D2.3 Implementation plan

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1 Terms and abbreviations

1.1 Terms

TERM	DESCRIPTION
112	single European emergency call number supporting Teleservice 12 (ETSI TS 122 003)
Call Termination	termination of call and freeing up of line (usually achieved by hanging up the receiver or pressing 'end call' or similar on screen)
Mobile network	Mobile radio network based on 3GPP standards for circuit switched telephony, also known as GSM (2G) or UMTS (3G)
E112	emergency communications service using the single European emergency call number, 112, which is enhanced with location information of the calling user TS12
eCall	emergency call generated either automatically via activation of in-vehicle sensors or manually by the vehicle occupants; when activated it provides notification and relevant location information to the most appropriate Public Safety Answering Point, by means of a mobile network, carries a defined standardized minimum set of data (MSD) notifying that there has been an incident that requires response from the emergency services, and establishes an audio channel between the occupants of the vehicle and the most appropriate Public Safety Answering Point
eCall discriminator	one of two flags included in the emergency call set-up message within the Service Category IE, that may be used by the mobile network to filter and route automatically and manually initiated eCalls to a designated PSAP term "identifier" not used
eCall In-band Modem (eIM)	Modem pair (consisting of transmitters and receivers at IVS and PSAP) that operates full-duplex and allows reliable transmission of eCall Minimum Set of Data from IVS to PSAP via the voice channel of the emergency voice call through cellular and PSTN networks.
eCall service	end-to-end emergency service to connect occupants of an affected vehicle to the most appropriate PSAP via an audio link across a PLMN together with the transfer of a minimum set of data to the PSAP
eCall transaction	establishment of a mobile wireless communications session across a public wireless communications network and the transmission of a minimum set of data from a vehicle to a

	public safety answering point and the establishment of an audio channel between the vehicle and the PSAP
in-vehicle equipment	equipment within the vehicle that provides or has access to in-vehicle data required for the minimum set of data and any other data that is to be sent as part of or complementary to the minimum set of data to effect the eCall transaction via a mobile network providing a link between the vehicle and a means of enacting the eCall service via a mobile network
in-vehicle system (IVS)	in-vehicle equipment together with the means to trigger, manage and effect the eCall transaction
Minimum Set of Data (MSD)	standardized data concept comprising data elements of relevant vehicle generated data essential for the performance of the eCall service [EN 15722:2011]
most appropriate PSAP	PSAP defined beforehand by responsible authorities to cover emergency calls from a certain area or for emergency calls of a certain type
network access device (NAD)	device providing communications to a mobile wireless communications network with homogeneous handover between network access points
public safety answering point (PSAP)	physical location working on behalf of the national authorities where emergency calls are first received under the responsibility of a public authority or a private organisation recognised by the national government
TSP	Third Party Service Provider
TPS-eCall	Third Party Services supporting a proprietary eCall.
VIN	Vehicle Identification Number

1.2 Abbreviations

TERM	DEFINITION
2G	Second generation mobile network, based on 3GPP standards, also called GSM
3G	Third generation mobile network, based on 3GPP standards, also called UMTS
3GPP	Third generation partnership Project
ACK	Acknowledgement
AIeC	Automatic Initiated eCall
AT	Attention (part of modem instruction, e.g. to dial as specified in ETSI TS 127 007)
AREU	Azienda Regionale Emergenza Urgenza
CRC	Cyclic Redundancy Check
ETSI	European Telecommunications Standards Institute
GIS	Geographic Information System
GNSS	Global Navigation Satellite System
GSM	Global System for Mobile communications, also called 2G
HGV	Heavy Goods Vehicle
HLR	Home Location Registry
HMI	Human Machine Interface
HPLMN	Home Public Land Mobile Network
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
IVS	In-Vehicle System
MIeC	Manually Initiated eCall
MSC	Mobile Switching Centre
MNO	Mobile Network Operator
MSISDN	Mobile Subscriber ISDN (integrated services digital network)
MSC	Mobile Switching Centre
MSD	Minimum Set of Data (EN 15722)
NAD	Network Access Device (e.g. a GSM or UMTS module)
NRN	Network Routing Number
PER	packed encoding rules (ASN.1)

PLMN	Public Land Mobile Network
PSAP	Public Safety Answering Point
SIM	Subscriber Identity Module (GSM/3GPP)
SUT	System Under Test
TPS	Third Party Service
TS12	Teleservice 12 ETSI TS 122 003, see also 112
UMTS	Universal Mobile Telecommunication System, also called 3G
USIM	User Service Identity Module
VLR	Visited Location Register

2 Introduction

2.1 Purpose of Document

This deliverable describes the work plan for WP2.3, where the outputs of the WP2.1 and WP2.2 will be mirrored into the physical HW installation and SW implementation processes, according to the specific project objectives the main activities are listed down as follows:

HW installation:

- OBU and after market devices installation into the fleet of vehicles
- Relevant PSAP upgrades of HW equipment (servers, screens, etc.)
- HW upgrades related to the integration of eCall services with the other ITS applications

SW implementation:

- IVS – PSAP communication link set up (implementation of the in-band modem)
- PSAP terminal SW upgrades - MSD data visualization
- PSAP terminal SW upgrades – VIN decoder
- eCall discriminator implementation at the MNO Mobile Switching Centres (MSC)
- Interface with the Traffic Management Information Centre implementation
- SW upgrades related to the integration of eCall services with the other ITS applications
- implementation of EUCARIS interface

2.2 Structure of Document

This document describes the plan of implementation during WP2.3 separately for each member state pilot site.

2.3 HeERO Contractual References

HeERO is a Pilot type A of the ICT Policy Support Programme (ICT PSP), Competitiveness and Innovation Framework Programme (CIP). HeERO stands for **H**armonised **e**Call **E**u**r**opean Pil**o**t.

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

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

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3 HW installation and SW implementation

The below paragraphs describe per Member State pilot site what is proposed in terms of the aim of each pilot site, and the necessary hardware and software that will be required to be implemented at each pilot site.

3.1 Romania

3.1.1 Introduction

The aim of the Romanian National Pilot is to develop a fully redundant eCall system, with minimal impact on the existing 112 System. During the pilot the eCall will be triggered from different locations in Romania, the call will be routed to the Level 1 PSAP located in Bucharest and from there the case (voice and additional MSD processed data) will be handed to the emergency intervention agencies located near to the eCall event.

Romania will create the mechanism to differentiate eCall from the regular emergency 112 calls, using the eCall discriminator flag and to extract the associated Minimum Set of Data (MSD). The MSD will be then processed; a separate connection with a VIN decoder server which will pull all the additional information to the system, the whole data package will be formatted and inserted back in the 112 database. The solution recommended by the European eCall Implementation Platform (EeIP) which was for, the use of EUCARIS network, will be used for the VIN decoder and the necessary hardware for this solution will be purchased during the pilot project and the necessary interfaces will be deployed.

3.1.2 Implementation activities

Most of the implementation activities will target the upgrade of the 112 PSAP. At the same time, a minor upgrade to the Traffic Management Centre will be required to receive information from the 112 PSAP.

Because the eCall service will be grafted on to the existing 112 System the first step of the implementation will carefully identify any technical implication. For this reason the first subcontracting activity (SubRO07 = **Technical specifications for PSAP upgrade**) will develop the correct technical specification to upgrade the PSAP. This activity will define the technical specifications for HW and SW updates/upgrades required for the integration of the pan-European eCall service with the current Romanian E112 System.

3.1.3 Hardware upgrades

Based on the results of the first subcontract as defined above, the following hardware will be procured:

- HW for capturing and extracting the MSD
- HW for processing the MSD
- HW for VIN decoding solution
- HW for interfacing with 3rd Parties Systems

All the HW procurement will be carried out through subcontracting. The following 5 subcontracting activities will upgrade the PSAP hardware:

SubRO01 = **HW for capturing and extracting the MSD**

The existing 112 System uses specific communication equipment that is responsible for taking the calls from PSTN on SS7 links and rerouting them in the 112 collaborative phone networks (owned and administrated by STS) from where they are forwarded to the correct PSAP based on the calling area code. Also, in this same equipment the solution for extracting the Cell ID & Sector ID code required for mobile location is implemented. All this equipment and its associated software is designed and developed by a Romanian producer. For these reasons this activity will be carried by this same Romanian equipment producer and supplier

This activity will consist of procuring the hardware and software needed for upgrading the PSAP, for capturing and extracting the MSD in the switching devices that are already installed in the Romanian E112 System. The eCall will be transmitted over the same links as the regular 112 calls, from mobile phone operators' networks of, through a fixed line network to the STS network.

SubRO02 = **HW for processing the MSD**

The MSD that will be extracted by the in-band modem will have to be processed by some hardware that will be installed in the 112 PSAP. This hardware will consist of servers, storage devices, routers, switches, firewalls and other data communication equipment.

This activity will consist of procuring the hardware needed for processing the MSD, after it has been extracted in the in-band modem. In the solution proposed for our national project, the extracted MSD will be delivered to a server platform to be processed.

SubRO05 = **HW for VIN decoding solution**

This activity will consist of procuring the hardware platform needed for the VIN decoding solution. This hardware will also incorporate the VIN decoding software that will interrogate the EUCARIS database. Also, this hardware will act as a database for all the EUCARES query responses.

SubRO06 = **HW for interfacing with 3rd Parties Systems**

This activity will represent the procurement of the HW for interfacing the E112 PSAP with other 3rd parties systems. The necessary hardware consists in servers, switches, routers, firewalls. During the pilot this hardware will be used for interconnecting the Traffic Management Centre with the 112 PSAP.

SubRO04 = **HW installation**

This activity will allow the installation of the hardware for the processing of the MSD and the integration of the MSD in the current E112 System. The hardware will need to be installed by the provider of the equipment to ensure full compatibility and efficiency of the system. It will be necessary to acquire the maintenance packets for the period of the project at a high SLA. This subcontracting activity will follow SubRO02.

SubRO10 = **HW for RNCMNR Traffic Centre**

Besides the HW upgrades for the PSAP, an upgrade will also be needed for the Traffic Management Centre, so that it will be able to receive information from the 112 PSAP in the instance of an eCall.

This equipment will retrieve information from the PSAP and transform this information in a format that is recognized by the software currently installed in the Traffic Information Centre, so that it will be presented to the TMC operator.

3.1.4 Software upgrades

Based on the specifications defined by SubRO05 the following software will have to be developed for upgrading the PSAP so that it will be able to handle eCalls:

- Software for decoding the MSD
- Software for processing and integrating the MSD in the 112 system
- Software for processing the VIN

Software for decoding the MSD

This software will decode the MSD that will be received by the in-band modem and it will transfer the decoded information to the MSD processing unit.

SubRO03 = **Software for processing and integrating the MSD in the 112 system**

The software for processing MSD, adapts it and inserts it in the 112 System databases in the same way as a regular emergency call, and will be subject of the same transparent public acquisition procedures. The amount of the costs for this subcontracting was estimated base on the costs on the mobile location solution, having in mind that is a similar implementation.

This activity will consist in developing the software for the processing of the MSD and the integration of the MSD in the current 112 System.

Software for processing the VIN

This software will receive the VIN number from the MSD and will automatically send a query to the EUCARIS database. After it receives the decoded information from EUCARIS it will store this information in a local database.

At the same time, this software will allow the operator to query EUCARIS based on the VIN number.

Besides the SW needed for the PSAP, some SW will have to be developed for the Traffic Management Centre so that it will be able to receive information from the PSAP.

3.1.5 Implementation timeline

After the analysis of functional and operational requirements for the required PSAP upgrades has been carried out in June 2012, the first subcontracting activity will begin. Also in June 2012, the software development for the Traffic Management Centre will commence shortly after this, in July 2012, the software development for MSD decoding and VIN processing will start.

Once the results of the SubRO07 subcontracting activity will be available, the hardware procurement can commence. The main HW for the PSAP (SubRO02, SubRO05, and SubRO06) will be procured between September and November 2012. The HW for extracting the MSD will be developed from September until December.

Also based on the results of SubRO07, the SW development for the PSAP will start in September, lasting until December.

The last HW to be procured will be the HW for the Traffic Management Centre, between November and December.

Lastly, during December, the last HW and SW acceptance tests will be done.

For more details you can observe the figure below.

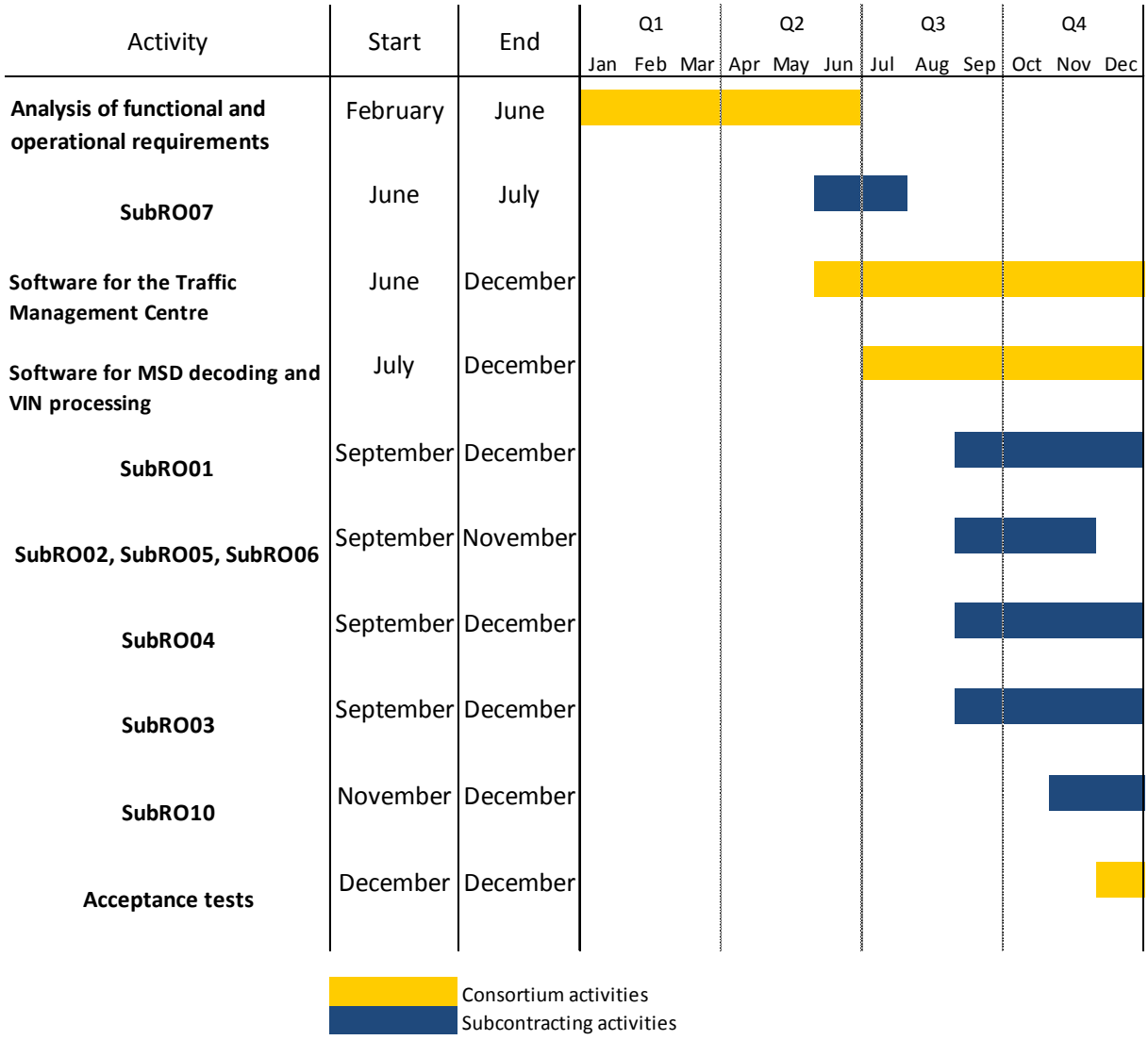


Figure 1: Scheduled activities of Romania side.

3.2 Germany

3.2.1 Introduction

Germany started very early with the development of eCall enabled systems. In 2009 a demonstrator was launched. This demonstrator used some very early IVS and was the first European system to implement In-Band Modem technology and the HLA protocol which was launched only a few months before.

The next step in eCall development was the German National Pilot. It was developed in 2010 and first introduced in December 2010 during a ceremony with the German Ministry of Transport. Its aim was to implement a sample PSAP system that could be used for testing purposes in real PSAPs. It was also developed to be used in the upcoming project HeERO, which was in the negotiation phase at that time.

