Multi-Agency Cooperation in Cross-border Operations in the Field of Public Protection and Disaster Relief

Mari Aro and Jyri Rajamäki

***Abstract*—** The technological aspects of TETRA (TErrestrial Trunked RAdio) ISI (inter-system interface) have been possible for more than a decade. ISI and interoperability between different organizations in different countries were already tested in 2003 in the Three Country Pilot, regarded as phase 0, and again in 2009 in the Rakel-Bosnet pilot project (phase 1). The basis of interoperability comes from EU Commission Council Recommendation on improving radio communication between operational units in cross-border areas (Doc. 10141/09 ENFOPOL 143 TELECOM 116 COMIX 421) of the 4-5 June 2009. This article introduces the Multi-Agency Cooperation In Cross-border Operations (MACICO) project. The initial purpose of the MACICO project is to point out the need for an ISI or similar interfaces between different public safety networks.

***Keywords*—**Cross-border operations, Emergency communications, End user requirements, Interoperability, Next generation emergency service, Public safety

I. Introduction

In recent years, the capabilities of Public Safety (PS) organizations across Europe have been considerably improved with the deployment of new technologies including dedicated TETRA (TErrestrial Trunked RAdio) and Tetrapol networks. Nevertheless, a number of events like the London bombing of 7th July 2005, the Schiphol airport disaster and the flooding disasters in 2010 have highlighted a number of challenges that Public Safety organizations face in their day-to-day work when making mission critical and safety critical decisions. According to the Public Safety Communication Europe (PSCE) [3], mission critical means: "A function whose failure leads to catastrophic degradation of service that places public order or public safety and security at immediate risk. These systems are paramount to the operation of a nation's public safety and critical infrastructure services and are therefore specified to have particular and adequate inbuilt functionality, availability, security and interoperability." According to PSCE, safety-critical decision means a decision that results in either lives being saved or serious injury being avoided.

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Security organizations increasingly face interoperability issues at all levels (technical, operational and human) as they interact with other national, regional or international organizations. Not only assets and standards must be shared across Europe to empower joint responses to threats and crisis in an increasingly interconnected network, but also security organizations have to benefit from interoperability functionality in their day-to-day work. The Multi-Agency Cooperation in Cross-border Operations (MACICO) project aims at developing a concept for interworking of security organizations in their daily activity [1].

On the one hand Europe is a patchwork of languages, laws, diverse cultures and habits that can change abruptly across borders. On the other hand, even within the same country, each security organization develops its own operational procedures. For efficient operations, many significant challenges need to be addressed, including communication systems (not compatible even when they use the same technology), differing procedures as well as inadequate language skills in cross-border cooperation. MACICO addresses not only the technical interoperability issue, but also the complete procedure enabling foreign users to cooperate keeping the intrinsic and vital security mechanisms of such networks.

The main goal of MACICO is to address on a short-term perspective the needs for improved systems, tools and equipment for radio communication in cross-border operations (cross-border surveillance, cross-border pursuit,…) as well as in operations taking place on the territory of other member states (high scale civil crisis operations or complex emergencies needing support of Public Safety Services from other Member States). On the other hand, MACICO encompasses the interoperability issues European countries will be faced with in a long term perspective, tackling the necessary transition between currently deployed legacy network and future broad band networks.

The Fig. 1 is a picture of the public safety telecommunication situation in Europe in the 2011. Since 1996, public safety sectors are convinced that they must harmonize operational procedures and that their respective dedicated network ensuring instant and reliable

communications for mission critical operations should be able to interoperate for cooperative missions.

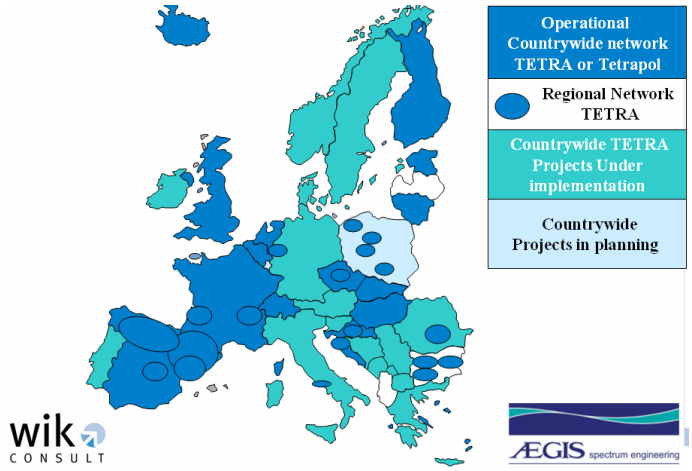

Fig.1 European public safety communication networks situation in 2011

Use cases are expressed by different end users as cross-border cooperation is being intensified (Police cooperation, Prüm Treaty [2]):

