Authorities where to route the eCalls. For the time when the eCall implementation is expected to be mandatory, the incremental costs to upgrade the MSCs will be moderated (as they will need to be upgraded to comply with the Release 8 of the standard. Vodafone, e.g, has stated that by end of 2012 all their MSCs could be progressively updated incorporating the eCall flag).

For Options 2 and 3 the SIM for the 112 eCall will be an *ad hoc* SIM in a dormant terminal with no management costs (there will be subscription costs only in case of upgrading of the SIM for provision of added value services). The cost of the SIM will be one time payment integrated in the cost of the in-vehicle system.

In case of private proprietary eCall service (Option 1) there is a need to install a SIM in the vehicle, subject to annual management costs. Furthermore, to ensure timely delivery of the SMS, special mechanisms should be implemented normally, which may mean annual payment to mobile network operators. In many proprietary systems, there is a need to pay one or two private companies to extract and route the calls and the SMS to the call centre and to decode and transmit the incident data.

#### Emergency call centre costs

For the 112 based eCall (Options 2 and 3), the marginal costs for each of those PSAPs duly equipped to handle 112 calls enhanced with location capabilities -E112- calls (obligation under the Universal Service Directive<sup>85</sup>) are:

In-band modem server (from 3,000 to 20,000 €, depending on the number of eCalls)

Software to decode the MSD and integration into the PSAP software

Training

For instance, for Bulgaria it is estimated that the total PSAPs upgrading cost to be 150,000€<sup>86</sup>, while UK estimated total 200,000€<sup>87</sup>. To these costs it should be added the annual operational costs. In case that the eCalls will be received in the same PSAP receiving other emergency calls, the majority of these costs will be subsumed within the normal operational costs; otherwise the costs will depend on the number of operators needed to handle the estimated number of eCalls (see also Annex III).

For the proprietary eCalls, (Option 1), OEMs or service providers should make available private call centres with trained personnel, available 24/24h, 7/7d, equipped with

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<sup>85</sup> Directive 2002/22/EC, Art. 26

<sup>86</sup> Source: eCall Driving Group

<sup>87</sup> Source: TRL study.

redundant workstations, GIS servers, software to decode the MSD and handle the eCalls, usually one call centre per country and per brand. Part of these costs will be subsumed within the costs to provide assistance services paid normally by subscription.

#### Administrative costs

The main administrative costs for public authorities due to the implementation of eCall would be the costs to certify the systems. In case of mandatory introduction or voluntary approach (Options 3 and 2) there will be European standards. In case of the do nothing option (Option 1) there will be national certification procedures designed by the countries administrations.

Certification procedures are well established nowadays. Vehicles need to be type-approved, and the eCall systems would be one part more of the whole procedure. Therefore, these costs in comparison with the total costs for type approve the vehicle, and taking into account the possible volume of vehicles equipped, are estimated as negligible.

#### *Analysis of Main benefits*

*NOTE: If otherwise mentioned, all benefits apply to the three policy options with different scales.*

Reduction of fatalities (with all vehicles eCall-equipped, between 1% and 10% depending on country population density, road and emergency response infrastructure)<sup>88</sup>.

Reduction of severity of injuries (between 2 and 15%)<sup>88</sup>.

*NOTA BENE: It is extremely difficult to estimate the benefits of the eCall system in terms of reduction of fatalities and of mitigation of severity of injuries. This is due to the fact that there are no reliable statistics on the time when the accident took place, but just from the moment the emergency services or the PSAPs were notified. Therefore the estimations should be taken with precaution. See Annexes IV and XIV for more details on the estimations and the methodology applied.*

Reduction of congestion costs caused by traffic accidents. This is due to the improvement of accident management, as the accident is immediately notified to the PSAPs and can therefore be transferred to the appropriate Traffic Management Control, which can immediately inform other road users. This will imply reduction of congestion due to traffic accidents (between 3 and 17%, depending on country population density, road and incident management infrastructure). It will also facilitate the avoidance of secondary accidents and reduce the CO<sub>2</sub> emissions due to traffic congestions<sup>89</sup>. While the reduction of fatalities will normally happen in low density roads or during night time, the impact on congestion reduction will be bigger for accidents in dense areas or during day.

Facilitation of rescue services and increased security of rescue teams (ex.: firemen) when extracting trapped occupants, as the MSD will provide information on the fuel type. This

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<sup>88</sup> SEiSS, E-MERGE, eIMPACT, AINO studies. For a more detailed analysis on the calculation, please see Annex IV

<sup>89</sup> "E-call en Verkeersveiligheidskansen, DEEL 4: De verwachte directe en indirecte effecten van e-call in Nederland". TRL study/

issue gets even more important when hybrid vehicles and/or Electric Vehicles are involved in the accident<sup>90</sup>.

Added value services may share technical resources with eCall. The eCall in-vehicle system would include the basic functionality of a telematic system, which would allow automotive industry to include more connected-car functionality<sup>91</sup>.

Reduction of SOS roadside infrastructure<sup>92</sup>, as road users would have the possibility to trigger an emergency call from each vehicle (option 3 only).