Keeping in mind the special German situation with more than 250 different PSAPs with differing levels of infrastructure, the German National Pilot was also developed as a fully redundant eCall system, with minimal impact on the existing 112 System. However, integration into existing PSAP systems is a part of the German Description of Work in HeERO and will be managed during the second test phase at the end of 2012. It must be mentioned that Germany does not currently have an MNO engaged in the project. Thus the eCall flag will not be available at the beginning of testing.

During the first phase of the project all IVS systems will use a long number and calls will be routed to the PSAPs in Braunschweig (from the start of the test) and Oldenburg (starting in June 2012 – delay refers to internal structural problems during a construction phase in Oldenburg). The PSAPs are equipped with additional eCall receiving systems. Braunschweig will install a new work place, while Oldenburg will integrate the eCall system into all existing work places. Germany will create the mechanism to differentiate eCalls from the regular emergency 112 calls using the eCall discriminator flag as soon as possible. This is to avoid the interference of eCalls with standard 112 calls and to avoid routing any other call through the eCall detection. The pilot will then extract the associated Minimum Set of Data (MSD) and processes it. During HeERO this means not only displaying the MSD and show an associated map but also enable a EUCARIS and KBA (Kraftfahrzeugbundesamt – Local authority for registering cars in Germany) connection to retrieve further information using the VIN. An additional internal VIN decoder can be used if the connection to EUCARIS is not available.

The pilot also implements a complete test bed with vehicle and test case administration. This means that every event during the eCall reception is logged into a database. This involves ISDN or SIP connections, In-Band modem events, HLAP transmission and the MSD decoding itself. In addition, also the complete voice stream starting from accepting the call will be recorded. This will help to track errors and to determine the times and data for KPIs'. It also gives the chance to create reproducible tests. This test bed also allows modification to the standard parameters for the In-Band modem and the HLAP depending on the incoming MSISDN of the IVS. This will help to identify issues depending on the mobile network, for example the echo cancelling.

The German National pilot consists of a client-server based solution. Currently Windows-based clients are available, web-based clients are under development. However, the development of the National pilot software is not a part of HeERO, but this fact will have no influence for fulfilling requirements arising from the HeERO DoW.

3.2.2 Implementation activities

Most of the implementation activities will target the installation of the PSAPs in Braunschweig and Oldenburg. The German team also launched a discussion of upgrading PSAPs by a two-stage system called “eCall switch”. This process allows the upgrade of the PSAP by a simple process of installing a simple switch to separate the MSD from the Voice call. While the voice call is redirected to the operator, the MSD is sent to a central processing centre and is sent back using a XML or PSAP web interface. Processing and backup infrastructure is installed only at the processing centre while the costs for PSAP upgrades are rather small. This will help to upgrade all 250 PSAPs in Germany and the necessary technology will be installed in Oldenburg. This is part of the SubDE01 subcontracting activity (HW/SW Demonstrator).

The Traffic Management Centre will be upgraded to take advantage of an interface announcing incoming eCalls.

Because the German PSAPs in Braunschweig and Oldenburg will be equipped with additional systems or software, the interferences with existing 112 services are manageable. This equipment is part of the SubDE02 subcontracting activity (HW/SW PSAPs)

3.2.3 Hardware and Software upgrades

Based on the results of the second subcontract the following hardware will be procured:

- Server based HW for receiving eCalls and processing the MSD. This server also runs the VIN decoder and the necessary interfaces to EUCARIS and KBA.
- Server based HW to upgrade PSAPs with the so-called “eCall switch”. This consists of two parts – a small hardware component to be installed at the PSAP and a Server based HW to process eCalls and also for backup and security
- Server based HW for deploying interfaces to the Traffic management centre and to communicate with 3rd party systems.
- Client based Hardware to install a dedicated work place at the PSAP in Braunschweig

The following software will be procured

- Software for processing and integrating the MSD in the 112 system
- Software for processing the VIN
- Operating systems for servers and additional work places

- Telephony connection interfaces to connect to the existing telephony hardware in the PSAPs
- Backup and Management software for the processing centre
- Backup and Management software for the PSAP in Braunschweig
- Management software for statistics processes

All the hardware and software procurement will be carried out through subcontracting. The following two subcontracting activities will upgrade the PSAP from the hardware's point of view:

SubDE01 = **HW/SW Demonstrator**

This describes all necessary hardware and software to implement an eCall processing centre and to process eCall in this centre. This involves Servers, Operating systems, telephony infrastructure hardware, backup solutions, management software, storage devices, routers, switches, firewalls and other data communication equipment. It will be necessary to acquire the maintenance packets for the period of the project at a SLA.

SubDE02 = **HW/SW PSAPs**

The two PSAPs involved in HeERO are equipped differently. While Oldenburg is a newly installed PSAP (currently under construction and will be finished in March 2012) with modern infrastructure, whilst parts of the systems in Braunschweig are more than 10 years old. The German HeERO team decided to upgrade them differently to test different upgrade scenarios. This results in different software upgrades. While Braunschweig requires a separated work place, the Oldenburg integration means to integrate eCall into the existing software solution. This requires only adaption and software upgrades.

On the hardware side, in Oldenburg a complete stand-alone eCall processing system with Servers, Operating systems, telephony infrastructure hardware, backup solutions, management software, storage devices, routers, switches, firewalls and other data communication equipment will be installed. In Braunschweig, only a few components for separating the MSD from the voice call will be installed. This consists mainly of an eCall switch Server and the work place. The eCall processing will be installed at a different place and is part of SubDE01.

3.2.4 Implementation timeline

After the analysis of functional and operational requirements for the needed PSAP upgrades has been carried out in July 2011, the German team had begun to start the upgrade

activities. Servers for the eCall processing centre, the upgrade for Oldenburg and Braunschweig were procured, first installation routines were started. In the mean time the discussions with the IT teams from the PSAP in Braunschweig and Oldenburgs were started to evaluate the necessary operations and changes required in the PSAPs. In September, the EUCARIS connector was introduced into the eCall processing server.

The hardware in Braunschweig will be installed until December. Due to internal problems during the construction phase in Oldenburg the PSAP did not go online in June this year. The start was delayed to March 2012, which results in an installation delay for HeERO until May 2012. Until the Oldenburg equipment is installed, the German testing is done only with the PSAP in Braunschweig. There is also a test PSAP installed at the office of the HeERO partner OECON, which will be used for testing purposes too.

Once the results of the SubRO07 subcontracting activity will be available, the hardware procurement can be started. The main HW for the PSAP (SubRO02, SubRO05, and SubRO06) will be procured between September and November. The HW for extracting the MSD will be developed from September until December.

During December, the last HW and SW acceptance tests will be done.

For more details you can observe the table below.

#	Name	Start	Finish
1	**Analysis of Functional and**	**03.01.11**	**30.06.11**
2	PSAPs	03.01.11	30.06.11
3	Traffic Mangement Centre	02.05.11	30.06.11
4	General German Situation	01.03.11	30.06.11
5	**Analysis of Current PSAP**	**01.07.11**	**21.07.11**
6	Oldenburg	01.07.11	15.07.11
7	Braunschweig	07.07.11	21.07.11
8	**HW Upgrade Decision**	**15.08.11**	**30.04.12**
9	eCall Processing Centre	15.08.11	28.10.11
10	PSAP Braunschweig	21.09.11	28.10.11
11	PSAP Oldenburg	16.04.12	30.04.12
12	**Software Upgrade Decision**	**20.09.10**	**16.05.12**
13	eCall Processing Centre	20.09.10	30.11.10
14	PSAP Braunschweig	20.09.11	14.10.11
15	PSAP Oldenburg	16.04.12	16.05.12
16	Traffic Management Centre	03.01.11	03.01.11
17	**Installation**	**15.09.11**	**15.06.12**
18	eCall Processing Centre	15.11.11	15.12.11
19	PSAP Braunschweig	01.11.11	18.11.11
20	PSAP Oldenburg	16.05.12	15.06.12
21	EUCARIS Connector	15.09.11	22.09.11
22	**Test and Acceptance**	**12.12.11**	**22.06.12**
23	Braunschweig	12.12.11	20.12.11
24	Oldenburg	15.06.12	22.06.12

Figure 2: Scheduled activities of German side.

3.3 Finland

3.3.1 Introduction

This report is prepared as a part of the HeERO project and it provides an implementation plan for the planned eCall pilot in Finland.

The implementation plan is based on the deliverable D2.2 (eCall Systems Functionalities' Specification – eCall pilot Finland), which specifies the functionalities of the eCall pilot in Finland.

3.3.2 eCall pilot system architecture

The following figure outlines the HeERO Finnish pilot system to be implemented, and its basic components.

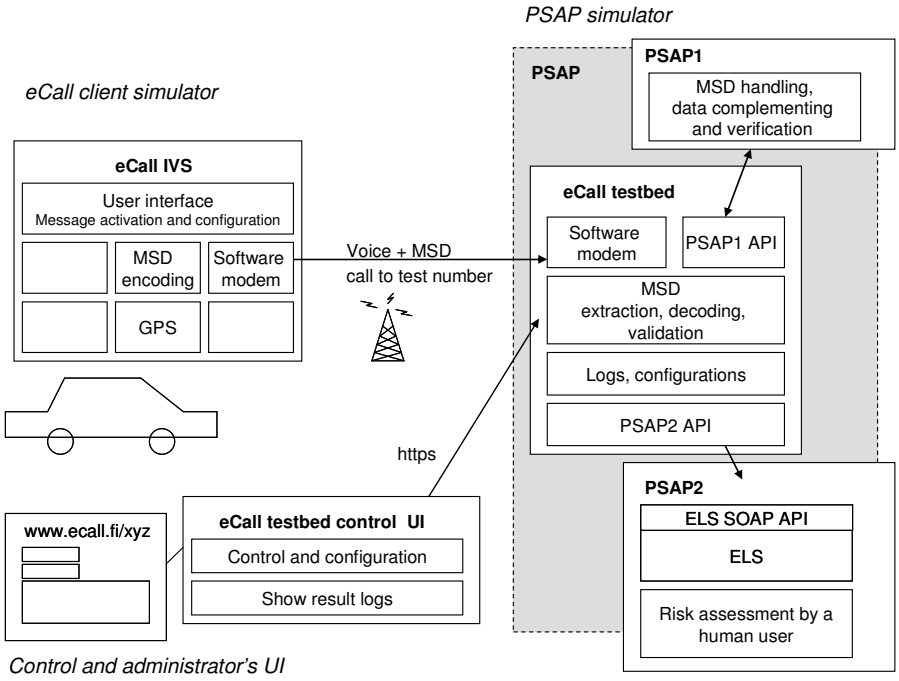


Figure 3: HeERO Finnish pilot system architecture outline.

The eCall system consists of several components that are described in the next chapter. The main parts of the system include:

- eCall client simulator (eCall IVS)
- PSAP simulator, which consists of eCall test bed system, PSAP1 service and PSAP2 test system.
- eCall pilot system control and administrator's UI.

3.3.3 eCall pilot system components

The eCall client (IVS) simulator will be implemented in the Finish Pilot Site. It will include functionality for generating and combining eCall message data content, encoding the message data for data transfer, opening phone calls and using in-band modem for sending eCall messages.

The simulator software will be first implemented for (laptop) PC environment. It will include a user interface for configuring and generating MSD (Minimum Set of Data) messages.

The generated MSD data will be encoded for the data transfer according to the standard CEN EN 15722 (eCall minimum set of data).

The client will use the eCall standardized in-band modem data transfer for sending messages. The standard ETSI TS 126 268 (in-band modem, ANSI C reference code, release 10) will be used.

The messages (opened voice call) are targeted to the configured phone number of the eCall receiver side (PSAP simulator). For testing purposes, the number is other than 112.

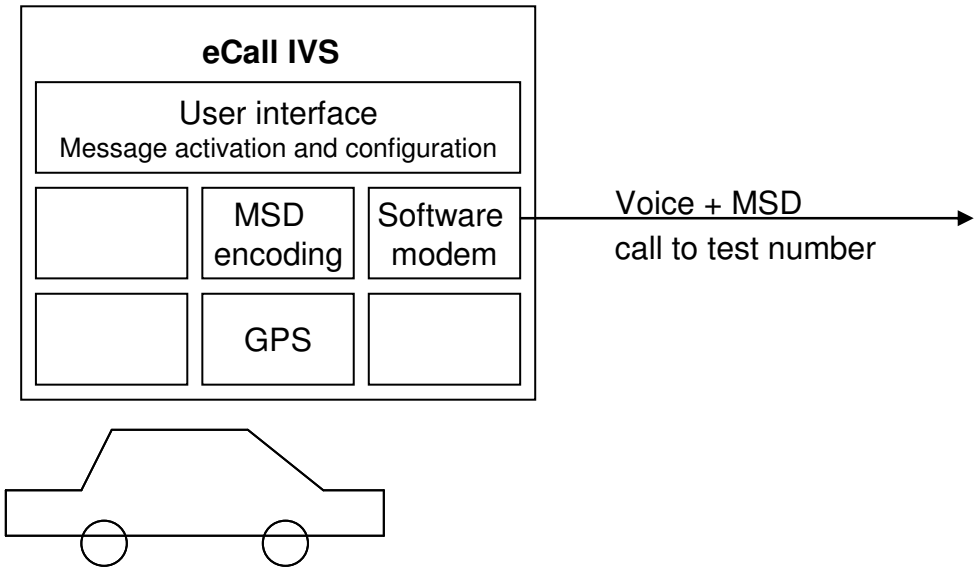


Figure 4: Finnish eCall client simulator.

3.3.4 PSAP simulator

The PSAP simulator part of the system will consists of eCall test bed, PSAP1 service and PSAP2 test system. These components together constitute the eCall pilot system eCall message receiver side.

3.3.4.1 eCall test bed

The eCall test bed is the eCall message receiver part of the system. It includes functionality for handling incoming eCall phone calls. It receives and decodes eCall message data, includes interfaces for PSAP1 and PSAP2 subsystems, provides logs for analyzing results and includes facility for configuring the operation of the system.

A test phone number (other than 112) is configured for test bed activities to receive eCall phone calls. The test bed uses the standard in-band modem to extract eCall data from the call.

The incoming MSD messages are assumed to be encoded according to the standard CEN EN 15722 (eCall minimum set of data). The test bed decodes and validates MSD messages.

For analyzing results, there will be a logging facility included into the system. It will provide information about received messages and error cases. In particular, it will be used to validate the operation of the system as well as eCall clients. The project deliverable "D2.4 System test cases and verification report" will later specify the system verification scenarios. The logs generated by the test bed have a particular importance in validation of the system operation.

The test bed will include interfaces for PSAP1 and PSAP2 systems. The interface with PSAP1 will enable the MSD data complementing and verification by PSAP1. See Subsection 3.3.4.2.

An interface will be implemented for the eCall test bed that enables the decoded eCall data to the PSAP2 system. See Subsection 3.3.4.3.

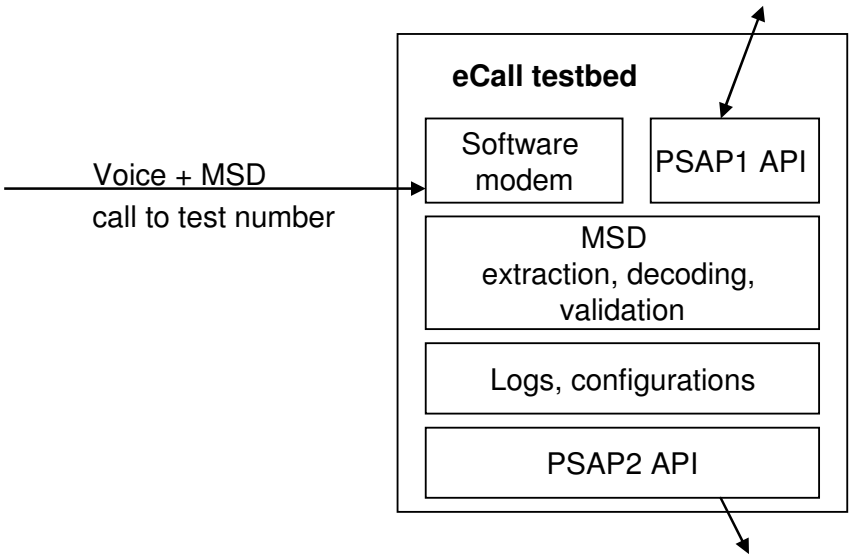


Figure 5: eCall test bed (eCall receiver).

3.3.4.2 PSAP1 subsystem

The decoded eCall data will be exchanged between the test bed and PSAP1 service in order to combine additional information with the eCall message. In particular, the PSAP1 service will complement and verify the received eCall data.