- day-to-day interoperability: covering routine public safety operations involving discrete parts of the same organisation, such as those involving police firearms and surveillance teams, or partners such as ambulance or the deployment of voluntary and statutory organisations involved in search and rescue;
- joint service interoperability: supporting an immediate response to incidents that requires the presence of two or more responder organisations, such as a motorway collision;
- mutual aid interoperability: whether for cross-jurisdictional incidents/events where the resources of adjacent partner agencies are mobilised, such as at environmental protests and major sporting events;
- task force interoperability: supporting local/nation-wide agencies collaborating for an extended period of time to address a particular problem as directed operations to counter illegal immigration and people trafficking;
- multi-agency interoperability: responding to major emergencies ("catastrophic events"), which may involve a much wider range of agencies such as at a terrorist incident or natural disaster.

MACICO proposes to find a common solution for addressing all these use cases and taking into account the current situation of European investments in their deployed networks, preparing at the same time the necessary transition to the future technology networks.

In creating the Shared Wireless Broadband Network in August 2007, the FCC recognized that the communication needs of public safety had grown to include interoperable broadband as well as narrowband services. Further work in 2009 by the FCC, the Public Safety Spectrum Trust (PSST), the National Public Safety Telecommunications Committee (NPSTC), DHS/SAFECOM accelerated the goal of creating a nationwide interoperable public safety broadband network utilizing 3GPP's Long Term Evolution (LTE) technology. With the introduction of LTE networks, public safety communications systems will have the opportunity to supplement their critical voice and narrowband data services with enhanced multimedia applications. MACICO defines and achieves the interfaces that will allow interconnecting the currently deployed networks to the future broadband networks. The resulting joint Narrow band/Broad band solution will provide public safety agencies with interoperable voice, video and data communications, delivering the access to information necessary to integrate awareness among agencies, facilitate interagency response, and implement a unified incident management strategy. Or, put simply, public safety agencies will be able to improve operational effectiveness and, ultimately, the safety of field personnel and the public they serve.

II. Use Cases

Figure 2 shows communications between terminals from two different networks, in which each terminal is under its nominal coverage. The on-field use case is cross-border cooperation of law enforcement authorities; cooperation in a coordinated effort to raid a criminal organization operating in different countries.

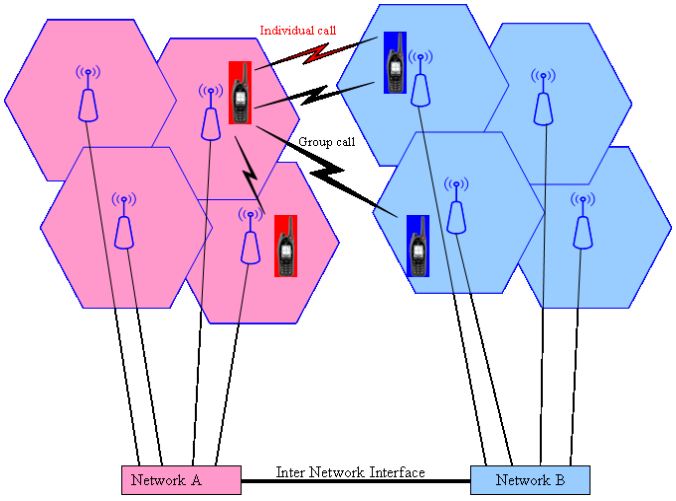

Fig. 2 Inter-network communication

Figure 3 presents communication between terminals from two different networks, in which each terminal is under its nominal coverage and can communicate to all terminals. The on-field use cases for this situation are for example (1) cooperation of private fire brigades, (2) communication of security personnel with public safety officers in the control room during incidents, (3) communication of armed forces to police officers, and (4) connection of a rapid deployment system to the regional or countrywide network.

Figure 4 expresses the situation of the need for coverage expansion, in which a terminal A can move into network B with the same communication services than nominal network.

