EUROPEAN COMMISSION

pulse

Platform for European Medical Support During Major Emergencies

D5.1 Procedures and Status Quo Report

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Title:	Document Version:
D5.1: Procedures and Status Quo Report	5.0

Project Number:	Project Acronym:	Project Title:
607799	PULSE	Platform for European Medical Support during major emergencies

Contractual Delivery Date:	Actual Delivery Date:	Deliverable Type*-Security**:
30/11/2015	30/11/2015	PU

**Type: P: Prototype; R: Report; D: Demonstrator; O: Other.*

***Security Class: PU: Public; PP: Restricted to other programme participants (including the Commission); RE: Restricted to a group defined by the consortium (including the Commission); CO: Confidential, only for members of the consortium (including the Commission).*

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Abstract:

In this D5.1, the detailed and aggregated results of analysing current national. EU-level and WHO healthcare systems and regulations are documented. The purpose of this document is to get architects and developers of the PULSE system as well as those involved in trial setup and technical, operational and societal evaluation, familiarized with the status quo of the European health system, both national and at EU level. It shows in-depth descriptions, analyses and comparisons of selected systems analysed, and it shows

a) How healthcare is embedded in the national, EU and UN crisis management
b) The huge variety in organizational structures, procedures and supporting tools
c) Which best practices can be used as starting points, sometimes even role models for PULSE; and
d) Where the PULSE system will have capabilities to improve existing systems

With these results D5.1 provides the basis for developing SOP guidelines for the PULSE system implementation and operation, documented in D5.2.

Keywords:
Healthcare status quo, SOP, Standard operational procedures, crisis & disaster management, national health systems, EU, ECDC, WHO, best practices

Revision	Date	Description	Author (Organisation)
1.01	12.01.2015	Toc & key words	Reinhard Hutter (RH),(CESS)
1.02	17.02.2015	Input 4.2	Martin Weber (CESS)
1.03	09.04.2015	Restructured; input from D2.1 etc.	RH
1.4	22.04.2015	Further detailing	Pasquale Mari (PM),(UCSC) Reinhard Hutter (CESS)
1.5	07.6.2015	Provided to partners for input production	RH
1.6	23.06.	Input 4.4. Provided to partners	Pasquale Mari (UCSC)
	30.06.	Input 4.5	Mihai Palfi (MP), (ONEST)
1.7	09.07.	Revised 4.5	RH
1.8	11.07. 20.07.	Restructured and completed chapters 1., 2. and 3 New 4.4 (IT) incl. Stadium	RH PM.(UCSC), sent by @12.07.
1.9	22.07.	Defined SOP and introduced the term DRCS Introduction 4.2	RH; HK
2.0	23.07.	Revised chapter. 4.5 First input to chapter.7	Mihai Palfi; sent 21.07. RH-review M P.
2.1	07.08.2015	Rev. chapters 1; 2; 3; 4.2 integrated	Hans Kühl (HK),(CESS) RH
2.1	15.08.2015	Chapter 5.1: German bilateral agreements	Hans Kühl (CESS)
2.3	24./25.08.2015	Revised chapter 4.5 and inputs chapter 7; References	Viorle Pectu et al (OST)
2.4	30.08.2015	Cleaned chapter 4.4	P.M. & R.H. (CESS)
2.5	11.09.	Input chapter. 4.3.1	Cian OBrian (IAEMO)
3.0	13.09.	Revised chapter 4.4	Pasquale M (CESS)
3.0	28.09.	New chapter.6 Revised and completed Table "23"	H.K. (CESS)
3.0	28.09.	New chapters 4.3.2 to 4.3.6	Cian OBrian (IAEMO)
3.0	30.09.	consolidated, formatted etc. whole doc.; switched chapters. 5&6	RH (CESS)
3.1	09.10.	Rome reference	RH distributed
3.2.Rome	14.10.	Rome editing; Basis for any new input	RH distributed

3.3.1/2	29.10.	Completed Glossary &definitions& acronyms All input until 28.Oct.	RH
3.3.3	30.10.	Consol. vers. for external review by Prof. Ippolito	RH: Mailed to Sabina, Pasquale, Hans,
3.3.4	06.11.	Input chps.3 & 4; old cpt 3 to Annex2	HK/RH
3.3.5	08.11.	Input It parts chapter3/4 & Annex3	HK/HK
3.3.5	09./10.11.	Re-structured main part New draft chapter.6. on Stakeholder involvement	RH
3.3.6	11.11.	Formatting & editing	RH
4.0	19.11.	Finalization	RH/HK
4.1 rev	26.11.-	Inputs from reviewers	HK/RH
5.0	30.11.	Finalized	HK/RH

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1 Introduction

1.1 Purpose of the Document

In preparing for and responding to emergencies, national and EU healthcare systems play a vital if not the core role in these circumstances. Due to the complexity of the numerous organisations and organisational forms involved and the historical, political, cultural and economic national differences, there is currently no "Single Standard" system structure across EU 28. An impression of the divergences of the basic financial, organisational and procedural parameters of 15 European nations has been given in a study of the European Parliament of 1998 [7]. The US example displayed below in Figure 1, is just a good illustrationn which shall give an impression of how many different organisations, procedures, disciplines etc, a national healthcare system usually comprises. For more details, see e.g. public health preparedness capabilities [6].

Figure 1: Attributes of a healthcare system [6]

In this context, the "… objective of WP5 is to provide validated procedures that will be adequate to improve the operation and success of the healthcare system in challenging disaster situations where combined operations are required at local, regional, cross border and international levels."[1] This objective will be supported by:

- "Improving existing and where necessary developing new procedures.

[1] See PULSE DoW – WT3/Work Package Description/WP5 – page 15.

