



Data Sharing Between Emergency Services

2023 Update

eena

EUROPEAN EMERGENCY NUMBER ASSOCIATION

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2023 Update

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Executive Summary

Data Sharing Between Emergency Services - 2023 Update

When an emergency requires the intervention of more than a single force, all parties need to know what is happening and where and to whom. Standardization is essential when integrating public safety information from diverse sources because senders and receivers need to understand each other. And when dealing with cross-border cooperation in emergency and crisis response activities, a complexity is added with the differences in languages and conventions.

Although there are many European and International standards covering the communications between people in distress and PSAPs, the communications between PSAPs and EROs are not that well defined, while more and more data is being conveyed to collaborating entities and first responders (including broadband data such as video feeds).

This current document aims to present an overview of the state of data sharing between emergency services in 2023, with some new examples of implementations and a set of new recommendations to conclude.

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This current document aims to present an overview of the state of data sharing between emergency services in 2023, with some new examples of implementations and a set of new recommendations to conclude.

This document contains....

- An introduction and justification of the need for data sharing between emergency services,
- An overview of existing standardisation
- Use cases from around Europe,
- Broadband communication requirements,
- Recommendations.

Introduction and Justification

The EENA Conference 2023 session on “Exchange of data between emergency services organisations” was described as follows:

Newcomers to this industry are often shocked by how little data is actually shared among organisations. This session gives the floor to public authority representatives who, through the development of projects and procedures to foster better coordination, have gone beyond the usual “we can't share data with other organisations because it's complicated”.

When an emergency requires the intervention of more than a single force, all parties need to know what is happening and where and to whom, preferably from common sources so there is no misunderstanding and no time is lost, and so the best possible answer to the situation can be provided. And even if different systems and technologies are used, sharing information is always a possibility, given that previously agreed operational procedures exist.

Standardization is essential when integrating public safety information from diverse sources because senders and receivers need to understand each other. And when dealing with cross-border cooperation in emergency and crisis response activities, a complexity is added with the differences in languages and conventions.

Although there are many European and International standards covering the communications between people in distress and PSAPs, the communications between PSAPs and EROs are not that well defined, while more and more data is being conveyed to collaborating entities and first responders (including broadband data such as video feeds).

Some countries have defined their own national standards for information sharing, and organizations like NENA have also done their bit in terms of standardizing information exchange between the different levels of emergency and crisis response.

And some ongoing initiatives are focusing on broadband communications between different stakeholders in emergency and crisis situations. Since September 2015, when EENA published an operations document on “Data sharing between Emergency Services” in which several standardization efforts and examples were presented, other dissemination activities have been carried out in which information and recommendations on data sharing between different levels of emergency and crisis response were provided, with considerations about sharing also geographical and multimedia information, not just text.

This current document aims to present an overview of the state of the art in 2023, with some new examples of implementations and a set of new recommendations to conclude.

Overview of Existing Standardisation

List of acronyms/terms that are mentioned in the chapter below, with definitions obtained from Wikipedia:

- **OpenAPI:** These are APIs that are published on the internet and are free to access by consumers. They can also be defined as APIs based on an open standard which specifies the mechanism by which a consumer queries the API and interprets its responses.
- **OpenID:** An open standard and decentralized authentication protocol that allows users to authenticate with multiple websites using a single set of credentials.
- **OAuth:** An open standard for access delegation, commonly used as a way for internet users to grant websites or applications access to their information on other websites but without giving them the passwords
- **GitHub:** It is a platform and cloud-based service for software development and version control using Git (a distributed version control system), allowing developers to store and manage their code. It is commonly used to host open-source software development projects and it is the largest source code host as of June 2023 (GitHub, Inc. is a subsidiary of Microsoft since 2018).
- **JSON (JavaScript Object Notation):** This is an open standard file format and data interchange format that uses human-readable text to store and transmit data objects. JSON filenames use the extension .json.

If we look at NENA in North America, which acts also as a standardization organization, we can find two elements: EIDO and IDX.

