



EENA Case Study Document



MANAGING CHANGE: THE EXAMPLE OF REGIONE LOMBARDIA, ITALY



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This document was written by members of EENA:

AUTHORS	Country / Organisation
Piero Maria Brambilla	ITALY / AREU
Luca Roberto Bergonzi	ITALY / Beta 80 Group

CONTRIBUTORS	Country / Organisation
Gary Machado	EENA
Tony O'Brien	EENA

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1 Introduction

This document intends to help any regional/national authorities understand the opportunities and challenges in migrating from a system in which emergency calls to different emergency numbers are responded independently to a system in which they are all responded by the same organisation in a seamless manner.

The evolution of the "112 model" in Regione Lombardia in Italy (about 10 million citizens), provides a relevant example of such a migration. In only a few years, four emergency numbers previously attributed to four different emergency services are now answered first by a Stage 1 PSAP.

The next chapters describe the project history and presents the implementation data.

The authors have analysed the pros and cons which are summarised here below and in more details in Chapter 4.

Pros:

- Fast call handling;
- Cost saving structure;
- Filtering of non-emergency calls;
- Automatic caller location for all emergency services;
- Collected statistics for all emergency Agencies;
- System scalability;
- Possibility to keep existing emergency numbers active

Cons:

- Civilian Call Takers need several months of training
- May result in increasing the global duration of the call for some agencies
- The coexistence of different CAD vendors and / or system integrators can be an issue

It should be noted that this document has been proposed at the suggestion of EENA but drafted by Piero Maria Brambilla (AREU) with the help of Luca Bergonzi (Beta80).

It does not necessarily represents the views of EENA. However, the EENA team believes the document can provide useful insight into the topic.

2 AREU - (Agenzia Regionale Emergenza Urgenza – Regional Emergency Agency)

Azienda Regionale Emergenza Urgenza (AREU) was instituted on April, 2nd2008 with the Deliberation no. 6994, issued by Regione Lombardia. In this Deliberation, AREU is instituted as the Regional Healthcare Agency, aimed to the governance and operational management of all the extra-hospital Emergency Medical activities in the Region, to develop the integration of the intra and extra hospital healthcare emergency, to coordinate the organs and tissues transportation service and to coordinate the regional blood transfusion and haematic-components activities. AREU's main objective is the unification and coordination of all the emergency activities carried out by the 12 Medical PSAPs, distributed on the regional territory. This includes people, processes, organization, technology and knowledge coordination for all the resources used in the out-of-hospital Medical Emergency system. AREU has also been selected has the organization responsible to build the first Italian 1st level PSAP, devoted to the management of the 112 European emergency Number, based in the city of Varese.

Currently, AREU manages ten 2nd level EMS PSAPs and two 1st level 112 PSAPs (Varese, now covering also Como, Lecco, Monza, Bergamo) and Milan. By the end of 2014, AREU will set up the third 1st level PSAP in Regione Lombardia, to cover Brescia, Sondrio, Lodi, Pavia, Cremona and Mantova, covering a population of approx. 10 MLN citizens + 2 MLN commuters.

3 Emergency numbers in Italy

In Italy there are four main emergency numbers:

- 112** – Used historically by Carabinieri since 1981. Carabinieri is the national military police of Italy, policing both military and civilian populations. There are some hundreds PSAPs on the territory, managing the traditional Carabinieri emergency number.
- 113** – Used by the National Police since 1968. The “Questura”, Police provincial headquarters, manages the service. There are currently 103 Questuras (PSAPs) managing the Police emergency number.
- 115** – Used by the Fire brigades since 1987. The Fire brigades provincial headquarter manages the service. There are currently 100 provincial HQs (PSAPs) managing the Fire emergency number.
- 118** – Used by the Emergency Medical Service since 1992. Each province manages the service (110 provinces), except for Regione Lombardia, where AREU manages the service for the whole region (12 provinces), and Regione Lazio, where ARES manages the service for the whole region (5 provinces).

Despite being similar for the territorial distribution, there are differences that make the four forces unique in terms of management:

- Carabinieri is a national force, under the Ministry of Defense, managed at a national level.
- Police is a national force under the Ministry of Interior, managed at a national level.
- Fire brigades is a national force under the Ministry of Interior, managed at a national level, except for the regions with special status (limited independency, i.e. Trentino-Alto Adige – Sicily – Valle D’Aosta – Sardinia).
- Emergency Medical Services is a provincial (or regional, see Lombardia and Lazio) force, under the Ministry of Health, managed on a local level.

This situation raised some problems when deciding to implement a single Emergency Number, namely 112:

- The coordination of forces, some of which have local power to decide their processes, and others who are managed at a national level.
- The coordination of ministries, when managing the new emergency number, especially because the Carabinieri already used 112.

3.1 History of the European Emergency Number 112 in Lombardia

3.1.1 2010-2011

In June 2010, AREU started an experimental project in Regione Lombardia, thanks to an agreement with the Ministry of Interior, to run the first 112 European Emergency Number PSAP. The model corresponds to the Model no.3 as presented by EENA:



Figure 1: Model used in Lombardia, following model no.2 proposed by EENA documents

The experiment included the creation of a 1st level PSAP in the province of Varese, recruiting civilian call takers that, after a period of training, would have been able to answer to calls, and forward only the appropriate emergency calls to the appropriate 2nd level PSAP. All calls from the four existing emergency numbers (see chapter 3) are redirected to the 1st level PSAP, without the elimination of the four numbers themselves. The decision to continue to use the four emergency numbers was due to the following reasons:

- Let the Italian citizens follow their normal habit for a touchy argument as the emergency calls, permitting a soft migration to the single emergency number
- Understand the aim the citizen is pursuing, when calling for emergency as soon as the call is entering the contact center (the Call Taker is able to see the called number)
- Be able to re-direct the incoming calls to the specific second level PSAP in case the first level PSAP is unreachable (disaster recovery based on the telephonic network intelligence)

In this way, AREU is not only able to calculate the amount of inappropriate calls that are filtered by the 1st level PSAP, but is also able to determine if citizens use the correct emergency numbers when asking for help. E.g: if a citizen dials 115, the 1st level PSAP understands if that person really needed fire brigades or dialled 115 because he didn't know who else to call, for another kind of emergency.