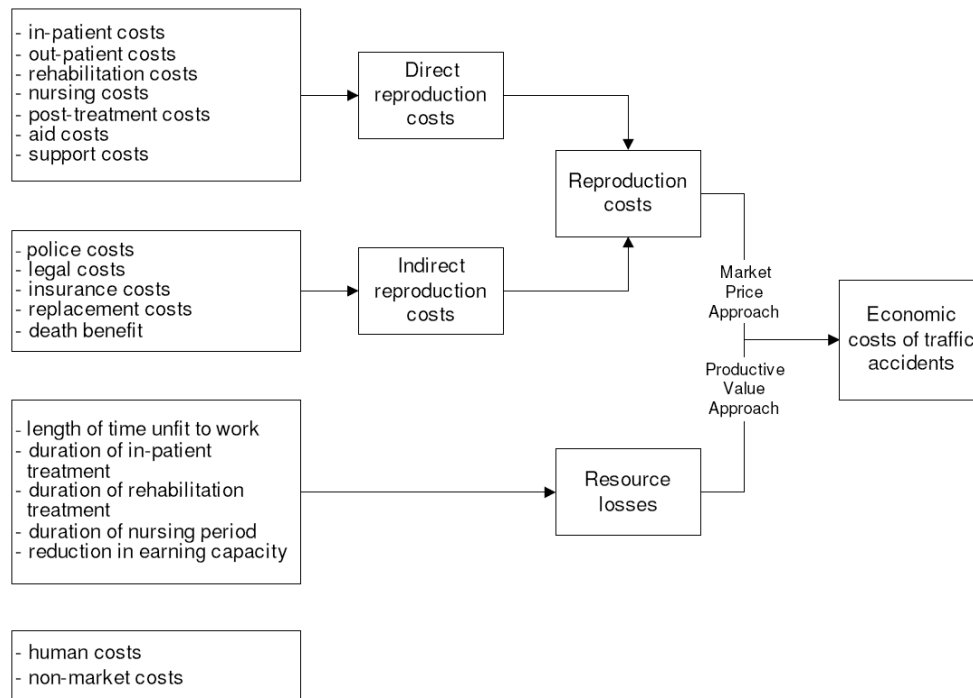


Figure 7: Main components of economic costs of traffic accidents<sup>93</sup>

For this impact assessment, the calculation has been based on estimation and costs and benefits, following the recommendations of the European Road Safety Observatory<sup>94</sup>.

In the Annex IV details on the methodology to estimate the costs and benefits are provided.

### *Under-reporting of accidents*

Underreporting of road accidents is a well recognized problem in all road accident statistics. Literature reviews recommend applying the correction factors for unreported road accidents as shown in Table 11.

<sup>90</sup> ADAC feasibility Study, May 2007

<sup>91</sup> "The competitiveness of the European automotive embedded software industry", Joint Research Centre – Institute for Perspective Technological Studies, 2010

<sup>92</sup> "A Cost Benefit Analysis of eCall and Event Data Recorder", S. Conry, April 2007

<sup>93</sup> Source: SEISS study

<sup>94</sup> European Road Safety Observatory

	<b>Fatality</b>	<b>Serious injury</b>	<b>Slight injury</b>	<b>Average injury</b>	<b>Damage only</b>
Average	1.02	1.50	3.00	2.25	6.00
Car	1.02	1.25	2.00	1.63	3.50
Motorbike/moped	1.02	1.55	3.20	2.38	6.50
Bicycle	1.02	2.75	8.00	5.38	18.50
Pedestrian	1.02	1.35	2.40	1.88	4.50

Table 7: European average correction factors for unreported road accidents<sup>95</sup>

An additional correction factor should be considered for fatalities which are not reported as road fatalities. Currently the reporting system is different across the EU: in some Member States road fatalities are considered only those with deaths in the accident spot, others count deaths within 24 hours or within 30 days of hospitalisation. Even greater discrepancies are registered in the classification of light/severe injuries.

Therefore, the figures of the Impact Assessment may underestimate the true number of road fatalities/injuries and the potential benefits of eCall.

#### *Cost-benefit analysis per stakeholders*

The three policy options would provide different impacts on each of the affected stakeholders, which are summarised in the table below.

*This table is providing description of qualitative benefits. Estimation of Monetary costs corresponding to these costs and benefits are provided in Annex IV.*

Stakeholders	<b><u>Policy Option 1</u></b>		<b><u>Policy Option 2</u></b>		<b><u>Policy Option 3</u></b>	
	<b>No EU action</b>		<b>Voluntary approach</b>		<b>Regulatory measures</b>	
	<b>Costs</b>	<b>Benefits</b>	<b>Costs</b>	<b>Benefits</b>	<b>Costs</b>	<b>Benefits</b>
<b>EU citizens</b>	For customers only	Reduction of severe injuries and fatalities for customers only; only in some Member States	For customers only	Reduction of severe injuries and fatalities for customers only. Some MS may not implement it	Repercussion of the IVS. All vehicles	Improvement of road safety.  Reduction of severe injuries and fatalities for all citizens  Reduction of congestion
<b>PSAPs</b>	Interfaces with private call centres	Calls filtered by private call centre	Upgrade (technical + HR)  Handling of eCalls	Immediate accident report  MSD (for customers only)	Upgrade (technical + HR)  Handling of eCalls (see Annex III for details)	Immediate accident report  MSD

<sup>95</sup> Source: Bickel, P. et al. 2005. Deliverable 2: State-of-the-art in project assessment, HEATCO Germany.

<b>Automotive industry</b> (offering private eCall service)	Implementation and management costs  IVS (±450 EUR)  Private call centres in each Member State  Liability on handling the emergencies  Privacy issues	Profit	IVS (±450 EUR)  Loss of profit (only for eCall, not for the added value services)	No liability issues on handling the emergencies  Possible AVS (eCall Platform in equipped vehicles)  No need for private call centres for eCalls	IVS (±180 EUR) <sup>96</sup>  Loss of profit (only for eCall, not for the added value services)	Same system for all countries  Interoperability  Possible AVS (eCall Platform in all vehicles)  No need for private call centres for eCalls  No liability issues
<b>Automotive industry</b> (not offering private eCall service)	None	None	IVS (±450 EUR)	No liability issues on handling the emergencies  AVS (eCall Platform in all vehicles)	IVS (±180 EUR)	Same system for all countries  Interoperability  AVS (eCall Platform in all vehicles)  No liability issues
<b>Stakeholders</b>	<b><u>Policy Option 1</u></b> <b>No EU action</b>		<b><u>Policy Option 2</u></b> <b>Voluntary approach</b>		<b><u>Policy Option 3</u></b> <b>Regulatory measures</b>	
	<b>Costs</b>	<b>Benefits</b>	<b>Costs</b>	<b>Benefits</b>	<b>Costs</b>	<b>Benefits</b>
<b>Emergency Services</b>	None	Limited	None	Reduced	None	Faster and more efficient service  Avoidance of secondary accidents at the scene  Advance guidance
<b>MNOs</b>	Negligible	Limited Profit (SIMs + Communication costs)	eCall flag implementation  Support of 112 calls	Reduced Profit AVS on eCall platform. Upgradeable SIMs)	eCall flag implementation  Support of 112 calls	Profit AVS on eCall platform. Upgradeable SIMs
<b>Healthcare and social services</b>	None	Lives saved, less severe injuries: limited for customers	None	Lives saved, less severe injuries: Reduced for customers	None	Lives saved, less severe injuries for all citizens Reduction of social costs
<b>Insurances and Service Providers</b>	Management costs  Private call centres	Profit	None (may contribute with incentives)	Platform for AVS  Additional info available  May receive delegation of public service  Reduction of dead and injured customers	None (may contribute with incentives)	Platform for AVS  Additional info available  May receive delegation of public service  Reduction of dead and injured customers