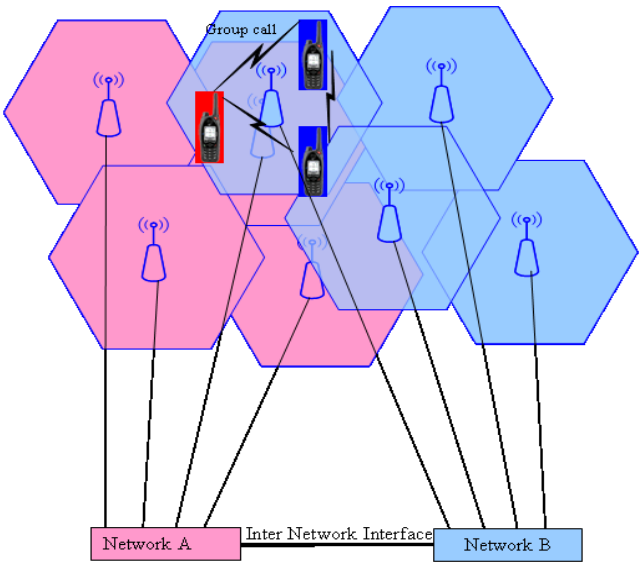

Fig. 3 Overlapping networks

The on-field use case is cross-border operation of public safety officers.

Figure 5 states the migration of communication inter-network with terminals mobility. The on field use case is operation of public safety officers in foreign radio networks.

III. Current Problems and Gaps

A significant problem is to develop an internationally interoperable communication and information system for public safety. For solving this gap, European industry has to solve problems delaying the introduction of new interoperable technologies, such as:

- diversity of technologies and standards;
- high cost and complexity of equipment and networks, costly R&D process;
- small and fragmented market;
- lack of relevant knowledge and education among public safety user communities.

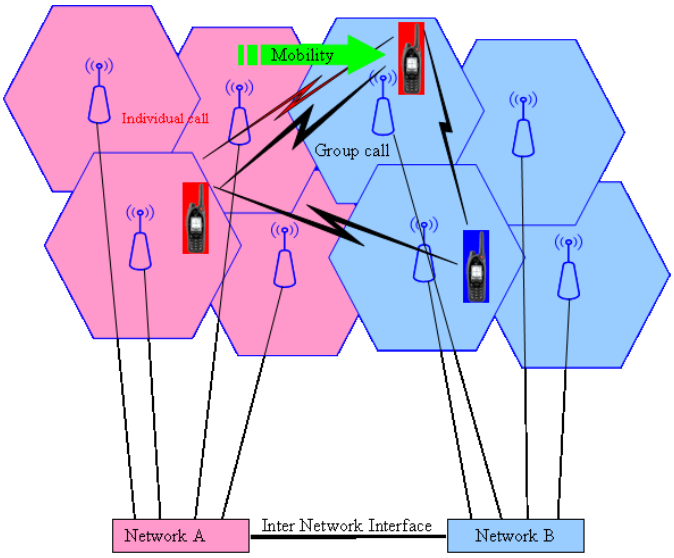

Fig. 4 Coverage expansion

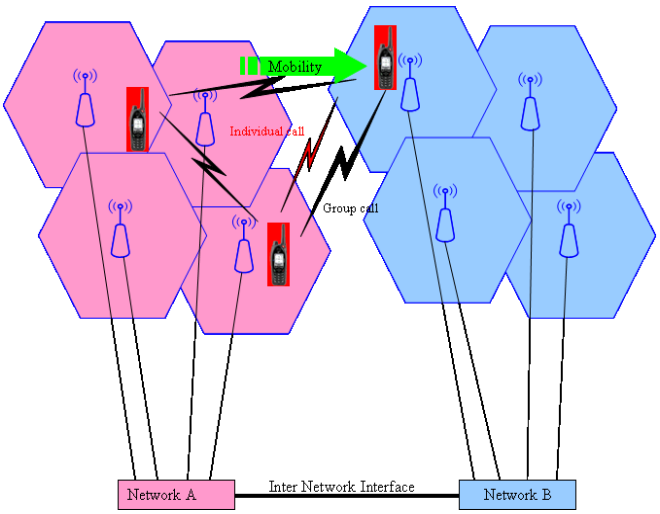

Fig. 5 Migration

The networks commonly used by governments and public safety agencies today are characterised by well-established public safety networks. Police, fire brigade, civil protection and the government are all using different networks and different terminals with no (or limited) technical compartmentalisation. Reasons are multiple and inherent to the specific requirements of the public safety sector. Dedicated networks and resources allow:

- to provide the required capacity for individual areas;
- to set Quality of Service and reliability requirements;
- total control if need to re-allocate resources between different users on the network;
- to set the requirements for the network maintenance and ensure adequate redundancy;
- to build out the network to support the phased introduction of different data services
- to ensure the continuity of the network by eliminating the risk of the network operators becoming insolvent or the operator personnel taking industrial actions; in order at the end to provide secure, robust and immediate communications for PS radio systems.

However, it is quite difficult - if not impossible - to communicate with the users of other working capabilities:

- in most cases, a GSM-phone is the only means that provides the needed communication support. Unfortunately, especially in crisis situations, the GSM network may become overloaded or stations may be destroyed and the specific requirements of resilience and high availability cannot be fulfilled;
- the interoperability feature is not addressed : an organisation cannot use the network of another organisation with its own radio equipment, no procedures allow to border organisation to "lend/configure" terminals and hence no procedures allow operators to control the correct use of their networks in cross-border operations.

All network solutions for professional mobile communications are based on proprietary system architectures. The air interface may be compliant with an open standard such as TETRA, but the internal interfaces are not open for integration of products from other suppliers. End-users

requiring seamless nationwide coverage cannot use equipment from multiple suppliers and therefore have to depend on a single supplier for all their requirements. This results in a vendor lock-in, which unfortunately prevents system expansions, interworking between different networks and future migration to newer technologies. MACICO proposes to develop in close collaboration with end-users and independent system integrators a solution removing the barriers of closed system architectures and allowing interoperability between Professional Mobile Radio (PMR) systems on the basis of open standards.

Besides, studies are flourishing to classify the requirements of the end users of PMR networks in cooperative operations. Figure 6 and 7 presents the results of a study led by the Public Safety Communications Europe (PSCE) categorizing the types of cross-border actions and pointing out the major issues faced in case of cross-border operations [3].

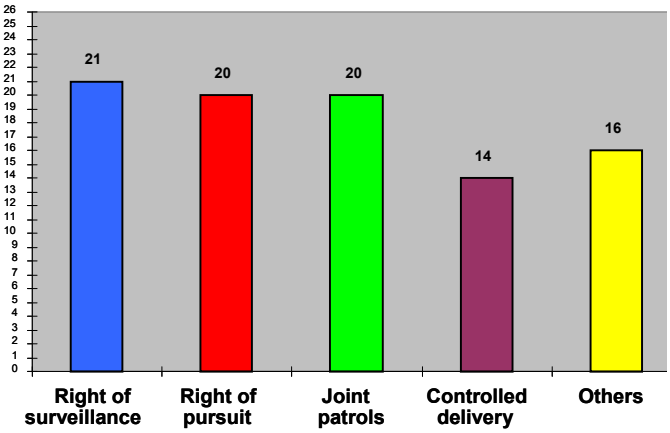

Fig. 6 Types of cross-border actions

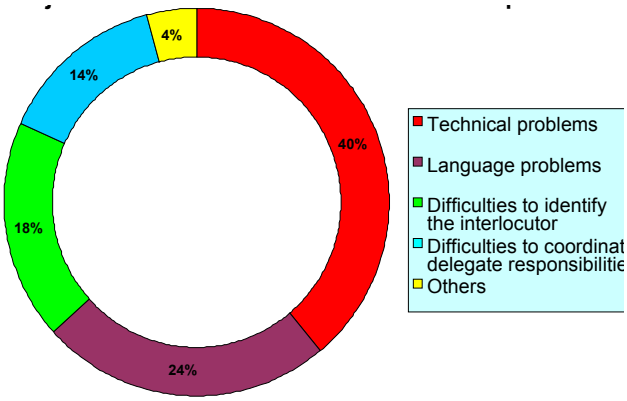

Fig. 7 Major issues faced in case of cross-border operations

IV. Current Initiatives

A. Initiatives in USA

USA has been most active in the interoperability area following the 9/11 terrorist attack in New York and the Katrina disaster. In both cases, the lack of interoperability was evident. The following programs are useful references.