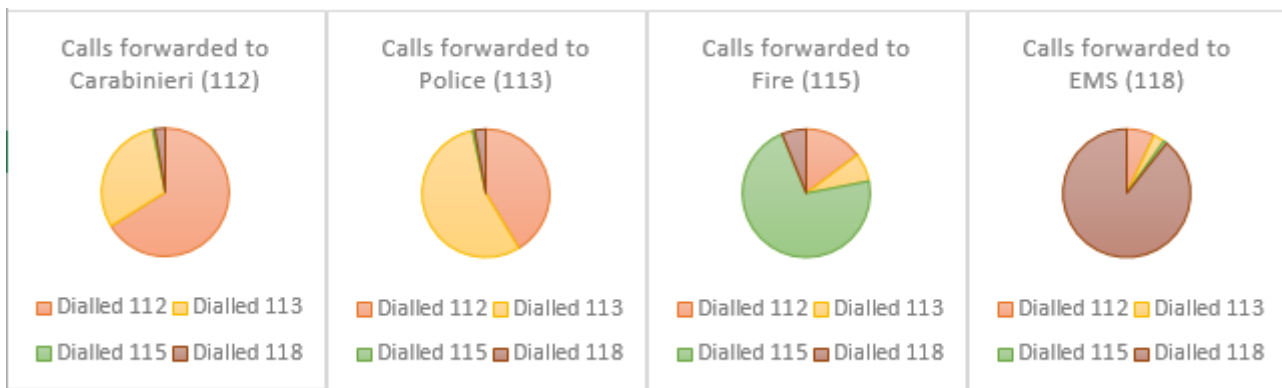


Figure 2: 2nd level PSAP forwarding VS. number dialled by the citizen.

This model is still evolving, as education for the population is undergoing, to spread the word that a unique emergency number is now available throughout Europe.

The experiment of Varese ended in July 2011, by officially accepting it as the 112 model for the whole region. In the period between June 2010 and June 2011, 1st level PSAP of Varese managed only the 2nd level PSAPs in Varese. Following the end of the experiment, becoming an official regional project, Varese PSAP started managing other 2nd levels as well, from the provinces of Como, Lecco, Sondrio, Monza and Bergamo, extending the population covered from approx. 1MLN to 3.6 MLNs.

3.1.2 2011-2013

Varese, Como, Bergamo, Lecco, Sondrio and Monza have been the only provinces in Lombardia and in Italy, with a European 112 model, until April 2013. They were all small provinces, with a relatively small number of calls, compared to big metropolitan cities.

The challenge for AREU started in May 2013, when the 112 model was applied to the city of Milan and its province. Milan is a metropolitan city, the second largest in Italy after Rome, counting around 3 MLN citizens and having approx. 1 MLN commuters during the weekdays, with a density of 2,000 citizens/km².

3.1.3 2014 and forward

By the end of 2014, AREU will have implemented also the 112 1st level PSAP in the City of Brescia, covering Brescia, Mantova, Pavia, Lodi and Cremona. With the end of this project, the whole region of Lombardia, including 12 provinces, for approx. 10 MLN citizens, will be covered with 112 1st level PSAPs, based on the 112 model no.2.



Between 2014 and 2015, other Regions will follow the Lombardia model, having reached an interregional agreement: Trentino-Alto Adige, (capital: Trento); Lazio (capital: Rome); Sicily (capital: Palermo); Friuli-Venezia Giulia (capital: Trieste)

3.2 The process implemented in 112 Lombardia by AREU

The process implemented in all 112 1st level PSAPs in Regione Lombardia, is regulated by a Standard Operations Procedures (SOP) document, created jointly by:

- Ministry of Interior – Department of Public Safety
- Ministry of Interior – Department of Public Rescue and Fire Brigades
- Ministry of Defense – Arma dei Carabinieri
- Governorate of Regione Lombardia

And it manages:

- Configuration of the three 1st level PSAPs in Regione Lombardia (Varese, Milano, Brescia).
- Procedures for the civilian Call Takers in the three PSAPs.
- Mapping of all 2nd level PSAPs involved in the rescues, with jurisdictions, both territorial and temporal.
- Methods of call transfer and data transfer between the 1st level PSAPs and the 2nd level PSAPs.
- Handling of calls in a foreign language.
- Architecture of the entire 112 system.
- Handling of technical issues (redundancies, disaster recoveries, etc.).
- Responsibilities for the maintenance of the 112 system.

In particular, it is worth noticing how the SOP document describes the civilian Call Takers as employees “Appointed of Public Trust”, whose duties and rights are described in Art. 1 of Law no. 146, of June, 12, 1990: the employees, being them Public trust employees, or private contractors, have a role that is created for the benefit and the interests of the community. This role bypasses the nature of their employment for matters of regulation and the rules for *Public Trust Agents* are applied to their contracts.

In addition, it is important to note that the SOP document specifies that 1st level PSAPs manage incoming emergency calls, filter improper calls and forward proper emergency calls & related data to the correct 2nd level PSAP. The 1st level PSAP, therefore, **has no control or management over the emergency operations** (a.k.a. dispatching) **whatsoever**.

The SOP document is available upon request to AREU and currently it is only in Italian. The following chapters give a brief overview of the topics covered in the document.