- Improving the common understanding, cooperation and interoperability at operational level, across different services (national, cross-border, international).
- Setting the basis for Standard Operational Procedures (SOP) and related standardization processes, … "[2]

This deliverable 'D 5.1 Procedures and Status Quo Report' generates the starting platform for the follow-on deliverable 'D 5.2 PULSE SOP'. The basic starting conditions for this WP5 work are set in the requirements (D2.1) and by the scenarios and underlying use cases (D2.2). For some summary of SOP requirements and schenario characteristics see also Annex 2, chaptrs 10.1 and 10.2, respectively.

Concentrating on healthcare and medical support in major emergencies in particular, this document gives an overview of respective systems and procedures in place today to start with. Gradually introduced and adapted over time, nations and relevant international organisations have implemented dedicated rules and regulations. Consequently, a vast number of relevant sources are available, from different organisations, different countries, different international organisations, at diverse management levels. Even if a full coverage of all the divergences is not practical, accepting the challenge PULSE is to identify similarities and common grounds in order to pave the way for the development and implementation of the PULSE platform.

Enabling this approach, a select number of procedures and related sources from national repositories, EU sources, and other international regimes such as UN, WHO, and US are analysed, of which the most pertinent with regard to PULSE are described, analysed and discussed in the chapters to follow.

This overview of the various national and international status quo situations will not just quote or extract from existing documents. It will particularly identify and evaluate existing procedures which bear relation to the PULSE project and the PULSE system in both ways: By identifying procedures which promise good practices for Pulse, and by elaborating where national approaches may benefit from a system like the PULSE platform. This way, D5.1 forms the basis for developing more distinctive procedures, which will be finally implemented in and/or supported, respectively, by the PULSE system and the scenario based experiments. They will be documented in D5.2.

In conclusion, PULSE will address improvements that will be validated in two rather different scenarios. They have been described and broken down into detailed use cases in D 2.2. Given by the context of the project, PULSE will have to prove its usability and performance in these two scenarios, which purposely differ in a large range of crisis parameters and attributes as documented in D 2.2[3].

[2] Ibid.

[3] See: PULSE D 2.2 – chapter 5.3 Characteristics of the two scenarios/Table 6 Comparison of the main scenario characteristics.

1.2 Definitions, References, Acronyms

Discussion, evaluation, and comparison of procedures require up front clear definitions of the relevant terms used such as SOP, PULSE System, Scenario. The agreed terms and definitions as used in D5.1 and D5.2 are listed in chapter 8.1. For the acronyms used in this deliverable, please see chapter 8.2. Country-specific acronyms, which are not important for the remaining document, are listed in 8.3 to 8.6.

References are collected in chapter7. They include references of general importance for D5.1 and D5.2. References only relevant for national considerations and explanations are handled as footnotes.

1.3 Scope of the Document

A signficant number of sources on crisis management and disaster management is available, from different organizations, different countries and different international organizations, at different management levels and on different organizations involved. The consortium identified differences and commonalities relevant for the PULSE system.

Procedures and related sources from:

- Selected national repositories, their differences and commonalities,
- US sources, and
- International regimes like UN-WHO; EU

have been analysed. Although structures and documentation of the individual system vay, we have as far as possible applied a standard scheme for assessing them against the PULSE SOP-requirements as they are identified in D2.1.

This way, D5.1 gives an overview of the status of healthcare related procedures and at the same time already identifies deficiencies and areas that may be improved by the PULSE system.

1.4 Structure of the Document

Generally, the core parts of the document, chapters 2 to 5 contain concise aggregation of results from detailed and in-depth analyses. For the sake of efficiency and transparency, the detailed work is documented in a series of Annexes.

Under chapter 2, the technical discussion starts with describing the starting conditions for the work to be done: Some **general principles** of how disaster management systems are structured and which major components in terms of organisations and procedures they usually contain are described. Samples are mainly based on German, United Kingdom, French and US sources.

In chapter 3, a selected number of EU countries are described and analysed. Their main characteristics are compared and summarized in chapter 4. International regimes in healthcare are discussed in chapter5. National and international analyses are based on much more detailed descriptions documented in Annex 3 and Annex 5. In Annex 4, some views on important framework conditions for disaster response are given, such as public-private partnerships or cooperation with the military and

specialized services etc. They are important for operating a healthcare system, however, lie partially outside the scope of PULSE. In chapter 6, conclusions are drawn and recommendations given on the further development of the dedicated procedure guidelines for the PULSE system in D5.2. In Annex 6, the stakeholder involvement is documented.

1.5 WP5 Working methodology

The figure below outline how the individual working steps build upon each other and lead into to D5.2. The methodology used mainly comprises a structured evaluation of the current situation i.e. of existing systems and procedures, national and international, and mapping the procedures against the PULSE requirements and scenarios.

Figure 2: WP5 D5.1 Workflow

This working process was supported by numerous consultation and validation activities with external stakeholders from different countries, disciplines and professions.

Both, collecting information for the status quo analysis (D 5.1) to identify typical commonalities, differences, gaps and deficiencies among existing heterogeneous procedures, as well as the development of the Pulse's set of SOPs (D5.2) required external stakeholder involvement. A series of meetings and activities were conducted in order to collect the information and to gradually validate the work progress. These included:

- Face to face meetings,
- Phone calls and web teleconferences,
- Completion of survey questionnaires,
- Team experts contributions.

Goals and experienced benefits, of the stakeholder engagements are:

- A better and accurate view of the existing procedures (written and enforced by laws and operational orders/directives etc) as well as the best practices (usually not-written but applied in day-by-day practice, leading to opportunities for SOP improvements).
- Presenting other countries' experiences, focuses on current regional/international cooperation in order identify opportunities to foster cross border cooperation.
- A preliminary validation of the foreseen trials/validation means, including requirements, scenario and SOPs.