SAFECOM [4] is an US communications program of the Department of Homeland Security. SAFECOM provides research, development, testing and evaluation, guidance, tools, and templates on interoperable communications-related issues to local, tribal, state, and Federal emergency response agencies. SAFECOM has taken steps on a variety of fronts to improve interoperability. One of the most relevant documents produced by SAFECOM is the Statement of Requirements (SoR), defining the vision of American end-users of the future interoperability.

The recent report by US GAO identifies in continuity of communications, capacity, and interoperability the primary areas of vulnerability in first responder emergency communications in communities across the country. The report focuses on issues related to emergency communications systems used by first responders in the aftermath of catastrophic disasters.

NIST OLES: The Office of Law Enforcement Standards (OLES) helps criminal justice, public safety, emergency responder, and homeland security agencies make informed procurement, deployment, applications, operating, and training decisions, primarily by developing performance standards, measurement tools, operating procedures and equipment guidelines. OLES is part of the Electronics and Electrical Engineering Laboratory (EEEL) of the National Institute of Standards and Technology (NIST).

B. European Initiatives

In Europe, a number of projects and organizations have analysed the needs and challenge of PS organizations in communications. The following programs are useful references.

The FP6 NARTUS project established a European platform and roadmap for future public safety communication, in order to facilitate European integration in the area of Public Safety with particular focus on PS communications and information systems. The R&D roadmap for future public safety communications is particularly relevant as it analyzes current gaps and identifies key research areas.

European Security Research and Innovation Forum (ESRIF) Final Report, December 2009, which proposes a European Security Research and Innovation Agenda (ESRIA) over the next 20 years. Reliability and interoperability of PS communications is one of the main topics considered in the document. The role of standardization to introduce innovative technologies in the market was highlighted.

The PASR project WINTSEC which is a precursor on the FP7 EULER project trying to define an EU SDR architecture for the Public Safety domain.

FP7 EULER project investigates the use of SDR for PS domain as a way to remove the interoperability barriers. The EULER project gathers major players in Europe in the field of wireless systems communication integration and SDR, is supported by a strong group of end-users, and aims to define and actually demonstrate how the benefits of SDR can be leveraged in order to drastically enhance interoperability and fast deployment in case of crisis needed to be jointly resolved.

FP7 SECRICOM project has the purpose to produce a competitive solution for secure communication and collaboration of emergency responders with advanced functions. SECRICOM address the interoperability barriers,

through an IP solution to integrate the many mobile devices already deployed in the Public Safety domain. A full-IP approach is also the essential block to provide a smooth evolution from systems currently developed to systems of new SDR generation.

FP7 REACH112 (REsponding to All Citizens needing Help) is a 3-year (2009-2012) project [5], partially funded by the EC - ICT PSP programme. 20 partners from five countries have taken part in this project, whose main objective is to find a communication solution for transmitting video, voice and text simultaneously, focusing on disabled people. Based on the requirements established by the "New EU Telecom Rules for 112 services", the project is based on the total conversation concept, which refers to a communication based on the combination of live real-time text, sign language, lip reading and voice. Currently REACH112 service is up and running. User requirements were used to consolidate the technology and the operational deployments at end-users, relay services and PSAPs. Now more than 7000 users can contact each other directly or via relay services. First real emergency calls have already been made and operators have been trained. Currently running pilots are being monitored in order to provide feedback to improve the whole design.

FP7 PEACE (IP-based Emergency Applications and Services for Next Generation Networks) [6] is a 27-month project (2008-2010) under the EC ICT-SEC "Critical Infrastructure Protection" joint call with eight partners from seven countries. Considering the increasing need for cooperation between both local and international first responder units when major catastrophes occur and the convergence of next generation emergency communications to all-IP network architectures, the main objectives of the PEACE project were to enable secure and consistent multimedia communications in severe emergency situations, creating ad-hoc networks, to provide fast establishment of communication between ad-hoc network nodes and to offer an architecture for supporting reliable distribution of centralized services (such as VoIP and name translation) and provisioning day-to-day emergency communications. The emergency management framework proposed by PEACE uses IMS secure multimedia connections in order to enable day-to-day emergency communications over an all-IP architecture and P2P VoIP and video communications and the creation of wireless mesh networks for extreme emergency services. Currently the PEACE project is completed and has demonstrated the capabilities of the proposed system.