3.2.1 Call handling

Specifically, for what concerns call handling, the SOP document states as follows:

- Callers may call emergency numbers from landline or mobile networks
- Callers may dial 112, or any of the former emergency numbers (113, 115, 118), and be always directed to the most appropriate 112 PSAP, redirected by network routing mechanisms.
- The 112 Call Taker picks up the call and, if required, sets up a conference bridge with an interpreter.
- The 112 Call Taker locates the caller, by means of a query to the MoI data center (CED interforze), connected to telco operators’ location databases (addresses for landline numbers; cell triangulation from mobile numbers)¹.
- The 112 Call Taker identifies the **Nature** of the call (Public safety, Medical rescue, Technical rescue)
- The 112 Call Taker indicates the **Reason** of the call, selecting one of the choices indicated in the SOP document, as implemented in the 112 PSAP CAD software.
 - There is no further qualification or detail about the emergency call by 112 Call Takers. Managing the details of the emergency, to decide the dispatch operations is left to the 2nd level PSAP Operator.
- The 112 Call Taker forwards the call **and** the incident information to the most appropriate 2nd level PSAP, mapped by the SOP document and into the 112 PSAP CAD software.
 - Once the 112 The Call Taker determined the correct 2nd level PSAP,
 - he contacts the 2nd level PSAP by phone,

¹ 112 PSAPs can manage also eCall location and smartphone GPS location through a specific app. See Chapter 4.1

- alerts the 2nd level PSAP operator that an emergency call is on hold,
 - transfers the call (and the data) and releases the line.
- Recording of the calls received by 112 Call Takers is done at the 1st level PSAP premises, until the call is forwarded to 2nd level PSAPs. From then on, calls are recorded locally at 2nd level PSAPs.

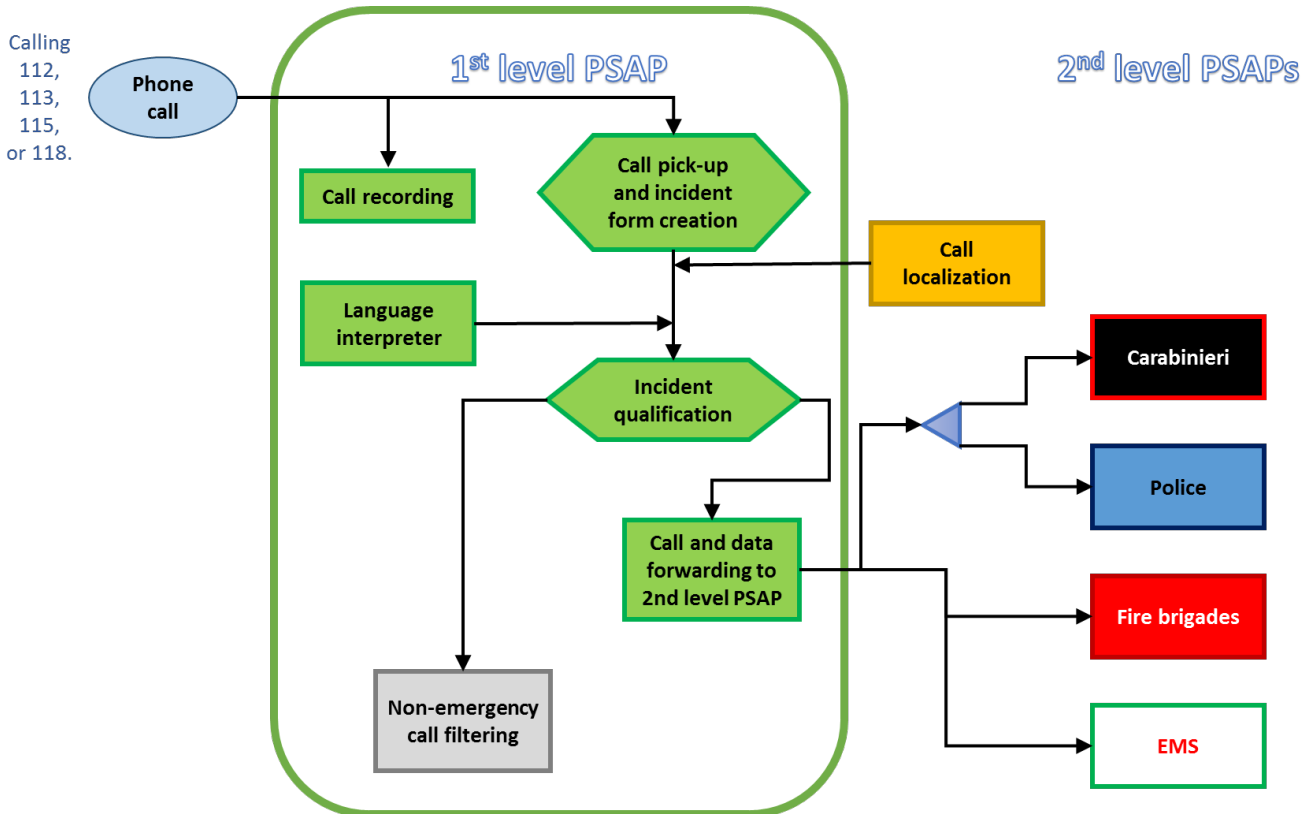


Figure 3: 112 call handling process, as described in the SOP document

The SOP document describes also all the particular cases to be managed, including, but not limited to:

- Handling of mute calls.
- Handling of calls dropped during the conversation.
- Handling of calls that require the intervention of more than just one single 2nd level PSAP.
- Handling of situations of call overflow.

3.2.2 Caller location

The traditional caller location (not involving smartphone app location via GPS, see Chapter 4.1 for that), is done using the service provided by the MoI through its data centre, connected to the telecommunications service providers. By law, telecommunications service providers need to forward the location of their subscribers, using cell triangulation, to the MoI. Landline subscribers are located using the National White pages records database.

