EENA Case Study

GIS112 Estonia

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1   Executive Summary

In March 2014 the project GIS112 was implemented. The project's aim was to reduce the responding time from answering 112 calls to the time when an emergency service reaches the scene.

The efficiency of the Emergency Response services has increased: the scene of an accident is designated faster, the ERC can make more flexible and efficient decisions to send out the best and fastest help, information exchange between authorities is faster and more accurate, help gets faster to the scene of accident and a complete view of the events and more efficient resource management.

2   Introduction

As technology evolves, it is inevitable for public safety organisations to adapt new solutions that will help save lives and make help even faster for the person in need.

Public Safety Answering Point (PSAP) is the first contact to a person in danger. It is crucial that the primary evaluation of the situation is done quickly and help is sent out at first opportunity. This can only be done if call-takers have the right facilities to process emergency calls.

Estonian Emergency Response Centre is constantly working on new developments to improve the process of managing emergency reports. This document gives an overview of geographic information system called GIS112.

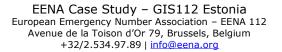## 3   Estonian Emergency Response Centre

Estonian Emergency Response Centre (EERC) is a national rescue organisation governed by the Ministry of the Interior. EERC consists of four regional centres: North Centre, South Centre, East Centre and West Centre. The main task of the EERC is to handle the emergency messages forwarded to the single European emergency number 112.
EERC:
- receives emergency calls (or messages), processes the emergency messages requiring ambulance, fire and rescue, police interference and enters the information about the incident into the emergency messages processing information system
- after having assessed the gravity of situation, dispatches fire and rescue teams, Explosive Ordnance Disposal (EOD) squads, ambulance teams and exchanges the information between EERC and the teams on scene of incident. Police units are dispatched by the Police and Border Guard Board.
- informs and involves other services, companies and organisations if necessary

In Estonia the single emergency number 112 is valid for fire and rescue, ambulance and police. The final steps towards the single emergency number 112 were made on European 112 Day 11th February 2015. Calling for help became simpler – there is only one emergency number to remember. It also means faster dispatching of emergency services and consequently help arriving more quickly to the scene.
The call handling system of the Estonian Emergency Response Centre is a 2-level system. The first stage is call-takers. 90% of the calls are answered within 10 seconds. The call-takers have to give the first evaluation in 60 seconds. They insert the main information about the incident - what happened and where and by using a specially developed protocol evaluate how severe the situation is. After that, the incident will appear to the second stage – dispatchers. When the dispatcher opens the incident, all suggested resources will appear (the system automatically generates a unique and fastest route to the scene) and with a confirmation, all the information will go to the selected resources to a mobile mGIS device and also via radio communication.
Although the EERC has four separate regional centres, the operations are done in one virtual control room. That means that all the information can be seen and managed at any physical location. Call overflow is also used, which means that the call is answered by the first available agent all over Estonia, irrespective of the load of the nearest regional control room.

4   GIS112

Having one emergency number, a digital map that expedites call management is very useful. In March 2014 the project GIS112 was implemented. The project's aim was to reduce the responding time from answering 112 calls to the time when an emergency service reaches the scene. One of the main goals of the project was to get faster help in an incident situation. The project was funded with the help of Estonian-Swiss Cooperation Programme. The cost of the project was 1,5 million euros, of which 15% was covered by Estonia and 85% by Switzerland.

The geographic information system consists mainly of a digital map placed in the control rooms of the Estonian Emergency Response Centre, and in rescue vehicles and ambulances.

The scene of an accident, the fastest way there and the available resources are displayed on the map. The new tool shows the location of the caller and the fastest ambulance and rescue teams on the digital map of the Emergency Response Centre. It also helps the ambulance and rescue vehicles to find the quickest way to the site of emergency, displaying the route on a digital map in the computers of the vehicles. Higher joint use of tools is the key enabling to make emergency response faster.
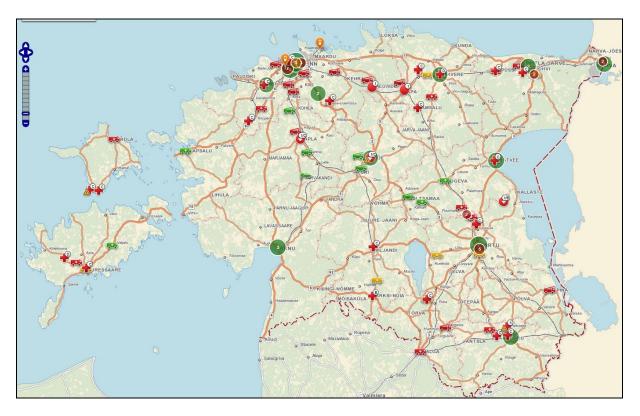

Image 1. An example of Real-time view of calls, incidents and resources.

5   Benefits of the new system

The new Geographic Information System GIS112 makes emergency service faster and more accurate. The main benefits for using GIS112 are following.