When a crisis takes place, there is a lot of information available from different sources and it sometimes happens that current communication systems are not able to provide this information in an organised way. In addition, it is quite typical that existing systems do not work properly during disasters. ESS (FP7-SECURITY) project [7] (2009 – 2013) tries to combine the information coming from different data sources and make it available to emergency agencies. In fact, the communication system that will be developed in this project will be able to transfer filtered and previously analysed information to crisis managers during critical events. This information will enable a more efficient control and management of the situations and an improved cooperation between different first responders and control centres. This system will be based on ISO or industrial standards, which will permit standard compliant applications to connect to ESS. In the context of the ESS project a "Nîmes floods" field test has been successfully performed while two more ("The Sisteron road tunnel chemical truck incident", Aircraft crash and forest fire) have been planned in the following months.

FP7 EULER (EUropean Software Defined radio for wireless in joint security operations) is a three-year (2009-2012) FP7-SEC collaborative project [8] gathering partners from 10 different European countries to create a system for the interoperability of emergency services during national and international coordinated emergency operations. Euler project has recently been completed and the final demonstration of the integrated communication system was carried out on 29th of March 2012. The project tried to emphasise the benefits for the interoperability of emergency forces of Software Defined Radio (SDR) platforms, which permit the fast deployment of radio communication systems using software components instead of hardware elements. Another objective of the project was the improvement of the capacity of wireless communication systems in order to enable high speed data transmission. For this purpose, a new waveform based on WiMAX and with enhanced security capabilities was proposed. It allows high-speed communication in unpredictable conditions. The demonstration of the system functionality was done using a backbone SDR network which utilises the designed waveform and connects different conventional commercial communication systems, such as TETRA, WiMAX or satellite connections.

FP7 SECRICOM (Seamless Communication for Crisis Management) [9] was a 44 month (2008-2012) FP7 SEC project in which 13 partners from 9 European countries have collaborated. The SECRICOM consortium conducted the final demonstration of the project in March 2012. The objective of SECRICOM was to design a system that permits a secure, fast and easy access to multimedia information (voice, images, video, documents, etc.) of higher quality in order to enhance cooperation between emergency organisations. As stated, this infrastructure enables a seamless interconnection of networks that are based on different technologies (such as TETRA, GSM, satellite, IP, SDR, etc.) in a secure manner, making use of a multibearer router. One of the main features of this system is security, because it goes from chip level to end-to-end encryption. It also includes some network monitoring and management modules and procedures.

CELTIC HNPS studies the interconnection with legacy systems and new technical solutions (e.g. ad-hoc systems) which could complement the work MACICO proposes to achieve.

V. Relevance to Market Needs

A. Market Development

The technological aspects of ISI (inter-system interface) have been possible for more than a decade [10]. ISI and interoperability between different organisations in different

countries were already tested in 2003 in the Three Country Pilot, regarded as phase 0, and again in 2009 in the Rakel-Bosnet pilot project (phase 1). The basis of interoperability comes from EU Commission Council Recommendation on improving radio communication between operational units in cross-border areas (Doc. 10141/09 ENFOPOL 143 TELECOM 116 COMIX 421) of the 4-5 June 2009. During the Three Country Pilot, different countries have had to upgrade their systems in order to start developing and testing the connection, which follows the council's recommendations. The three countries involved were Belgium, The Netherlands and Germany.

The Rakel-Bosnet pilot project was arranged between Sweden and Germany. The MACICO project, regarded as ph2, will contribute to the European leadership in the area of telecommunications including public safety systems where Europe proved its leadership with systems like TETRA and TETRAPOL. With this the future development on market and standards, as well as security and operability will be taken to the next step.

The biggest challenge is that the market is small and fragmented. With development and standardization new business ideas will emerge, and increased competition will bring down both maintenance and usage costs. But how this can be done? In mid or long term future; LTE networks will provide the opportunity to offer new public safety services such as voice and data as real time services comprising video, data base access and many other essential information, crucial for saving more lives [11].