- EIDO refers to a NENA Standard for Emergency Incident Data Object, and it is an ANSI approved standard from October 2021 (NENA-STA-021.1a-2021), reviewed in April 2022. It is worth mentioning that the current JSON file is available with OpenAPI Schema on Github.¹

“As agencies and regions move forward with implementing NG9-1-1 and IP based emergency communications systems, it is critical that they adhere to a standardized, industry-neutral format for exchanging emergency Incident information between disparate manufacturer’s systems located within one or more public safety agencies, and with other Incident stakeholders.”

- IDX refers to the Incident Data Exchange functional element that collects EIDOs, and it is mentioned in the NENA i3 specification (link, page 310).

“The IDX receives requests for EIDOs and puts the information together. A detailed description of IDX functionality/interfaces will be part of a future version of this document.”

¹ <https://www.nena.org/page/EIDO>

From a more global perspective, we can find ISO and OASIS standards that were already mentioned in the EENA document from 2015:

- **Shared situational awareness:** ISO/TR 22351:2015: Societal security — Emergency management — Message structure for exchange of information. The structured message is called **Emergency Management Shared Information (EMSI)** and can be used complementary to other message protocols, as for example the common alert protocol (CAP).
- **Emergency data exchange:** The EDXL framework by [OASIS](#), including:
 - Common Alerting Protocol (EDXL-CAP), also an ITU-T recommendation (ITU-T X.1303 bis (03/2014)).
 - EDXL Distribution Element (EDXL-DE)
 - EDXL Resource Messaging (EDXL-RM)
 - EDXL Situation Reporting (EDXL-SitRep)
 - EDXL Hospital Availability Exchange (EDXL-HAVE)
 - EDXL Reference Information Model (EDXL-RIM)
 - EDXL Tracking Emergency Patients (EDXL-TEP)

From a pure GIS perspective there are no standards defined for Public Safety; there are standards that are provided/created by the Open Geospatial Consortium to allow for data exchange, but they aren't addressing the Public Safety world per se (yet location-based data is a part of the data that needs to be exchanged during emergency situations).

Formats like the ones provided by WFS (Web Feature Service) were provided to guarantee the exchange of data between different systems but there are several different implementations of WFS that may affect the real portability of data. This said it comes back to the CAD implementers to provide some level of coherence between their systems.

From a broadband communications perspective, and specifically for Mission Critical Video sharing, let's take the example of the MCVideo service that supports video communication between two or several users; According to 3GPP TS 26.281, MCVideo clients shall support the H.264 (AVC) codec and may additionally support the H.265 (HEVC) codec.

And of course, there are some national initiatives that could be considered national standards like CISU in France, UCRI in Germany or MAIT in the UK. All these will be detailed further in the next chapters of this document.

Use Cases

National/Regional Examples in Europe

We have picked several examples of data sharing between public safety organisations within countries that are relevant to this document; some are national level implementations, and some are at regional level.

FRANCE – CISU

The French CISU (*cadre d'interopérabilité des situations d'urgence*) protocol is a framework for interoperability in emergency situations that is based on the EDXL-DE specification, which was first used in France to exchange information from the joint Paris metropolitan area level 1 PSAP to the Paris Police, Firefighters and Medical PSAPs.

The CISU protocol is notably implemented within the SGA (alert management systems for stage 1 PSAPs in France) which use a common tree to describe any emergency situation in a multi-force logic. The CISU format is also used in the definition of semantics and data exchange standards for the exchange management systems, enabling qualified data to be shared with the forces concerned.²

The EMSI (Emergency Management Shared Information) standard (based on ISO/TR 22351:2015) is also used in France notably to exchange data with emergency medical services.

GERMANY – UCRI

The German Universal Control Room Interface (UCRI) is an interface specification for control centres that is expected to be deployed across Germany, which is currently used in PSAPs in Berlin, Saarland and Saxony for data exchange with the emergency medical services 116 117.

The UCRI specification describes the exchange of mission data between two or more mission command and control systems via a secure mission data exchange API, through a UCRI web service interface written in JSON format and using security specifications (OpenID and OAuth).

