



eSafety Forum

1st Plenary Meeting, Brussels on 22 April 2003

Report of the Working Group on eCall

Chair : P. d'Oultremont (ERTICO/Belgacom)

SUMMARY

- eCall top of eSafety action list (eSafety Forum, November 2002)
- WG has held two meetings since. Key results so far :
 - Focus on eCall functional model : *what would make eCall a workable proposition at EU level ?*
 - Model to be built on four constituencies
 - *Automotive industry* (call initiation capability)
 - *Telecom industry* (call transport)
 - *PSAP* (call listening capability) and *EA* (emergency operation capability) national environments
 - *Service providers* (commercial assistance)
 - Close cooperation with the eSafety business rationale WG
 - Critical task : resolve the “chicken and egg” situation (here the “call and respond” situation). This implies answering the following conundrum : *who is to invest how much and when to achieve what results ?*
 - The task is being addressed partially through scenario analysis (scenarios to be constructed and assessed against the Emerge “reference frame”). Two lines :
 - *Influence of call contents* (data set) on emergency response
 - *Impact of call path* (direct or through service providers) on eCall functional model (this WG) and business rationale (companion WG)
 - Telecom Operators to produce a detailed analysis of call transport (voice and data) technical requirements and corresponding protocol handling
- The main WG objectives are, at this point in time :
 - To produce, by year end, the key elements needed by political and industry decision makers to take the necessary steps to enable eCall
 - To feed the business rationale WG, in the course of 2003, with a reasonably comprehensive eCall functional model.

European In-vehicle e-call Position Paper European Vehicle Manufacturers

Co-ordinated by ACEA

1. General Remarks

1.1 Support of EU Initiative

The European Automobile industry supports the objective of the EU Commission to further increase road safety, reduce the number of serious accidents and provide an efficient harmonized European (112) emergency service to speed up rescue times.

1.2 The Automobile Industry could provide valuable support and eliminate serious deficiencies of the general e-112 call

Vehicle emergency calls differ from the general emergency calls, especially when it comes to input, handling and output of data. Both calls, however, are directed to the same rescue infrastructure.

The general emergency call, about to be deployed within the European Union through "e-112", is intended to treat any forms of emergency situation: domestic accidents, distress of patients, attacks, mountain rescue.

The width of the spectrum to be covered forbids too important a technical specialization. It is about a priority vocal call, the possible localization of which depends on the place of the call and is limited to the current technology (today the triangulation of the GSM or registered address/positions when landlines or public emergency poles/terminals are used).

The efficiency of the mobile e-112 service to improve the release of the road help remains limited:

- The localization is not sufficient to indicate the place of intervention: in urban area the trajectory of the vehicle is often indispensable to clarify the exact place, in rural area the precision of the techniques of triangulation GSM degrades strongly, and side road error or wrong riverside may turn into critical loss of rescue time
- The call can be impossible when the injured vehicle occupants are not able to trigger the call, the mobile phone is lost or damaged in the accident

On the other hand, the in-vehicle integrated emergency call could be characterized by:

- Precise localization, direction and map matching, allowing accurate on-road or roadside location,
- Automatic triggering of the call in case of impact,
- Robust integration in the vehicle, allowing to mitigate the limits of the call : matching of data allowing to identify the caller, type of vehicle ; hands free access to and from the accident victims (allowing listening in worst cases), power back up, call back capacity in case of break of communication

1.3 *Innovation is our business*

Since its existence the Automobile Industry has steadily improved active and passive safety of its vehicles through numerous innovations. Manual and automatic location based technologies are only a few on a long list of new customer-oriented products and services.

The automobile industry initiated emergency call in mid 90's and keeps exploring enhanced approaches, from vehicle sensors and technical data bases allowing better context analysis.

1.4 *Economic situation in many countries limits recovery of investments*

Based on new technologies and new services the average content value of the vehicle has increased by more than 35% over the last 10 years. On the other hand the average private income has stayed behind this development making it more difficult for the customer to pay for additional features. Any additional system/product integration as standard vehicle equipment, however, is commercially only feasible when customers see a high need and are willing to pay for it.