As the technology is developed and the costs could be brought down, the variety of users will increase. The demand for interoperability between different networks already exists, but how much would a development of a new countrywide network bring to the market? The outcomes of MACICO interest a global installed based of users which is forecasted to increase by over 2.5 million from 2008 to 2013 [12]. The emerging markets represent the largest areas of growth. It should be noted that the Licensed mobile radio market may be higher still; with shipments into Asia being considerably higher than previously thought. The clear migration from analogue to digital could be improved. As a percentage of the total installed base, digital terminals in active use are estimated to increase from 11.9% to 32.7% from 2008 to 2013. The interoperability feature developed in MACICO enhances the synergies between the private networks and give possibilities to be linked directly to public safety organisations which could increase motivations for adopting digital technologies. Moreover, significantly, the global Tetra market installed base is forecast to grow with a CAGR of 20.8% over the five year forecast period, and a surge of growth is forecast in 2011 driven by a third wave of large contracts currently under consideration. The interoperability feature could ensure European industries to position their product face to the American offer and to better fight against the foreign low cost digital technology, the market of which is expected to heat up.

Another direction to which the market could expand is new sectors in end-users. The main focus has been on police, customs, border guards, paramedics, fire department and other traditional public safety organizations. However, the TETRA and TETRAPOL networks could be proven useful for organizations maintaining critical infrastructure, military and different industries.

B. Expected Impact

The establishing of interoperability by MACICO project will contribute to the European leadership in the area of telecommunications including public safety systems where Europe proved its leadership with systems like TETRA and TETRAPOL. It will facilitate the further development of European public safety communication systems standards. The MACICO project will increase the competitiveness of European industry in the areas of fixed and deployable networks integration, security to meet the society demand for higher security and effectiveness of emergency operations.

Public safety communications market is relatively small and highly fragmented. The interoperability approach will create new business opportunities for introduction of new applications, devices and services and will decrease the operation costs by reusing existing infrastructures in heterogeneous environments.

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MACICO project is centred on the public safety sector – police, fire, paramedic/EMA/ambulance, custom, coastguard, drug enforcement agency- because we can touch a large population through the customers of the consortium. Nevertheless, other sectors divided by end-user application as PMR and PAMR could profit by the outcomes of MACICO. Among them we can mention: (1) transportation: railways, fleet management, railroad safety, railroad traffic management, cargo container transfer, airports, taxis, metros, ports, buses; (2) military: non-tactical army, navy, air force, marines, national guard, peacekeeping troops; (3) utilities: water supply, electricity generation and transmission, power generation, gas transmission & generation, petroleum exploration/production, nuclear power provider, oil,…; (4) industrial: construction, wholesale, broadcasting & programming production, heavy industries,…; (5) other:

public services, local government, fisheries, postal, game warden, forestry.

The analysis of installed base estimates showed that in areas such as Asia and Oceania, both the installed base and terminal shipment were higher than projected in 2007. In those large areas, where the developed European PMR solutions perfectly match, the interoperability would be a decisive advantage to gain the market.

Furthermore, interoperability issues are at stake in numerous organisations. In Luxembourg: Police Grand Ducale has the intention to deploy a nationwide TETRA network in 2011 - 2012. Interoperability with ASTRID (Belgium), BOSNET (Germany) and ACROPOL (France) is crucial for such small country. In Germany, the states (Bundesländer) have many small utility networks coming from different vendors (EADS, Motorola, Rohde&Schwarz,…) in operational use and so they consider as vital to guarantee that the nation-wide PS network be interoperable with those smaller networks.

Here are the main MACICO impacts identified at the national level:

• For French and Spanish partners, today, fragmentation of the public safety communications market is very high due to its smaller size, its higher equipment cost and the co-existence of a number of competing standards and technologies. The interoperability feature has the potential to reduce market fragmentation, to reduce equipment costs and will allow a larger number of equipment and service providers to enter the market, further reducing the equipment costs and encouraging the introduction of new services.

• Some countries have deployed multiple local networks with different technologies. Due to divergence of telecommunication politics, it is very difficult to impose one technology to all organisations. MACICO will allow the deployment of a national network by connecting already deployed networks. It will stop never-ending discussions between these organisations for a national network and unlock new contracts.

• Taking the decision to upgrade a network to a new generation is not easy because organisations cannot afford any loss of services. During migration MACICO will connect the two networks and ensure services. Demonstrating to organisations that it is possible to be as transparent as possible during migration may influence organisations for new contracts.

• Today when a competitor has deployed a large network in a country, it is difficult to do business with that country. MACICO will unlock this kind of business with interoperability. When a network will have to be upgraded or extended, it will allow entrance into competition. This project will offer new opportunities.