5.1   The scene of an accident is designated faster.

The system displays the approximate location of the caller using location information provided by the Mobile Network Operator (*push*-method). A landline telephone is positioned based on the address (with the accuracy of the building/apartment) from the operator database. Mobile phone locations are calculated based on cell towers. Additionally, it is possible to open different layers of information on the map, for example public objects (e.g. hospitals, nursing homes, schools) to help specify the location of the caller. For example, in images 2 and 3 below, there are bus stops, Parking lots (marked as "P"), kindergartens (marked as "L") etc. Different layers about information needed for the rescue operation (e.g. water points, hydrants, etc.) or ambulance and police (service areas etc.) are also added to the map.
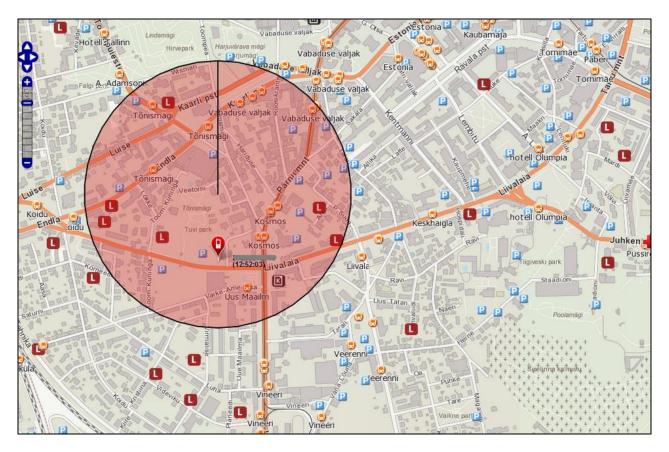

Image 2. Caller location and map layers.

Image 3. Caller location and map layers.

5.2 ERC can make more flexible and efficient decisions to send out the best and fastest help.

All the resources (rescue and ambulance vehicles and their statuses) are displayed on the digital map. The colours of the cars differ based on the statuses – green resources are available and ready to go to an accident; red marks an occupied resource (whether on the scene, driving to the hospital etc) and yellow marks resources that have been alarmed and are on the way to the place of incident.

Image 4. Resources and hydrant map layer.

5.3   Information exchange between authorities is faster and more accurate.

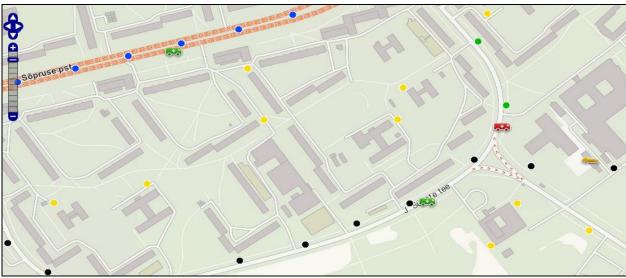Data is exchanged electronically between the Emergency Response Centre and rescue teams and ambulance brigades. Location of the accident and all the closest available resources are visible both to the dispatchers of the ERC and to the team responding to the scene of an accident. The resources use a similar map in mGIS device.

Image 5. MGis device on ambulance and rescue vehicles.

5.4   Help gets faster to the scene of accident.

The system draws up a unique and the fastest deployment plan for each event, and displays the fastest way to the scene (as seen on image 6); fast electronic digital map-based exchange of information makes finding the scene faster. The estimated time of arrival is also shown to the dispatcher. Today, the system calculates the fastest route and estimated time of arrival (ETA) based on road cover (asphalt, gravel, etc) and the speed limit.

The dispatching system is also integrated to our emergency management system. After GIS112 offers the dispatcher best suitable resources, he/she can alarm them from the map. The alarming system is based on TETRA radio communication network.

Image 6. Nearest available resources and their fastest route to the incident.

5.5 A complete view of the events and more efficient resource management

Rescue and ambulance events and calls can be observed on the map chronologically and geographically which makes it easier to identify problematic areas or predict some kind of situation patterns that might improve reaction to incidents. For example, in image 7 and 8 illustrative overviews of calls and incidents in a certain period of time are shown.

Image 7. An example of all calls at a random day on a period from 8 a.m. to 3 p.m.

Image 8. An example of all rescue and ambulance incidents at a random day on a period from 8 a.m. to 3 p.m.

