



Brussels, 16th September 2010

Public Consultations DEPLOYMENT OF IN-VEHICLE EMERGENCY CALL - eCALL - IN EUROPE

Comments from the European Motorcycle Industry (ACEM)

ACEM, the Motorcycle Industry in Europe, is the professional body representing the interests and combined skills of 12 Powered Two-Wheelers manufacturers, and 17 national associations out of 13 European countries. ACEM directly represents a total of 24 Powered Two-Wheeler brands (PTWs: motorcycles and mopeds).

Executive summary

Safety is a major priority for the Powered Two-Wheeler industry. ACEM and its members dedicate energy and resources to acquiring and analysing data regarding road safety and Powered Two Wheelers in order to identify and prioritize areas for improvements and implementation of applications. This process follows an integrated approach looking at human, vehicle and infrastructure related factors, seeking to involve policymakers and other relevant stakeholders at European, National and local level.

The developments for eCall are at very early stage in particular those related to PTWs and PTW manufacturers have adopted an individual approach towards finding the best solutions to a multitude of open and complex questions. At the same time some manufacturers have been very actively involved in co-funded projects covering this domain at European level (for example Safe rider project, SIM project, etc).

The knowledge gained through the individual manufacturer research and EU projects has enabled the motorcycle industry to identify a wide range of potential solutions, which need to be further explored through research, validation tests, and standardisation activities to understand the minimum system configuration(s) and estimate their costs.

Following a first analysis, whilst it is impossible at this stage to quantify them precisely, the costs associated with a legislative approach to eCall would be disproportionately high for the vast majority of PTW models. Furthermore, the overall benefit of eCall (fatalities and severe injuries) is between one fourth and half smaller for PTW than for cars, due to the fact that PTW accidents predominantly occur in situations where eCall is of less benefit (urban daytime). Finally, there is still no clear visibility on fundamental prerequisites such as when eCall infrastructure would be operational across the EU.

For these reasons ACEM does not support a legislative approach to eCall on PTWs and considers today that standardization activities are a prerequisite at this stage.

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1. eCall: potential configurations and main challenges

a. Car technology is not suitable for powered two-wheelers

PTWs do not have the sensors that are pre-existing in an automobile and used to trigger an emergency transmission. Accident timing, speed, and decelerations for cars are derived from airbag system components that do not exist on PTWs.¹

One key issue then is how to generate automatically an accident signal either from a motorcycle and/or from the rider's personal equipment. Various sources of information may be exploited in isolation or in combination such as the use of banking angles, decelerations, rider detachment from the vehicle and others.

Another key issue is the system robustness and false alarms: a motorcycle may 'fall over' in a number of circumstances without the need for an eCall signal to be generated.

Once a system concept has been established, the following obstacles need a robust solution, more challenging than for a car:

- Crash protection for the eCall system itself has to be defined and specified for the motorcycle and the rider equipment.
- The sensors, their function, location and algorithms to discriminate an emergency from a normal situation have to be developed, and the system proven on the more exposed motorcycle environment.
- Packaging will be greater than for an automobile.

b. A more complex HMI

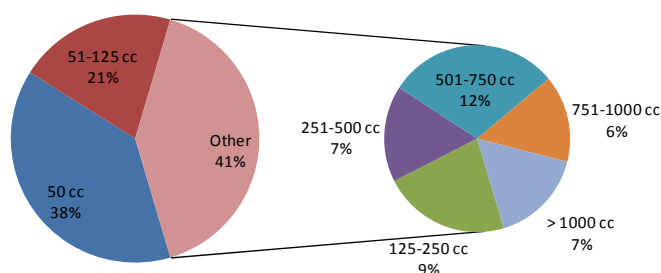
The voice link available in a car through the pre-existing audio system should be integrated in the rider's helmet. The robustness of the link with the motorcycle (e.g. via Bluetooth) needs to be operative in all accident configurations, the battery integrated in the helmet needs proper monitoring and maintenance, it should not be sensitive to weather conditions. PTW and helmet industries will have to closely cooperate in order to develop common standards and product planning strategies.

Simpler applications could be explored but clearly only manual triggers in most cases would not be useable by the rider due to his/her detachment from the vehicle.

c. The market size and the diversity of models represent technical and economical obstacles

The PTW market currently stagnates at 2 million units per year. It is often perceived as a whole, however it is characterized by a great diversity. Whilst the largest market segment (60%) is represented by urban oriented vehicles with a cylinder capacity below 125cc and consumer costs between 1,000 € and 3,000 €, PTWs above 500cc represent 25% of a market with consumer costs starting at around 5,000 €.