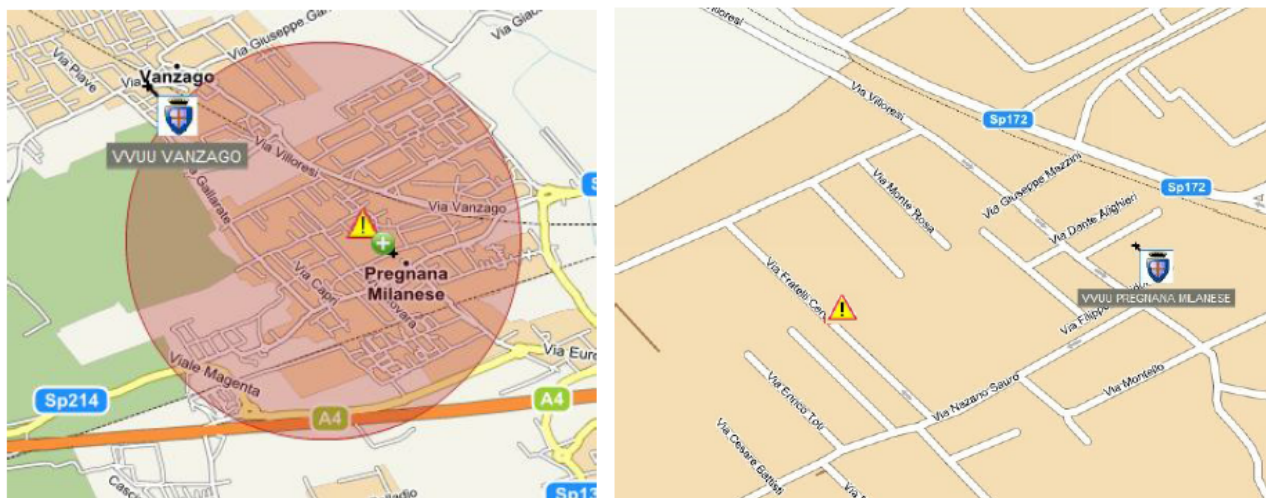


Figure 4: Caller location - mobile phones (LEFT), landline phones (RIGHT)

In both cases, the 112 PSAPs forward the request for localization to the MoI data centre, passing both the CLI (Calling Line Identifier) and the OP-id² (Telco Provider identification). This second parameter is particularly useful, because it allows the MoI data centre to focus its location request to the correct telecommunications service provider, instead of polling all of them, looking for the location information. The location information arrives at the 112 PSAP in approx. 2-3 seconds from the polling, automatically initiated by the CAD system.

3.2.3 End of call handling

The duty of the 112 Call Taker ends when the details about the incident are transferred to the appropriate 2nd level PSAP. This means:

- The emergency call is forwarded successfully to 2nd level PSAP Operator
- The incident form, created on the 112 CAD software by the 112 Call Taker is successfully forwarded to the 2nd level PSAP
 - Thanks to the integration between 1st level and 2nd level CAD systems, the 112 Call Taker knows if the incident is effectively being managed by the 2nd level Operators, and the 112 Call Taker can close the incident and archive it.

The 2nd level PSAP operator receives the data collected by 1st level Call Takers, including the location of the call and reason of the call (basic information). His duty is to confirm the data received at the phone with the end-user, and continue the interview, to get a detailed description of the event, in order to create the most appropriate dispatch.

4 Considerations

4.1 PROs

Besides the caller location, a great advantage present in 112 PSAPs, already described in Chapter 3.2.2, in a recent document (June 2014), a commission instituted by the Ministry of Interior, defined the model adopted by AREU (112 Lombardia) as the most correspondent to the needs of the Italian Emergency Services. The document also highlights some other advantages, that can be summarised as follows:

- The 112 Lombardia model best responds to the needs of the Emergency Medical Services, because it minimises the queuing times: Police / Carabinieri could be managing situations that require their direct intervention.
 - i.e.: using a 1st level PSAP made of professionals from the Police and or similar forces, like in the United States with 9-1-1, might slow down the response time of ambulance services, that will see their calls being queued, after law enforcement based calls. The Commission considers

² The OP-id is carried on telephone signalling by telco operators, processed at the PBX level and passed to the 112 CAD system.



highly critical to shorten as much as possible the response time for EMS calls, considering how important is the time factor for specific pathologies (e.g. heart attack, MI, stroke, cardiocirculatory arrest, etc.), where even a short delay could change impressively the surviving probability.

- The 112 Lombardia model also guarantees a filter to improper calls (hoax calls, non-emergency calls, etc.) that can be particularly critical for certain services, reducing the number of calls to be managed by 2nd level PSAPs by less than 50% of the calls they would manage if there was no 1st + 2nd level infrastructure.
 - In particular, in a country like Italy where 112 was already used by Carabinieri, they received all types of calls, emergency and not emergency, concerning law enforcement and other types of emergencies as well. The territorial distribution of Carabinieri PSAPs (several and small, covering small areas) could sometimes create queues which are now rare to occur.