3.3.4.3 PSAP2 subsystem

The PSAP simulator (eCall test bed) will transfer the decoded eCall data to the PSAP2 test system (ELS). ELS is the National Emergency call E112 system in Finland, first implemented in 2002 which handles over 4 million calls per year.

An interface will be implemented for the eCall test bed that enables the eCall message transfer to the ELS. The SOAP (Simple Object Access Protocol) interface of the ELS system will be used.

3.3.5 eCall system control and administrator's user interface

There will be a special Web user interface for managing the operation of the test bed (see following figure). It will provide configurations for the test users (e.g., registering phone of their eCall IVS device) as well as system administration functionalities. It will also provide views of test result logs.

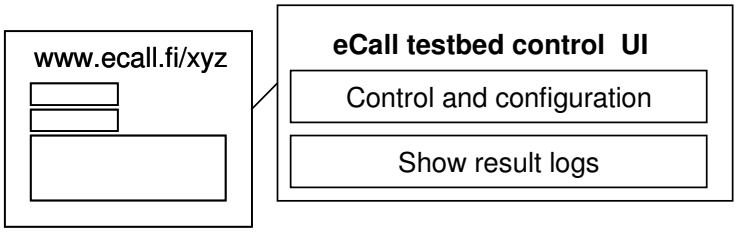


Figure 6: Finnish system control and administration.

3.3.6 eCall testing

eCall testing during the pilot will be accomplished as illustrated in the following figure:

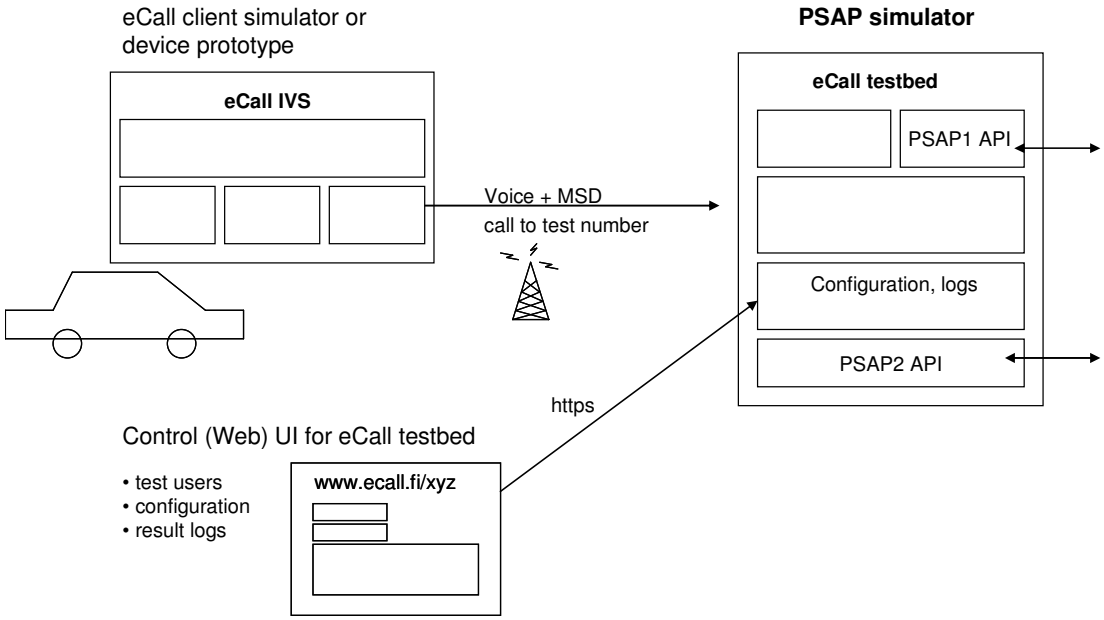


Figure 7: Finnish eCall testing.

In addition to the eCall client simulator (described in Section 4.1) several other eCall clients may be used during the pilot. They may include both eCall client simulators and/or in-vehicle clients (if available).

The clients used should include functionality for generating and sending standard eCall MSD (Minimum Set of Data) messages via the standardized in-band modem solution to the test number configured to the PSAP simulator (eCall test bed)

During the tests, the Web user interface for managing the operation of the test bed (cf. Section 4.3) will be used. It will provide configurations for the test users, possibility to register the eCall clients (e.g. client phone numbers) used in the tests. Also, the pilot system operation can be managed via the user interface. It will also provide views to result logs.

The log facility of the test bed will provide information about received messages (e.g. call time, modem session, duration, MSD information, warnings) and error cases. In particular, it will be used to validate the operation of the system as well as eCall clients.

The eCall pilot system can be directly used in cross borders activities that are planned to take place with one or two consortium partners.

In practice, tests may be accomplished so that Finnish eCall Test bed is used as an eCall receiver (PSAP) and/or the eCall client simulator (part of Finnish eCall pilot) used as an eCall sender (in vehicle).

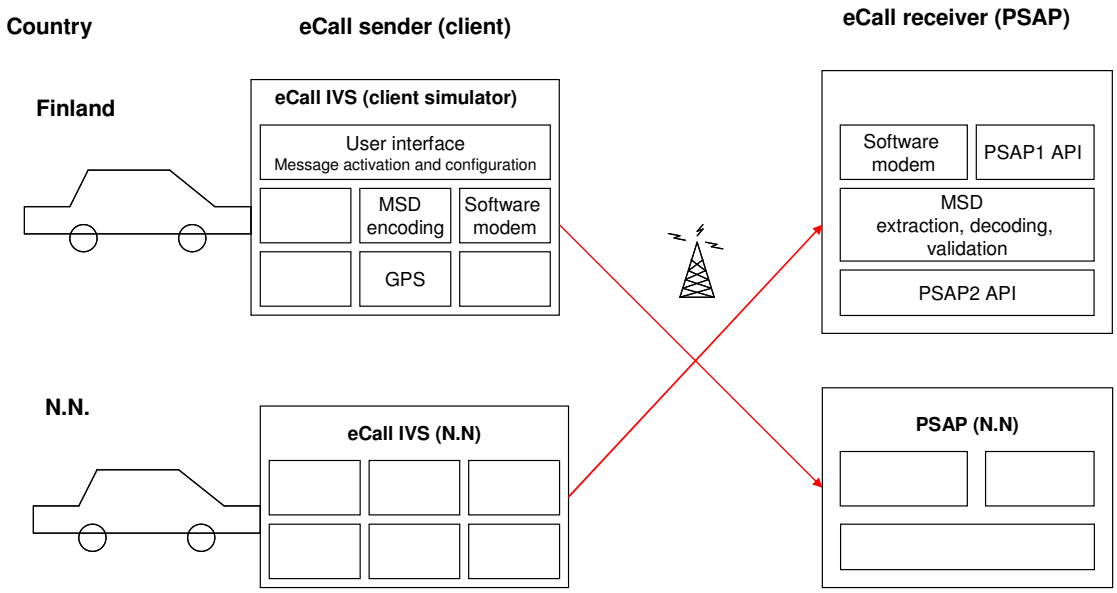


Figure 8: Cross borders tests using the Finnish pilot system eCall sender and receiver parts.

3.3.7 Description of implementation phases

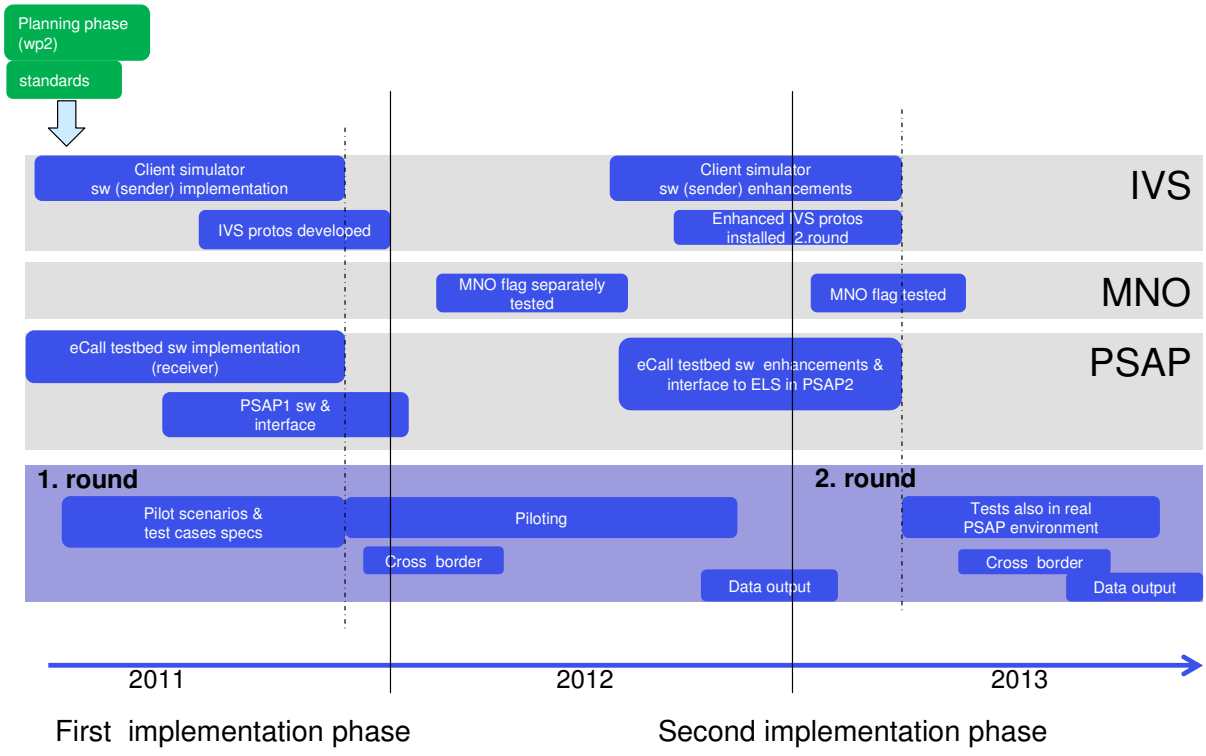


Figure 9: Scheduled activities of Finnish side.

Implementation phase	Project scope
First phase	Implementing the core functionality for the Finnish eCall pilot system: 1. eCall client simulator SW implementation 2. eCall receiver (test bed, PSAP simulator) SW implementation 3. MSD message encoding, decoding and validation in test bed PSAP simulation environment 4. Opening voice call and MSD message data transfer to the test number of the test bed. eCall in-band modem functionality. 5. PSAP1 functionality. MSD data complementing and verification. 6. PSAP2 interface. 7. Development of eCall device prototypes for the pilot 8. Separate MNO eCall flag tests 9. User interface SW for eCall test bed configuring and administration. Result logs to validate and analyse the operation of the system as well as eCall clients.
Second phase	First phase system further developed and enhanced on the basis of the results from the first round pilots: 1. eCall client simulator enhanced. Client-side result logs. Testing the operation of PSAP. 2. eCall receiver (test bed, PSAP simulator) enhanced. 3. VIN decoding and handling 4. PSAP1 functionality 5. PSAP2 interface and operation. 6. New and enhanced eCall IVS device prototypes for the second round pilots 7. MNO eCall flag tests

Table 1: Implementation phases of Finnish side.

3.4 Czech Republic

3.4.1 Introduction

The main purpose of this chapter is to briefly describe HW installation and SW implementation plan of the mandatory public eCall in the Czech Republic. Czech eCall project is divided into three main phases (see figure 12: General project schedule of Czech eCall pilot). Software and hardware implementation is described primarily in phase IIa-b eCall CZ, which includes the main technical areas. These areas are further described in the paragraph shown below: Description of implementation phases 3.4.5.

As there were two pilot testing projects in the Czech Republic for eCall which started in 2007, the Ministry of Transport and its main subcontractor Telefonica O2 have a lot of experiences in this area. Thanks to these project and also the e112 infrastructure, the Czech Republic can within HeERO pilot project test IVS from two vendors, transmitting eCall through Telefónica Mobile Network specially adjusted by eCall Flag functionality and use PSAP "testing platform" for first phase of testing, where PSAP testing which truly simulates the

PSAP 112 operating system and will be used for the new PSAP SW / functions verification. TPS interface as well as data flow towards Traffic management system will be tested.

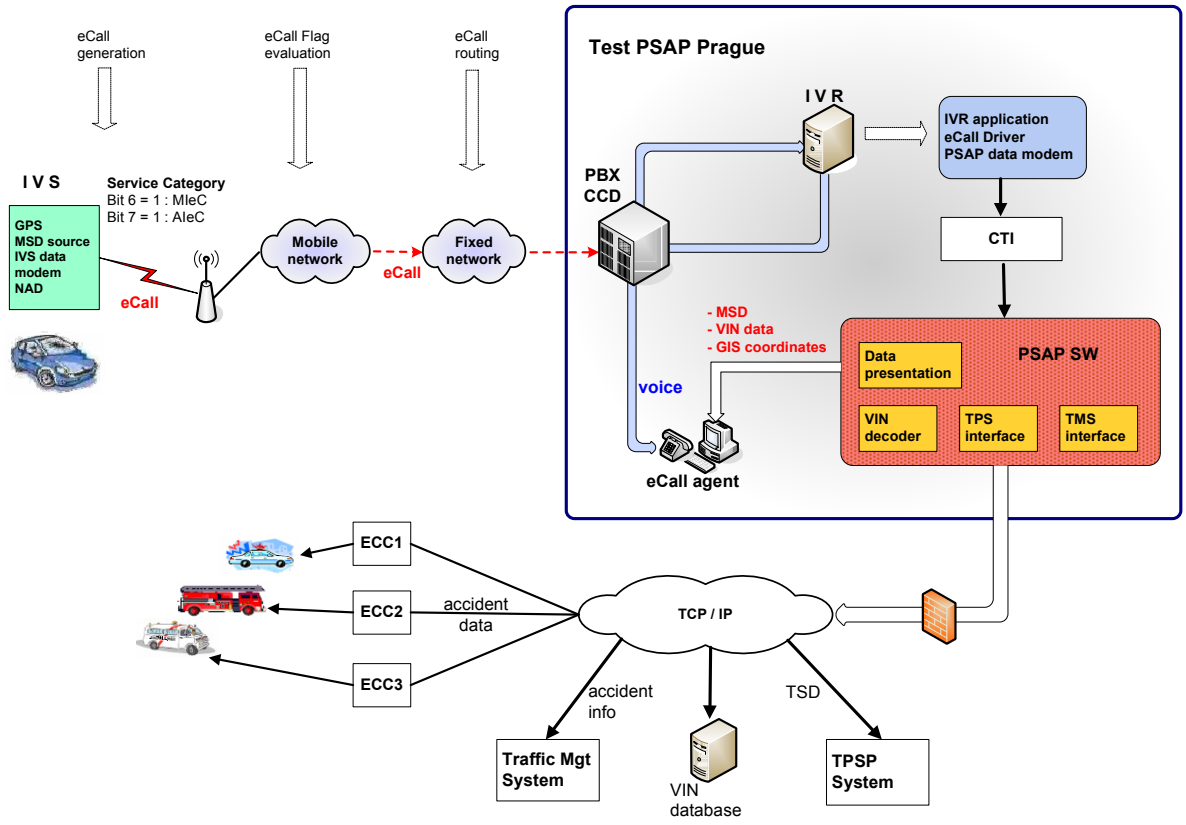


Figure 10: Overall eCall pilot architecture

3.4.2 Mobile network

There are three significant mobile network operators in Czech Republic - Telefónica Czech Republic, T-Mobile and Vodafone, but eCall flag will be implemented only on Telefónica network for the purpose of the HeERO project.

3.4.2.1 eCall flag implementation

Basic adaptations which will be carried out on the mobile network within HeERO project are as follows:

- detection of Emergency Service Category Value in the MSC
- differentiation between eCall 112 and speech only 'Teleservice 12' emergency calls from mobile terminals
- new NRN (eCall) assignment
- proper eCall routing to the testing PSAP

As a very first step in the HeERO implementation plan there is a verification of eCall flag functionality in our MSC SW in the mobile network test lab. Once Service Category based routing in the MSC SW will be successfully proved, there will be initiated a respective modification in Telefonica O2 real mobile and fixed voice network. All MSCs will have to detect Service Category and based on AIeC or MIeC bit =1 they will have to ensure a setting up of respective eCall NRN. This routing information is then transferred into the fixed network which will route eCall to the testing PSAP.