1.5 *Almost no customer demand for in-vehicle e-call systems*

In-vehicle emergency call (e-call) systems are currently offered by many vehicle manufacturers as an option. However, demand is very low, as is the willingness to pay for the related hardware and service.

1.6 *Negative Business Case for e-call services*

The low willingness to pay for an e-call service on one hand and the high cost of system integration in a vehicle on the other has resulted in a negative business case, blocking the automobile industry from further pursuing this service on a larger scale. As other Telematics services today do not have a positive business case either, a cross financing possibility does not exist. This brings the automobile Industry in a difficult position. On the one hand the automobile industry has the technology and the know how as well as the willingness to contribute to a better emergency concept in Europe, on the other any further commitment would add significant losses to the bottom line in an already difficult market.

2. In-Vehicle Devices and Service Infrastructure

2.1 Projects could be better coordinated

To underline its commitment and to find solutions, the automobile industry has involved itself in a number of EU or Member State initiated or promoted activities like EMERGE, e-Safety (e-call), GST (Rescue). DG TREN has also set up an expert group on e-call just recently. The Automotive Industry sees here the need for an overall project leadership and management to ensure that efforts are coordinated, resources aligned and objectives harmonized. Additional efforts seem necessary to bring all stakeholders (industry, governments, infrastructure operators, rescue-services, users) together and to secure that common interests and the specific role of each stakeholder are shared and accepted.

2.2 Low cost devices still need to be developed

Volume market solutions for e-call must be based on low cost devices allowing accurate location/direction information (GPS or other technologies) and vehicle sensor data to be routed to focused emergency support. These devices do not exist today. Development would follow the normal and known product development and penetration cycles in the vehicle industry (minimum 5 years). To achieve low cost targets, the automobile industry is basically prepared to share certain development costs, standardize hardware components, software and interfaces.

2.3 Product development needs to be in line with infrastructure development

Beside the hardware costs and the time needed to develop a low cost device the automobile industry sees a major barrier for vehicle related enhanced e-call services in the existing infrastructure which is currently not able to handle and process precise location and vehicle sensor based information. Before product developments could start, a clear definition of expected information and format, as well as commitment and timing for the complete rescue chain are required from the public side.

2.4 A private e-call infrastructure cannot substitute public obligations

To overcome public deficiencies the automobile industry has subcontracted at its own cost private service providers to handle GPS based e-calls and forward accurate position and other accident relevant data to the public sector. Current business cases have shown that for a mass market application the automobile industry is not able to carry the cost of a dedicated private infrastructure to fulfill a constitutional right of each citizen for emergency support.

2.5 High synergy potential in public-private partnership

While on one side the private sector works with state-of-the art technology but high costs not covered by commercial incomes (customers seeing emergency as a public service duty), the public sector on the other side handles all kinds of emergencies (vehicle accidents being perhaps 10% of the volume) with permanently reduced budgets, a number of operators and out-dated technologies. It is strongly recommended by the automobile industry to leverage the investments, strengths and knowledge of the private sector with the experience and dedication of the public emergency sector under a public-private partnership. Such a partnership would lead to a new optimised emergency networked infrastructure with clear roles and responsibilities, defined interrelationships, lowest possible investments, highest productivity and a shorter timeframe for implementation. A European infrastructure would solve cross border emergency issues and set the standard for high quality services across Europe.

Moreover, the private sector will be in position to proactively improve emergency information with up to date technology and private databases, allowing public emergency organization to focus on emergency situation handling, with limited investment to get automatically necessary data (push) and access, when needed, complementary information (pull). The public sector should then be able to reduce its effort and equipment costs to workstations and training, allowing faster and more flexible adoption of automotive e-call.

2.6 Automobile industry offers support in bringing the two sectors together

The automobile industry is well aware of the fact, that current emergency infrastructures vary significantly from one member state to the other but the automobile industry is also aware of excellent good practices which could set positive examples and drive the initiative.

The initiative has to come from the public side but the automobile industry is more than willing to moderate or accompany such a process.