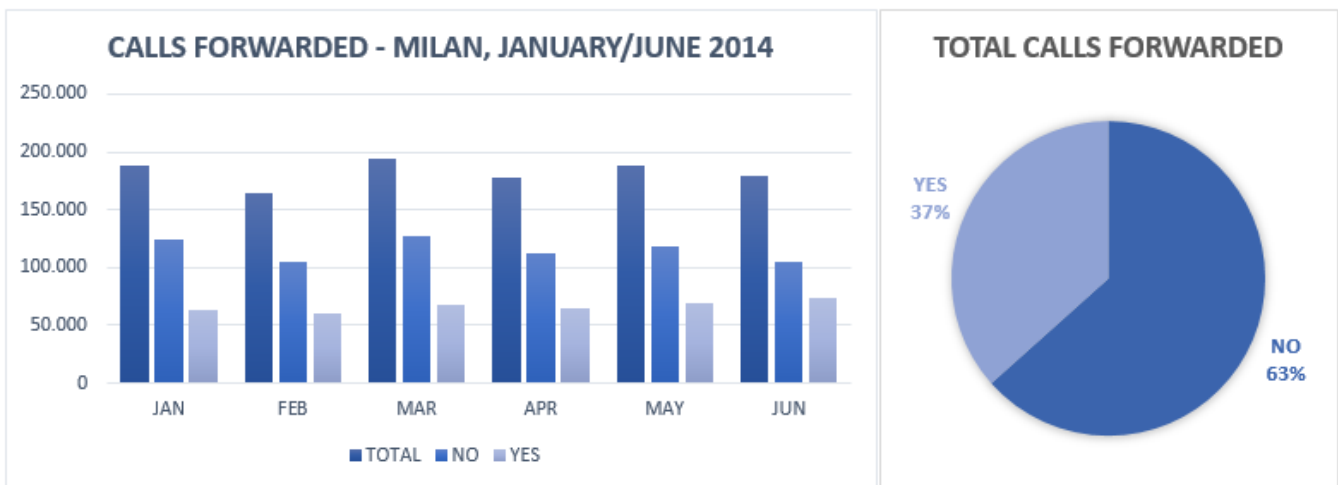


Figure 5: Calls forwarded to 2nd levels

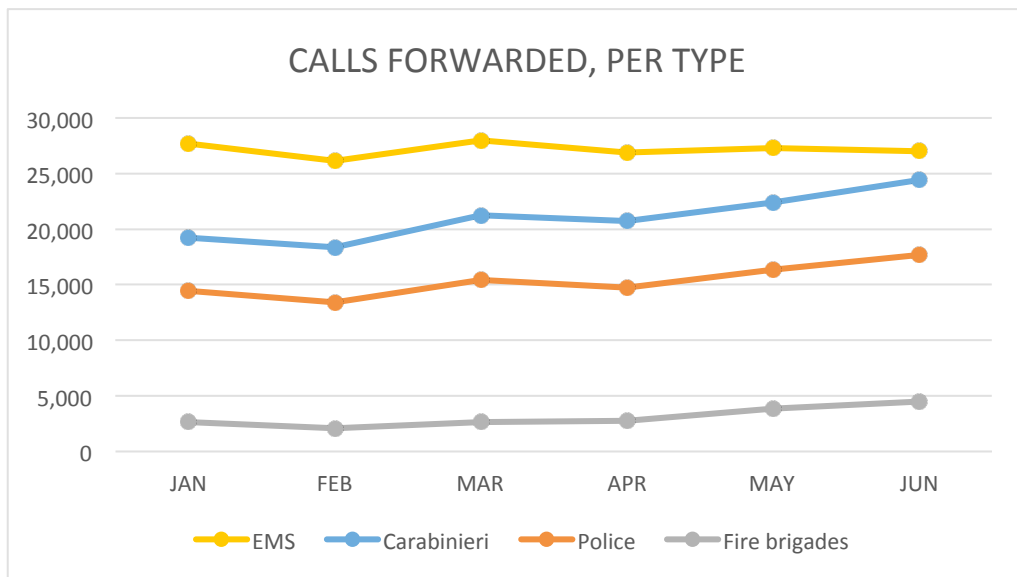


Figure 6: Calls forwarded, per type



- According to the budgetary figures collected by the MoI, the 112 Lombardia model is a cost effective model: Each 1st level PSAP in Lombardy has been modelled to manage a population of approx. 3.5 MLN people (i.e. the metropolitan area of Milan has a PSAP on its own). Each PSAP has a cost of **3.45 MLN € per year**. This price is divided into 2.28 MLN € for human resources (salaries, training for 50 PSAP operators) and 1.17 MLN € for infrastructures (including telephone lines to connect to the PSAP). It makes approximately **0,98 € per citizen per year**.

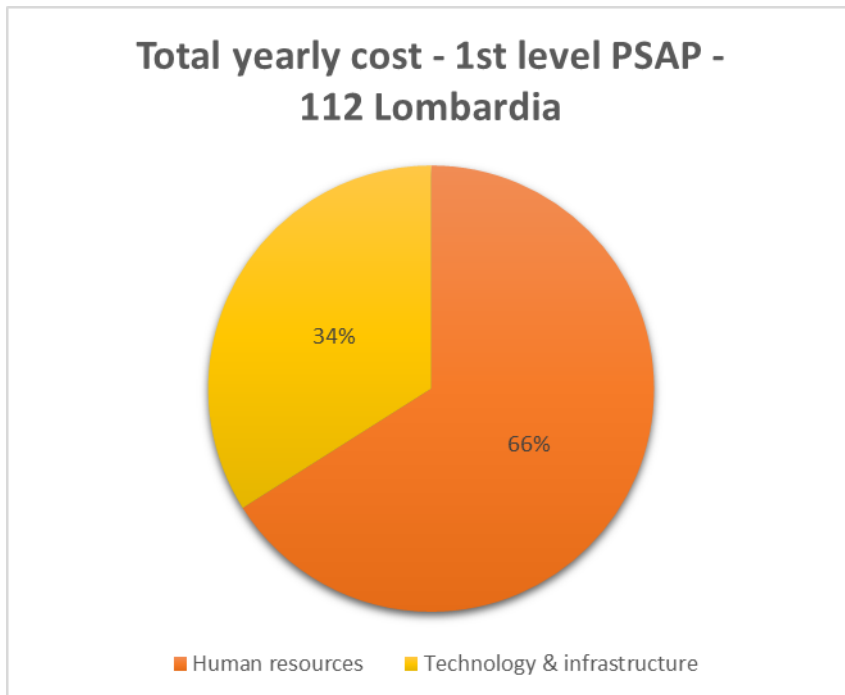


Figure 7: Total yearly cost, divided into macro categories

AREU's experience also highlighted other PROs that were not part of the Commission's report:

- The creation of three³ different 1st level PSAPs in Regione Lombardia stimulated the process of 2nd level consolidations, operated by EMS PSAPs, followed by Police PSAPs, to save operational and infrastructural costs also at second levels.
 - Thanks to the creation of the 112 PSAP, AREU was able to divide Regione Lombardia in four areas, approximately similar in terms of population (with the metropolitan area of Milan being the only exception). By doing this, AREU is currently running a project to shrink the number of 2nd level EMS PSAPs, from 12 to 4, each for its jurisdictional area (mountains, lakes, lowlands, plus the Metropolitan Area of Milan). Police forces are now about to start a similar consolidation project, following a cost saving process.
 - Redistribution of calls among the PSAPs responsible of managing the rescues, allowed also an efficient redistribution of resources and shifts, to optimize the employment of human resources.
- Perceived quality of service increased: The 1st level PSAP is able to get almost 100% of the incoming calls, making sure that citizens do not need to wait, with the feeling of not being helped.
 - The average answering time to a 112 call, is 3 seconds and the number of unanswered calls is around 2%, while AREU can also track the amount of calls willingly dropped by users before the Call Takers were given time to pick up the call. Citizens perceive a high quality of the service offered, especially when they were used to being queued by small overloaded PSAPs, before the introduction of 112 Lombardia.