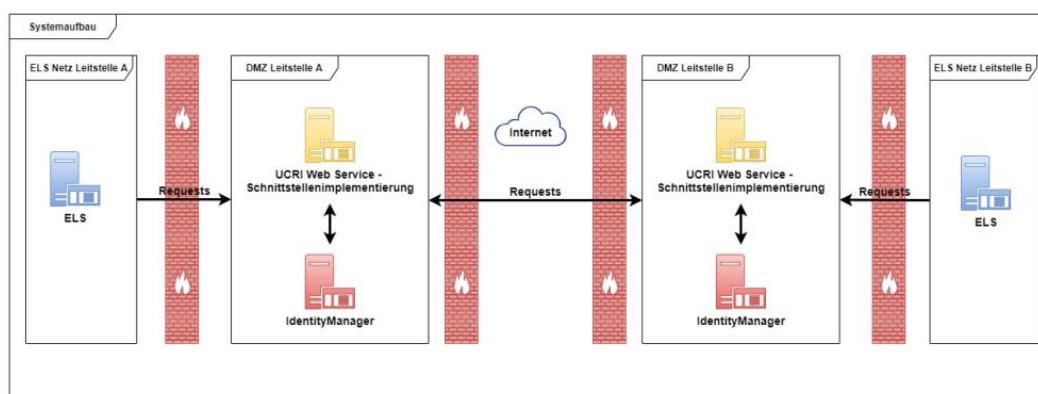


Abbildung 1: Systemaufbau

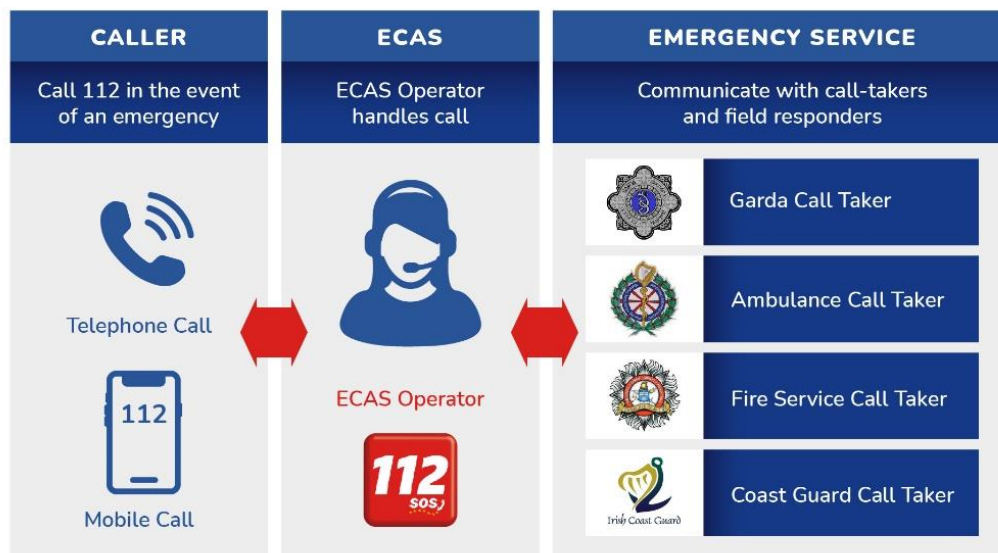
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² <https://ansc.interieur.gouv.fr/soutien-a-linteroperabilite-des-services-durgence/>

³ https://pmev.de/wp-content/uploads/2022/12/UCRI-Specification_V1.0.pdf

IRELAND – ECAS

The Irish Emergency Call Answering Service (ECAS), as a national level 1 PSAP, has procedures in place to alert and share data with blue light organizations such as firefighters, police, or medical personnel.



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The ECAS system maintains data on the call details, Caller, and any available location information. All of this is available to the Stage 2 Emergency Services when the Call is connected to them by the ECAS using an automatic Pull Request by the Stage 2 CAD systems. The Callers CLI is used as the key for this pull request, and this may return details of multiple calls from the past 24 hours.

The data/interface is formatted and available as a proprietary XML schema from the ECAS’s call handling platform and support for this schema has been implemented on the Emergency services systems.

The data available from the ECAS does not include any incident or situation related information as this data is collected by the emergency services after the ECAS (stage 1) phase of the call.

The Emergency services have identified the requirement to be able to share incident information between multiple stage 2 Emergency services and are looking at the possibility of using MAIT to share incident data although these discussions are at an early stage.

SPAIN (several regions)

Given the regional competences of public safety operations in Spain and a lack of national regulations defining the requirements for inter-agency information exchange, there are different examples that can be mentioned.