3 Service Content

3.1 Higher data quality

To support emergency operators with better location data and higher quality information the automobile industry will agree on a so-called “Minimum Set of Data”¹ to be sent to the PSAP together with the initiation of the 112 voice call. The Minimum Set of data has to meet PSAP requirements² in line with objectives and operator capacity. Current and also future Cell ID technology provided by the Telecom networks is and will not – in many cases - be sufficient to provide position data with the required accuracy in case of a car accident.

The automobile industry would be willing to explore further the development of services provided that an infrastructure is available to handle such data and the business case aspects are fulfilled. But as for minimum emergency, we can hardly expect customers to pay for this extra efficiency, as we cannot refuse this life saving development to low end priced cars.

3.2 GTP/ETSI Standards

The automobile industry generally agrees that a harmonized European emergency system needs to be based on one common standard. GTP has been discussed as a potential protocol but the current status quo on GTP is not yet acceptable.

If, as recommended, a private/public cooperation is taking place with private data aggregator, the need of a common/unique communication protocol is not proven as far as service level requirement is met. Private e-call data provider shall then receive data in relevant communication protocols, and harmonize prior to send or give access to PSAP. In this case the development of a protocol interpreter to work with all major existing protocols is encouraged.

4. Timing

4.1 National differences

To achieve a harmonized European emergency call service system where all European citizens can trust in a high service standard, the different national systems and structures need to grow together to become fully interoperable. While some countries already have optimized structures others can learn from, systems/infrastructures in other countries seems to be overloaded and

¹ Minimum set of data: use case header, version (hw, sw release, OEM/terminal identifier), time stamp, EMERGE ID, location, direction, vehicle descriptor (color, type of vehicle), breakdown status (automatic/manual), Service Provider identifier)

² Send rescue vehicle to the right location as fast as possible, provide all information needed to best locate/identify the vehicle and inform on status of the accident/victims. Reduce number of false alarms.

highly costly. Many countries are very fragmented. This situation makes it very difficult to promote a common in-vehicle e-call solution. The automobile industry, therefore, recommends relating any timing to the readiness of a larger market area and to guarantee Member States commitments first to adapt their rescue organization, prior to a common European introduction date.

4.2 *Public commitment is crucial*

Member States need to commit to infrastructure timing as a prerequisite for private investments in high volume product and service development. As vehicle manufacturers have considerable lead times for new products and in-vehicle systems an early commitment is essential to meet overall EU expectations (2010 objective of 50% fatal accident reduction).

4.3 *Voluntary commitment currently unrealistic*

Based on the above it is absolutely unrealistic to expect the European automobile industry to introduce in-vehicle e-call systems as a standard device with any new vehicle when necessary infrastructure optimizations, upgrades and restructurings, together with a sustainable economic model, are not taking place in parallel. Furthermore development of low cost hardware for a mass market has not yet started and due to known development times in the industry and pending standardizations, products will not yet be available either.

The Role of the PSAP Needs of the Emergency Authorities (EAs)

Co-ordinated by Martin Hill (ODPM)

Whichever EA arrives first at an incident it will have to make an assessment of the situation and decide if other services are required: e.g:

- fire brigade to deal with fire or to cut people out of wreckage;
- ambulance service because people are injured or trapped.

Any data received from an e-call system should enable the emergency service operator who takes the initial call to carry out this assessment and dispatch any of the emergency services which is clear will be required. To effectively reduce the time for management of the incident the data should indicate:

- the seriousness of the incident
- the likely seriousness of injuries
- the need for people to be freed from wreckage
- the number of people who may be injured
- the risk of fire

Essential Data Requirement (Minimum data set)

The following information is regarded by the emergency services as essential to speed up and improve the response. The service should be either automatically or manually activated when pushing the e-call button of the In-vehicle system (IVS). In priority order:

- GPS location of the vehicle in latitude and longitude;
- Direction of travel derived from the last 3 GPS positions with 30 meters intervals – to define the direction on the highway the vehicle is;
- Number of sensors activated;
- Vehicle descriptor – to define the colour, model, VIN, terminal number, licence plate, to enable the emergency services to identify the accident vehicle.
- the source of the emergency call and at least two sensors, e.g. airbag, roll-over, front crash, side crash or rear crash.
- Time – to define when the call was generated;
- SP identification – to enable the emergency operator to find additional data about the accident.