¹ Currently, an airbag



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The characteristics of PTWs (different vehicle size, weight, space, balance, dynamics, and handling) vary in a range far more important than for cars and would require many different adaptations of the eCall application, multiplying the development costs by a high number of possible configurations.

The cost implications would be considerable, especially prohibitive for smaller PTWs, but also for larger motorcycles due the fragmentation of volumes.²

d. Conclusion on potential solutions and challenges

Based on information currently available the application of the eCall technology on powered two-wheelers is not mature enough to identify the best viable solution(s) and therefore today any quantification of the cost impacts per unit would be premature and unrealistic. In addition, it would not cover elements linked to the rider's equipment, such as helmet.

2. Estimation of benefits (ACEM internal analysis) – June 2010

a. Literature review

An exhaustive literature review has been undertaken by ACEM for evaluating the potential benefits of eCall for motorcycle users. From this exercise, the following conclusions can be drawn:

- Most of the studies are based on assumptions and are not evidence-based;
- There is a large variability in claims related to the potential benefits of eCall;
- The highest benefit is assumed for the following accident scenarios: rural, night time and single accidents;
- The “Golden Hour” theory frequently used as basis for the benefit calculations;
- Dead before arrival to hospital is usually disregarded from the benefit calculations.

Short summary of the main characteristics of the 11 studies that have been examined by ACEM is available in Annex 1.

b. Methodology

Amongst all 11 studies, SBD (McClure & Graham 2006) has been considered as the most elaborated available research and has been selected as the most structured and appropriate way to estimate the potential eCall benefits for motorcycle users.

² The average EU sales per single PTW model represent 1,000 units yearly.



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MAIDS³ data has been applied to the analytic framework of its detailed accidents analysis (see Annex 2 for more details on SBD study).

Four “benefit” levels (high, medium, low, none) have been considered based on the possible presence of other callers, as determined by the accident characteristics in terms of location, timing, and type (single/multiple). The 4 benefit levels have been applied to fatalities and subsequently to serious injuries (SI).

Similar as SBD, the following assumptions have been used to estimate the possibility of survival: 30% of fatalities occur within minutes of the crash and a total of 50% of fatalities are diagnosed at hospital arrival with or without eCall. The remaining 50% of fatalities, caused by e.g. massive bleeding, generally occur between 10 and 60 minutes after the accident.

The “Golden Hour” formula has been applied. It states that a minute response time improvement leads to a reduction of 2% of the preventable fatalities. Based on the above, one minutes time gain will result in a maximum reduction of 2% of preventable case fatalities or $50\% \times 2\% = 1\%$ of all fatalities.

c. Estimated eCall benefits in reduction of fatalities and SI for motorcycle users

Scenario 1 – Complete application of SBD methodology

The complete application of the SBD methodology results in the following first estimated benefits:

³ Motorcycle accident in-depth study (MAIDS) – <http://www.maids-study.eu/>. MAIDS is the most comprehensive in-depth data currently available for PTWs accidents in Europe. The investigation was conducted during 3 years on 921 accidents from 5 countries using the OECD common research methodology.

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MAIDS database of PTW accidents distributed in accordance with the described scenarios (921 cases, 105 fatalities)

scenario	Maximum reduction SBD study	MAIDS distribution of fatalities	Maximum reduction in number of fatalities		MAIDS distribution of S.I.**	Maximum reduction in number of S.I.**	
			cases(*)	%		cases	cases(*)
High level	15%	1	0	0,1%	2	0	0,0%
Medium level	10%	19	2	1,8%	63	6	1,6%
Low level	5%	48	3	2,3%	115	6	1,6%
No benefit	0%	37	0	0,0%	190	0	0,0%
all levels total		105	5	4,2%	370	12	3,2%

*rounded off for total bodies

** S.I.: hospitalised 1 or more days

Scenario 2 – SBD methodology with use of dead on-scene MAIDS data

The actual information from MAIDS with the 75 cases of dead on scene (71% of all MAIDS fatalities) has been integrated in the formula instead of the SBD assumed percentage of 50%. The remaining part of the SBD methodology has been unchanged with the following assumptions: no survivability for dead on-scene cases and for all other fatal accidents, application of the Golden Hour formula.

This scenario resulted in an estimated benefit of 2.1%.

d. Conclusions on ACEM estimations of eCall benefits

According to the literature review, the overall benefit of eCall for cars is estimated to range between 1 and 20% in terms of fatality reduction. The selected research by SBD shows that the estimated benefit could reach a 7.5% less fatalities and a 6% less S.I. in the hypothesis that all cars and vans in the UK would reach a 100% eCall fitment rate.