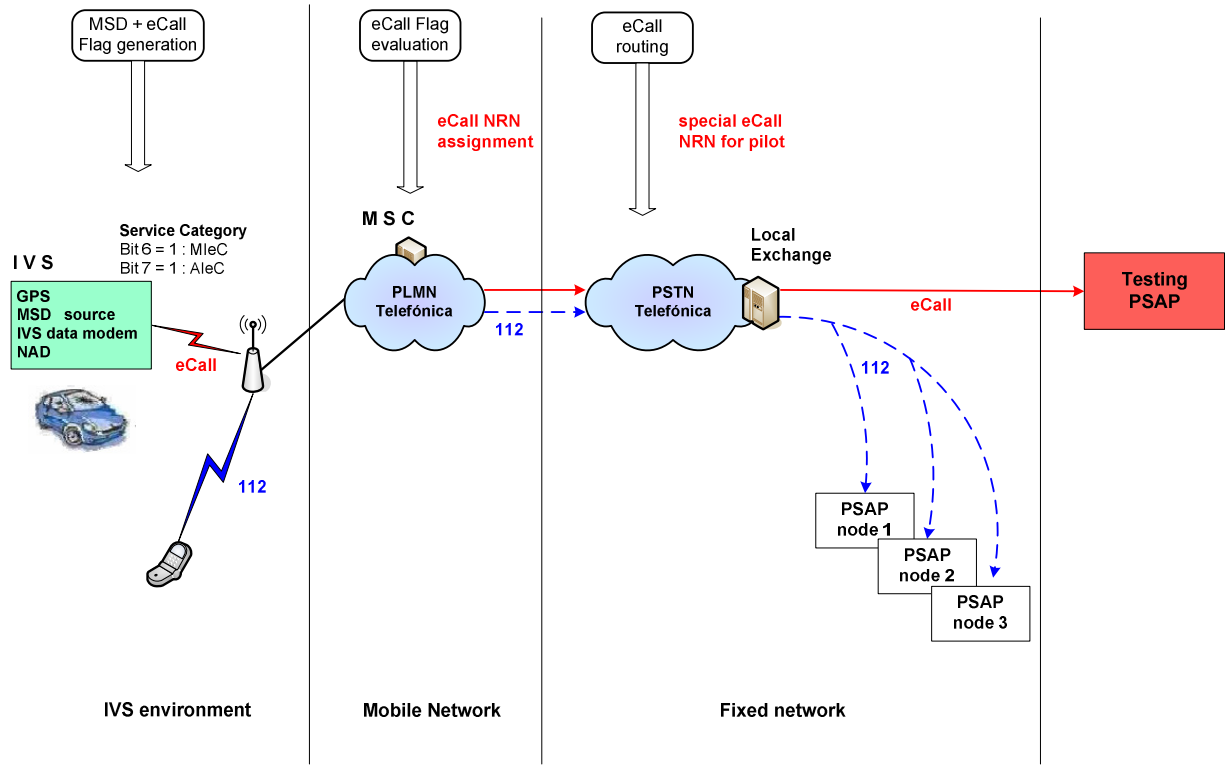


Figure 11: Principle of eCall discriminator qualified routing

3.4.3 IVS

There two prototypes of eCall IVS will be used, one from Secar and other from Telematix production. Both of these OBUs are based on common fleet management equipment, where some extra features for eCall like In-band modem will be added.

3.4.4 PSAP

Basic changes to be realized during pilot project implementation:

A) Call Centre part

- integration of PSAP In band modem into the IVR
- PBX/CCD routing configuration
- Checking and handover of MSD into the application superstructure

B) Application superstructure part

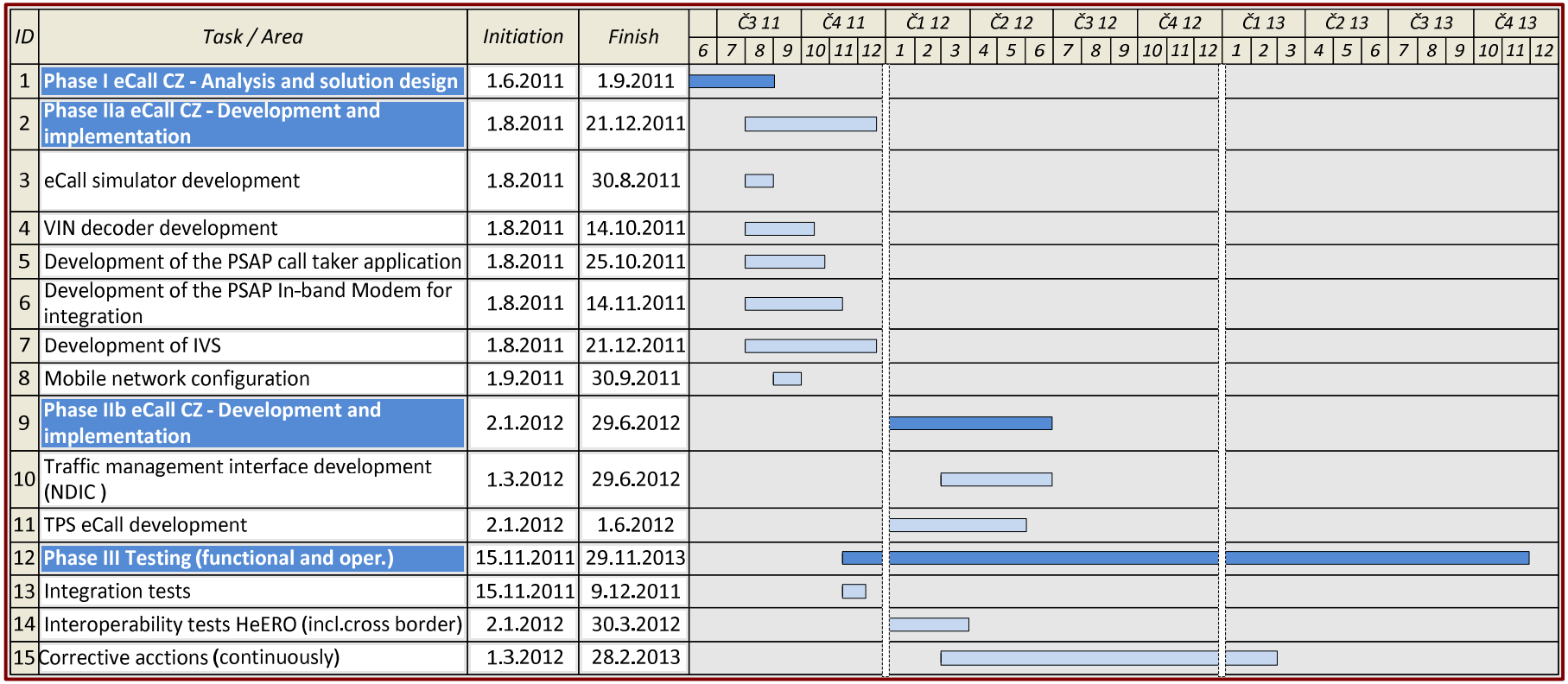
- MSD handling
- presentation and visualization of MSD in call taker application
- visualization of incident location in GIS
- VIN decoder implementation
- transmission of MSD and VIN data to the Emergency Rescue systems (Fire Rescue Service, Police and Ambulance)
- transmission of eCall data into the Traffic Management System
- implementation and testing of TPS interface
- PSAP modem integration

3.4.5 Description of implementation phases

The HW installation and SW implementation is represented in Phase IIa-b eCall CZ Development and implementation (see figure: General project schedule of Czech eCall pilot). All development works below are in accordance with prescribed standards for the project HeERO.

- eCall simulator development – web-oriented application for eCall enabling the following functions : dial any number for test eCall, dial Emergency call with eCall flag, MSD generation, eCall simulation = simulation of IVS
- VIN decoder development – establishment of interface between VIN decoder service and PSAP call taker application, preparation of structure information transmitted from VIN, data interface verification, PSAP call taker SW update
- PSAP call taker application – HW a SW testing environment preparation, SW development, testing and update (new SW release have to support at least – MSD, VIN Decoder interface and data gathering, TPSP interface and data gathering, data transmitting to traffic management (NDIC), call taker application layout update, data model modification and update).

- PSAP modem integration, telco – eCall flag data interface development and implementation, MSD data transfer support, teleco inban modem development, HW and SW update of current testing environment (Alcatel technologies)
- IVS development – OBU development according HeERO specification (GPS, GSM , in-band modem technologies), IVS modem data and voice transmission, manual and automatic eCall support, supporting data and voice communication according to QUALCOMM standards
- Mobile network - implementation of eCall flag in Telefonica Czech Republic, a.s. network (data and voice transmission)



ID	Task / Area	Initiation	Finish
1	**Phase I eCall CZ - Analysis and solution design**	1.6.2011	1.9.2011
2	**Phase IIa eCall CZ - Development and implementation**	1.8.2011	21.12.2011
3	eCall simulator development	1.8.2011	30.8.2011
4	VIN decoder development	1.8.2011	14.10.2011
5	Development of the PSAP call taker application	1.8.2011	25.10.2011
6	Development of the PSAP In-band Modem for integration	1.8.2011	14.11.2011
7	Development of IVS	1.8.2011	21.12.2011
8	Mobile network configuration	1.9.2011	30.9.2011
9	**Phase IIb eCall CZ - Development and implementation**	2.1.2012	29.6.2012
10	Traffic management interface development (NDIC)	1.3.2012	29.6.2012
11	TPS eCall development	2.1.2012	1.6.2012
12	**Phase III Testing (functional and oper.)**	15.11.2011	29.11.2013
13	Integration tests	15.11.2011	9.12.2011
14	Interoperability tests HeERO (incl.cross border)	2.1.2012	30.3.2012
15	Corrective acctions (continuously)	1.3.2012	28.2.2013

Figure 12: General project schedule of Czech eCall pilot.

Note (table): label the columns "CX XX" means "no. quarter, year"

3.5 Italy

3.5.1 Introduction

This report is prepared as a part of the HeERO project and it provides an implementation plan for the eCall pilot in Italy.

The implementation plan is based on the deliverable D2.2 (eCall Systems Functionalities' Specification – eCall pilot Italy), which specifies the functionalities of the eCall pilot in Italy.

The Italy pilot will include the European eCall and an advanced breakdown call service (shortly bCall), enabling the handling of geo-referenced breakdown calls to a commercial service provider.

Finally, the pilot will include the communication between the PSAP and a simulated "Real Time Traffic and Travel Information Centre" (RTTI Centre) for a quicker information service to the road users.

3.5.2 General overview of technical solution

HeERO Italian pilot project will test IVS from three vendors installed in three FIAT car provided by CRF and IVS from MM installed in 10 or more cars of volunteer ACI members involved in the pilot. Transmitting eCall through Telecom Italia Mobile (TIM), modified to accept the eCall Flag functionality, and through Telecom Italia fixed network that will deliver the eCall to a real EU 112 first level PSAP in Varese.

Varese's PSAP is the first installation in Italy of 112 unified number services and is run by AREU. The area covered by this operation room serves more than 1.100.000 citizens and the test bed will be a portion of this area that will include urban and suburban environments. The Varese PSAP is structured with a 1st level infrastructure and a 2nd level, including police, emergency units, fire fighters and Carabinieri. The architecture will be modified to be able to include the new data from the MSD both in the classification of the event in 1st level PSAP and into the dispatch to 2nd level.

3.5.3 Description of implementation phases

In the following, except the operational tests, are detailed the tasks identified in each phases:

PSAP1 HW upgrade

In order to decode eCalls and allow the correct management of MSD to be used by PSAP, a new dedicated HW for analyzing and decoding incoming eCalls will be used, alongside the classical PBX for incoming calls.

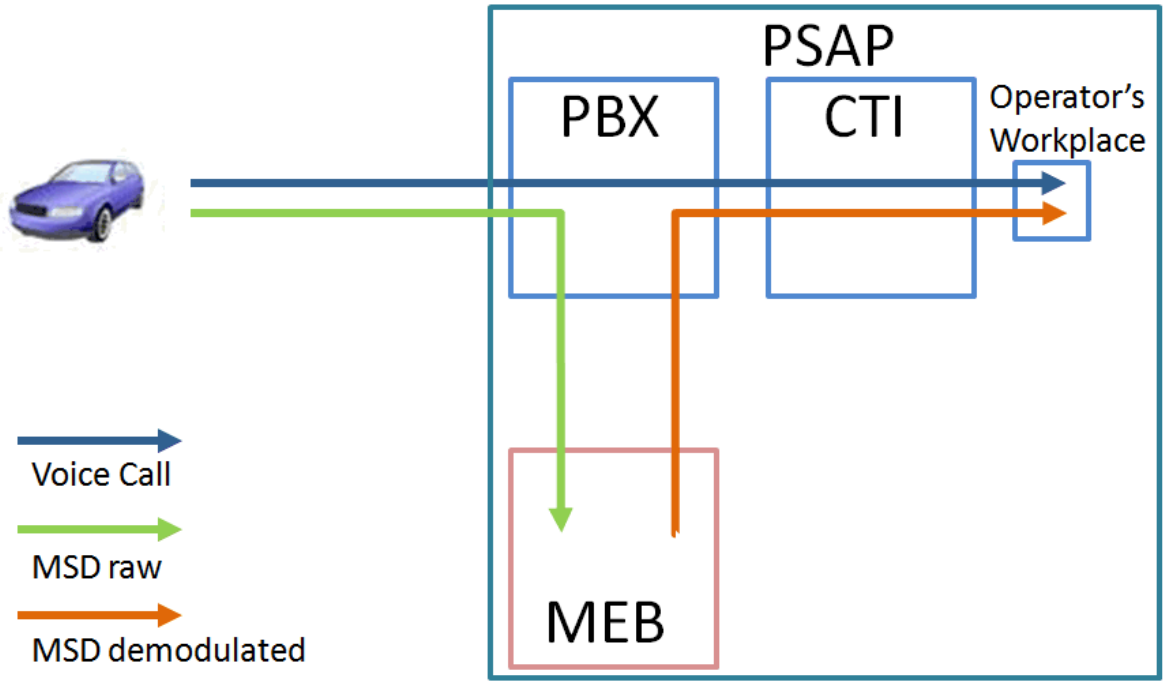


Figure 13: MSD Extractor Box (MEB)

The MEB, on receiving the eCall, will start demodulating AND, at the same time, will forward the call to the operator's workplace through the CTI. If the operator answers before the end of the demodulation, he will hear network noises and then will be put immediately in conversation with the vehicle. If no operator is available after the end of the demodulating process, the call will be already into the operator's queue waiting to be answered by the first free operator.

The MEB HW will be developed in Milan and then will be moved to the Telecom TLab in Turin to start extended component tests with IVS from CRF and MM (see below).

At the end of these phases it will be moved and integrated into the Varese PSAP.

3.5.3.1 PSAP1 SW upgrade

Except for the SW included in the MEB, other parts of the PSAP architecture will be modified in order to manage eCalls.

- CTI module: it will be adapted to handle MSD messages sent by the MEB, extract the data, decode the PER encryption, and populate the extended database with eCall specific fields.
- Event sheet: the event sheet used by the PSAP operator will be adapted with new information coming from the eCall event, which is not currently present. According to the type of information presented in the MSD, the 1st level PSAP operator may or

may not see all of them in the event sheet. They will be, however, kept in the database for 2nd level PSAP that might require them.

- A SW update and the creation of data format will be realized to be exchanged with the Italian Vehicle Registry and EUCARIS databases for data concerning VINs.
- A SW update and the creation of data format will be realized to be exchanged with ACI for data concerning Traffic Information.

3.5.3.2 PSAP1 SW & network integration

As no international standard is present for PSTN part, for pilot purposes the PSAP will be provided with dedicated connections (either ISDN or E1) for eCalls.

New actors will be also included in the scenario, as the PSAP will be connected to

- the Italian Vehicle Registry, who will manage VIN information extracted from MSD to provide extended data about the vehicle and will serve as gateway to EUCARIS database;
- ACI (Automobile Club Italiano), also partners of HeERO project, in order to send data about the vehicles involved in emergency situations.

The new developed PSAP SW will be put in place and linked with the MEB and with the Italian Vehicle Registry and ACI, be ready to enter the operational phase.

3.5.3.3 Mobile & Fixed telco networks upgrade

The proper processing of the eCall as specified by the reference standards requires the introduction of a number of upgrades and/or customizations to be implemented in both the mobile and fixed public operational networks. It has to be highlighted that, some of the devices and the solutions used and tested by the HeERO Pilot are at prototype level. However all the processing performed by the public mobile and fixed networks are working on live operational networks. As a consequence, a number of steps are necessary to guarantee that the technical features introduced in HeERO make it possible for the pilot not to cause any degradation of the public service offered by the fixed and mobile network operators involved in the Italian pilot tests.