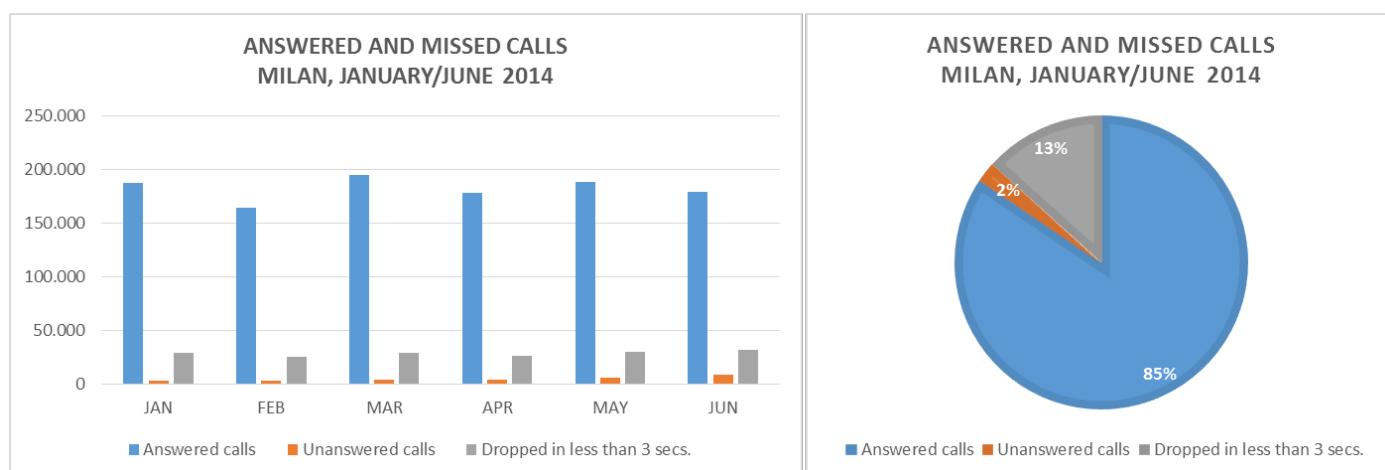


Figure 8: Answered calls

- Citizens are also redirected to the most appropriate 2nd level PSAP for their needs. As all four emergency numbers are still active, all being managed by the 112 PSAP (see chapter 3), there are occasions when citizens just dial the wrong number, compared to the real service they need. Without a 112 PSAP managing the call forwarding, they would be time-consuming calls for Emergency Management PSAPs.

³The third 112 PSAP in Brescia will be active by the end of 2014.

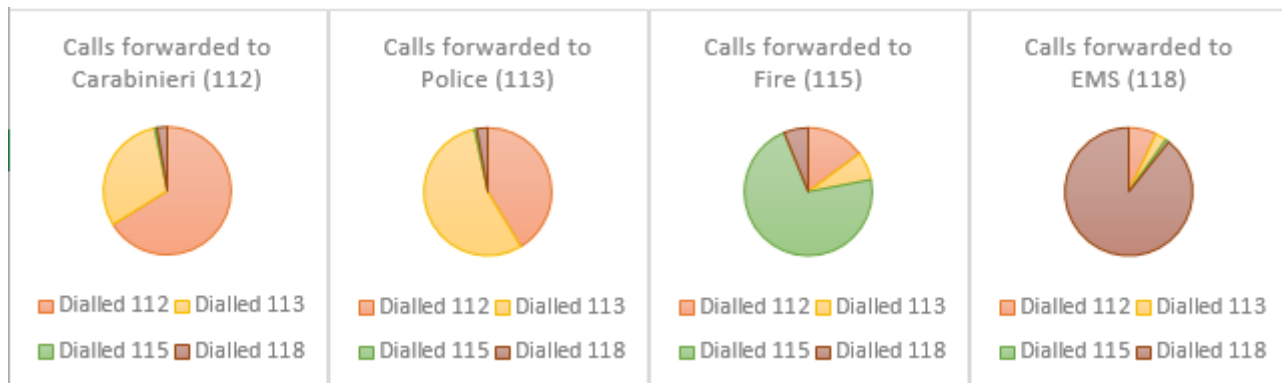


Figure 9: 2nd level PSAP forwarding VS. number dialled by the citizen.

- Developing a 112 PSAP opens agencies to the implementation of several new technologies that can be considered cross-disciplinary.
 - AREU was part of the HeERO project (www.heero-pilot.eu), aimed at the development of eCall pilot sites in different European Countries. The 1st level PSAP of Varese was chosen to be the Italian pilot site and it's currently employing a fully functional eCall modem, able to deliver eCalls to the 1st level operators. Varese is able to distinguish automatic and manual eCalls and it is connected to the EUCARIS VIN database, to recognize cars at a European level. **AREU is proposing itself as the focal eCall PSAP in Italy to other PSAPs thanks to the technology that is already in place in Varese.**
 - Starting in July 2014, AREU launched its 112 app for iOS, Android and Windows Phone, called "Where ARE U" (<http://where.areu.lombardia.it>), to provide to the 112 PSAP operators the location of smartphone callers. The app also stores several other details, such as the ICE (In Case of Emergency) numbers directly on the PSAP operator's screen and basic details about the caller (gender, age, etc.) AREU is the current service provider for the app, being also the entity who manages data covered by privacy. As AREU is a "consumer" of the service provided by the MoI localisation DB (CED interforze), **AREU is proposing itself as a "provider" for other PSAPs as well, who want to exploit the app localisation services, nationally and internationally.**
- Being an "autonomous entity, a 112 PSAP implemented using this method is highly scalable: new 2nd level PSAPs can be added to the pool of PSAPs managed and served by the 1st level, keeping a low infrastructural cost, in the process of migration.
 - The 112 PSAP in Varese started in 2010 managing four 2nd level PSAPs: Varese's Police, Varese's Carabinieri, Varese's EMS and Varese's Firefighters, who could continue their activities in their former PSAPs. Today, by adding some new workplaces and with proper IT configurations, Varese's 1st level PSAP is able to manage a total of 14 2nd level PSAPs at the same time, which means all the 2nd levels (Police, Carabinieri, EMS, Firefighters) from Varese, plus all PSAPs from Como, Bergamo, Monza, Sondrio.
 - Starting from September 1st, a new force joined the list of 2nd level PSAPs: Metropolitan police of Milan (different from National Police) can now receive calls for a particular type of incidents, qualified as "car accidents without injured people". Metropolitan police didn't have a dedicated emergency number and now they can benefit from filtering capabilities of the 112 PSAP.
 - The introduction of eCall technology in AREU's PSAPs, suggested a new feature to be deployed: the Italian Association of Drivers (ACI), member of the HeERO consortium, is now treated as a "2nd level PSAP" by AREU, when providing information about "car accidents" to be forwarded to their subscribers.
- As reported in Chapter 3.1.1, the 1st level PSAP keeps the existing emergency numbers, side by side to 112. This decision had several benefits including:
 - Let the Italian citizens follow their normal habit for a touchy argument as the emergency calls, permitting a soft migration to the single emergency number
 - Understand the aim the citizen is pursuing,, when calling for emergency as soon as the call is entering the contact center (the Call Taker is able to see the called number)