There are two main reasons that explain why the overall benefit of eCall is smaller for PTW than for cars:

- The percentage of dead on scene where eCall could not have an effect is greater for PTWs in the MAIDS data than in the SBD assumption;
- The estimated reduction in fatalities occur predominately for cars in conditions with a high benefit of eCall (non built-up roads at night, UK car accident data), and for PTW in conditions of low benefit (non built-up roads during daytime, MAIDS accident data).

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Based on the SBD methodology and the Golden hour concept, the integration of MAIDS fatality data indicates **an overall benefit of eCall for PTW ranging between 2 and 4 % with a 100% fitment rate.**

3. The way forward: standardisation

ACEM considers that standardization activities are a prerequisite at this stage and has already requested a liaison status to CEN TC 278 WG 15.

The specificities of powered two-wheelers and the characteristics of PTW accidents require working on very fundamental standards such as, but not limited to:

- Motorcycle accident definition,
- HMI and voice link,
- Manual trigger,
- Reliability and robustness
- Certification of components for motorcycle application.

Once these fundamentals will be established, then standard solutions and minimum requirements could be selected, worked out and their costs quantified. If this road map is not followed low cost eCall systems may cause a flux of false alarms and the whole eCall concept may lose its credibility.

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Annex 1 - Literature review on eCall

1. E-MERGE Review (Geels et al, 2004)

- Area: pan-European
- Time reduction: in quiet times and in more remote areas
- Fatalities reduction: 5 - 10% in EU-15
- S.I. reduction: 5 - 10%, slight injuries: no reduction
- Kind of study: questionnaire targeted to experts working at PSAPs in Italy, Spain, Germany, Netherlands, Sweden and UK

2. STORM

- Area: Stuttgart
- Time reduction: from 21,2 to 11,7 minutes in rural areas, from 13 to 8 minutes in urban areas
- Kind of study: Field test traffic management and information system

3. AINO Study (Virtanen 2005)

- Area: Finland
- Time reduction: 82% was within 5 min. of the accident; 14% delay 5–30 min., 4% over 30 min
- Fatalities reduction: prevented 5% + could possibly prevented 5% = 10%
- S.I. reduction: not examined
- Kind of study: evaluation of fatal accidents between 2001-'03 by traumatology experts, on the basis of injuries suffered by persons involved
- **eCall for PTWs – not evidence based** – “The system would have been most effective in accidents involving vehicles for which eCall is not designed (i.e. motorcycles, mopeds etc.), followed by accidents involving vehicles for which eCall is designed (i.e. cars, vans, lorries and buses). Based on experiences from fatality estimations it was assumed that eCall would have bigger effect on motorcycle accidents as the delays are usually longer in these cases. Benefit PTW estimated at 3 times of that of cars since PTW riders are alone». **Furthermore, the assumptions from this study are relevant only to Finland which represents a marginal part of the European PTW market with a specific PTWs profile (riding for leisure, big motorcycles, only few months in the year).**

4. eIMPACT (Baum, Wilmink et al 2008).

- Area: EU
- Fatalities reduction: 5.8%, if 100% equipped with eCall (low: 3.6%, high:7.3%).
- S.I. reduction: small increase (0.1%)
- Kind of study: to assess the socio-economic effects on effects on traffic safety and efficiency;

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- Basis: data Finnish AINO study was transformed into EU-25 accident data with different distribution of accidents in various accident types.
5. **SEiSS** (Abele et al 2006)
- Area: EU25
 - Fatalities reduction: 5 - 15%,
 - S.I. reduction 10 - 15%
 - Kind of study: survey to estimate socio-economic benefits, assumptions based on E-MERGE project.
6. **TRACE** (Lahousse et al 2007, Pappas et al 2008, Evanco 1999, Champion et al 1999).
- Area: Australia
 - Time reduction: 3 min in urban areas 6 min in rural areas
 - Fatalities reduction: 2.2% of the total of passenger vehicle occupants involved in crashes in Australia. Leading to a potential of 10.5% in urban areas and 12% in rural areas
 - Kind of study: based on GM's OnStar system in Australia; OnStar was assumed to detect the accident, notify emergence services and determine its location successfully in 95% of the accidents.
7. **SBD** (McClure & Graham 2006)
- Area: UK
 - Time reduction: 10 min
 - Fatalities reduction: 3% in 2020 if fitted on 2/3 of cars
 - S.I. reduction: 2%
 - Kind of study: The socio-economic benefits and costs, based on national accident statistics, assuming 98% success rate eCall in 2020.
 - Accidents were classified by road type, time (daytime/night) and type of accident (single and multiple) into 'high', 'medium', 'low' and 'none' scenarios in regards of probable benefits of eCall
 - Casualties with heart or respiratory failures will die with or without eCall (about 50% of fatalities). The other 50% of fatalities, where the cause of death is e.g. through massive bleeding, generally occur between 10 and 60 minutes after the accident. For these fatalities each minute that the total response time can be reduced, 2% of these fatalities were assumed to be prevented.
 - Reduction serious injuries based on the German STORM project.
8. **Erie county field test** (Bachman et al 2001).
- Area: Erie County, western New York State, USA
 - Time reduction: 5 min. (time delay was 0,5 minutes for vehicles with and 5,6 minutes for vehicles without equipment)