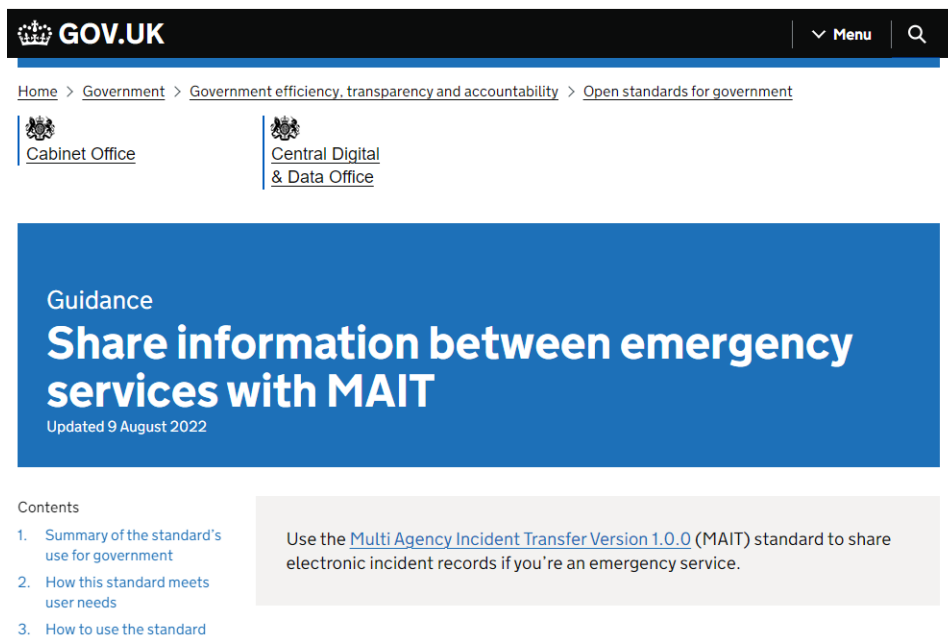
In several regions the data exchange is based on the open EDXL framework by OASIS (i.e. in the Extremadura region that shares incident data between the regional 112 PSAP and the National Police),

⁴ <https://112.ie/making-an-emergency-call/>

and in some cases this also includes cross-border cooperation activities (i.e. in the Galicia region that shares incident between the regional 112 PSAP and its Portuguese neighbours).

UK – MAIT

The Multi Agency Incident Transfer (MAIT) is an XML schema, and it is an open standard for secure electronic sharing of incidents between agencies that does not require point-to-point connectivity because it is based on a hub approach that achieves secure inter-agency incident messaging in just 16 seconds.^{5 6}



The screenshot shows the top navigation bar of the GOV.UK website, including the logo, a menu icon, and a search icon. Below the navigation bar, there are breadcrumb links: Home > Government > Government efficiency, transparency and accountability > Open standards for government. Two logos are displayed: Cabinet Office and Central Digital & Data Office. The main content area features a blue header with the text 'Guidance Share information between emergency services with MAIT' and 'Updated 9 August 2022'. Below this, there is a 'Contents' section with three numbered items: 1. Summary of the standard's use for government, 2. How this standard meets user needs, and 3. How to use the standard. A callout box contains the text: 'Use the Multi Agency Incident Transfer Version 1.0.0 (MAIT) standard to share electronic incident records if you're an emergency service.'

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It's sponsors were BAPCO and the Joint Emergency Services Group (JESG) in Wales, and so Welsh Emergency Services were among the first emergency services in the UK to adapt their PSAP systems with the Government's address dataset (NLPG) which uses the Unique Property Reference Number (UPRN) to ensure that accurate address data supported the information exchange based on MAIT, and they have since reported a reduction of resource deployment time by more than 3 minutes and CAD to CAD exchange times of ~0.5 secs regardless of the number of agencies.

The standard is being used by category 1 (police services, ambulance trusts, fire & rescue services, coastguard and local authorities) and 2 (i.e. the highway agency) emergency response organizations, and voluntary groups can also use the standard to receive relevant information.