<sup>96</sup> The cost of the in-vehicle system (IVS) is different in policy options 2 and 3 as the latter will allow larger economy of scale and reduce the price.

<b>Road operators</b>	None	Negligible	None	Prompt info available	None	Prompt info available
				Faster clearing time		Faster clearing time
				Lane reservation		Lane reservation
				Less congestion		Less congestion
				Reduced due to penetration.		Reduction of SOS phones in the roadside

Table 8: Qualitative Cost-benefit analysis by stakeholders

The relative increase of the price for low-end vehicles (worst case scenario, average cost: 9,000 EUR) is estimated to be around 2% (180€) for option 3; 5% (450€) for option 2; 8,9% for option 1 (800€) on average. For options 1 and 2 the consumer will be confronted with the choice to pay an extra amount for the eCall option. For option 3, the consumer will ignore the real cost of the system as it will be subsumed in the total price; this is an added value for life-saving in-vehicle systems, such as seatbelts, airbags or ABS. Otherwise it may impact mainly the low-income consumers as the price increase would be relatively higher, and this may refraining his decision. This would mean that low-incomers risk not benefiting from life-saving systems in the vehicles, as pointed out in the public consultation by the users' organisations.

The real threat for vehicle manufacturers is not the cost associated with regulatory eCall. Instead, the automotive industry could take advantage of the deployment of eCall to piggy-bag innovative new features on a mass-market scale, thereby making their vehicles more appealing to consumers.<sup>97, 98</sup>

The in-vehicle eCall equipment could form the basis for an in-vehicle platform that could support additional public or private telematics services giving further safety and economic benefits.<sup>99</sup>

#### *Analysis per vehicle categories*

The eCall system is currently available in the market for passenger cars, motorbikes and light commercial vehicles. In the case of policy option 3, the mandatory implementation of eCall will start from certain vehicle categories (namely passenger cars and light duty vehicles below 3.5t), for which the standards, the triggering mechanisms and the relevant technology is currently available. Nevertheless, the eCall system would be beneficial also for other vehicle categories, as explained below.

##### **1.1.1.1. Passenger cars and light duty vehicles**

Passenger cars and light duty vehicles will benefit from the eCall service, mainly in case of accidents in interurban roads, during night hours, and in cases where one or two vehicles are involved in the accidents. Passenger cars and light duty vehicles (with the exception of flat nose light duty vehicles) are equipped with sensors that can detect serious accidents and hence

<sup>97</sup> "Market trends report: getting ready for public eCall.", SBD - 2010

<sup>98</sup> "The competitiveness of the European automotive embedded software industry", Joint Research Centre – Institute for Perspective Technological Studies, 2010

<sup>99</sup> "Impact assessment on the introduction of the eCall service in all new type-approved vehicles in Europe, including liability/ legal issues", TRL and others. SMART 2008/55, page 245

trigger the eCalls. Therefore the eCall service can be deployed immediately in these categories of vehicles.

## Motorcycles

Motorcycles will be the category of vehicles that will benefit the most from the deployment of the eCall service, as in many of the accidents in which motorcycles are involved the rider remains unconscious for a certain period, and the motorbike goes outside the road, remaining invisible to other road users in many more cases than passengers vehicles<sup>100</sup>.

bus	mopeds	Car	agricultural	heavy	pedal	motorbikes
-60,9%	-36,0%	-34,8%	-33,7%	-30,8%	-28,5%	<b>-3,3%</b>

Table 9: Decrease on the number of fatalities between 2001 and 2008 (total -28,3%)

There are some systems already offered in the market with very limited penetration<sup>101</sup>. The triggering mechanisms, based either on helmet impact or on leaning sectors, although close to be reliable to identify serious accidents, may benefit from further research. Once adequate triggering mechanisms will be refined, motorcycles can install automatic and manual eCall services.

The relative costs of the eCall system in comparison with the overall cost of the motorcycle can be more onerous than in the case of the passenger cars, namely in case of low cc engine motorbikes (e.g., L1e and L2e). Depending on the type of motorcycles they may benefit more from eCall systems (e.g., high cc motorcycles are more used in interurban journeys, mid cc for urban commuters) although it is difficult to establish total correlations.