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- Fatalities reduction: potential of approximately 20%
- Kind of study: demonstrate the technical feasibility of in-vehicle automatic collision notification system and its benefits to victims of motor vehicle crashes.
- 700 vehicles with eCall automatic collision notification (ACN) 2500 vehicles were equipped with collision event timers (CET).

9. Czech eCall study (Riley et al, 2006).

- Area: Czech Republic
- Time reduction: 3 - 5 minutes
- Fatalities reduction: 3 - 9%
- S.I. reduction: 5 - 10%.
- Kind of study: socio-economical effects of eCall, using casualty classification
- Reduced response time: estimated by national rescue service.
- Calculation of possible impacts was focused on casualties involving cessation of respiration. 10 - 30% of all fatalities on motorways and roads (951 fatalities) were assumed to be cases with respiration trauma, which means 95 - 285 victims could have benefited from the eCall system.
- Results STORM project used for time calculation

10. Swedish eCall study (Anonymous 2005)

- Area: Sweden
- Time reduction: urban 4 min. rural 10 min.
- Fatalities reduction: 2 - 4%
- S.I. reduction: 3 - 4%
- Kind of study: socio-economic benefits, using Swedish statistics of traffic accidents.
- Based on the results of earlier research such as: E-MERGE, SEiSS and STORM, the golden hour principle
- Relation between the probability of survival and the time between accident and medical attention was obtained from a Swedish research report (Handell&Dahl1996) and golden hour principle.

11. Dutch eCall study (Donkers et al 2008)

- Area: Netherlands
- Time reduction: 3 minutes
- Fatalities reduction: 1 - 2%
- S.I. reduction: 1%
- Kind of study: Analysing national road statistics
- Assumed eCall will be beneficial for single accidents night selected
- Assumed: 50% dead on scene.
- Relation quicker treatment calculated by golden hour theory.

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Annex 2 - SBD (McClure & Graham 2006)

UK research classification

- A „high“ level of benefit is assumed for:
 - Single vehicle accidents on non built-up roads (non-motorway) at night (low probability of call).
- A „medium“ level of benefit is assumed for:
 - Single vehicle accidents in daytime on non built-up roads;
 - Single vehicle accidents at night on built up roads;
 - Multiple vehicle accidents at night on non built-up roads.
- A „low“ level of benefit is assumed for:
 - Multiple vehicle accidents in daytime on non built up roads;
 - Multiple vehicle accidents at night on built up roads;
 - Single vehicle accidents in daytime on built up roads;
 - Single vehicle accidents at night on motorways;
- No benefit is assumed in the case of:
 - Multiple vehicle accidents in daytime on built up roads;
 - Multiple vehicle accidents at night on motorways;
 - Single vehicle accidents in daytime on motorways;
 - Multiple vehicle accidents in daytime on motorways.

Estimated gain in response-time

SBD assumed that the following arrival time improvements (thanks to earlier responds and benefit exact location) are possible:

- High level scenario: 15 minutes
- Medium level scenario: 10 minutes
- Low level scenario: 5 minutes
- No benefit level: 0 minutes

Possibility of survival – medium level

SBD uses the following assumptions to estimate the possibility of survival:

- 30% of fatalities occur within minutes of the crash, and
- A total of 50% of fatalities are diagnosed at hospital arrival with or without eCall
- The remaining 50% of fatalities, caused by e.g. massive bleeding, generally occur between 10 and 60 minutes after the accident.

The “Golden Hour” formula states that a minute response time improvement leads to a reduction of 2% of the preventable fatalities.

Based on the above two, SBD assumes that 1 minutes time gain will result in a maximum reduction of 2% of preventable case fatalities or $50\% \cdot 2\% = 1\%$ of all fatalities.

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Possibility of survival for all levels

	time	survival possibility
High level scenario	15 min.	15%
Medium level scenario	10 min.	10%
Low level scenario	5 min.	5%

The maximum benefit of eCall is the total sum of the number of fatals per level multiplied by the survival rate for each level. = \sum (fatals * survival rate).

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