⁵ <https://youtu.be/TF1doOoTeao>

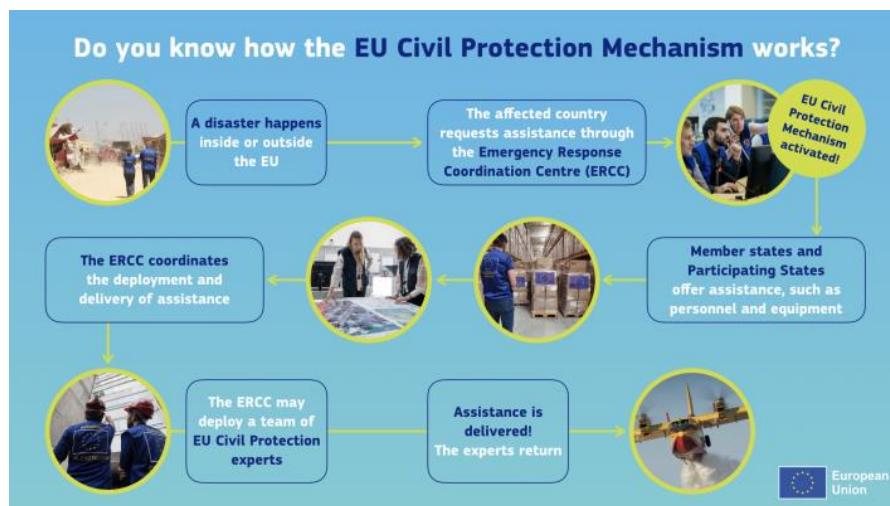
⁶ <https://youtu.be/v8prshthYXc>

⁷ <https://www.gov.uk/government/publications/open-standards-for-government/multi-agency-incident-transfer>

Cross-border Cooperation in Europe

Having already shared examples of multi-national data sharing in the 2015 document (i.e. the ARIEM 112 project between Spain & Portugal), this time we will focus on a couple of different examples:

European Emergency Response Coordination Centre – ERCC



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The European Emergency Response Coordination Centre (ERCC) through the EU Civil Protection Mechanism maintains a direct link to civil protection and humanitarian aid authorities in EU Member States enabling a real-time exchange of information whenever resources from different countries are deployed to assist countries/regions in need.

The ERCC also acts as the central 24/7 contact point when the solidarity clause is invoked. It provides emergency communications and monitoring tools through the Common Emergency Communication and Information System (CECIS), a web-based alert and notification application enabling a real-time exchange of information.⁹

European H2020 project STRATEGY

The European H2020 project STRATEGY (Facilitating EU pre-standardization process through streamlining and validating interoperability in systems and procedures involved in the crisis management cycle) planned to develop a pan-European framework of the pre-standardisation activities for systems, solutions, and procedures, addressing interoperability related crisis management. Aspects validated through sustainable tests and evaluation frameworks. Considering needs identified from previous EU initiatives and the desktop research on the EU priorities, the project addresses eight streams within crisis management:

1. Search and Rescue: Requirements for acquiring digital information from victims during Search and Rescue operations.
2. Critical Infrastructure: CWA 18028: Semantic layer definition and suitability of EDXL-CAP+EDXL-SitRep.

⁸ https://civil-protection-humanitarian-aid.ec.europa.eu/what/civil-protection/eu-civil-protection-mechanism_en

⁹ https://civil-protection-humanitarian-aid.ec.europa.eu/what/civil-protection/emergency-response-coordination-centre-ercc_en

3. Response Planning: CWA 18024: Emergency management – Incident situational reporting for Critical Infrastructures
4. Command and Control: Collaborative emergency response – Common addressing format and emergency identification protocol. Management of forest fire incidents – SITAC-based symbology
5. Early Warning: Guidelines for effective social media messages in crisis and disaster management. Exchanging of building and infrastructure damage information with Common Alerting Protocol
6. CBRN-E (Chemical, Biological, Radiological, Nuclear and high-yield Explosive threats): Societal and citizen security — Electronic Chain of Custody for CBRNE events — Part 1: Overview and concepts (Technical Specification), and Societal and citizen security — Electronic Chain of Custody for CBRNE events — Part 2: Data management and audit (Technical Specification)
7. Training: Specifications for Digital Scenarios for Search and Rescue Exercises. Evaluation of exercises – Implementation guidelines
8. Terminology: Guidelines for the mapping of terminology and icons

The ultimate project goal has been to strengthen the resilience of the EU against all types of natural & man-Made disasters (multi-hazard approach), by ensuring first responders' safety and empowering their operational capacity through (pre-)standardisation that may support next generation solutions and procedures, ensuring an effective and efficient collaborative response to crises.