- Being able to re-direct the incoming calls to the specific second level PSAP in case the first level PSAP is unreachable (disaster recovery based on the telephonic network intelligence)

4.2 CONS

From AREU's experience, there are also some warnings, when implementing a system based on civilian 1st PSAPs:

- High responsiveness of EMS may be affected by the introduction of a two-level call handling process.
 - As opposed to being able to answer the call in such a short time, as described in the previous chapter, the perception of 2nd level EMS operators, was that the calls were getting longer than they used to be before the introduction of the 1st level PSAPs. **How to handle this:** the perception that calls take a longer time is especially tied to those calls that were not completely qualified by the 1st level, due to the lack of details. EMS can be extremely articulated and requires a strong and well-organized process workflow for data collected by 112 PSAPs.
 - AREU run an experiment on this topic in September 2013, providing 1st level Call Takers with an advanced incident qualification filter only for EMS cases. The results didn't give any particular increase in the service provided because:
 - Calls did shorten, but not enough to justify the costs of running this extra service.
 - 2nd level Operators needed to move to 112 PSAP in order to pick up and efficiently qualify EMS calls, resulting in employing too many skilled EMS professionals all at once.
- The PSAP operators' selection process needs to be very accurate, but at the same time flexible.
 - At the beginning of the Varese experience, AREU's management had to find out which type of skills were needed for the agents to be employed in the new PSAP. Being in the medical emergency business, it was natural to source these people from the public assistance associations. The experience was very positive, but with growing needs, alternatives needed to be examined as well.
 - AREU, in agreement with the regional management, decided to ask to employees of the Regional System for a voluntary job change. This method was quite efficient in terms of spending, because the people involved were already in the regional payroll, but an enormous effort was needed in terms of selection. This activity consisted not only in the traditional selection tests, but lasted for the entire training period including a final exam. In this way we excluded more than 70% of the candidates, keeping only motivated and skilled people.
 - A third way, used to fulfill the needs of the system, was to use a different source of human resources: we accessed the lists of unemployed people, who subscribed to employment offices, looking for people with a variety of skills. Despite being able to find good professionals among them, the problem with this kind of employees is that, being a public trust employment, their contracts cannot last more than 18 months and the permanence of these people can last even less, because of the opportunity they have to get back their original job.
 - The situation now is stable with a mix of the different categories of people, even if this leads to a significant turnover imposing a permanent training and re-training effort.
 - For the new 112 PSAP in Brescia, another more traditional way of HR selection will be used, opening a public job position, with the usual rules of public employment.
- Integration among different CAD vendors needs to be managed in order to make the system efficient.
 - The more PSAPs are connected with 112 PSAP, the more technologies will be present at the decision table. This interoperability may be complicated, depending on the vendors' openness. **How to handle this:** the best way to avoid mismatches of data or seeing proprietary standards rising from a vendor or another, the Agency managing the 112 PSAP should decide or at least propose a standard method for all CADs to communicate and receive data. A good example of this, is the use of CAP⁴ protocol to share emergency messages.

⁴ To know more about CAP, please refer to: https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=emergency



4.3 PROs & CONs summary table

PROs	CONs
Fast call handling , because civilian Call Takers are not busy managing Dispatches(as they would be if 112 was managed by any of the Emergency Agencies).	Civilian Call Takers need several months of training , and they need accurate HR screening.
Filtering of non-emergency calls , to reduce the workload on 2 nd level PSAPs, dedicated to dispatching.	The structure composed by a 1 st + 2 nd level PSAP may result in increasing the global duration of the call for those 2 nd level PSAPs that have complex processes (i.e. EMS). The smaller amount of calls received, filtered by 112 PSAP and a strong process description and rules of engagement for EMS can improve the final results of introducing two levels of call handling.
Cost saving structure: 112 PSAPs can be modelled to be efficient in terms of costs. They also facilitate 2 nd level PSAP consolidation for increased cost saving.	The coexistence of different CAD vendors and / or system integrators among 1 st and 2 nd levels may introduce cost overheads to achieve seamless integration.
Automatic caller location for all Emergency services. Before the introduction of 112 PSAP, Italian EMS and Fire brigades didn't have the access to the automatic location services provided by the MoI	
Collected statistics for all Emergency Agencies. The quality of data collected, for KPI calculation usually is left to the single agencies. 112 PSAP can collect aggregated data for all agencies.	
System scalability: being an autonomous entity, this kind of 112 PSAP can seamlessly add new 2 nd levels under its jurisdiction, or implement new ways of information exchange with other Agencies.	
Possibility to keep existing emergency numbers active allows emergency agencies to keep their own jurisdictions, allows disaster recovery in case 112 PSAP or telephone lines are unreachable, permit Call Takers to highlight the possible reason of the call, based on the numbers typed by the caller.	

4.4 Conclusions & recommendations

The experiment of 112 Varese was extremely successful. From this experience, concerning a 112 PSAP managing approx. 500.000 citizens, AREU was able to extend seamlessly the model to an area that covers 10 MLN people, with a flexible infrastructure. The three 112 PSAPs now have under their umbrella more than 40 2nd level PSAPs including Police, Carabinieri, Firefighters, EMS and a few special PSAPs like Municipal Police of Milan and Italian Drivers Association.

The project demonstrated that creating a 1st level PSAP that filters calls, redirects users, and answers rapidly, increased the perception of the population to be "taken care of" and of the quality of emergency response.