A detailed documentation of the stakeholder involvement including recommendations on the future involvement is given in Annex 6.

2 Disaster Management and Healthcare, a general overview

This chapter shall provides an overview and examples on the complexity of EU healthcare systems and their basic characteristics. They are embedded in the larger context of disaster and crisis [4]management.

This PULSE "Status Quo" report D5.1 shows the basic common principles of disaster management and concentrate on the aspects which should be of relevance for PULSE.

Regardless of the four countries chosen (Germany, Ireland, Italy, Romania) for the very detailed analysis of their healthcare and medical support systems in chapters 3 and 4, the examples were selected because they portray, among other differences, the range of centrally organised nations versus distinct federal statehoods.

2.1 Crisis Management Systems across Europe

„Countries will face major challenges to protect their populations from an increasing number of potential health threats in the future. Preparedness and prevention will play a significant role in ensuring an efficient response to national and international crises.“[5]

[4] The terms Crisis, Disaster and Incident management are defined in chapter 8. Definitions overlap and terms are often used sysnonymously

[5] WHO “Emergency Medical Services Systems in the European Union”, WHO Regional Office Europe, Copenhagen, 2008, page 16.

The overall EU's crisis management activities depend largely on respective national constitutional frameworks and legislative regulations, which also governs the generation and utilization of capabilities and resources of the individual EU Member States. Recognizing that an effective disaster response is more dependent on the pre-existing local system than on external assistance, nations have implemented disaster response and civil protection systems fitting their specific environments.[6]

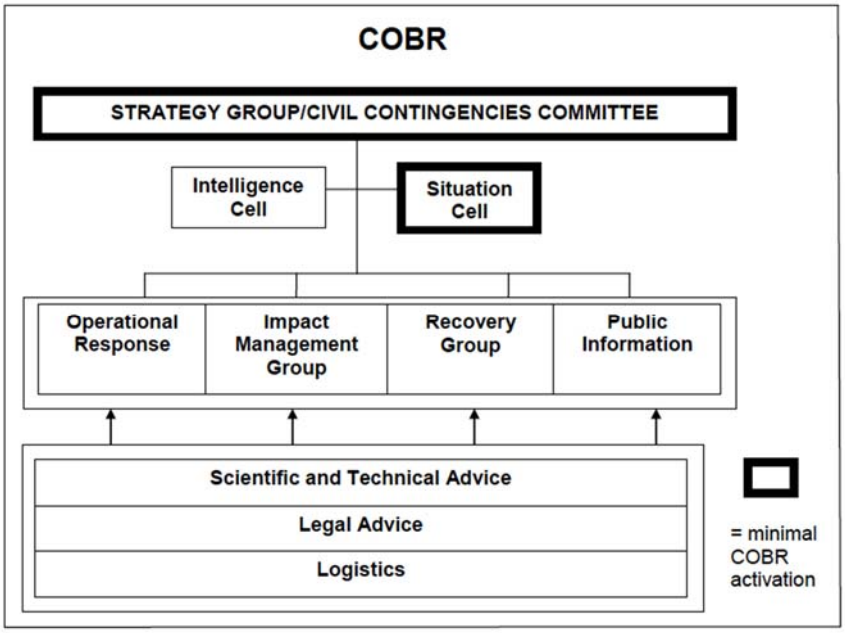
As an example, below comparison of the crisis management systems in UK, Germany and France illustrates the difference of systems in the European Union given by constitutions and legal basics.

Contingent on respective constitutional frameworks and legislative regulations, nations have implemented crisis management systems fitting their specific environments. As an example below comparison of the systems in UK, Germany and France illustrate how different systems can be in the European Union.

UNITED KINGDOM

As a centralized state, governing over Crown Dependencies, Overseas Territories, and Devolved National Legislatures (Wales, Scotland, Northern Ireland), the United Kingdom installed the so-called Cabinet Office Briefing Room (COBR). For details see Figure 3 and [25].

Figure 3: The UK Central Government Cabinet Office Briefing Room



Operating below the Strategic Group are three levels of command as follows:

- Operational Command (aka Bronze Command): Management of immediate work at the emergency site or affected area.

[6] Compare: Ibid.

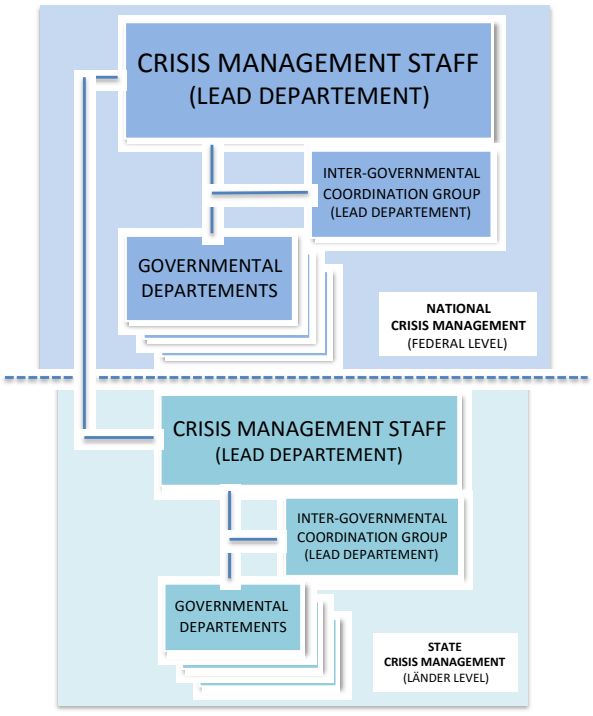
- Tactical Command (aka Silver Command): Coordination of actions taken by Bronze Command in order to achieve coherent and efficient response.
- Strategic Command (aka Gold Command): Establishment of a framework to support immediate response by providing resources, prioritizing demands and determining plans.