Provided the above, the consortium, upon mapping the existing standardization universe, proceeded the identification / prioritization of existing standardization gaps that were promoted to be addressed through the establishment of respective CEN Workshops- in line to respective operational needs of practitioners.

In this context, STRATEGY partners completed and published 11 CEN Workshop Agreements (CWAs) and 2 Technical Specifications (TSs) for eight streams within Crisis Management.

1. CWA on Requirements for acquiring digital information from victims during Search and Rescue operations
2. CWA on Emergency management — Incident situational reporting for critical infrastructures
3. CWA on Semantic layer definition and suitability of OASIS EDXL-CAP and OASIS EDXL-SitRep standards for crisis management in critical infrastructures
4. CWA on Structuring an emergency response plan for crisis management stakeholders*
5. CWA on Collaborative emergency response – Common addressing format and emergency identification protocol
6. CWA on Management of forest fire incidents – SITAC-based symbology*
7. CWA on Guidelines for effective social media messages in crisis and disaster management
8. WCA on Exchanging of building and infrastructure damage information with Common Alerting Protocol
9. CWA on Specifications for Digital Scenarios for Crisis Management Exercises
10. CWA on Evaluation of exercises – Implementation Guidelines
11. CWA on International and interinstitutional crisis and disaster management – Guideline for the mapping of terminology and icons
12. CEN/TS Societal and Citizen Security – Digital Chain of Custody for CBRNE Evidence — Part 1: Overview and Concepts
13. CEN/TS Societal and Citizen Security – Digital Chain of Custody for CBRNE Evidence — Part 2: Data Management and Audit

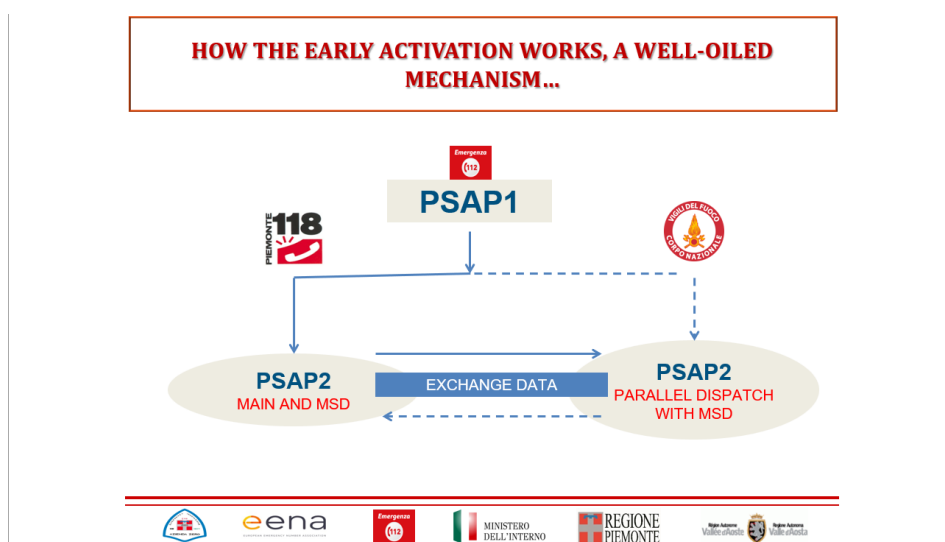
The (pre-)standardisation documents listed above were evaluated during their elaboration process, though a series of tabletop exercises as well as a full-scale exercise. In this respect a wide spectrum of European and international stakeholders had the chance to provide valuable feedback for optimising the final outcomes towards becoming useful tools for practitioners to efficiently respond to relevant crises.

For more about the context of each CWA, their strengths, and opportunities for wider adoption and the positive impacts they may have, please access the project web site at <https://strategy-project.eu/the-strategy-h2020-project-our-outcomes-and-achievements/>.

The final event of the project will be held on 6th October 2023, with focus on the presentation of the core results of the pre-standardization work conducted within the project, and on how interoperability can address the operational needs of crisis management practitioners.