This particular architecture of 112 is also very cost-effective and rapidly deployable, needing only the preparation of a single PSAP to coordinate several other 2nd level PSAPs, that can continue their activities, with no need of relocation. Emergency services may also retain their previous well-known emergency numbers that will be managed by the 112 PSAP, allowing a slow painless migration to 112 for the population. Statistics taken from a structure like this allow continuous improvement of the service, and can highlight weak points of 2nd level PSAPs, should there be any. Qualitative reporting is as useful as quantitative reporting. All technologies implemented in a 112 PSAP can become available to other PSAPs as well, creating a full operational emergency centre and service provider.

When creating a structure such as a 112 PSAP, it is very important that all processes from 2nd levels are well known by 112 PSAP managers/owners in order to provide the best service for everyone. Preferring a process to another, may cause a loss of equilibrium and lack of cooperation by those organizations that were underestimated.

A 112 PSAP like this can benefit from the employment of civilian Call Takers, with a lower impact on HR costs, however it is recommended that civilians follow a deep screening, due to the particular job that they are going to face. In addition, measures against turnover should be taken in consideration: according to the contract type, high turnover may be avoided. In case the contract model does not prevent high turnover, there should be an efficient training process that is able to turn newcomers in Call Takers in a short time.

By having a pool of 2nd level PSAPs to serve, it is hardly possible that technologies will be the same. 112 PSAP owners should try to cope with the existence of different technologies, by defining data exchange standards either exploring existing solutions, or discussing and defining a standard along with other PSAPs.

Appendix 1: AREU approaching NG112

AREU, as a pioneer of the European Emergency Number 112 in Italy, is already looking to the Next Generation.

Several PSAPs in Italy are interconnected via an IP private network, under the jurisdiction of the Ministry of Interior. This network (called *VPN Emergenza*) was introduced to provide secure IP connectivity among PSAPs and to provide them future-proof capabilities, becoming *de facto* an initial draft of what could be **an Italian ESInet**. Some of the features provided by the *VPN Emergenza* are:

- Redundant connectivity among PSAPs
- Guaranteed symmetric bandwidth connection
- Minimum bandwidth guaranteed for VoIP communications
- All firewalls and routers configured for VoIP communications
- HTTPS encrypted connections
- PSAPs handshake via digital certificates, issued by the Ministry of Interior

Introducing the Next Generation Services described in the previous chapters (e.g. eCall, smartphone apps), *VPN Emergenza* added new features to the existing ones (such as caller location via MoI datacentre). Examples of these new services include those described in the two previous Chapters (where *VPN Emergenza* acts as a “private cloud”): eCall data and smartphone location information from the 112 app, will be available to all PSAPs who will request the access through the *VPN Emergenza*. As new IP-based services will be made available (e.g. 112 Videocalls), *VPN Emergenza* could provide a source for those services, potentially saving costs of infrastructure, especially to smaller PSAPs.

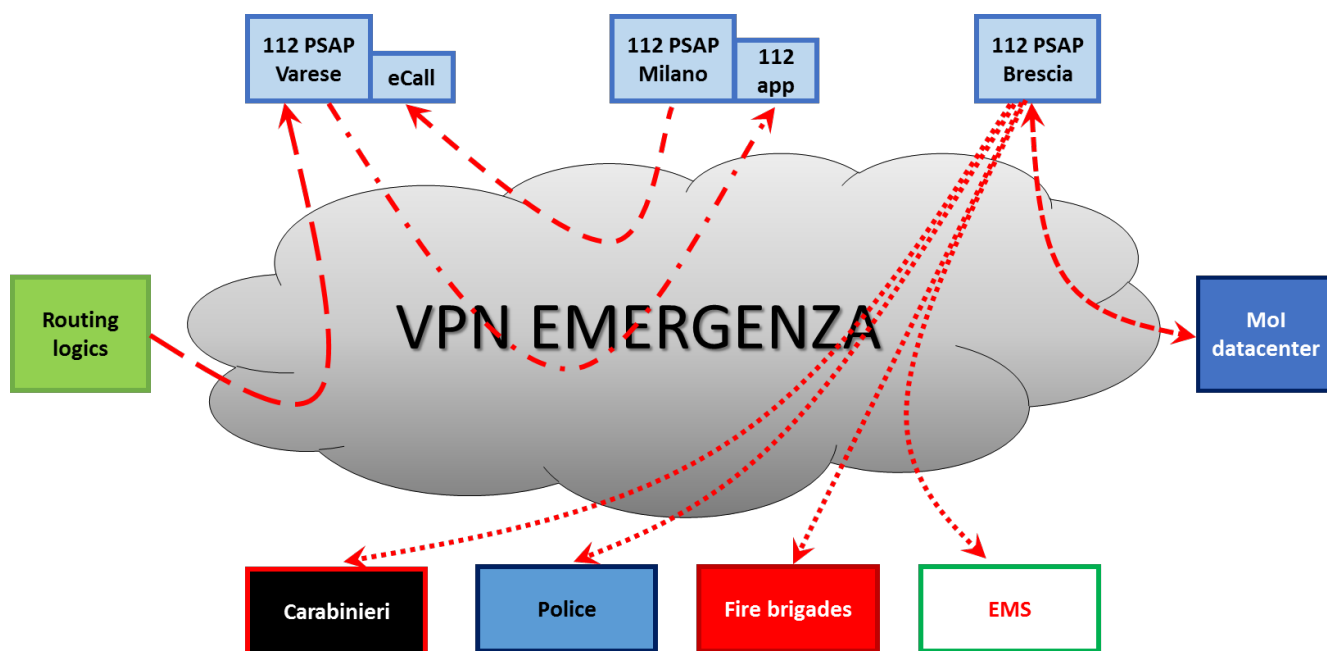


Figure 10: examples of information fluxes, using *VPN Emergenza*

All 112 PSAPs in Regione Lombardia (as well as 2nd level PSAPs managed by AREU) are already connected to the *VPN Emergenza* and a mandatory requirement to implement a new 112 PSAP in Italy, is the interconnection to this ESInet, because the MoI call location services need this access to operate.