England itself and the devolved administrations will mirror the tasks of the UK central crisis mechanism. Regional Co-ordinating Groups or Regional Civil Contingencies Committees will support communication with the centre in response to an incident, will coordinate multi-agency operations, and will identify and task resources.[7]

GERMANY

In Germany, a state with a distinct federal structure, the underlying idea is the joint federal – state responsibility for managing unusual emergencies. In response to incidents of national significance, a lead governmental department supported by specific crisis management staffs takes over. Depending on the scope and scale it could also directly involve the Chancellor.

Figure 4: German Crisis Management System [26]



[8]

[7] Ibid, paragraphs 2.23 and 4.2.V).

[8] Ibid.

The Inter-Governmental Coordination Group conducts coordination on federal level and with the states. The group is responsible for:

- Joint assessments, risk evaluations and damage prognosis,
- concerted operational recommendations, and
- a synchronized communication strategy agreed and sustained by federal and state governments [26]

This role oriented and structured crisis management approach is mirrored by a layered system in the 16 federal states and is – in principle - carried downwards to regional and local structures.

FRANCE

Historically, in France – as in the UK, the state also has played a very central role in crisis situations.

Today, the following dispositions exist:

- Departments: The Prefect in the Departments takes sole command of incidents having significant repercussions. In order to coordinate services, information and queries, the Prefect is responsible for emergency plans and runs the operation from fixed and mobile command posts, concentrating on rescue-clearing, medical care, transportation and works, police and public order, and transmission.
- Intermediate Level: Seven so-called 'Zones' established throughout France (comparable to the FEMA regions in the US). The departments have been grouped within these zones. The zones have a permanent staff and call upon 'Interregional Centres for Operational Co-ordination of Public Safety'. They distribute resources among the departments and perform situational synthesis.
- National Level: Department of Defence and Civil Safety within the Ministry of Interior. This department runs its own national operations centre. It can send reinforcements and intervention and instruction units. In addition it can call upon operational and support agencies, back-up forces and other specialized assets [27].

A much more detailed analysis of the four countries chosen (Germany, Ireland, Italy, Romania) is given in chapters 3 and 4.

2.2 EU General Crisis Management Objectives

Albeit organisational structures, responsibilities and related procedures differ between nations, **the baseline for effective preparedness and response in major emergencies are commonly recognised objectives based on general principles and key operational requirements.**

Having reviewed appropriate national response policy documents such as the US National Response Framework, the Irish Framework for Emergency Management, the UK Civil Contingencies Act, and the German Disaster Response and Civil Protection Acts, disaster preparedness and response focuses on the following overarching

default objectives:

- **To protect and save human life.**
- **To meet basic human needs and to alleviate suffering.**
- **To protect property and the environment.**
- **To maintain or restore basic services and community functionality.**
- **To uphold the rule of law.**
- **To stabilize and contain the incident and to establish a safe and secure environment.**

During major emergencies medical support is a lead function and/or is embedded in objectives discussed above. In order to tailor capabilities and resources available to meet objectives determined, response is predicated on general principles as follows:

- The **flexibility** of response structures to ensure capabilities and resources to address a variety of risks and threats.
- The **adaptability** to allow partial or full implementation of capabilities and resources in context of a particular incident.
- The **scalability** to permit implementation of capabilities and resources appropriate to each requirement.[9]

To provide for all contingencies and to identify and utilize opportunities for development and implementation of its platform, PULSE is to navigate along these recognised objectives and general principles. Ultimately, the successful and effective integration of medical support functions in a comprehensive disaster response system rests on the key operational requirements for:

- Intelligence and information gathering,
- Threat and risk analysis,
- Warning and alerting,
- Operational picture generation and situation assessment,
- Resources and capacity planning,
- Task planning, prioritisation and execution control,
- Logistics and stockpiling,
- Coordination between different services/stakeholders, including cross-border support management,
- Post-crisis evaluation and collection of good practices,
- Training and exercising.

These are the 10 SOP areas on which the PULSE project is founded.

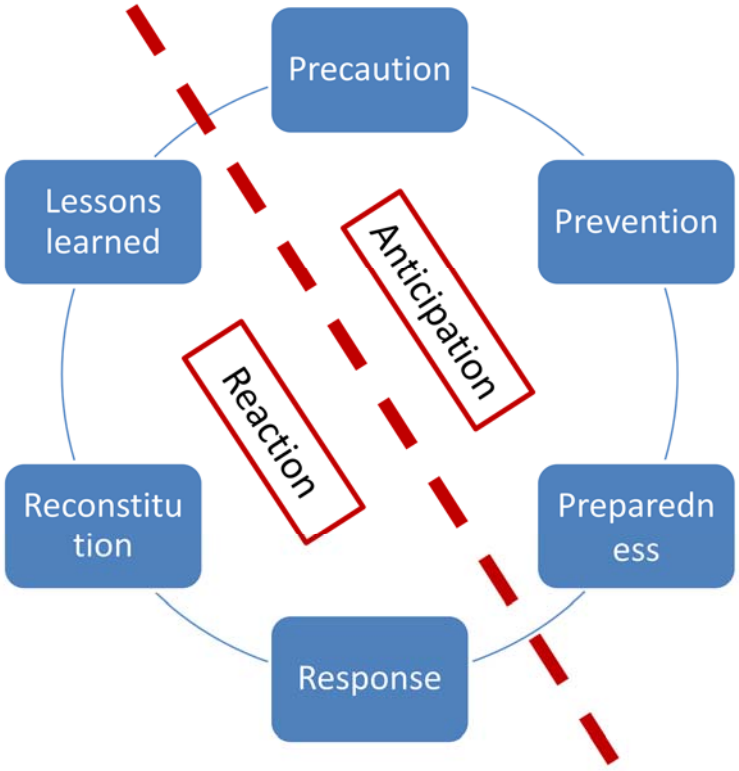
2.3 The Cycle of Crisis Management Components

Below, the cycle for crisis management is presented. This cycle although referred to

[9] General principles also flow from the national policy documents discussed in the paragraph above.

by different names across the EU 28 is consistently a pillar of EU major emergency management. As will be seen, the PULSE systems has a role across the entire cycle in different degrees of detail and functionality.