Presented During the EENA 2023 Conference

ITALY - Piedmont region



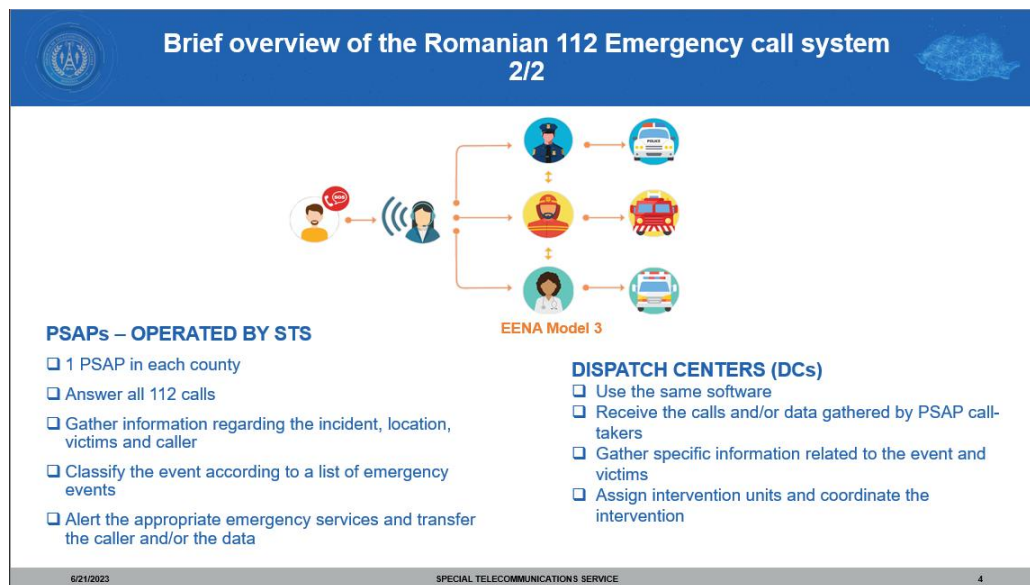
In the EENA Conference 2023 Giacchino Santocono Russo from NUE 112 Regione Piemonte presented the experimentations carried in their region for an early activation of emergency response organizations such as the firefighters and the emergency medical services simultaneously:

- The experimentation included 3 type of events, which could be high priority or not:
 - Car accident with injured and stuck victims
 - Sudden illness in hard to access places
 - Accident at work
- Such early activation is based on a Minimum Set of Data (MSD) that is built from the initial interrogation and based on the type of event, which is then assigned a priority and can be shared together with voice communications to both 2nd level PSAPs in parallel.

As a result of the experimentation, they noted:

1. A substantial reduction of activation times for firefighters.
2. A reduction of the average duration of communications with callers during high priority events

ROMANIA



Operating and dispatching on a single national methodology and CAD platform on a fully NG112 system shall provide higher interoperability with calls & data from heterogeneous environments and enriched case information, but not without a common operational framework dealing with a call-processing regulation and a cooperation methodology, and with common documentation duly designed and updated.

Such cooperation needed to be approved by central authorities & advised by a National Committee as it applies to organizations nationwide, and was deployed in iterations, with the latest update entering into force in 2021; it establishes cooperation flows during call management (112 call-takers and dispatchers are in conference with the caller at the same time), and it details the responsibilities of the different stakeholders at national and regional level, as they work with a single list of emergency events.

Lessons learn were also shared:

- Time consuming process, to be planed thoroughly
- Assign a coordinator and involve all those directly impacted
- Challenge the status quo but be mindful of what can really be done
- MAKE IT AS SEAMLESS AS POSSIBLE FOR THE EMERGENCY CALLER

SWITZERLAND - Valais region



In the EENA Conference 2023 Toufic Saad from the Cantonal Police of Valais presented the rules and regulations for sharing information between the PSAPs in the region; two emergency response centres, one for firefighter and police and another one for medical services.

With a growing number of incidents, and challenges at both operational and regulatory levels due to the different stakeholders, a decision was taken some years back for a renewal of facilities and technology to go live in 2025, which shall serve to enforce the coordination, optimize the response times and dispatching activities, and also enforce privacy, IT security and overall regulations.