In particular, the HeERO pilot test involves only one national mobile operator (i.e. TIM, the Mobile Network Division of Telecom Italia) and will be performed in one specific telephone district (i.e. Varese) where the first level PSAP is geographically located as well. As for the fixed network routing and delivery aspects, Telecom Italia Fixed Network Division takes care of it, in analogy to what already deployed for the national E112 implementation.

The phases needed to release the end-to-end network processing of the eCall are globally shown in the GANTT diagram. In particular, the following steps have been foreseen:

- Mobile Network - Impact analysis & deployment requirement
- An accurate analysis of the possible impacts on the operational mobile network needs to be performed. It identifies the deployment requirements and the pre-deployment testing to be jointly performed by the mobile network operator and the supplier.
- Mobile Network - eCall discriminator signalling patch provision by Ericsson
- This activity takes into account the time needed by the supplier in order to provide the customized patches to be installed in the Varese MSC and the related commercial negotiation.
- Mobile Network - eCall discriminator signalling patch pre-deployment test
- Pre-deployment certification & testing, as routinely requested in any real operational environment.
- Mobile Network - eCall discriminator deployment in the Varese MSC and testing
- Deployment & testing phase
- Fixed Network - Impact Analysis & Deployment requirements
- Analysis of the suitable routing mechanisms taking into account both the pilot requirement and the likely extensions that will be required for the real operational deployment when multiple mobile operators will be involved in the service operation.
- Fixed Network - Deployment of the selected eCall routing in the fixed network
- Deployment & testing phases
- End-to End eCall Routing mobile/fixed networks test
- End-to-end eCall processing test and release

3.5.3.4 IVS MM

According to HeERO specification, this phase describes the activities necessary in order to manage eCall and bCall.

Firmware customization for eCall management, that is:

- In-band modem firmware integration: data and voice transmission

- Management of manual eCall trigger and MSD
- Implementation of KPIs
- eCall flag management
- EGNOS enabled (to be verified)
- Firmware customization for bCall management, that is:
- Management of manual bCall trigger
- bCall data sending, using private protocols, to the ACI centre
- management of eCall priority, in case of bCall / eCall simultaneous activation

3.5.3.5 IVS CRF

The Fiat Research Centre development activity is focused on different brand IVSs systems integration on FGA vehicles. This activity can be divided in the following steps:

- Agreement with IVS suppliers about testing the eCall functionalities and sharing information and results.
- Verify the compliance of the systems to PAN EU standards in terms of requirements; dedicated tests of GPS and NAD systems on localization and connectivity capabilities will be performed.
- Analyze the on board installation impact for different FGA vehicles through CAD analysis and test results on connectivity capabilities in order to find the best trade off between the available place in the vehicle and functional requirements.
- Design and develop the integration of the IVSs to the vehicle network.
- Implementation of HeERO KPIs calculation procedures.

3.5.3.6 Component & integration test

In order to test MM eCall system compliance to standards the following functionalities will be verified with the support of Italian MNO and Italian PSAP (initially with the preliminary version installed in the TLab laboratory then in the Varese Pilot):

- On board eCall discriminator management.
- MSD communication over In Band Modem.
- Voice communication over In Band Modem.
- Manual activation.

- MSD management.
- Test of the overall EU PAN eCall functionality.

In order to test IVSs capabilities, compliance to standards, product maturity, and the following functionalities will be verified for all the different IVSs with the support of Italian MNO and Italian PSAP:

- GPS and localization precision.
- On board eCall discriminator management.
- MSD communication over In-Band Modem.
- Voice communication over In-Band Modem.
- Automatic and manual activation.
- MSD management.
- Test of the overall EU PAN eCall functionality.

3.5.3.7 ACI Fleet recruitment

The ACI Fleet, which will be consisting of 10-20 units, will be recruited among the new ACI Members in the Province of Varese, based on the following criteria:

- Km travelled per year.
- Age group.
- Willingness and motivation (installation of the IVS, training, tests).

3.5.3.8 Training for ACI drivers

During this phase the volunteers will be instructed in the following topics:

- Difference between eCall and bCall.
- How to implement the eCall test.
- How to implement the bCall test.

The training will include a practical in-room simulation, enabling to evaluate the learning process.

3.5.3.9 bCall Development

This phase is related to the bCall and related ACI services development; it includes the following activities:

- MM Tbox firmware customization in order to manage:
    - manual bCall trigger
    - bCall data sending, using private protocols, to the ACI centre
    - eCall priority, in case of bCall / eCall simultaneous activation
- bCall Services customization by ACI
    - reverse geo-coding;
    - membership-related data (car segment, services available to members)
- verification test covering the different parts of the bCall service chain, that is:
    - Manual bCall activation
    - Verification of bCall data
    - Analysis of voice call (voice quality, reliability of the call with internal antennas, reliability and delay of MSD reception in case of low signal strength)
    - Testing Trade off conditions (testing of bCall / eCall simultaneous activations, testing of eCall priority over bCall, testing of eCall in case of GPS signal jamming or no position available, testing of eCall in case of GSM signal jamming or no network)

3.5.3.10 T-Box ACI cars installation

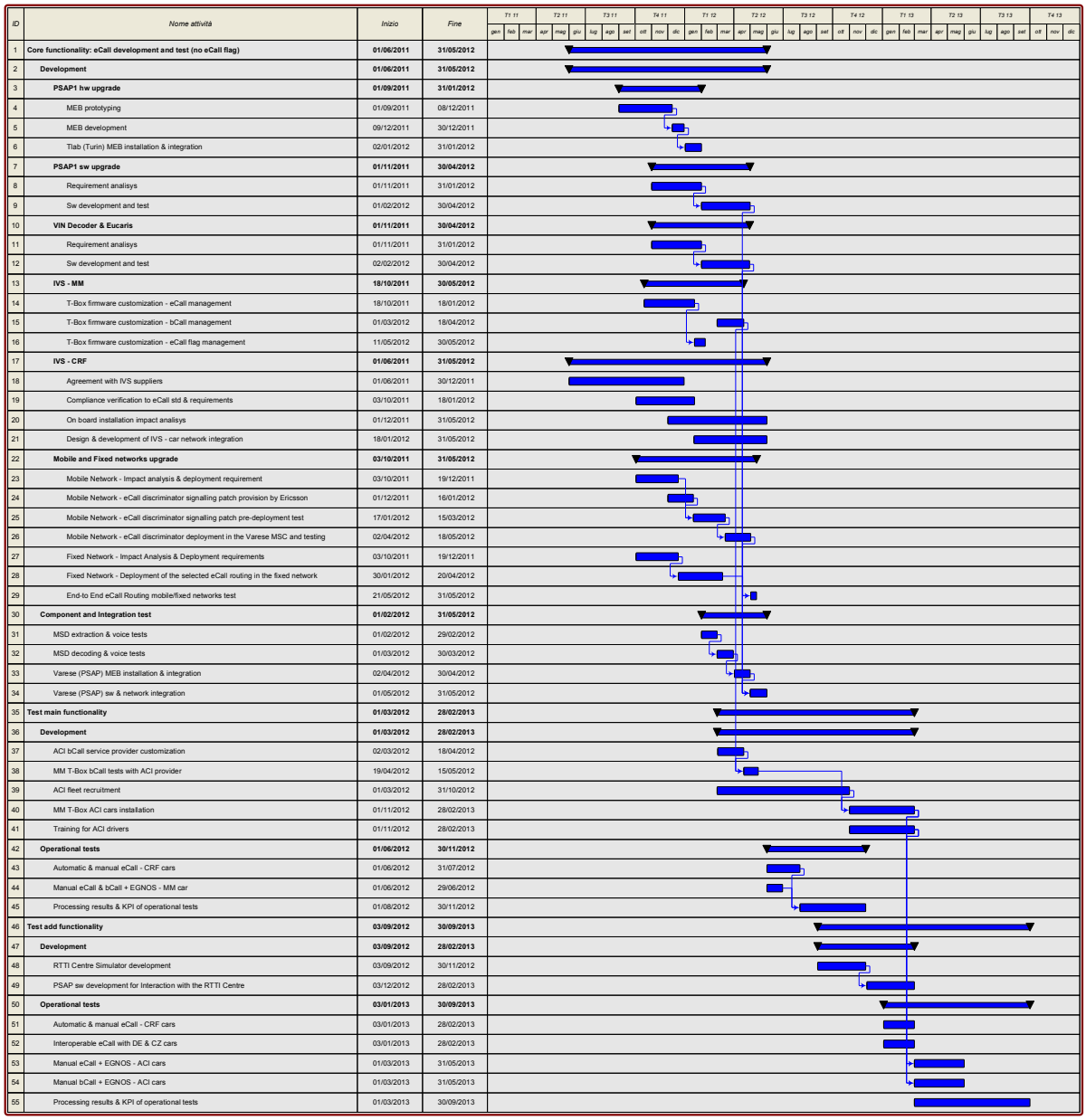
This phase describes all necessary operations to install the ACI fleet: eCall systems preparation (acquisition of eCall systems, upgrading of Tbox firmware), selection of installation centre, training, installation.

3.5.3.11 RTTI Centre Simulator development

During this phase, all the tasks related to the generation and handling of a traffic info xml file from automatic eCalls will be tested, including:

- The reverse geo-coding of automatically-generated MSD.
- The generation of the xml file from the MSD.
- The integration of the xml file into the simulated Traffic Information database, as an “eCall event”

3.5.4 Implementation timeline



ID	Nome attività	Inizio	Fine
1	**Core functionality: eCall development and test (no eCall flag)**	**01/06/2011**	**31/05/2012**
2	**Development**	**01/06/2011**	**31/05/2012**
3	**PSAP1 hw upgrade**	**01/09/2011**	**31/01/2012**
4	MEB prototyping	01/09/2011	08/12/2011
5	MEB development	09/12/2011	30/12/2011
6	Tlab (Turin) MEB installation & integration	02/01/2012	31/01/2012
7	**PSAP1 sw upgrade**	**01/11/2011**	**30/04/2012**
8	Requirement analisys	01/11/2011	31/01/2012
9	Sw development and test	01/02/2012	30/04/2012
10	**VIN Decoder & Eucaris**	**01/11/2011**	**30/04/2012**
11	Requirement analisys	01/11/2011	31/01/2012
12	Sw development and test	02/02/2012	30/04/2012
13	**IVS - MM**	**18/10/2011**	**30/05/2012**
14	T-Box fimware customization - eCall management	18/10/2011	18/01/2012
15	T-Box fimware customization - bCall management	01/03/2012	18/04/2012
16	T-Box fimware customization - eCall flag management	11/05/2012	30/05/2012
17	**IVS - CRF**	**01/06/2011**	**31/05/2012**
18	Agreement with IVS suppliers	01/06/2011	30/12/2011
19	Compliance verification to eCall std & requirements	03/10/2011	18/01/2012
20	On board installation impact analisys	01/12/2011	31/05/2012
21	Design & development of IVS - car network integration	18/01/2012	31/05/2012
22	**Mobile and Fixed networks upgrade**	**03/10/2011**	**31/05/2012**
23	Mobile Network - Impact analysis & deployment requirement	03/10/2011	19/12/2011
24	Mobile Network - eCall discriminator signalling patch provision by Ericsson	01/12/2011	16/01/2012
25	Mobile Network - eCall discriminator signalling patch pre-deployment test	17/01/2012	15/03/2012
26	Mobile Network - eCall discriminator deployment in the Varese MSC and testing	02/04/2012	18/05/2012
27	Fixed Network - Impact Analysis & Deployment requirements	03/10/2011	19/12/2011
28	Fixed Network - Deployment of the selected eCall routing in the fixed network	30/01/2012	20/04/2012
29	End-to End eCall Routing mobile/fixed networks test	21/05/2012	31/05/2012
30	**Component and Integration test**	**01/02/2012**	**31/05/2012**
31	MSD extraction & voice tests	01/02/2012	29/02/2012
32	MSD decoding & voice tests	01/03/2012	30/03/2012
33	Varese (PSAP) MEB installation & integration	02/04/2012	30/04/2012
34	Varese (PSAP) sw & network integration	01/05/2012	31/05/2012
35	**Test main functionality**	**01/03/2012**	**28/02/2013**
36	**Development**	**01/03/2012**	**28/02/2013**
37	ACI bCall service provider customization	02/03/2012	18/04/2012
38	MM T-Box bCall tests with ACI provider	19/04/2012	15/05/2012
39	ACI fleet recruitment	01/03/2012	31/10/2012
40	MM T-Box ACI cars installation	01/11/2012	28/02/2013
41	Training for ACI drivers	01/11/2012	28/02/2013
42	**Operational tests**	**01/06/2012**	**30/11/2012**
43	Automatic & manual eCall - CRF cars	01/06/2012	31/07/2012
44	Manual eCall & bCall + EGNOS - MM car	01/06/2012	29/06/2012
45	Processing results & KPI of operational tests	01/08/2012	30/11/2012
46	**Test add functionality**	**03/09/2012**	**30/09/2013**
47	**Development**	**03/09/2012**	**28/02/2013**
48	RTTI Centre Simulator development	03/09/2012	30/11/2012
49	PSAP sw development for Interaction with the RTTI Centre	03/12/2012	28/02/2013
50	**Operational tests**	**03/01/2013**	**30/09/2013**
51	Automatic & manual eCall - CRF cars	03/01/2013	28/02/2013
52	Interoperable eCall with DE & CZ cars	03/01/2013	28/02/2013
53	Manual eCall + EGNOS - ACI cars	01/03/2013	31/05/2013
54	Manual bCall + EGNOS - ACI cars	01/03/2013	31/05/2013
55	Processing results & KPI of operational tests	01/03/2013	30/09/2013

Figure 14: Italian implementation timeline

3.6 Greece

3.6.1 Introduction

The main purpose of the Greek National Pilot is the development of an operational eCall system, working in parallel to the existing 112 System within the framework of the HeERO pilot project. For this purpose a single PSAP will be designed and installed, with the objective to extend the functionality of the existing 112 call-centre, being compatible to it, so that they can be fully integrated in the future. Furthermore, the eCall system will be tested using two

client vehicles which will be equipped with the appropriate eCall equipment allowing them to communicate with the central PSAP station. All the necessary hardware and software components will be purchased or developed and then deployed during the pilot project. The Greek implementation is not intending to use a discrimination flag for routing e-Calls since there is no MNO involved in the local consortium, instead it is possible that a completely different number will be used for testing purposes (e.g. 113 or a long number). Finally, it is considered to use the local Greek VIN database maintained at the Ministry of Transport, so as to retrieve the required additional information about the vehicles that establish an eCall connection with the PSAP station. It should be first step for interoperable solution based on EUCARIS database.

3.6.2 Architecture

The main hardware components that will be used to implement the PSAP station are shown in the next figure.

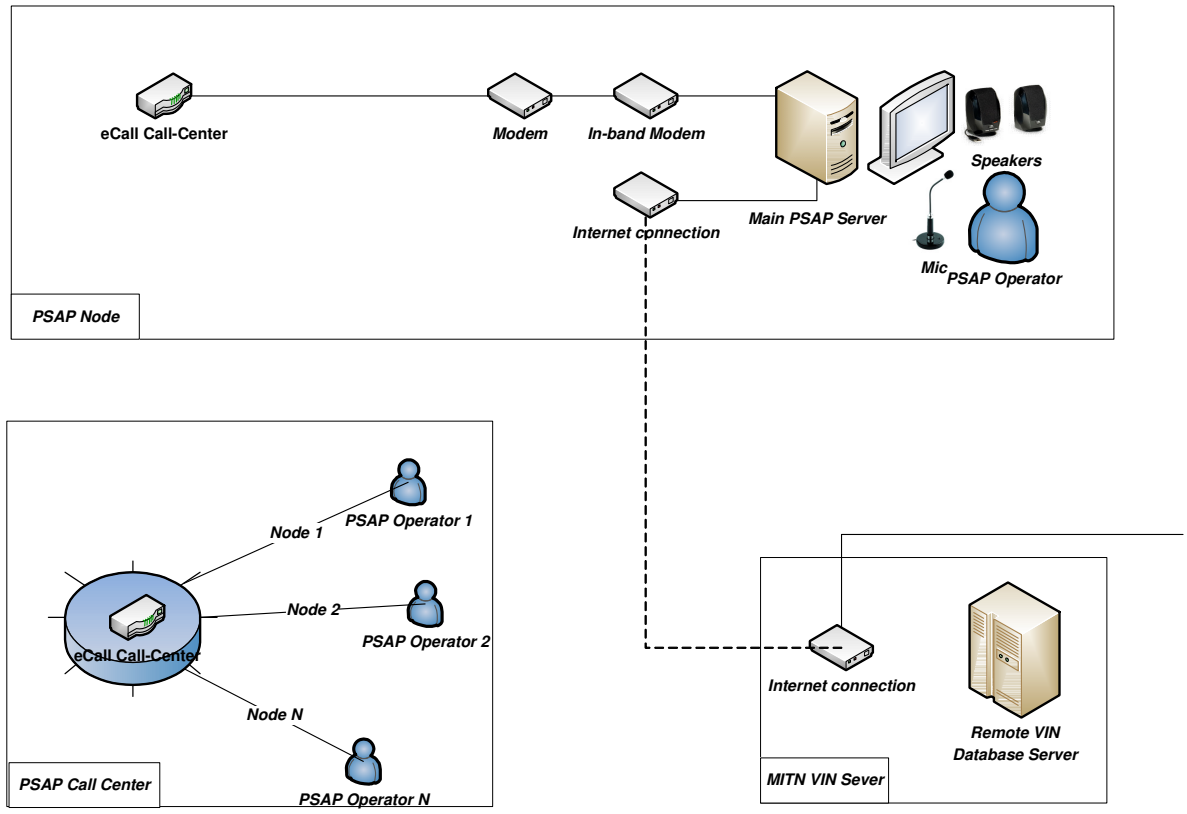


Figure 15: Components that will be used to implement the PSAP station (Greece).