Figure 5: The typical crisis management cycle



In principle, crisis management phases include the elements as follows:

- Precaution/ pro-action
  - eliminating structural causes of incidents; building of basic structures: organizations, tools, resources
- Prevention
  - beforehand measures to reduce vulnerabilities and avoid threat and opportunities and reduce consequences,
- Preparedness
  - measures of planning, training, exercising, awareness raising, staff organization
- Response
  - actual dealing with incidents: detection, evaluation, alerting, counter-acting, avoidance of escalation
- Recovery/Reconstitution
  - measures to recover, return to normalcy and/or restore the status quo-ante, or at least equilibrium
- Lessons Learned
  - extraction and evaluation of findings and best practices. Transfer of

them into training, exercising, planning and improvement programs.

These basic functional components of the cycle mostly common to all C2 "systems" include:

- Basic principles of leadership and command attitudes, mission tactics principles, styles of leadership; ethical principles, political correctness etc.
- Organizations and their hierarchies and networks,
- Procedures for detection, identification, assessment, response and recovery
- Assignment of responsibilities, tasks and resources
- Rules for executing the tasks
- Rules for change, substitution, fall-back positions
- Rules for crisis communication and public information

Focussing on response and to some extent on preparedness, PULSE also addresses selected aspects of precaution, early warning, information management and sharing, and training and exercising.

2.4 Legal and other Constraints that PULSE must operate within

In the PULSE process of identifying improvement potential, designing tools for improvements and implementing them in test scenarios, some basic framework conditions must be considered. **The legal and procedural framework** for such a compound of tasks, rules and responsibilities is nation specific. Constitutions, legal basics, federal vs. centrally governed states, integration into international bodies such as EU, UN, WHO bring about different national authorities, responsibilities, financial provision and other aspects also for the healthcare domain. In the example of Germany again, the national healthcare system is more or less run by public/private enterprises and it rests on the following pillars:

- National level/state/local level legislation
- Bilateral agreements with neighbouring states
- International law and international level agreements, above all UN and EU
- Structures and rules needed for, public-private partnerships (PPP)
- The operational characteristics concerning other dependent organizations and services, including volunteers and NGOs
- The need of new solutions to be interoperable with existing systems.

As the legal orientation differs between the European Member States, it limits opportunities for standardization on an international scale. However, to PULSE it offers opportunities for cooperation, harmonization and the improvement of interoperability.

The PULSE DoW in WP 5 purposely sets the objective for interoperability "...in challenging disaster operations where combined operations are required at local, regional, cross border and international levels". This requires that systems working for and fitting to cross-organisational, cross-border an international cooperation need to be interoperable. It is also a requirement stated in D2.1.

In Annex 2, these basic characteristics for good healthcare systems and conditions for improved collaboration are discussed in some more detail. Full scale analysis, particularly of the legal and ethical aspects can be found in the deliverables of WP8.

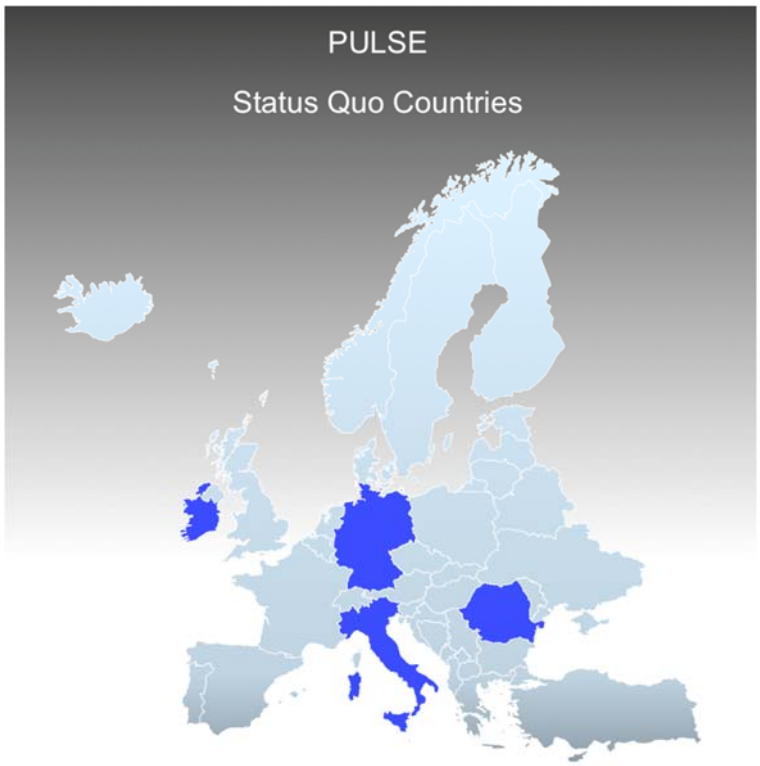
3 Analysis of EU countries

In this chapter and individual sub-chapters, sample healthcare systems are described and analysed with regard to (a) their strengths and the (b) needs for improvements and opportunities for PULSE to help compensate for these needs. Both form a basis for the PULSE guidelines as formulated in D5.2.

The concise analysis here is based on very elaborated descriptions and analyses which are documented in Annex 3.