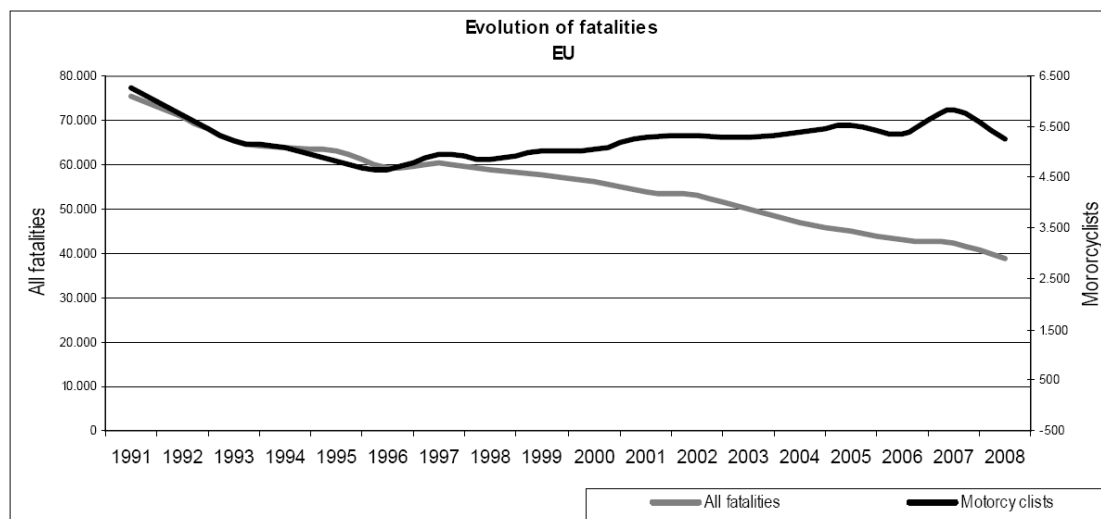


Figure 8: Total road fatalities and road fatalities of motorcyclists in the period 1991-2008<sup>102</sup>

<sup>100</sup> Aino Study on the impact of the introduction of eCall in Finland. See [www.aino.fi](http://www.aino.fi)

<sup>101</sup> E.g. eBike10 service from Mapfre.

<sup>102</sup> COM(2010) 389 – ‘Towards a European road safety area: policy orientations on road safety 2011-2020’

## Other Vulnerable Road Users

The vulnerable road users are involved in a high percentage of all accident with fatalities in Europe. Motorcycles and mopeds have been considered in the previous section. Regarding bicyclists and pedestrians, although normally they will not benefit from the automatic triggering of eCall, they can benefit from the manual triggering of eCall from the vehicle involved in the accident.

This will accelerate the arrival of the emergency services, as a/ the emergency services will receive the exact position of the accident; b/ they will know that they are normally dealing with a road accident; c/ even if the occupant of the vehicle is in shock it will be easier to trigger the manual eCall than to phone the right emergency number, and the Minimum Set of Data will provide the information if (s)he cannot find the location.

2001	2008
40,1%	44,6%

Table 10: Share of fatalities involving vulnerable road users (motorcycles+mopeds+cycles+pedestrians)<sup>103</sup>

## Heavy Duty Vehicles (Trucks and buses)

Trucks will also benefit from the implementation of the eCall service in Europe. Although reliable mechanisms have not been deployed yet to trigger eCalls, the manual eCall may be beneficial in cases where heavy duty vehicles are involved in accidents, as normally heavy duty vehicles suffer fewer consequences than passenger cars of vulnerable road users in case of accidents.

Another benefit of eCall in heavy duty vehicles when the triggering mechanism will be refined, will be for those transporting hazardous goods, as authorities will be immediately informed about this fact, and take the necessary measures to protect the road users.

Moreover, heavy duty vehicles are subject to criminal offences, principally in resting areas. In those cases having a manual eCall that could put them directly in contact with police will be a beneficial tool<sup>104</sup>. Similar benefits are applicable to other types of professional drivers, such as taxi drivers and other public transports drivers subject to criminal offences.

Regarding buses, it would be important for the PSAPs in case of accident to know the number of passengers travelling in the vehicle, as this will allow them to send the necessary resources to the incident scene without delays.

The relative costs of introduction of the eCall system in relation with the overall costs will be the lowest for this category of vehicles.

## Impact of the recent economic crisis in the automotive industry

It is difficult to correlate the impact of the economic crisis with the introduction of eCall.

However it is expected that the regulatory option (Option 3) will be the one with the least impact regarding the introduction of eCall, as the price of the eCall system will be included in the final price of the vehicle. According to the public consultation the cost increase in the

<sup>103</sup> Source: CARE database

<sup>104</sup> European Union Road Federation (ERF)

vehicles due to the introduction of an eCall system would not affect their choice of the vehicle in 76% of the cases.

Due to the crisis, the Option number 1 will be more difficult to sustain, as vehicle OEMs will need to make investment in proprietary systems and private call centres to handle eCalls without revenues, which will be more difficult during crisis situations.

Regarding the voluntary option (Option 2), as the price of the eCall as option is expected to be several times the price of the minimum eCall service mandated in the vehicle, it is expected that it will be less demanded.

#### Impact on vehicle demand and industry's profit margins

For the regulatory option (option 3), with a reduced price of less than 200 €, the vehicle demand will not be affected, or very marginally, as shown by the answers provided in the public consultation. Within this option, as the in-vehicle system will be introduced in all the vehicles, it will not distort the competition or affect the margins; only for low-end cars may have a slight effect. For the other 2 options, the vehicle demand will not be affected significantly, as eCall will be an option. There may be an increase of demand of vehicles equipped with the eCall option, but not affecting the overall demand. However, in case that a harmonised and interoperable eCall is not introduced in all EU Member States, the automotive industry could encounter additional logistic expenses in order to produce and supply the appropriate vehicle model to each Member State according to national requirements (risk of market fragmentation).

Regarding the impact in the EU automotive industry of the regulatory introduction of eCall (Option 3), the European OEMs will not be affected, as all vehicle manufacturers will need to include them. On the contrary, it will place them in an advantageous situation in relation to third countries that foresee the regulatory introduction of eCall related systems, like Brazil, or eCall systems following the European Standards, like Russia.

The automotive industry may benefit from the introduction of eCall platform in the vehicles to offer other telematic added value service which could increase their profits. This may have more impact for policy option 3, then 2 and 1, due to the penetration levels. This has been also highlighted by the answers to the eCall public consultation.

The automotive suppliers industry will benefit widely from the mandatory introduction of eCall, namely when coming out from a crisis period.

The mandatory introduction of eCall will mean an important opportunity for the automotive software industry to close the gap between Europe and other regions (US, Japan) and will increase their competitiveness in relation with them, strengthening the European position<sup>105</sup>.

Telecom industry will also benefit from the telematics services that may be offered using common technical resources with eCall.