These include:

- In-band modem for handling MSD messages. The role of this modem is to transmit/receive data (MSD packet) using the established voice channel.

- The central PC for each operator including a modem for serving the incoming call. This PC will be responsible for establishing the call between the operator and the vehicle, processing the MSD and any additional information and finally visualizing that information to the PSAP operator.
- Call centre for handling incoming calls.
- Connection to the Greek VIN database via internet.
- Speaker/Microphone for communicating with the client vehicles

The software that will be required for the PSAP station includes the following:

- SW for decoding/encoding the MSD messages.
- SW for visualizing information to the PSAP user.
- SW for communicating with the VIN database and retrieving information.
- SW for handling incoming calls through the computer user interface.
- Digital maps SW for visualizing position of the vehicle.
- SW for decoding the location of the vehicle and visualizing its position to the digital map.

All the previous listed software components will be running at the dedicated main PSAP server which will be used by the PSAP operator to communicate with the vehicle driver. The connection with the VIN database will be implemented using an internet connection between the PSAP centre and the Ministry of Infrastructure, Transport and Networks, where the database server will be located.

The hardware components that will be installed inside the client vehicles will be the following:

- GPS receiver for acquiring the coordinates of the vehicle, which are going to be transmitted using the MSD packet.
- In-band modem for transmitting data along with voice in a single phone call session.
- GSM modem for establishing phone calls with the PSAP station.
- Display device for visualizing information to the driver (touch screen or nomadic device).
- Input device for simulating a collision (the driver presses a button and then the system interprets this action as an airbag activation)

- Speaker/microphone so that the driver is able to communicate with the PSAP operator.

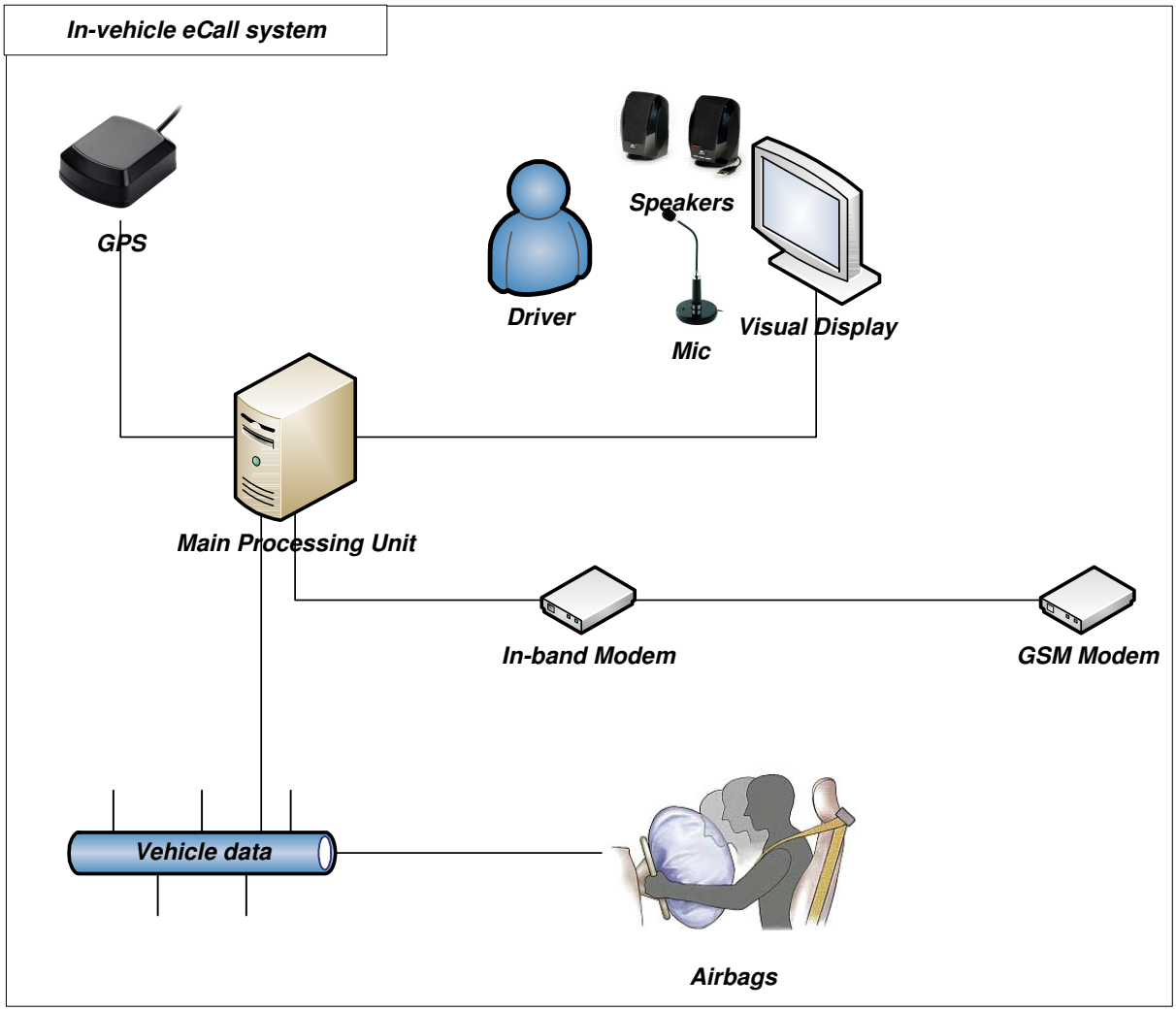


Figure 16: In-vehicle eCall system (Greece).

The software that will be required for the client vehicles used in the tests includes the following:

- SW for decoding/encoding the MSD messages so it is possible to send/receive all the necessary information to and from the PSAP station.
- SW for visualizing information to the driver for the testing purposes.
- Software for retrieving information from the vehicle.

3.6.3 Implementation Timeline

The required equipment is planned to be acquired through a public procurement process for the required hardware. This procedure has been initiated from the summer 2011 and it is

envisaged that it will have concluded probably by May 2012. In the same time period all the necessary organizational arrangements will be finalised. In the two last months (April-May 2012) an initial installation and functional testing of all hardware components is going to be performed for a first evaluation of the deployed system. During September 2011 and March 2012 there is also going to be a procurement process for the necessary software that is required for the eCall system to be operational. The final system implementation which will include the integration of all hardware components and the installation of software is going to be performed from April 2012 to September 2012. Finally, additional training of PSAP operators is planned to have been completed by September of 2012.

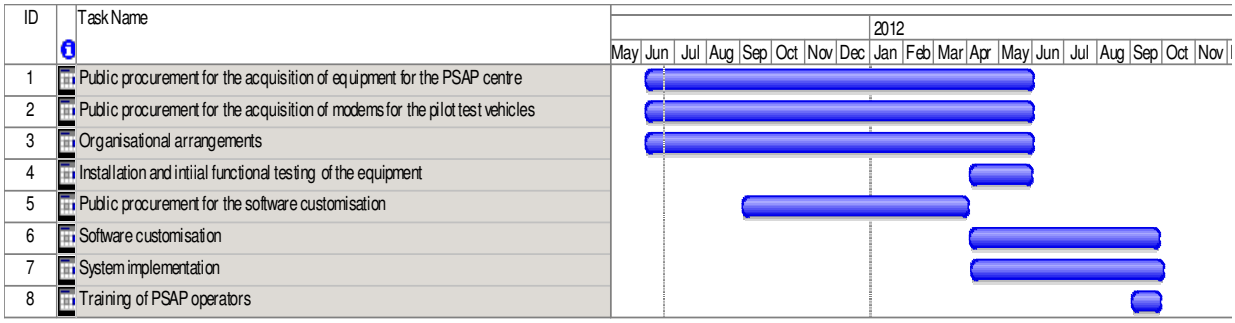


Figure 17: Scheduled activities of Greek side.

Note: This time plan may be delayed in cases of issues raised during the national public procurement procedures.

3.7 Sweden

3.7.1 Introduction

The implementation plan is based on the deliverable D2.2 (eCall Systems Functionalities' Specification – Sweden), which specifies the functionalities of the eCall pilot in Sweden.

The Swedish eCall pilot is focused on validation of the technical functionality of the eCall transmission and identification of related technical issues in IVS, Mobile Networks and PSAP. Extra attention will be paid to the aspects of timing, reliability and robustness of the MSD transmission. The hardware and software implementation plan is to develop (where necessary), implement and deploy the eCall software for trials in Mobile Networks, PSAPs and IVSs. No commercial discussions with the software and hardware vendors are planned within the HeERO:S project. The software will be deployed in real live environments for cars, mobile networks (for the mobile networks even in the live networks providing national coverage) and a copy of the real PSAP used for all PSAP related incoming calls in Sweden. In addition, the plan is to develop an On Board Unit simulator and a PSAP simulator, both

installed in a laptop PC. The combination of simulator and real environment will be used during the design and development phase, this also allow the partners to be most resource effective by allowing testing in their own facilities, as the PSAP simulator, IVS simulator, Real PSAP and Real IVS is developed independently this will allow to find any ambiguities in the specifications/standards

The pilot will include the eCall generation from two independent IVS:es (simulator and real), sent from desk as well as from real cars, over two independent mobile networks, to two different PSAPs (simulator as well as copy of the actual PSAP software used by SOS Alarm, the Swedish PSAP).

During operations, the plan is that the pilot will perform both functionality tests of the full eCall chain, as well as drive tests using a few cars involved in eCall over the two different mobile networks. To get the results from these tests and to analyse how the Key Performance Indicators (KPIs) are met, we will also need a specific evaluation- tool, which can take the log data from the IVS and from the PSAP and compare them automatically.

3.7.2 General overview of technical solution

The pilot will be using Volvo´s S60 cars, with On Board Unit (provided by Actia) used for the Volvo OnCall IVSs and solutions as a base line for addition of the eCall functionality. The eCall will then be established over TeliaSonera´s and Telenor´s mobile networks, and in the first phase directed to non-commercial copy of the PSAP run by SOS Alarm for all of Sweden. The PSAP will receive and answer the eCall and thus complete the full eCall functionality chain. It is expected that after the reception of the MSD the existing procedures and methods can be followed by PSAP, and that eCall will therefore be a minor extension and modification to the existing PSAP procedures.

The implementation aims for an operation phase with the following technical set-up:

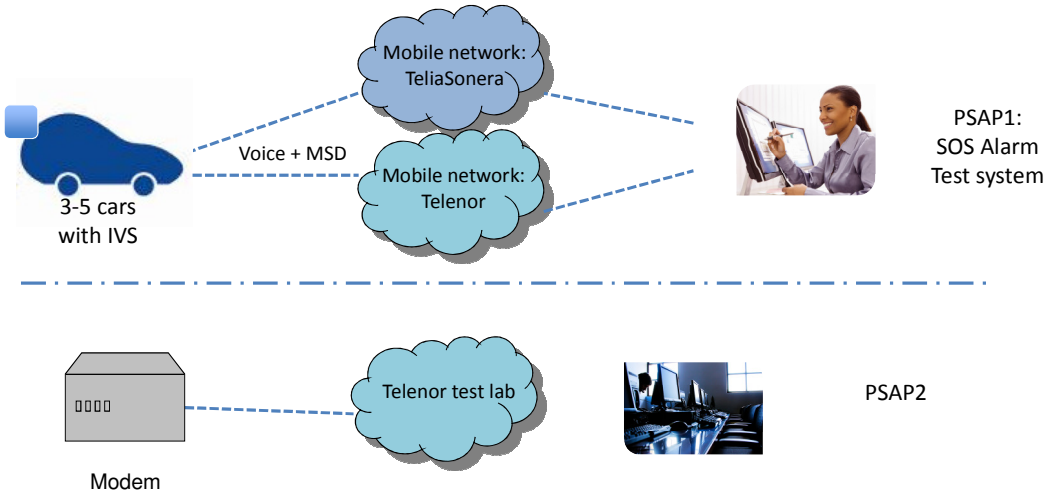


Figure 18: Sweden operation phase technical set-up.

3.7.3 eCall pilot subsystems overview

The Swedish pilot implementation is planned to be performed step-wise, with each step implementing additional functionality, with the goal of producing sub-systems that will be used to achieve the overall Swedish intentions with the pilot.

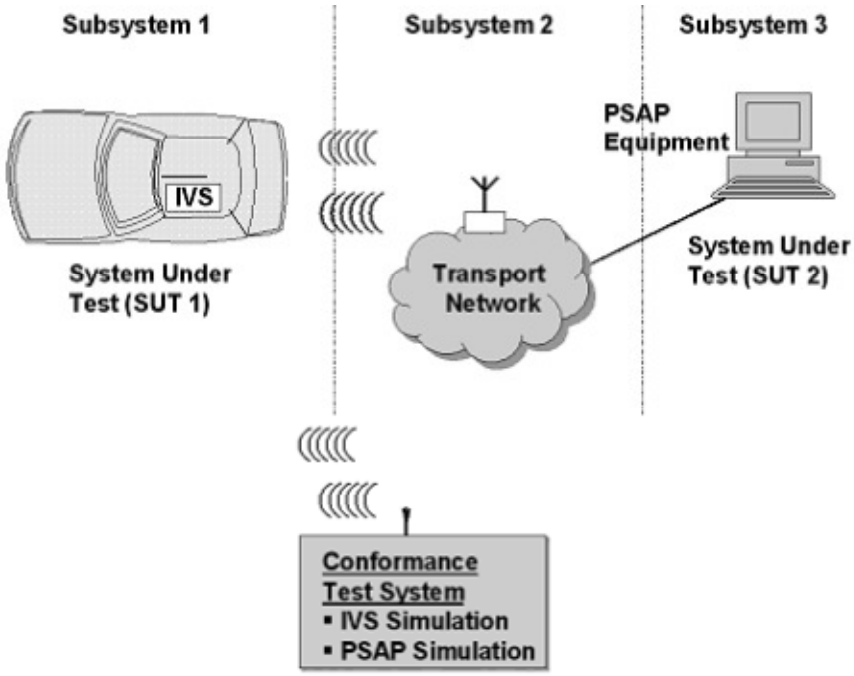


Figure 19: End-to-end eCall system extended with conformance test system.

As the full system consists of three distinct subsystems; PSAP, Public Land Mobile Network (PLMN) and IVS, these systems will be discussed separately below.

PSAP: The commercially used PSAP system called “CoordCom”, which is currently used in by SOS Alarm in Sweden will be used in the pilot as basis. The necessary software modules

(in-band modem, high level application protocol etc.) will be added. The intent is to allow for testing of the commercially used system without risking to negatively affecting the real daily Swedish PSAP activities.

PLMN: at least the testing of two different Mobile Networks is planned:

a. Activation of the eCall flag software patch in Telenor´s mobile network, using MSCs from Nokia Siemens Networks. No other modifications with respect to eCall are foreseen.

b. Activation of the eCall flag support in TeliaSoneras's mobile network, using MSC:s from Ericsson. No other modifications with respect to eCall are foreseen.

IVS:

The existing Volvo OnCall On board Unit will be used, with SW adaptations to the eCall application and modem SW according to the ETSI and CEN standards.

TEST Systems:

A Test-PSAP and a Test-IVS as well as a Test Mobile Network will be used in addition for testing during the eCall adaptation of the Volvo-IVS and CoordCom PSAP. This approach allows concurrent development of IVS and PSAP and a deep debug level.