3.1 Sample selection and justification

For the description and discussion on sample healthcare concepts and procedures below four EU Member States have been chosen.



They constitute not only the four countries of which partners are contributing to the PULSE project.´they also represent some 33 % of the overall population of EU 28 ranging from north to south and east to west. These four nations also combine in the project the different aspects of EU mainland territorial states, include the Irish island state and including a "recent joiner" from Eastern Europe. The selected countries

show vastly different economic powers (GDP), size and geography, and political and administrative structures and constituencies. Detailed description and analysis of the status quo of healthcare concepts and procedures are given for:

- **Germany**
- **Ireland**
- **Italy and**
- **Romania.**

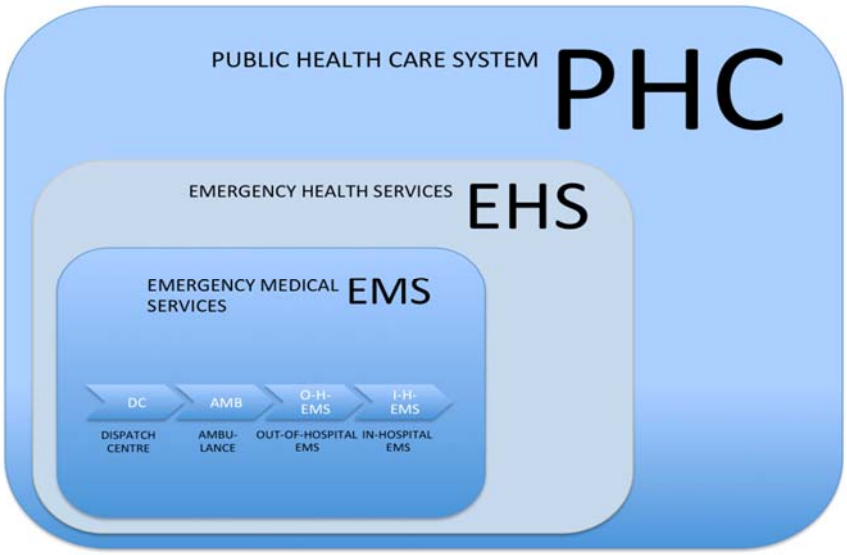
The summaries of the findings for the individual nations and a comparative summary are given in the chapters following under chapter 3.5, and a comparison under 4.

3.2 Research methodology

At present, no single European-wide EMS model exists. In general, the EMS status of a country depends on its peculiar national environment and medical setting. Albeit displaying substantial differences, EU Member States have legislation in place that regulates EMS systems.[10] Given this heterogeneity, it was considered important to collect data from four EU Member States (DEU, IRE, ITA, ROM) on their respective healthcare/medical system components in order to allow comparisons, to analyse and assess the level of performance of these components, and to deduct requirements for the development of a suite of PULSE tools for medical support in major emergencies.

Originally, EMS was understood as the first-line medical care to victims directly at the incident scene. Matured over time, EMS is part of a larger healthcare domain as shown in Figure 6.

Figure 6: Healthcare Domains[11]



[10] See: WHO, „Emergency Medical Services Systems in the European Union“, 2008, available at: https://ec.europa.eu/digital-agenda/sites/digital-agenda/files/WHO.pdf

[11] The term EHS (Emergency Health Services) as shown in above figure originates from: Ibid. In PULSE it stands for ‚European Health Services' throughout the documents.

Including key stakeholders such as hospitals, community health services, pre-hospital emergency care services, medical suppliers, rescue services, health related voluntary services and others, the European Health Services need consistent, coordinated and standardised advanced support methods and tools providing support in critical tasks (e.g. early threat detection, common operational picture, creation of surge capacity). At pan European level the requirement includes an interoperable framework with the ability to provide a coordinated European response to any major medical incident . In the context of this larger healthcare perspective, PULSE aims to meet these challenges.[12]

Acting on the assumption of a European-wide necessity for a platform like PULSE providing not only decision support but also knowledge management in health related decision making during major emergencies, existing national and international systems and respective procedures have been analysed for the identification of common grounds and divergence. Resulting conclusions and recommendations will set the framework conditions for specific PULSE operational procedures guidelines emerging from these findings and will be discussed in D.5.2.

The following two chapters are setting some basic considerations for describing the commonalities and divergences of the individual systems analysed in chapter 3.5 and Annex 3.

3.3 Common Grounds

Emergency planning, response coordination, support and sustainment, and recovery is encompassed within existing national or regional structures. In the context of these principles common to all, overarching disaster response objectives for medical support in major emergencies primarily hinge on the protection and saving of human life and the alleviation of suffering. Consequently, medical professionalism regulated by national and international standards is a collective aspect to all health operators across different health sectors/professions and diverse nationalities. However, with a closer view on PULSE, health operators interviewed for the generation of a PULSE project starting point, a selection of health operations support areas was favoured:

- Online systems to gather more information from the scene,
- More accurate communication with hospitals of destination,
- Better knowledge of command and control systems instituted,
- Identification of the emergency location,
- The actual conditions of the victims/patients,
- Identification of hospital beds and availability, and
- Informative applications on health risks in emergency situations.[13]

[12] See: PULSE DoW, A1: Project Summary.

[13] See: PULSE, D.2.1 Requirements specifications, page 118, 119.

They were considered essential improvements to facilitate even more effective medical support in major emergencies, nota bene on the immediate response level.

While there is considerable commonality on the lower levels, the abundance of international health regulations and procedures, on WHO and European level in particular, also portrays a unique landscape of health related communality at the international level.