Desirable Data Requirement

The data from the vehicle which is regarded as desirable to enable the EA to determine the seriousness of any incident and therefore the level of the response required, includes:

- Speed
- Deceleration
- Radial speed
- Tilting

- Persons on board – in numbers and heart rate
- Temperature – engine compartment and passenger cell
- Smoke sensor – engine and passenger compartment
- Wearing of seat belts, with child seat indication
- Points of impact

Additional services

This data is not required for the response to the incident but will help the emergency services and any IVS Service Provider (SP) deal with resolving problems which may result from the incident and assist in any investigation of the incident.

- Contact details for vehicle owner/driver;
- Insurance details;
- Driving licence;
- Evidence of road worthiness (e.g. test certificates);
- Next of kin or other persons to inform;
- SP incident manager;
- Services offered by the SP to the driver – e.g. to deal with property from the vehicle; vehicle removal and repair;
- Medical information relevant to the occupants of the vehicle.

In the main this information will benefit the occupants of the vehicle and their SP rather than the PSAP and EA, although it may reduce the burden on the EA if, for example, the next of kin have to be contacted, rather than have to rely on documents carried by the occupants or in the vehicle.

Accuracy of information

The value of any data is linked to its accuracy. If the EAs find that data from IVS systems and SPs is inaccurate they will not rely on it and will continue to insist on voice communication either with the vehicle occupants or eye-witnesses at the scene. In effect this means that no benefit will be gained and in the majority of cases the assessment of need will be made by the first EA responding to the incident.

Legal obstacles issues

Information provided as part of E112 (i.e. voice call plus location information) and which forms part of the immediate emergency call chain is not within the data protection restrictions under European law (Universal Service Directive 2002/22/EC, and Directive on Privacy and Electronic Communications 2002/58/EC) and may be used by the emergency services for the purpose of providing assistance.

Directive 95/46/EC on the protection of individuals with regard to the processing of personal data and the free movement of such data stipulates that personal data may be processed where the processing is necessary in order to protect the vital interest of the data subject.

However, protection for the EAs is not considered to extend to other data provided by the IVS or added by the SP. This means that there will need to be an

agreement from the person from whom the data is generated that the SP has permission to store the data and the circumstances in which it may be released.

Any agreement would have to extend to assure accuracy of the data.

The SP or other owner of the database would need to indemnify the PSAP and the EAs for any act, or failure to act, as a result of providing inaccurate or false information. The SP would also need to indemnify itself against the failure of its communication chain if that were to result in the worsening of the emergency situation.

Again the PSAP and the emergency authority would need to indemnify themselves against the receipt of incorrect information, or failure on their part to use information if that resulted in a worsening of the emergency situation.

Harmonisation; Transmission of data; and Organisational change needed

The development of any Europe wide arrangements for e-call raises the issue of the need for harmonisation of the arrangements, and possibly the establishment of some centralised arrangements for managing the arrangements, for example a central data base.

There is an obligation under European law on all telephone communication operators to provide a 112 emergency call service. It is for this reason that the partners in the E-merge Project decided that in developing the E-merge concept it should be based on the 112 arrangements since these already provided the arrangements across Europe for the transmission of emergency calls through the networks to the PSAPs and the EAs, and from July 2003 the obligation to provide, in so far as technically feasible, location information. The development of the necessary interface between the telephone operators and PSAPs for providing location data is currently being undertaken by ETSI/EMTEL. Given time constraints it seems unlikely that the operators will have sufficient time to introduce the protocol by July, although some countries (eg UK and Spain) have already implemented earlier versions of the specifications. Once the protocol is agreed the obligation placed on the operators should ensure that they adopt the protocol and the expectation is that it will be rolled out across the networks rapidly.

It is understood that the interface should also provide the technical basis upon which the additional e-call data might be transmitted. The potential is therefore being developed for e-call data to be available across Europe in advance of the introduction of IVS into the volume car market.