The Ericsson test mobile network in Aachen will be used to verify eCall flag implementation in the IVSes.

3.7.4 Implementation activities PSAP

Implementation strategy:

Ericsson will add additional functionality for eCall for test purposes in the CoordCom product, allowing for a seamless integration of calls and eCalls, and reusability of HW, SW and Standard Operating Procedures. The eCall functionality includes In-band Modem, MSD decoding, Call distribution, Case Handling, MSD visualization in text and on map and data logging (to be able to evaluate KPI's)

Software upgrades:

The eCall functionality is planned to be introduced in the CoordCom product starting from CoordCom 5.2.

3.7.5 Implementation activities MNO TeliaSonera:

Implementation strategy:

TeliaSonera´s Mobile Network will be upgraded with eCall functionality in a single step.

Software upgrades:

TeliaSonera: All Mobile Switching Centres (MSC) in the mobile network need to be upgraded with a software patch, enabling support for eCall flag and routing of the eCalls to the specific PSAP. Ericsson is proving the necessary software patch for the MSCs.

No other modification to the PLMN are foreseen with respect to the support for the Inband Modem

3.7.6 Implementation activities MNO Telenor:

Implementation strategy:

Telenor Swedish mobile network will be upgraded with eCall functionality. For full scale trial/commercial usage only commercial license will be required.

Software upgrades:

Telenor Sweden: All MSC's and MSC-Servers will be upgraded with a software patch enabling eCall flag functionality and ECM and ECA categories are routed to a test PSAP. For full scale trial/commercial deployment they will be redirected to a live PSAP.

3.7.7 Implementation activities IVS:

Implementation strategy:

The implementation has an incremental approach divided into 7 steps:

Step 1) Implement the MSD generator including the ASN.1 encoder. Exchange MSD test data (ACTIA - Ericsson), and verify that encoding/decoding works according to the CEN Standard.

Step 2) Implement eCall application (high level application protocol) and the in-band modem, test with the Ericsson-Test-PSAP on bench and verify.

Step 3) Same as step 2, but test with CoordCom and verify.

Step 4) Implement eCall flag settings (service category). Test and verify in Ericsson test network (Aachen).

Step 5) End to End test, OBU on bench → Real network → PSAP System (CoordCom). Verify eCall flag routing, MSD generation and ASN1 encoding/decoding, High level application protocol (PUSH & PULL, Acknowledgement, timing), in-band modem and voice end to end.

Step 6) Implement dormant mode and verify (functionality that allows the IVS to act as an IVS configured for eCall only (not registered on a PLMN at power up)

Step 7) same as step 5, but OBU installed in a vehicle (initial drive tests)

The OBU will also include a data logging feature (to be able to evaluate KPI's)

Software upgrades:

- MSD generator including ASN.1 encoder / decoder
- In-band modem (NAD SW)
- eCall application (high level application protocol)
- eCall flag settings
- Dormant mode
- Logging feature

3.7.8 Implementation activities Test systems:

Implementation strategy:

The Ericsson-Test-IVS and Ericsson-Test-PSAP are developed and maintained by Ericsson Germany, situated in Herzogenrath, close to Aachen (car-license-plate: AC). In the following these test-devices are called AC-IVS and AC-PSAP.

The AC-PSAP and AC-IVS will be used for testing during the eCall adaptation of the OBU and CoordCom system. The Ericsson test mobile network in Aachen will be used to verify the eCall flag implementation in the Volvo OBU.

The AC-IVS and AC-PSAP are based on a flexible Laptop-implementation in C++ under WINDOWS7 with specifically developed Audio-/I/O drivers for reliable real-time performance.

They will to the largest possible extend the C-Reference-Code of 3GPP, provided in TS 26.268-Rel10.0.0. Only where necessary this Reference C-Code will be modified or complemented for a "real" IVS or "real" PSAP.

This implementation will be very flexible as we expect that changes will be necessary during the HeERO-project time.

Software upgrades:

The total SW-implementation will consists of five basic building blocks (besides some secondary routines for I/O): These blocks are described below as they will work after being developed.

1) AC-eCall-Inband-Modem-Server, in short called "Server" in the following.

This Server implements and executes the In-band Modem on IVS-Side and/or on PSAP-Side.

It has communication interfaces to the “Graphical User Interfaces” of the High-Level Applications in IVS and/or PSAP.

It has communication interfaces to the local Microphone-Input and the local Loudspeaker-Output.

It has communication interfaces to the Network Access Device via high quality analogue I/O.

The Server logs all important events on a log-file in ASCII-format with time stamps of 10ms precision. It further logs all Voice and Modem signals in sending and receiving direction on multi-track audio files for later offline evaluation.

2) AC-IVS-GUI (Graphical User Interface of the IVS Application)

This IVS-GUI handles all necessary Application Level details, such as:

- getting the trigger for an eCall-action by mouse-click (or SW-activation)
- assembling the MSD by taking the actual position and actual time (to 10ms relative precision) and taking the “static data”, like VIN, number of passengers, etc, from a pre-prepared XML-file;
- adding an “Optional Data field” to the MSD with an Time-Stamp refinement to 10ms precision
- performing the ASN1-encoding
- sending the MSD in digital form “down” to the Server for In-band transmission;
- getting Status-Info “up” from the Server, as specified in TS 26.268, such as

  “IVSEVENT_”
- SENDINGSTART, SENDINGMSD, RESTARTMSD, CONTROLSYNC, CONTROLLOCK, LLACKRECEIVED, HLACKRECEIVED, IDLEPOSTRESET, IDLEPOSTSTART, TIMEOUT,
- and complemented by the (missing) RECEIVEDSTART
- handling the standardized “PULL-MSD”, “HL-ACK” and “CLEARDOWN”

- logging all important events with time stamp in 10ms precision on a log-file in ASCII-format.

Provided user-functionality by IVS-GUI is:

- trigger an eCall with In-band with eCall Flag “Automatically triggered” to 112 (high priority)
- trigger an eCall with In-band with eCall Flag “Manually triggered” to 112 (high priority)
- trigger an eCall with In-band to a ”long number” (no eCall flag, no priority)
- trigger a normal voice call (to 112 with priority or to a long number without priority)
- accept an incoming voice call (call-back from PSAP)

The IVS-GUI is responsible to synchronize the time and clock of the Laptop to the GPS-time with an absolute precision of about 100ms.

3) AC-PSAP-GUI (Graphical User Interface of the PSAP Application)

This PSAP-GUI handles all necessary Application Level details, such as:

- getting the trigger for an eCall-action by mouse-click (or SW activation)
- receiving the MSD “up” from the Server in digital form
- performing the ASN1-decoding
- extracting also the Optional Data Field with the time stamp refinement to 10ms precision.
- checking “plausibility” and sending the HL-ACK, if OK or the CLEARDOWN, if wanted so by the Operator
- getting Status-Info “up” from the Server, as specified in TS 26.268, such as “PSAPEVENT_xxx (no addition is done for the PSAP case).
- handling the standardized “PUSH-MSD, “PULL-MSD”, “HL-ACK” and “CLEARDOWN”

- logging all important events with time stamp in 10ms precision on a log-file in ASCII-format.

Provided user-functionality by PSAP-GUI is:

- accept an incoming voice call and wait for the Inband-Initiation, i.e. the PUSH signal (also called SEND-Bursts)
- accept an incoming voice call and immediately “PULL” the MSD by sending the “SEND MSD!”, also called START-Bursts
- trigger an MSD-PULL with In-band with HL-ACK at the end
- trigger an MSD-PULL with In-band with CLEARDOWN at the end
- trigger a normal voice call-back to the IVS (no priority)

The PSAP-GUI is also responsible to synchronize the time and clock of the Laptop to the GPS-time with an absolute precision of about 100ms.

The MSD may be displayed in graphical form using “Google-map” (Internet-connectivity required). The actual MSD transmission time is displayed online with 10ms precision, thanks to the Optional Data Field within the MSD (note: depending on how precise the clocks in AC-IVS and AC-PSAP are synchronized).

4) AC-IVS-NAD

The AC-IVS-NAD (Network Access Device) is a commercial 2G+3G mobile phone from Sony Ericsson (Z800).

It has been modified with several extensions:

a) The eCall Flags are added to the Emergency Call Setup in the following way:

- calling 112 => emergency call setup without the Service Category IE (without eCall Flag)
- calling 113 => emergency call setup with Service Category set to “Manually Triggered eCall”
- calling 114 => emergency call setup with Service Category set to “Automatically Triggered eCall”.

b) Disabling all Voice Enhancement Devices, such as Automatic Gain Control, Noise Reduction, Acoustic Echo Cancellation, etc. to guarantee optimal processing of the Inband Modem signals. The Control-Plane-Interface between IVS-GUI and IVS-NAD is per Bluetooth, using the standardized AT-Command set. The User-Plane-Interface between IVS-Server and IVS-NAD is via analogue cable for Voice and Modem signals.

5) AC--PSAP-NAD

The AC-PSAP-NAD (Network Access Device) for HeERO-testing and presentation uses a commercial 2G+3G mobile phone from Sony Ericsson (Z800).

It has been slightly modified for the PSAP:

a) Disabling all Voice Enhancement Devices, such as Automatic Gain Control, Noise Reduction, Acoustic Echo Cancellation, etc. to guarantee optimal processing of the Inband Modem signals

The Control-Plane-Interface between PSAP-GUI and PSAP-NAD is per Bluetooth, using the standardized AT-Command set.

The User-Plane-Interface between PSAP-Server and PSAP-NAD is via analogue cable for Voice and Modem signals.

3.7.9 Implementation activities evaluation tool:

HeERO: Sweden plans to perform thousands of SW-triggered eCalls in many different regions of the two PLMNs in order to get a good statistical basis for the evaluation of the agreed KPIs. Both, IVSs and PSAP(s), will log all relevant data in real time for later, offline, evaluation. For this evaluation an automatic evaluation tool (in SW) is required.

Implementation strategy:

The implementation of this automatic evaluation tool can start once the KPI´s are ready and agreed. The intent is to specify and then purchase the software from an external SW-house, provided that it can be built.

3.7.10 Implementation timeline

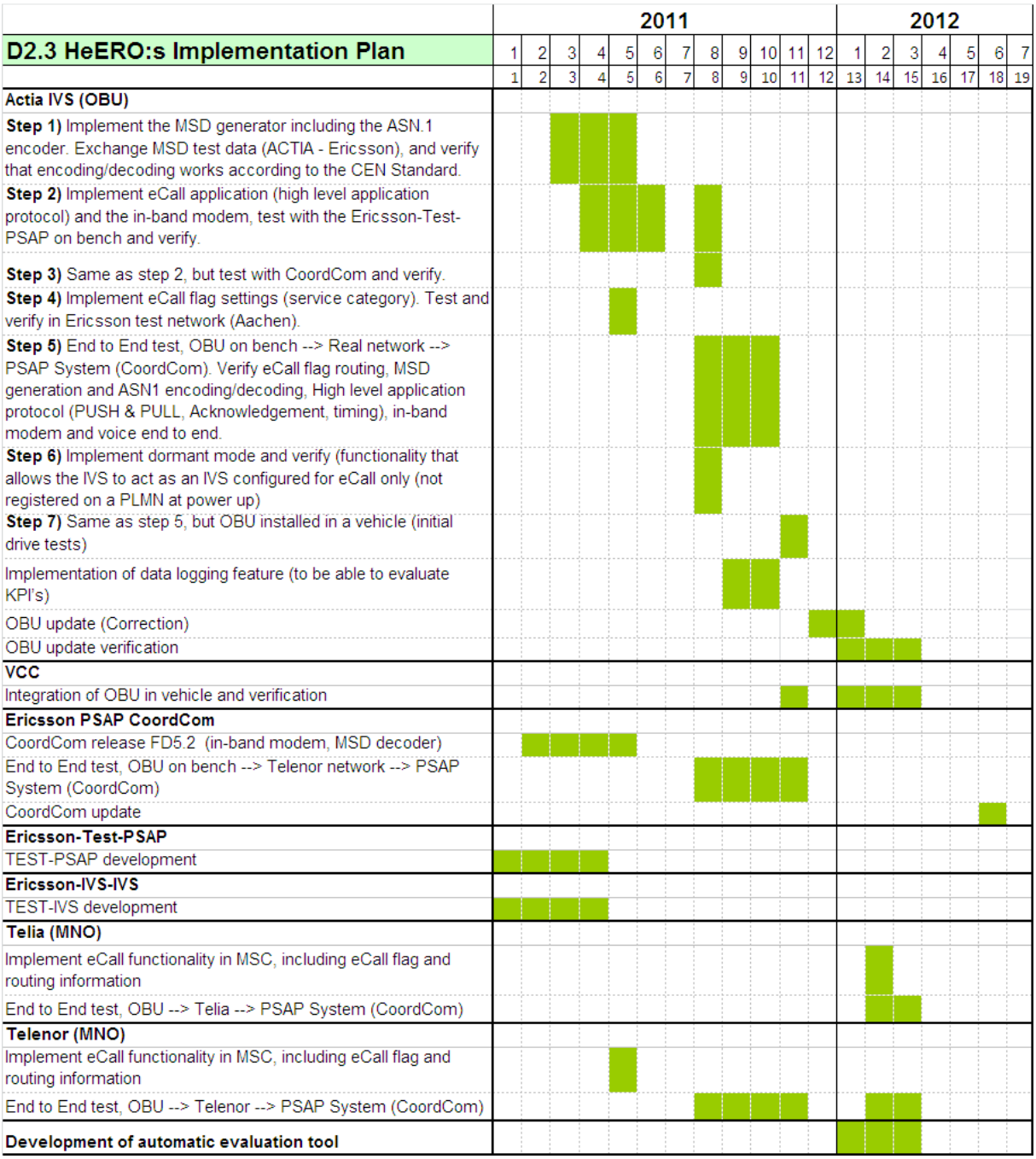


Figure 20: Swedish implementation timeline

3.8 Croatia

This report is prepared as a part of the HeERO project and it provides an implementation plan for the eCall pilot in Croatia.

The implementation plan is based on the deliverable D2.2 (eCall Systems Functionalities' Specification – eCall pilot Croatia), which specifies the functionalities of the eCall pilot in Croatia

3.8.1 General overview of technical solution

The components of the Croatian eCall Pilot Architecture are presented on following figure.

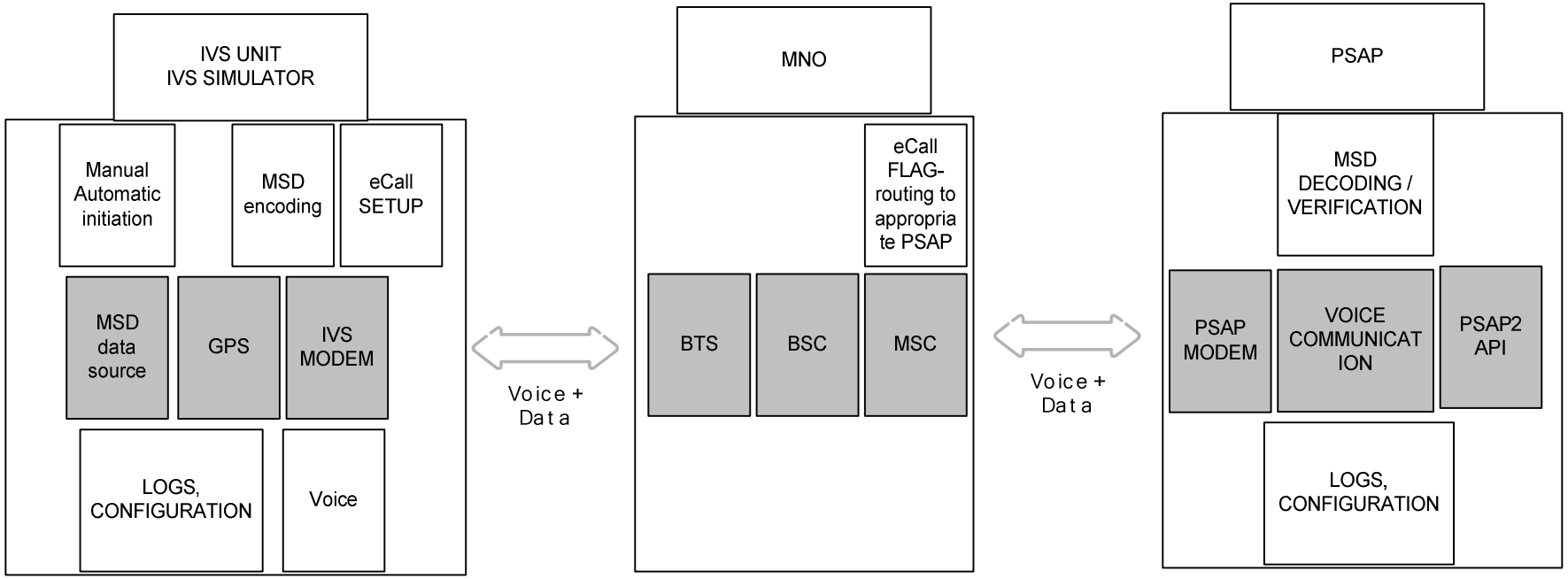


Figure 21: Croatian eCall Pilot Architecture.