#### Impact on Mobile Network Operators

For options 2 and 3, the impact on telecom operators, the impact is estimated to be limited because:

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<sup>105</sup> "The competitiveness of the European automotive embedded software industry", Joint Research Centre – Institute for Perspective Technological Studies, 2010

The implementation of the eCall discriminator is part of the standards the MNOs have to comply with

The number of estimated additional 112 calls is considered reduced because of the substitution effect

With options 2 and 3, there will not be additional traffic signalling in the networks as the terminals will be dormant.

On the other hand, Mobile Network Operators may benefit from the possible added value services that may be offered using common technical resources with the eCall platform.

#### Impact on SMEs

The deployment of eCall depends on major stakeholders (public authorities responsible for the PSAPs, Mobile Network Operators and Automotive Manufacturers) with very dissimilar business characteristics from SMEs (large enterprises, large number of employees, large turnovers, etc.). SMEs are therefore not considered among the population affected by the initiative.

#### *Analysis of possible number of eCalls*

The total number of eCalls, based on statistics from existing private systems (i.e., GM OnStar in USA and PSA in Europe) is estimated to be around 5,5 million of calls per year when fully deployed in the whole passenger cars park. This would mean an increase of 2% of the total number of emergency calls in Europe, around 3 calls more per PSAP operator per day (without taking into account the substitution and accumulation effects, that is, respectively the emergency calls that will not be done using the mobile phones because the eCalls are initiated automatically, and the accumulation of eCalls on the real incident by the PSAP operator, e.g., in case of accidents in the highway, where several "good Samaritans" may call for the same incident)

The estimation of the total number of expected calls can be found in Annex III

##### 1.1.1.1. Hoax calls and false calls

*Hoax calls* are considered those from abusive callers (i.e.: for a joke, to test a mobile phone, etc.). Hoax calls are considered punishable offences and usually prosecuted as crimes. That is why many hoax calls to 112 number are made from public phones or SIM-less mobile phones (e.g., to demonstrate that the terminal works for selling it). It is therefore unlikely that hoax calls will be made by the eCall system which is intentionally equipped to be quickly identifiable if needed.

*False calls* are considered those from people that:

Require assistance but do not need intervention from emergency services.  
Call unintentionally the emergency services.

The experience with private eCall services shows an important percentage of false calls in case of manual eCalls (in the order of 90%), whereas in case of automatic eCall the percentage of false calls is much more reduced (around 30%).

It should be considered that in the case of the private eCall services existing in the market, all of them are bundled with assistance services; therefore the occupant of the vehicle is asking

for a service he has paid for. It is also expected that the number of false calls would decrease by means of awareness/education campaigns for stand-alone eCall services.

*"Automatically triggered eCall is likely to have a lower false alarm rate compared with conventional emergency calls."*<sup>106</sup>

False/hoax calls are not an issue specific to the eCall service. The PSAPs in Europe are usually working with a percentage of false/hoax calls around 60% of the calls to the emergency numbers in Europe. This is considered a normal operation within the protocols of the PSAPs operators. This amount of "extra" calls can be assumed by the PSAPs operators so the system does not risk to be saturated due to the increase of false/hoax calls<sup>107</sup>.

It should also be considered that the eCalls will have a substitution effect, which means that eCalls will replace, in many cases, calls to the 112 or local emergency numbers. However, this replacement effect is difficult to estimate until the service will be in operation. eCall will also have the advantage that in case of many calls related to the same accident, the PSAP operator will be able to recognise the vehicle involved in the accident (the one that has triggered the automatic eCall) and therefore accumulate all the other calls to the real one, saving resources. The estimation of the number of expected calls can be found in Annex III.

### **Costs comparison between private emergency call services (policy option 1) and public eCall service (policy option 3)**

The table below provides a comparison between the main investments needed in case of private eCall systems and public harmonised interoperable EU-wide eCall systems. Results from the public consultation and private surveys indicates that majority of respondents prefer the handling of the eCalls by public emergency call response infrastructures. The public consultation also indicates that a significant number of respondent are supportive of keeping the existing private services in parallel to the public pan-European eCall.

	<b>Call Centres</b>	<b>Communication Costs</b>	<b>In-vehicle system</b>	<b>Maintenance of PSAPs phone numbers and boundaries</b>	<b>Mobile Network Operators</b>	<b>Other Costs</b>
<b>Private eCall services</b>	~One per MS x Automotive Brands. Annual contracts with the Service Providers (normally providing also other services)	Annual fee to Mobile Network Operators per country + Costs of the calls + Costs of SMS + SIM	Different IVS for each automotive brand. Small-scale production.	Structure to maintain the database at European level	None	Third party(ies) to ensure the timely delivery of data, the telematics platform and to send the data to the right call centre operator.
	Annual payments based on commercial agreement with service provider(s) <sup>1</sup>	~20,000€/year /country € 2/call Communication costs call center-PSAPs	€ 800	Timely effort in resources	€ 0	Annual payments based on commercial agreement with 3 <sup>rd</sup> Party <sup>1</sup>

<sup>106</sup> "Impact assessment on the introduction of the eCall service in all new type-approved vehicles in Europe, including liability/ legal issues", TRL, SMART 2008/55, page 245

<sup>107</sup> See estimated number of calls including false/hoax calls in Annex III.

<b>Public eCall (based on 112)<sup>108</sup></b>	1 time Upgrade of PSAPs or 1 per MS if eCall dedicated solution plus increasing costs for annual operation	None. 112 calls are free under the Universal Service Directive <sup>109</sup>	Mass production	None	One-time implementation of the eCall discriminator (software upgrade of the Mobile Switching Centres, part of the Release 8 of GSM standards)	None
	€ 1,100,000 on average per Member State	€ 0	€ 180	€ 0	Modest (the marginal increase with respect to the normal upgrades is negligible)	€ 0

Table 11: Comparative table for Private and Public eCall

Note 1: The third parties may be manifold, e.g., those acting as call centers answering the call and handling the incident, those ensuring timely delivery of the data and those supporting the telematics platform. Part of the private call centres costs would be shared with other assistance services in case they will be offered. It is difficult to estimate the costs for the private centres as these costs are subject to confidential market agreements. Moreover the costs will depend on the number of vehicles equipped.