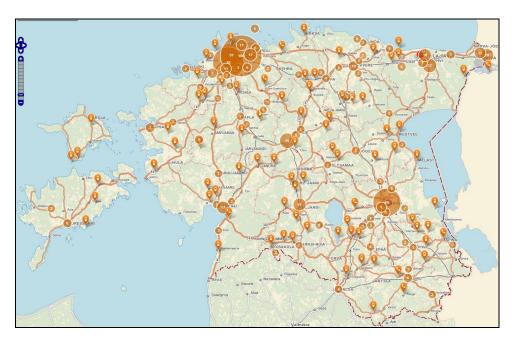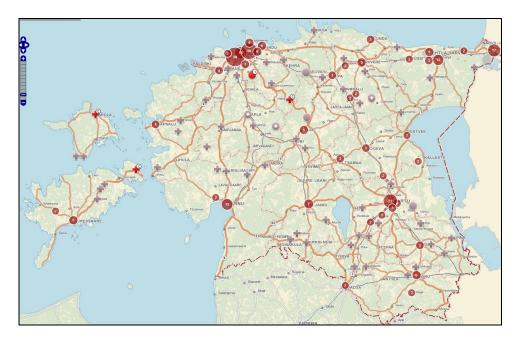## 6   Development process

The development of GIS112 started in 2009. The Emergency Response Centre, Police and Border Guard Board, Health Board, Rescue Board etc gave the input to work processes. The IT and Development Centre of the Ministry of Interior coordinated the development project of GIS112. Additionally IT Company CGI was included into the software development.

Since the development was extended to a longer period of time, some of the initial requirements changed. It required constant work from different project partners in order to adjust the technological development to the changed working processes. Problems regarding the hardware interoperability to handle the software were also encountered, resulting in the need to upgrade the computers and other means of production.

The project was a good example of teamwork between many different organisations and companies. At the end of the development, week-by-week meetings with all the project partners were held to specify details and to arrange the GIS software integration activities.

6.1   Data

GIS112 was integrated with many other information systems and databases. GIS112 provides the opportunity to search and display different kinds of data on the map.

The official Estonian Land Board map is used as the base map. Address data from Estonian Land Board's official address database is updated weekly and automatically all new address data will be imported into our system, therefore the newest addresses are used. Also in case the caller does not know the address, but is near some well-known object the system provides the search of point of interest (POI), for example shopping malls, monuments, schools etc).

POI data is collected from different public databases collected by our partner which unify the data for our system. On average it is updated quarterly.

Additionally, new map layers are taken into use. The ERC has the possibility to collect data from various databases and create new map layers. For example, some of the recent layers added were information about hiking tracks, nursing homes, swimming spots, hunting areas etc which can be shown on the map to provide faster identification of the caller location.

7   Future developments

Although GIS112 has been in use for a while now, constant upgrades and updates are inevitable, because the need for information changes.

7.1   Integration of Police information system

Probably one of the most important development and the current main priority of ERC is integrating Police and Border Guard Boards information system into Rescue and Ambulance information system and GIS112.
Since the implementation of 112 as one emergency number in Estonia, the control room has been using two different information systems to manage the calls. In 2016 the police module will be integrated to the main information system. Also, the police resources and incidents will be shown on the GIS112 map. This makes the work process of handling police and/or complex incidents faster and more convenient to the control rooms.
Along with the integration of Police information system additional integrations to different databases are added. For example inquiries from police, Schengen and Estonian Road Administration databases can be made.

7.2   AML location

Currently EERC is testing the advanced mobile location (AML) solution in cooperation with Sony. So far the first results have been promising, but the testing is still in early stage. AML could provide additional and more precise location information which uses the caller's mobile phone location services. The AML data could be integrated into the GIS112 and to work processes.

7.3   Real-time road information

Real-time road information is crucial for faster help. Negotiations are being held to connect "Smart Road" to GIS112 in the future. Smart Road is a real-time information system developed by the Estonian Road Administration. It gives an online overview of road conditions all over Estonia. For example it provides the road condition parameters (slippery, wet, snowy, etc), air and road temperature, wind speed and visibility. It also shows traffic restrictions (damage/building repairs etc). Real-time road information makes the deployment plan calculated by the system more accurate and help will get to the scene of the accident faster.

8   Lessons learnt

When it comes to IT developments, there are a lot of nuances to consider. In such specific and detailed process many things might not go as planned and circumstances can change during the process, which requires adaption of new conditions. There are some things to point out regarding the GIS112 project that might be considered as lessons for future.

First is the importance of teamwork and the people involved in the development process. Since GIS112 project took time to finish, the people in the core team changed. Changes like this have more affect in IT development, because the information is much more detailed and the risk of losing your key developers might have a huge impact to the outcome of the project. So people need to be constantly updated and the know-how has to be shared.

The second aspect to point out is data and keeping it up to date. GIS112 is integrated with many databases, all with their own information sources. These databases are updated at different times, which makes data updates difficult – some of them are updated weekly, others maybe only once a year. One of our biggest challenges today is keeping the information up to date.

A lot of after-developments. Since GIS112 was and still is a huge project, involving many parties, it took a long time to be taken into daily use. Some of the functionalities did not finish in time, so there is still a lot of after-developments. Also, when a project takes time to finish, some of the initial requirements might change during the development process, or new ideas might come up. That requires adaption from both developers and end-users.

The last thing to point out is user trainings. It is very important to have the training right before a program is taken into daily use. Otherwise people might forget the details and tips given. It is also important that the program is completed before the training. If shown a half-finished system, the mind-set of the end-users might not be very positive.

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