3.4 Divergences

Contingent on respective legislations and constitutional regulations, national frameworks and structures for disaster response in major emergencies hold diverging approaches across national systems offering a variety of not always consistent departures for the implementation of a PULSE system. Crucial aspects in the consideration of PULSE functionality across local, regional, national and international response levels are concerned with the identification and manipulation of interfaces, IT hubs, and nodes for accessing and communicating with national systems and repositories. One particular challenge in this context lies in the customization of the PULSE system and the respective population of necessary data bases, definitions and rules to meet national peculiarities, which is much more than overcoming language barriers.

Below summary description of the national systems of the four countries selected for this PULSE project evidently proof the existence of this diversity.

3.5 Summary Descriptions of National Systems

As mentioned above, the detailed input can be visited in Annex 3. Here, the main analysis results and characteristics of the national systems are summarized. The relation to PULSE here is evaluated by sources analysed while the national systems are mapped to the individual PULSE requirements and scenarios in the individual chapters 4.x.

3.5.1 Germany

A distinct federal system. Layered responsibilities, extensive mutual support arrangements, and pronounced cross-border as well as international collaboration have rendered a national system characterised by a high degree of autonomy of the cognizant rural district, county or municipal authorities.

Table 1: SOP Status Quo Summary (Germany)

Key System Source	Issuing Organiz.	Geo-Area Covered	Operational Focus	Characteristics	Conclusions for PULSE
National Pandemy Plan	RKI Robert-Koch-Institut	Germany	Preparedness & Response in case of a pandemic.	Joint recommendation of federal and state governments in case of an Influenza	Access to national plans, identification & utilization of interfaces.

				Pandemic.	
Framework Ebola	RKI Robert-Koch-Institute	Germany	Ebola virus disease intervention preparedness.	Guideline concerned with definition and description of a strategy covering the process from the first responders on site to preparation and coordination of second line structures.	Access to national plans, identification & utilization of interfaces.
Leitfaden für die ärztliche Versorgung im Katastrophen-fall	BBK Federal Agency of Civil Protection and Disaster Response	Germany	Guideline for medical care and support in major emergencies.	Vade mecum for practitioners and medical staffs in support of medical aspects of civil protection.	Access to national plans, identification & utilization of interfaces.
DV 100	AFKzV Ausschuß FwAngel, KatSchtz u. Zivile Vtdg	Germany	Leadership & Command in Emergency Operations.	Comprehensive, nation-wide incident command system covering - leadership & command principles - incident command system - command process.	Potential role model for uniform and unified incident command structures and procedures.
LÜKEX Exercise Series	BBK	Germany	Preparedness and Response in major emergencies of national dimension.	Education & integrated training of high level decision maker, staffs & stakeholder.	Potential role model for integrated high-level table-top & functional assessment exercises, including post-exercise evaluation procedures (e.g. LÜKEX 13).
GeschOrdng InterMinKoord Grp	Federal Ministry of the Interior	Germany	Inter-governmental Coordination (national level).	Procedures for coordination, adjustment, reconciliation and consultation in crisis situation.	Exemplary process and procedures to utilize interfaces facilitating crisis response coordination in a layered federal system.
GeschOrdng KoordGrp	State Ministry of the Interior and community	State of North-Rhine Westfalia	Inter-departmental coordination (state level).	Comprehensive response coordination in major emergencies and	Exemplary process and procedures facilitating crisis response in a

	relations			routine staff exercises.	layered federal system informed by the government and controlling / coordinating lower administration levels.
SOP Crisis Staff	Landkreis Düren	County of Düren	Organization, set-up and operations of a local crisis staff.	Seamless and effective coordination and collaboration of all Stake holders and departments in major emergencies.	Exemplary process and procedures in responding to a major emergency at local level.
EUMED Ambulance Concept	GGD Zuid-Limburg Gemeentelijke Gezondheids Dienst	Meuse-Rhine Euregio	Euregional emergency support plan.	Improvement of cooperation in the border region Belgium, the Netherlands & Germany in the field of emergency rescue operations.	Potential role model for cross boundary/border cooperation and collaboration.
EUMED Hospital Concept	GGD Zuid-Limburg Gemeentelijke Gezondheids Dienst	Meuse-Rhine Euregio	Euregional distribution of casualties plan.	Allocation of casualties in the border region Belgium, the Netherlands and Germany.	Potential role model for cross boundary/border cooperation and collaboration.
Federal Joint Information & Situation Centre	Federal Ministry of the Interior	Germany	Civil Protection and Disaster Response.	Interdisciplinary approach including all services of civil safety prevention and linking them up to an efficient protection system for the population and its basic survival needs.	Exemplary structure and procedures for control and coordination in support of national-level decision makers. Access for mutual information exchange and cross-border coordination.

The major challenge Germany is confronted with, rests on its federative system. This very much so determines preparation and conduct of response operations in crises situations and major emergencies. Official crisis management authorities and health care officials closely follow this scheme. They are hierarchically organised from top federal down to local levels of administration and control. The physical conduct of response operations rests on:

- Public as well as on private stakeholders;

- Volunteer and professional organisations;
- Governmental capabilities and authorities substantiating or supporting response efforts in terms of planning, education, training, exercising, specialised assets and satellite based communication systems including nationwide accessible smart phone applications; and
- Non-governmental organisations.

In order to make this a seamlessly working system, civil protection and disaster response is embedded into the legislative process on federal and state level supported by respective acts and regulations on all levels. On the one hand this system ensures adherence to nation-wide objectives and standards while respecting local or regional peculiarities at the same time, and on the other hand it facilitates international cooperation and collaboration.

Nevertheless, each and every stakeholder engaged in response operations, health care and EMS included, works on their own regulations, which are based on national or even international standards. The problem of inter-connecting the different stakeholders in a given case is threefold.