These costs have been considered to the best extent in the estimation of the cost benefit analysis herein after.

### Complementary note for the reader: Cost-effectiveness and human values

The cost-benefit analysis and the nature itself of the impact assessment aim to provide actual facts and figures in order to objectively present the various solutions to the defined problem.

However we believe that the legislator, as public authority of the large community of European citizens, should focus not only on the cost-benefit analysis, but also take into high consideration ethical values that can be hardly quantifiable, such as the value of a human life and the cost of human suffering.

***"A high level of human health protection shall be ensured in the definition and implementation of all Union policies and activities."*<sup>110</sup>**

***"Everyone has the right of equal access to public service in his country."*<sup>111</sup>**

***"Mandatory eCall would mean that the public investment in eCall infrastructure was shared more equitably between citizens rather than the benefit of public investment falling preferentially on citizens who can afford optional in-vehicle equipment."*<sup>112</sup>**

<sup>108</sup> The estimations for policy option 2 are the same as for public eCall with the difference in the higher cost per in-vehicle system (450 EUR instead of 180 EUR)

<sup>109</sup> Directive 2002/22/EC, Art. 26

<sup>110</sup> Charter of Fundamental Rights of the European Union (2000/C 364/01), Art. 35

<sup>111</sup> United Nations, Universal Declaration of Human Rights, Art. 21(2)

<sup>112</sup> "Impact assessment on the introduction of the eCall service in all new type-approved vehicles in Europe, including liability/ legal issues", SMART 2008/55, page 245

## Prospects of penetration for the scenarios foreseen

In case policy option 3 is chosen, the operational objectives stated in section 3 are predicted to be achieved by 2030, meaning several decades earlier than in the other two cases (policy options 1 and 2).

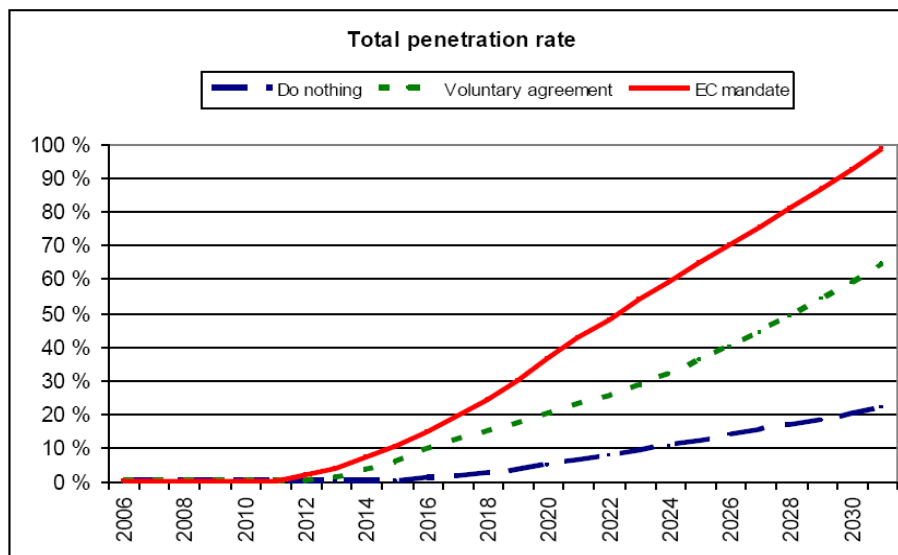


Figure 9: Total penetration rate following the three scenarios of eCall implementation<sup>112</sup>

This scenario has been identified by the TRL study, which states *"In the do-nothing scenario the penetration rate is estimated at 6%, in the voluntary approach the penetration rate is estimated at 23% and in the mandatory introduction scenario at 42% in 2020"*<sup>112</sup>. Estimations are based on an average annual sale of 16 million new vehicles in the EU.

Similar penetration rate for policy option 3 is foreseen also by a recent study by SBD, as shown in the following figure.

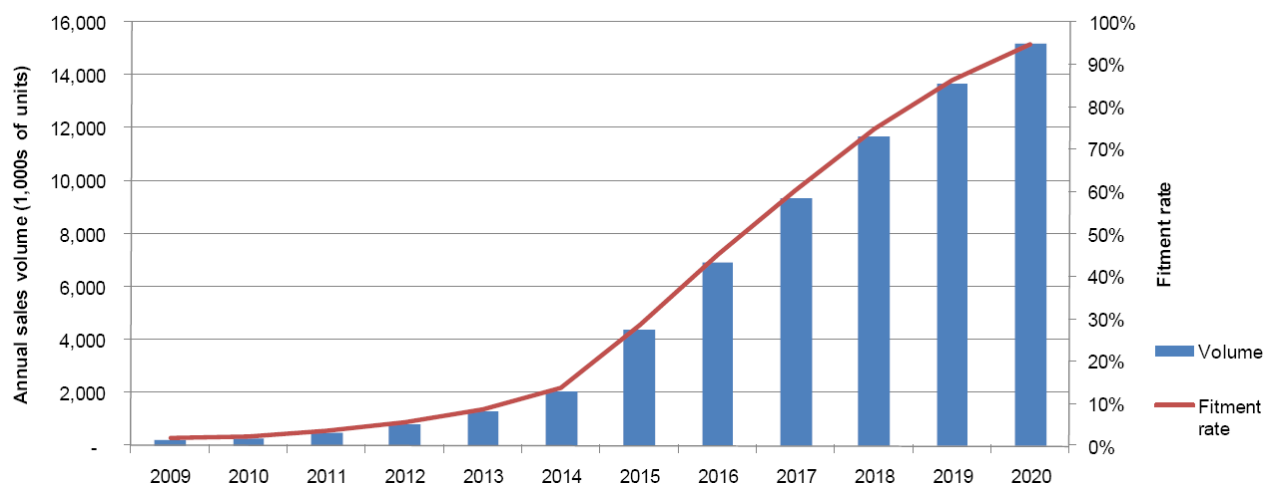


Figure 10: Predicted sales volume and fitment rate for eCall in case of Regulatory measures<sup>113</sup>

Based on the above estimations, we can draft a projection of equipped vehicles, saved road fatalities and mitigated serious injuries through the years 2013-2033<sup>114</sup> for the 3 policy options, as indicated in the following table.