The networks are already required to give priority to 112 calls, and therefore using this as the basis for any e-call arrangements has the advantage of giving a similar level of priority to data linked to any 112 voice call.

Any agreement between the vehicle owner and a SP places a responsibility upon each to ensure the accuracy of any data supplied to the PSAP and thence to the EA. This data base will be held by the SP for purposes other than 112 emergencies. Although this may create problems for the PSAP who will have to be able to contact a SP to obtain the data not provide direct by the IVS (the minimum data set), the necessary identifiers can be provided in the initial e-call message from the IVS to the PSAP., It is for this reason that E-merge has decided that for

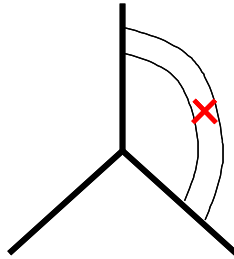
the purposes of the project no central database should be established and that it should remain the responsibility of the SP to create and maintain their own database.

GSM Roadmap and technologies for LBS

Co-ordinated by Kevin Oord (Vodafone)

Cell I.D. – is in existence today and the accuracy depends upon the diameter of the cell site, this can vary from 500m in dense urban areas to 70km in the countryside.

Cell I.D + Advanced Timing – uses timing signals from the mobile to the base station it is registered on (at the time) to calculate the approximate distance it is away from the base station. As base stations are tri-sector (have three directional sectors) the position can be calculated as below:



ECGI (Enhanced Cell Global Identity) – is approximately 3 times more accurate than the above method, in suburban areas between 200m and 300m accuracy is expected. This method used the signals from a number of base stations with differing power levels, the differences are reported back to the network and a position is calculated from them.

Road system integration – If we translate this to the road system in a given country (accurate digital mapping is readily available in most markets) we are able to gain a much higher accuracy for vehicle based applications. This enables us to measure the signal power level changes in relation to the road network and effectively collect data.

Assisted GPS (AGPS) – is where most of the information required sits in the network. The three main elements required to get a GPS fix are:

- 'seeing' the satellite (knowing exactly which satellite is in view)
- accurate time of day
- the frequency of the signal from the satellite

In a standard GPS receiver all this happens locally, which is why it takes 3 or 4 minutes to register the first position. With AGPS all these elements are gathered outside the GPS receiver, which means that the GPS receiver in the mobile can get a fix in seconds. It also means higher accuracy (around 5 to 10 metres) and also 'in building' positioning.

So which technologies will telcos standardise on?

- Cell I.D.
- Cell I.D. with Timing Advance
- AGPS

A phased approach is most likely for sure Cell I.D. will be implemented in the near future by multiple telcos.

The Effect on Automotive Telematics:

Cell I.D. + T.A. and ECGI may well suit the majority of applications for P.O.I. etc in the telematics world. Due to the different Accuracy levels not all method are applicable for mission critical services such as Ecall.

Definition of additional services, delivered to customers and to emergency authorities by Service Providers. (Focus emergency response).

Co-ordinated by Marcel van Empel (Bosch Communications Center)

Please keep in mind this document contains possible services that can be delivered by Service Providers in relation to emergency responses. As can be seen under 'technological and economic assessment' (see below) the feasibility of creating these services is dependent on developments within the service chain.

1. Delivered to emergency authorities

a. Emergency process

i. Accident data

1. Provide sensor information (Breakdown status)
2. VIN
3. Location
4. Direction
5. Licence Plate
6. Time of event

ii. Repatriation

1. Contact family members via personal profile
2. Language intervention

iii. Provide medical profile

1. Standard information in SP database available
2. If available, distance monitoring of medical processes
 - a. Cardio monitoring
 - b. Chronicle monitoring
 - c. Medical advice (2nd opinion)

iv. Overflow network partner (?)

v. Conference call intervention between PSAP's and SP's

1. If other languages are involved. The SP's can support and translate language intervention support.

2. Delivered to customers

a. Towing companies

i. Provide specific information about:

1. Type of accident
2. Time to arrival (if roads are blocked, area cannot be accessed. Company can be asked to stand by until further notice from SP's is provided.
3. Road conditions

b. Hospitals

i. Ambulance

1. Provide medical status and profile
2. Provide sensor information
3. Provide environmental circumstances

- 4. Navigation support
- ii. Hospital
 - 1. Provide medical profile.
 - 2. Repatriation
 - 3. Status reports
- c. Technical Disaster teams**
 - i. Chemical
 - ii. Other.
- d. Automotive company**
 - i. Provide specific information about
 - 1. Location id.
 - 2. Technical diagnosis
 - 3. Damage diagnosis
 - 4. Technical status
 - 5. Airbags
- e. Insurance company**
 - i. Provide accident profile
 - 1. Location id
 - 2. Damage diagnosis / profile
 - 3. Car replacing
 - 4. Hotel booking
- f. Lease and / or rental companies**
 - i. Status reports
 - ii. Car replacing
 - iii. Hotel booking

In order for the PSAP to receive the additional data, we suggest the solution described in the E-MERGE concept. In this concept the data the PSAP receives from the car, contains the SP identifier. (a 0800- number and a fixed IP address). By this way the PSAP can extract additional data from the database kept by Service Provider.

Description of Technological and Economic assessment

It is very important to have an insight in both the technical and the economical conditions, in order to create awareness of what should be done to actually create the described additional services.

Technological provisions

With respect to sensors:

Vehicles are increasingly equipped with more and more sensors systems to improve active and passive safety of vehicles. This includes information of relevance for accident and rescue management. In this line of thinking there are the technological possibilities to make all kinds of information available. (Think of: impact/deceleration speed, seat occupation, passenger compartment temperature changes, smell sensors on smoke, alcohol,

distracted/weariness sensors, road surface sensors, distance sensors, fog sensors, general speed sensors/speed alert, more crash sensors) Of course it is also up to the PSAP's to indicate what sensors and services they prefer.

A problem arising is the question whether these sensors will be brought to market and if so, on what scale. It is assumed that the introduction of new sensors will be in luxury cars, before going into (cheaper) mass-production. Of course the introduction of new sensors is based on the willingness of customers to pay.

With respect to telematics based services:

At this moment many services are available already. Together with the development of sensors, the additional services as described above should not encounter many technological barriers. It is the acceptance of the market and the importance placed from the political side that will determine the future use of additional services, leading to safer roads throughout Europe.

Besides this there are legal implications in introducing additional services. (Legal liabilities, data protection issues etc.) As agreed, the PSAP group will look at these different legal issues in each member state.

Economic provisions

Achieving additional services in the service chain will clearly depend on the willingness of all parties to co-operate. Consultation and tuning between parties is an essential element to reach our goals. Hereby we refer to the work already done by E-MERGE. Here the service chain as desired is described in detail already. Moreover, the system will be tested in several European countries.

Whenever decided not to work in a public-private partnership between all partners of the rescue chain, the in-vehicle e-call will probably stay at its current level. A service offered by private service providers, for mostly luxury cars, not creating an overall solution for e-safety on European roads.

Costs can vary widely, depending on the amount of services offered. However, each customer should be protected against accidents, independent of personal wealth. Additional (less critical) data could be offered by service providers on the basis of an extra fee.

A system that could be used for billing customers is making a difference between fixed and variable payments. The customer pays a fixed amount for getting the service installed. On top of that there could be variable payment, depending on what additional services the customer wishes to receive.

With regards to the telematics based service it is important to stress that services struggle for positive business cases at this time. From this point of view it cannot be expected that large investments will take place, without political support.

Conclusion and Next steps

The working group has succeeded in attracting the participation of key stakeholders and has created significant momentum behind readying e-call for pan-European introduction.

In order to ensure that the target will be met it is essential during the next phase of the working group to focus on the following:

- Finalize agreement on data sets to be delivered from the vehicles.
- Endorse a pan-European routing of the e-call message (built on the infrastructure of E112 ?).
- Clarify the commitment and status of the e-call infrastructure at the PSAP level in the different Member States including the plans for the future.
- In parallel to the above, define the commitment of the automotive industry to introduce e-call and synchronize with the above.