Croatian eCall Pilot Architecture comprises the following components: IVS units (both the IVS simulator and commercial-grade units), Mobile network, PSAP. Those are to be implemented at the Croatian test site.

3.8.2 In Vehicle System

The eCall IVS units (both IVS simulator and commercial-grade units) are to be deployed as the Croatian eCall test bed components. The IVS units comprise features for setting up the eCall according to the most recent 3GPP and CEN eCall standards. The IVS will be configured to dial either 112 call with eCall discriminator, or to dial directly the PSAP number.

eCall implementation plan	Expected
⊟ **IVS**	
IVS Simulator	**Q3/2011**
IVS unit	**Q4/2011**
⊟ **HAK**	
Partner 1	**Q3/2011**
Partner 2	**Q3/2011**
Installation	Q4/2011
⊟ **ERA - GLONASS**	
Standard Acceptance	**TBD**
PSAP remote testing	**TBD**
IVS testing	**TBD**

Figure 22: Croatian implementation plan & IVS.

3.8.3 Mobile Network Operator

Both laboratory and real-network eCall test-beds will be deployed for the Croatian eCall Pilot activities. The eCall laboratory MNO component consists of fully functional mobile network, including the Radio Access Network (RAN) and the Mobile Switching Centre (MSC). The MSC is connected to the PSAP over standardised telecom infrastructure (which means what?). The MSC software release is eCall discriminator-enabled, which allows for proper routing of the eCalls to eCall-enabled PSAP.

MNO	
MNO VIPNET - LAB	**Q4/2011**
eCall lab setup	
eCall patch implementation	
eCall feature impact on network testing	
eCall flag functionality testing	
MNO VIPNET	**Q1/2012**
Testing - Lab environment	
Testing- Vipnet - Lab environment	
Vipnet - Live network	
MNO TELE2 - LAB	**Q4/2011**
eCall lab setup	
eCall patch implementation	
eCall feature impact on network testing	
eCall flag functionality testing	
MNO TELE2	**Q1/2012**
Testing - Lab environment	
Testing - TELE2 - Lab environment	
Vipnet - Live network	

Figure 23: Croatian implementation plan & MNO.

3.8.4 PSAP

The PSAP component is fully eCall-enabled. After the eCall is received, an on-screen message is presented to the PSAP operator, and the PSAP operator is able to answer the eCall voice communication according to the eCall-related standards. The PSAP event logger is deployed, thus allowing for log maintenance and log transfer for further analysis.

PSAP	
PSAP - LAB	**Q3/2011**
Hardware installation	
Software installation	
eCall feature installation	
eCall feature testing	
PSAP - DUZS setup	**Q4/2011**
Hardware installation	
Software installation	
eCall feature installation	
eCall feature testing	

Figure 24: Croatian implementation plan & PSAP.

3.9 Netherlands

3.9.1 Introduction

The implementation plan is based on the deliverable D2.2 (eCall Systems Functionalities' Specification), which specifies the functionalities of the eCall pilot in the Netherlands.

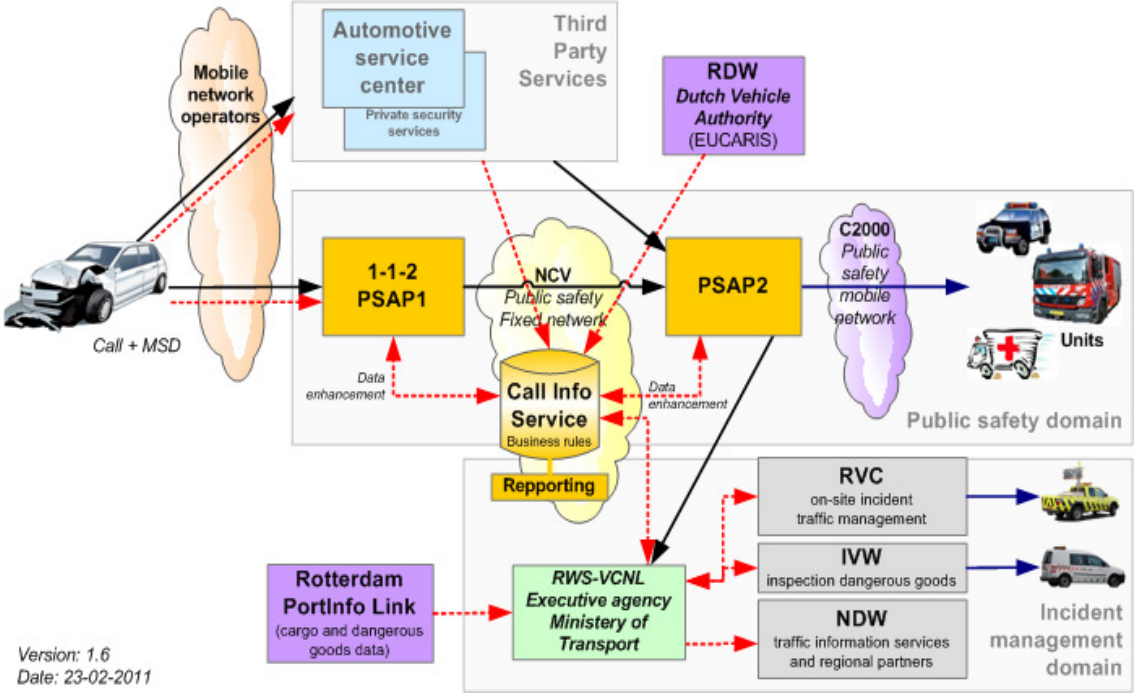


Figure 25: General overview of the technical solution

3.9.2 Description of implementation phases

The project has been divided into 5 phases. In the first phase which will be completed end of February the core functionality will be realized. Also we will investigate the conditions for the next phases. After evaluation we will decide which functionality will be added in the subsequent phase.

In the last phase the eCall pilot has to meet the service level of the real 112 operations to be accepted as a reliable service. To be prepared for this most critical phase the responsible operational people are already involved in the previous phases.

The phases are described in more detail in the first textbox below. The second box shows the general planning approach. This shows that instead of having one operational phase we have divided the operational phase in three sub-phases.

Project phase	Project scope
1	"Core functionality": • Handling eCalls up to PSAP2; notification of PSAP2 Intake process • Notification of Rijkswaterstaat • Processing of EUCARIS data • Hazardous substances in optional data part of the MSD • Routing without eCall flag (to separate telephone number) • Processing results operational tests
2	• Advanced '1-1-2 GIS application' in PSAP1 regarding agents • Functionality '1-1-2 GIS function – automatic routing' • Processing results operational tests
3	• GMS / NMS • Hand-over of collected information to the emergency vehicles • Interfacing to Third Party Services (TPS) eCalls • Processing results operational tests
4	• Routing based on eCall flag • Hazardous substances: external database • Processing results operational tests
5	• Deployment to production environment

Table 2: Implementation phases in Netherlands.

3.9.3 The core functionality

In phase 1 we will install a fleet of ten test vehicles. These will manually trigger automatic, manual and test calls. The used IVS has to comply to the CEN and ETSI standards.Special IVS systems will be used in trucks to send the MSD with the extended data set as defined in the CEN document on HGV eCall.

The eCalls will be send to the MNO participating in the project. This MNO will implement the eCall flag. The MNO will deliver the eCall messages to destinated entry points for handling. Various ways of connecting the MNO and PSAP will be considerd.

The networks of the other MNO's will be used to check the correct transfer of the in-band modem signal through these networks.

At the PSAP entry point manual and automated eCalls will be handeld according to the functional design. This will include the connection with RDW and EUCARIS. The eCall information and handling data is being send to RWS which functions as the starting point for road management, dangerous goods and salvage management.

Testing will be done accoriding to the test plan using the CEN end-to-end conformance test as well as scenario's.

In this phase the use of the eCall information in the full chain is done in a partly automated way as the subsequent phase will take this up. A special devellopment is that of HGV eCall. This demonstrates how load data can be put into the MSD in a reliable automated way

without beining dependend on manual interaction with the driver. This data will have to be retrieved at the PSAP end.

After realisation and testing of the basic infrastructure private fleet owners are welcome to test their prototype Pan EU eCall applications.

Depending on the results and on approved test plans this can lead to more large scale tests in the following phases (3 or 4).

3.9.4 Hardware and software required by In Vehicle System

We aim to use more than one make of IVS in the trail. Most of these IVS's will come from private partners that have showed interest to join the project. All the IVS's will have to be conformant to the eCall standards. This will be tested using the CEN end-to-end conformance tests. (CEN E2E tests)

In phase 1 we will install a fleet of ten own test vehicles. These will manually trigger automatic, manual and test calls. The used IVS has to comply with the CEN and ETSI standards. Special IVS systems will be used in trucks to send the MSD with the extended data set as defined in the CEN document on HGV eCall.

3.9.5 Hardware and software required by Mobile Network Operator

The eCall will be send to the MNO participating in the project. This MNO will implement the eCall flag. The MNO will deliver the eCall messages to designated entry points for handling. Various ways of connecting the MNO and PSAP will be considered.

As the Mobile Network Operator (MNO) used in the project is not part of the project team they are not obliged to give inside information on their technical solution.

The networks of the other MNOs will be used to check the correct transfer of the in-band modem signal through these networks.

3.9.6 Hardware and software required by PSAP1, PSAP2 and TMC

3.9.6.1 PSAP1 (112) and PSAP2 (emergency rooms)

As we do not want to disturb the operational processes in our 1st and 2nd level PSAPs the pilot will be performed on separate systems. These pilot systems will simulate the operational systems.

The pilot systems will be hosted by the subcontractor KPN Newtel Essence who is also responsible for the development and installation of the hardware and software. The workstations can be installed at any desired place, as long as there is an IP-connection

available to the pilot systems. As a result, this implementation is not only suitable for the operational pilots but also for demonstration purposes.

The handling of eCalls can either be done manually or automatically. Automatic handling makes it possible to perform tests without the necessity of call-operators being present at all times. Also in case of automatic eCall handling, the link with RWS (TMC) and RDW will be fully operative.

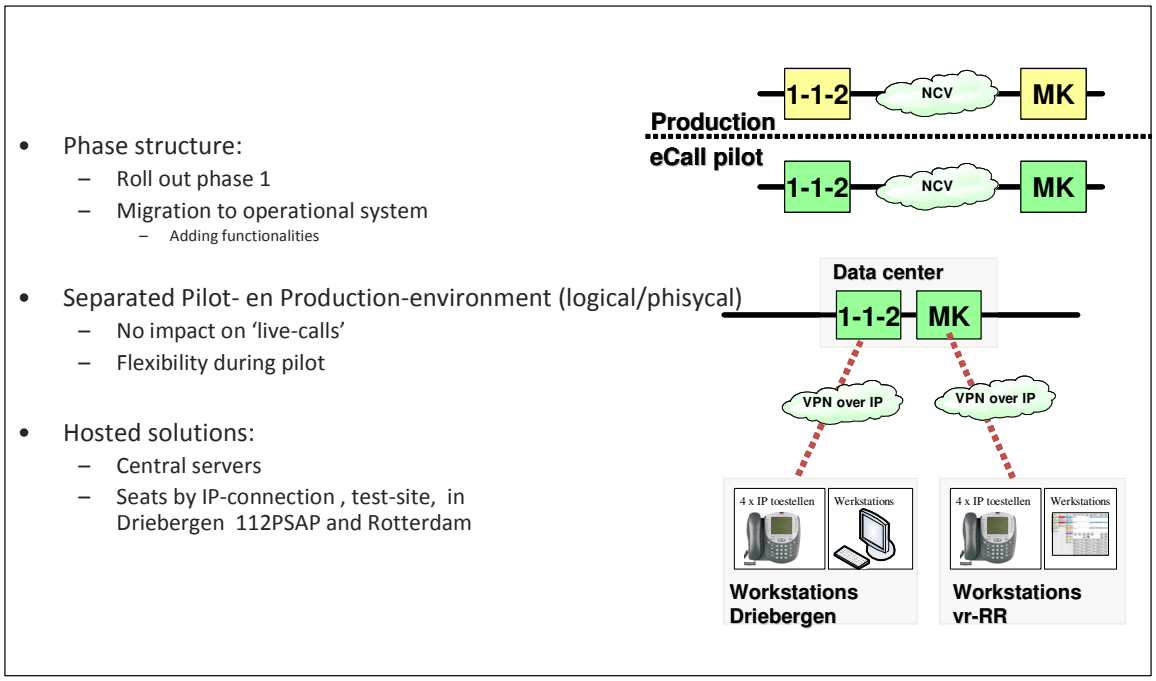


Figure 26: 112 and emergency room handling

3.9.6.2 TMC

The TMC will be connected directly to the Call Info Service system (CIS). This is the system were all information of eCall is gathered and enriched by EUCARIS and additional information of PSAP or TMC. There will be developed software and a user interface for the TMC operators to handle the eCalls and enrich these with traffic management information.

The TMC is part of the eCall chain and also part of the testing scenarios. KPI's are also developed for the TMC. These will be tested and reported during the performance test phase. Next to that it is very important that procedures and handling in the TMC and between TMC and PSAP/112 are evaluated.

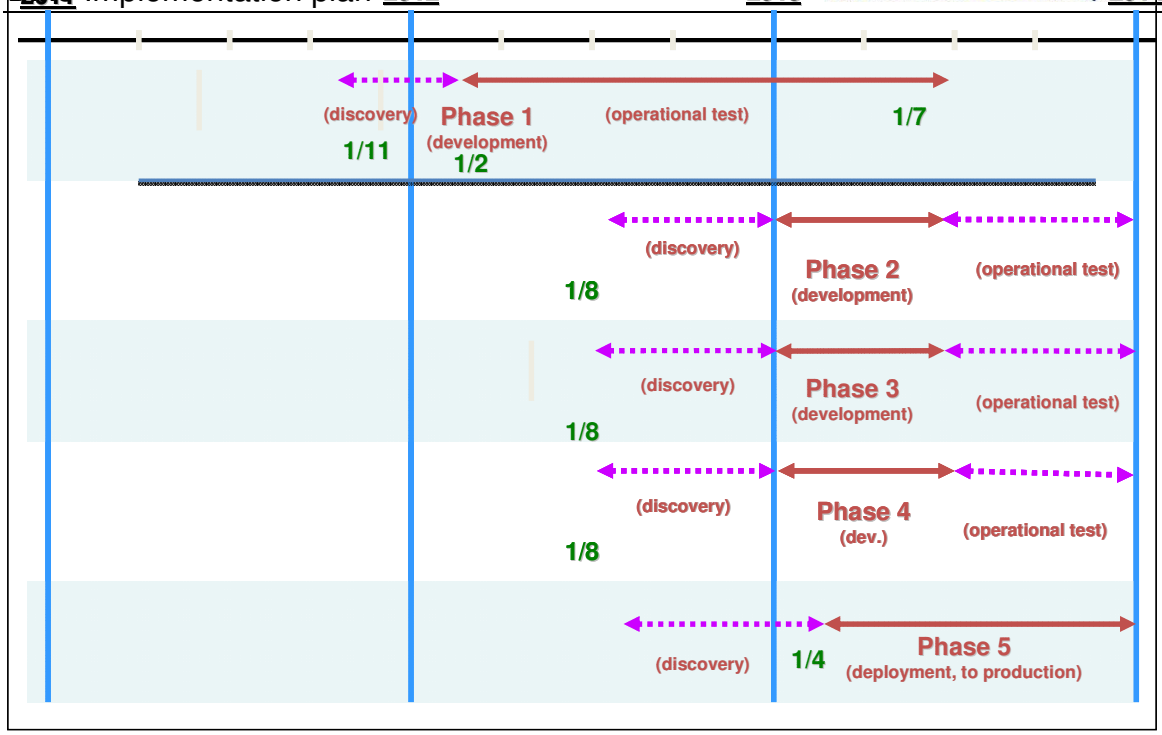


Figure 27: Implementation timeline in Netherlands