Details on the way of calculating costs and benefits of the different three options can be found in the annex IV. Annex IV provides clarifications on how to reach the figures in the table. Policy option 1 starts on year 2011, as there are private systems already existing today. The Option 2 starts on year 2014, as vehicle manufacturers have declared that they need lead time since the standards are approved and pilots have been done.

The vehicles equipped with these private systems have also been added to the estimated possible number of eCall equipped vehicles for Options 2 and 3.

It is expected that a certain number of after-market solutions will appear in the market for options 2 and 3, retrofitting the existing park. This will help to accelerate the penetration of eCall in Europe. The amount of possible aftermarket solutions however is difficult to estimate and has not been considered in the calculation.

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<sup>113</sup> "Market trends report: getting ready for public eCall", SBD/TEL/2401, 2010

<sup>114</sup> 2014 is considered as initial year for voluntary approach (option 2) and 2015 for the Option 3, the regulatory measures as it is foreseen that the regulatory measures could enter into force as of this year, taking into account the regulatory path and lead times. Estimations are calculated until 2033 as this will be the year when 100% penetration could be achieved for policy option 3.

	<b><u>Policy Option 1</u></b>			<b><u>Policy Option 2</u></b>			<b><u>Policy Option 3</u></b>		
	<b>No EU action</b>			<b>Voluntary approach</b>			<b>Regulatory measures</b>		
YEAR	eCall equipped vehicles (million)	Saved road fatalities	Mitigated serious injuries	eCall equipped vehicles (million)	Saved road fatalities	Mitigated serious injuries	eCall equipped vehicles (million)	Saved road fatalities	Mitigated serious injuries
2013	1.4	8	64	1.4	8	64	1.4	8	64
2014	1.7	9	74	1.7	9	74	1.7	9	74
2015	2.0	10	86	2.3	12	99	4.3	22	187
2016	2.3	12	100	3.0	15	128	9.2	47	395
2017	2.8	13	116	3.8	19	161	16.6	81	695
2018	3.3	15	134	4.8	23	199	26.3	123	1,081
2019	3.9	17	156	6.0	27	242	38.5	174	1,553
2020	4.6	20	180	7.4	32	292	53.3	233	2,110
2021	5.4	23	209	9.1	38	352	68.2	288	2,649
2022	6.3	26	242	11.1	45	423	83.2	339	3,173
2023	7.5	29	280	13.6	53	508	98.5	387	3,683
2024	8.8	34	324	16.6	63	610	113.9	432	4,180
2025	10.4	38	376	20.3	74	731	129.6	475	4,665
2026	12.3	44	435	24.8	88	876	145.6	514	5,141
2027	14.5	50	503	30.3	103	1,049	161.9	552	5,608
2028	17.2	56	583	37.0	122	1,257	178.7	588	6,069
2029	20.3	64	675	45.2	144	1,507	195.9	622	6,526
2030	23.9	73	781	55.3	169	1,806	213.6	655	6,982
2031	28.2	83	904	67.6	200	2,166	232.0	686	7,440
2032	33.3	95	1,047	82.6	236	2,599	251.2	717	7,901
2033	39.3	108	1,212	101.1	278	3,120	271.0	747	8,371
<b>TOTAL</b>		<b>827</b>	<b>8,481</b>		<b>1,758</b>	<b>18,263</b>		<b>7,699</b>	<b>78,547</b>

Table 12: Expected penetration and main benefits for the 3 policy options

Estimations are calculated up to year 2033 as this is the expected year of full penetration of the eCall service in case of policy option 3.

## Comparison with other in-vehicle intelligent safety technologies

Although it is difficult to compare the impact of the introduction of the eCall service with other in-vehicle intelligent safety technologies, Annex XII provides a comparison of the Cost-Benefit Ratios estimated for the mandatory introduction of eCall, Electronic Stability Control (ESC), Advanced Emergency Braking System (AEBS) and Lane Departure Warning System (LDW). Annex XII includes also an estimated comparative break-even analysis.

	Electronic Stability Control		Advanced Emergency Braking		eCall	Lane Departure Warning
	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles	Light vehicles	(all vehicles)
<b>Benefit / Cost Ratio (BCR)</b>	<b>3.97</b>	<b>1.16</b>	<b>0.43</b>	<b>2.15</b>	<b>3.16</b>	<b>1.1</b>

Table 13: Comparison of BCR for in-vehicle intelligent safety technologies

Using similar assumptions, eCall ranks after ESC as system with higher BCR. eCall and ESC are also the systems performing better in the break-even analysis.

## Comparison of Benefits-Costs Ratios for the three Policy Options

To calculate the benefits-costs ratios first, the potential of saving lives and preventing injuries along the time have been assessed, considering different percentages for the different countries (using clustering methodology) to reflect their different road network and emergency response infrastructures. Subsequently they have been corrected for the actual take-up in the car park (see table 12). These effects have been monetised (see unit values for the different options in Annex XIV). Then these benefits have been compared with the quantitative costs estimates and other quantified benefits of the introduction of the service for the different stakeholders; the BCR has been calculated for the 3 policy options using a conservative approach. For more details about the methodology see Annex IV and Annex XIV for the empirical tables with the monetary values.

The following table summarised the BCR results for the three Policy Options, with the assumptions and estimations above mentioned and detailed in Annex IV. To calculate these BCR, annualised values have been considered, using a discount rate of 4%, as recommended by the Impact Assessment Guidelines

	<b><u>Policy Option 1</u></b> <b>No EU action</b>	<b><u>Policy Option 2</u></b> <b>Voluntary approach</b>	<b><u>Policy Option 3</u></b> <b>Regulatory measures</b>
<b>BCR</b>	<b>0.29</b>	<b>0.68</b>	<b>1.74</b>

Table 14: Comparison of accumulated BCR for the Three Policy Options

It should be noted that there are some effects that cannot be quantified with a valid estimation, such as the benefits of introducing added value services, the avoidance of secondary accidents or the savings on road-side SOS phones infrastructure, due to lack of accurate data or

difficulty of a clear prospective. These effects will increase the quantitative net benefit estimate.