• The impact of the Finnish partners will produce services that enhance the international competitiveness of companies, society and other customers at all stages of their innovation process. The Finnish partners thereby create the prerequisites for growth, employment, international cooperation, safety and wellbeing. The Finnish partners will promote the realization of innovative solutions and new businesses by foreseeing already in the strategic research stage the future needs of their customers. The Finnish partners will creatively combine their multidisciplinary expertise with the know-how of the partners. The Finnish partners will also exploit the global networking and networks, the basic research results of universities and research partners, and solutions offered by SMEs and industrial partners in its services.

C. Laurea University of Applied Sciences

Laurea University of Applied Sciences is an institute in the Helsinki metropolitan area in Finland. It teaches a variety of different degrees both in Finnish and in English. It is the only university in Finland to teach security management, focusing on corporate security and risk assessment. Laurea SID Labs are an international R&D&I environment, which enables cooperation between companies, Laurea and its students. This means, that the research activity is integrated into the studies, creating networks for the students as they graduate, and new and innovative ideas for the companies. The method is called Learning by Developing, or LbD in short. LbD is a Laurea University of Applied Sciences –model of learning. In short, the model enables to incorporate studies and development projects in a way, that the students get to work alongside with, and for, companies during their courses. The model enables Laurea to full fill its duty to boost the regional development and highlight the cooperation between students and the working life, whilst supporting students' professional growth.

MACICO-project's outcome will be the cornerstone of further security field research in Laurea. Laurea's vision for utilizing the results and outcome of MACICO project is to bring the provider and end-users together to improve national safety and security communication. Not only is this a national issue, but to enable international multiagency cooperation using ISI would increase the safety and security at the Baltic Sea area. To develop these praxis' between two or more Nordic countries, Laurea has been planning two spin-off projects called Arctic ISI and Baltic ISI. The purpose for these projects is elaborated below.

Arctic ISI is a TETRA ISI project with Finnish, Swedish and Norwegian authorities in the Lapland border-areas. A few scenarios are already presented in MACICO's results, especially the Torniojokilaakso-scenario. The ISI would help the multiagency authorities from all countries to communicate with each other easily and efficiently in situations like floods, forest fires and such.

Baltic ISI's region of influence would cover roughly the Gulf of Finland –area. The consortium would comprise at least of Finland and Estonia. The Finnish Authority network VIRVE already has some TETRA towers in Estonia, but the Estonian authorities cannot use them. To enable the two countries to cooperate in TETRA network, this issue as well as the possibility for Finnish authorities to connect to Estonia's TETRA network has to be resolved.

With the wide contact network including public safety organizations, universities and companies which Laurea has, the possibilities to help the end-users and providers to communicate on need and possibilities are good. As neither the provider nor the end-user, it might be easier to search for the best solutions, which serve all actors. With this in mind, efficient research is easier to do with an open mind.

D. Intellectual property rights

Project results and immaterial rights will be shared in the consortium, as will be stated in MACICO Project Consortium agreement. Hence, each party has its own exploitation plan of the results. Results, as deemed and agreed important for bringing to the larger public audience, like standardisation items, research results etc, will be managed by the disseminating WP to maximise the effect of the project results in the industry as well as other actors in the field.

WP6 deals with efforts to promote the project achievements outside the consortium, in the community at large. The presentation and the progress of the project will be available on a public website. For an efficient collaborative work we will create private site with forum, private messages and document sharing.

VI. Discussions and Conclusions

Many of the above initiatives deal with the same issues as the MACICO project. Nonetheless, MACICO's approach has its originalities; it proposes a concrete trial on operational network; its outcomes target a short-term industrialization after project completion; its solution is not intrusive and keeps the architecture of currently deployed networks; it addresses operational and technical interoperability; it addresses interoperability issues not only on major crisis but also in day-to-day work which allows end users to be already familiar with the procedures with no specific training; it deals not only with infrastructure but also the terminal which is usually forgotten in other programs. MACICO proposes to examine feasibility for dual standards handsets; and it prepares a smooth migration to the future broad band networks. The main conclusion of MACICO is that technological interoperability challenges are easy to solve; the only problem is the economic situations meaning that PSC operators are not investing for developing their networks. However, operational interoperability challenges are much more difficult, because there the main problem is distrust between public safety authorities.

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