Broadband communications requirements

When sharing information with different stakeholders (which may or may not be in the same country or in the same network), information sharing considerations need to include the mechanisms to actually do the sharing.

With the evolution of broadband communications in the last few years, the possibilities of sharing rich data have grown a lot, and the expectations too. Why not share live or still images, or full documents, for instance?

A current example is the use of Mission Critical Video as tested in several scenarios across countries in the course of the Broadway project (<https://www.broadway-info.eu/>). The MCVideo service supports video communication between several users (i.e. group call) and private calls between two users. According to 3GPP TS 26.281, MCVideo clients shall support the H.264 (AVC) codec and may additionally support the H.265 (HEVC) codec.

Bandwidth requirements are listed in the table below:

	H.264 (AVC)	H.265 (HEVC)
Supported container formats	mkv, mp4, qtff, asf, avi, mxf, ps, ts, m2ts, evo, 3gp, f4v	mkv, mp4, qtff, asf, avi, mxf, ps, ts, 3gp
Recommended bandwidth for video encoding	480p — 1.5 Mbit/s 720p — 3 Mbit/s 1080p — 6 Mbit/s 4K — 32 Mbit/s	480p — 0.75 Mbit/s 720p — 1.5 Mbit/s 1080p — 4 Mbit/s 4K — 15 Mbit/s

Leveraging the transition to packet-switched networks enables the transmission of additional media and data within and across multiple ESInets. Additional information such as incident information, person and/or vehicle information can be integrated and exchanged.

Interconnecting multiple ESInets allows a standardized information exchange. Additional adapter or ADR (Additional Data Repositories) within the ESInet can be used to transform data into the specific data format of the countries.

A European-wide authorization mechanism as described in the NG112 standard can be used to reduce administrative efforts while enabling data exchange between PSAP of different countries without previously established peerings.

Recommendations

In an ideal world, interoperability in Public Safety could be part of initiatives such as “Interoperable Europe¹⁰”, an initiative of the European Commission for a reinforced public sector interoperability policy, which contains the Interoperable Europe Act.

And standardization authorities should not wait to be pushed by public and private organisation to start work to normalise the data to be exchanged between Public Safety entities.

For public authorities:

- Work with your neighbouring regions/countries to agree on a common yet flexible approach, while being mindful of network (including broadband network) compatibility constraints.
- Work with standardization and regulation bodies, both nationally and internationally. Keep pushing them if needed!
- Be mindful of data privacy and consent requirements when sharing information.
- Share best practices!

For vendors:

- Build solutions that allow sharing information with 3rd parties and avoid black boxes.
- Make your APIs adaptable to different requirements and standards.

¹⁰ <https://joinup.ec.europa.eu/interoperable-europe>

Annexes

- EENA Conference 2023 – Session on “[Exchange of Data Between Emergency Services Organisations](#)”. Interventions from:
 - Kaili Tamm, EENA (session chair)
 - Giacchino Santocono Russo, NUE 112 Regione Piemonte (Italy)
 - Toufic Saad, Cantonal Police of Valais (Switzerland)
 - Liana-Emilia Musat, Special Telecommunications Service (Romania)
- EENA Conference 2023 – Session on “[Providing More Data to First Responders the new Era of Mission Critical Communications](#)”. Interventions from:
 - Mladen Vratonjic, EENA (session chair)
 - Tero Pesonen, TCCA
 - Wolfgang Kampichler, Frequentis
 - Duncan Swan, BAPCO
- UCRI (Germany): https://pmev.de/wp-content/uploads/2022/12/UCRI-Specification_V1.0.pdf
- CISU (France): <https://ansc.interieur.gouv.fr/soutien-a-linteroperabilite-des-services-durgence/>
- MAIT (UK):
 - <https://www.gov.uk/government/publications/open-standards-for-government/multi-agency-incident-transfer#challenge-multi-agency-incident-transfer>
 - <https://www.gov.uk/government/publications/open-standards-for-government/multi-agency-incident-transferExamples>
 - <https://www.bapco.org.uk/what-we-do/mait/>
- NENA:
 - EIDO: <https://www.nena.org/page/EIDO>
 - NENA JASON EIDO in Github: <https://github.com/NENA911/EIDO-JSON>