## CONCLUSION AND PREFERRED POLICY OPTION

The harmonised implementation of an interoperable EU-wide eCall service in the EU has been in the agenda of the European Commission since 2005 and has become now a priority action for the improvement of road safety and the deployment of ITS in Europe.

All major stakeholders directly affected by eCall are supporting its deployment under the condition that the implementation will be undertaken in parallel by all actors (mainly OEMs, MNOs and PSAPs).

More than 80% of the people responding to the public consultation find the eCall system useful and they would like their vehicle to be equipped with eCall. 68% are in favour of the mandatory introduction of eCall and 58% prefer eCall to be handled by public authorities. There is no clear opinion whether eCall can be achieved through private-led initiatives, but major actors in the public consultation advocate for the maintenance of private services in parallel to the public eCall, provided that it could provide similar level of service and EU-wide coverage.

Numerous studies on eCall have shown that the system can potentially avoid around 4% of the road fatalities per year in Europe and reduce the severity of injuries by a factor around 6%. eCall can also have a significant impact on the reduction of the congestion caused by the traffic accidents and thus the overall congestion of the European roads.

For the above reasons and in line with the outcome of this impact assessment (cost-benefit analysis – see Annex IV – and assessment of different options), the policy option 3 results to be the most effective and efficient, and therefore is the preferred option for the implementation of the eCall system in the EU.

This means mandatory introduction of the harmonised interoperable EU-wide eCall service, based on 112 and on the pan-European standards developed by the European Standardisation Organisations, in all vehicles in Europe starting by certain categories (i.e., passenger cars and light duty vehicles)<sup>115</sup>, including upgrade of Mobile Network Operators and PSAPs to receive/forward and handle the eCalls. This service may coexist with the private eCall services<sup>116</sup>.

This option complies with the principle of proportionality as it does not go beyond what is necessary to achieve the objectives satisfactorily, its scope is limited to those aspect where the Union can do better (ensuring EU interoperability and continuity of the service), while a substantial part of the implementation (organisation of PSAPs) is left to national decisions. The upgrade of the PSAPs infrastructure will be done by the Member States in the way best suited to their national/local architecture, thus respecting the specificities and circumstances applying in each Member State.

The EU-wide eCall has been conceived in a way to minimise the impact on all the stakeholders in the value chain and distribute it in a fair way (automotive industry, mobile network operators, Member States - PSAPs). Financial and administrative costs for

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<sup>115</sup> Categories may be extended when appropriate triggering mechanisms ensuring reliability and cost-efficiency of the system will be found. In the meantime other categories of vehicles (e.g., Heavy-duty vehicles, motorbikes) could benefit from manual eCall and/or aftermarket equipment.

<sup>116</sup> As explained in section 5.4

national/regional authorities are foreseen to be minor and commensurate with the objectives to be achieved.

The choice of the community action is based on existing regulatory frameworks, and it is the simplest possible taking into account the number of stakeholders involved and the complexity of the implementation of the service.

## **EVALUATION AND MONITORING**

The European Commission will be in charge of monitoring progress and providing a report on the implementation and impacts of the chosen policy option. Member States will be asked to inform the Commission of actions taken in response to the initiative.

The evaluation and monitoring process will be based on the following indicators:

Number of Vehicles equipped with eCall service – currently ±800,000

Number of eCalls (automatic and manual) and results (lives saved, severe injuries reduced, other benefits, percentage of false calls) – overall figures not available, as owned by various private service providers (see estimations in Annex III)

Number of Mobile Network Operators Upgraded and correspondent EU area covered – currently none

Number of upgraded PSAPs and correspondent EU area covered – currently none

Number of vehicles equipped with an in-vehicle telematics platform including the eCall system – currently ±800,000

Reduction of time achieved at PSAPs on emergency management

Reduction of time achieved at traffic management centres on incident management

These information will be gathered by the Commission from/through appropriate fora (e.g.: EeIP, ITS Committee, etc.) at regular intervals. The Directive 2010/40/EU foresees that Member States report periodically on the progress of their actions, including eCall.

## **OPINION OF THE IMPACT ASSESSMENT BOARD**

The draft version of this Impact Assessment was examined by the Impact Assessment Board (IAB), according to the COM(2010) 543 "Smart Regulation in the European Union". The IAB declared that all procedural requirements were respected in the conduction of the impact assessment.

Following the issue of the IAB opinion<sup>117</sup> on the 21<sup>st</sup> January 2011, the Impact Assessment was revised taking into account the recommendations of the IAB. These recommendations are included in this final version of the document and they have been taken into account in the following way:

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<sup>117</sup> Opinions of the IAB are publicly available at [http://ec.europa.eu/governance/impact/iab/iab\\_en.htm](http://ec.europa.eu/governance/impact/iab/iab_en.htm)

**Recommendation 1: Clarify the nature of the problem and the baseline situation.**

Additional paragraph has been added in section 2.4 to explain the market failures more clearly, making also reference to section 5.2 where further details are provided. Regulatory failures are also addressed in section 5.5.

**Recommendation 2: Explain whether a wider range of options can be defined.**

Additional paragraph has been added in section 5.4 describing the possible options. It should be noted that parallel action from all major stakeholders involved (i.e., automotive manufacturers, mobile network operators and Members States) is considered by all stakeholders as a pre-requisite for eCall harmonised and EU-wide deployment.

**Recommendation 3: Improve the assessment and presentation of impacts.**

A section was added in Annex XIV clarifying the total implementation and operational costs and their split between public and private sector. Additional paragraph was also added in section 5.8.5. The costs of the different options are included in table 8 (qualitative cost-benefit analysis) and further details are provided in Annex IV.B.1.

**Recommendation 4: Better compare the options.**

Table 5, 6 and 8 modified following the recommendation, including clear comparison to the baseline scenario and the addition of explanatory footnotes. The same appraisal criteria have been used for all the options.