1. The first issue is concerned with technical communication.
2. The second issue deals with common decision making, and last but not least,
3. Number three lies in unified command and control.[14]

Apart from the fact, that lessons identified and learned from recent disaster response operations in Germany, and that training and exercising is maintained and conducted on high standards throughout the system, primary improvement potential by PULSE is assessed to lie in the three areas as discussed above.

3.5.2 **Ireland**

Based on a ‚Framework for Major Emergency Management' a ‚National Steering Group' undertakes national level functions, maintaining appropriate emergency functionality promoted by inter-locking coordination arrangements.

Table 2: SOP Status Quo Summary (Ireland)

Key System Source	**Issuing Organis.**	**Geo-Area Covered**	**Operational Focus**	**Characteristics**	**Conclusions for PULSE**
Framework for Major Emergency Management (MEM)	National Irish Government	Ireland	Provision of protection, support and welfare in times of	Applies to on-site, local level and regional level emergency management authorities. Provides common	Exemplary national system engineered with no dedicated

[14] A realistic case-study on Länder(State)-level of these issues and deficits based on a real disaster in Germany has been presented in [29]. (though from 2008, many findings are still valid).

			emergency. Co-ordination at all levels of major emergency management.	terminology, inter-agency working structures, linkage to national level emergency management and determines a lead agency in every emergency situation.	legislation in place for civil protection.
Strategic Emergency Planning		Ireland	To inform Irish national major emergency planning.	Encompassed with governmental and departmental structures and founded on the principal that service delivery should take place at the lowest level possible with co-ordination at the most appropriate level, a Lead Government Department is identified.	
MEM-Co-ordination		Ireland	Effective and streamlined co-ordination process.	Definition of key roles, setting & co-ordination of responsibilities and parameters/boundaries for the mandate/authority, identification of physical spaces & appropriate communication facilities, co-ordination of media liaison & information management systems.	Potential role model for the management of major emergencies.

3.5.3 **Italy**

Focus of this chapter is on scenario-specific national pandemic planning and civil protection plans which are followed through the various administration levels from top to bottom and in one case also including a private stakeholder. A more specific differentiation between the two PULSE Scenarios is given under Annex 3, chapter 11.4.

Table 3: SOP Status Quo Summary (Italy)

Key System Source	Issuing Organis.	Geo-Area Covered	Operational Focus	Characteristics	Conclusions for PULSE
National Plan for preparation and response to influenza pandemic	CCM National Centre for Disease Prevention and Control	Italy	Common approach for preparedness & response across the regions for the management of pandemics.	Defining guidelines on coordination entities, epidemiologic surveillance, preventive measures, resource management, training, alerting	Access to national plans, identification & utilization of interfaces.

				procedures and communication tot he public.	
Regional Plans for preparation and response to influenza pandemic	Regional Health Agency	Regions	Regional approach for preparedness & response for the management of pandemics.	Guidelines concerned with organization, monitoring, preventive measures, resources, communication and training.	Access to national plans, identification & utilization of interfaces.
Local Plans for preparation and response to influenza pandemic	Local Health Agency	Communi-ties	Local regulations for the conduct of medical support in pandemics.	Details on specific medical guidelines, civil protection measures, incident organization & structures, resources and medical supplies.	Access to national plans, identification & utilization of interfaces.
National Guidelines on the Sanitary Organization in case of Social Disasters	National Department of Civil Protection	Italy	Nation-wide EMS assistance.	Addressing regions and organizers of public events regarding preparations and response in programmed and not programmed events.	Exemplary procedure for the preparedness and management of disasters taking place during public events.
Regional 118 Plans		Region of Piedmont	Guidelines for 118 dispatch centres.	Establishment of alerting systems and criteria and formulas for EMS capabilities and resources.	Role model for the integrated management of medical support in dispatch centres.
Local Plan of Sanitary Assistance	Stadium of Rome	Rome	Medical preparedness and Response in major emergencies in the stadium.	Regulations for medical staffs, EMS organization and activation, operational procedures, rules of behaviour, transport of patients and hospital admittance.	Role model for medical support in specific localities and environments.

3.5.4 **Romania**

Under the provisions of the national legal framework, the contemplation of cooperation between different stakeholders in the area of civil protection and disaster response flows into emphasizing county involvement and detailed hospital level treatment and handling of victims/patients.

Table 4: SOP Status Quo Summary (Romania)

Key System Source	Issuing Organis.	Geo-Area Covered	Operational Focus	Characteristics	Conclusions for PULSE
General Legal Framework Red Plan	The General Inspectorate for Emergency Situations	Romania	Mode of action at county level in the event of disasters and collective accidents.	Coordinated response of all structures with means of intervention in the case of collective accidents and/or calamities, with extremely fast manifestations and limited effects over time.	Access to national plans, identification & utilization of interfaces.
General Legal Framework White Plan	Ministry of Health The General Inspectorate for Emergency Situations	Romania	Series of individual intervention plans for national disasters including storms, blizzards, earthquakes, flooding, chemical, radiological & defence related emergencies.	Mode of action by which a county hospital can carry out both an effective response to disasters and continuous care of the current patients who could not be evacuated to other hospitals or released from the hospital.	Access to national plans, identification & utilization of interfaces.
Index of Coding of the 112 Emergencies	Ministry of Health	Romania	Allocation of resources and means of intervention.	Identification of type, degree and urgency of medical problems through 112 emergency calls.	Exemplary system for the provision of immediate information.
Triage and Evacuation	Ministry of Health	Romania	Nation-wide triage and medical care management system.	Effective mechanism for the determination of treatment and related transport in case of overload of local health care facilities.	Detailed procedure for the management of large numbers of victims/patients.
Patient Transfer	Ministry of Health	Romania	Regulation for inter-clinic patient transfer.	Roles and authorities of medical clinic personnel to transfer or receive patients requiring medical emergency intervention measures.	Detailed procedure for the management of transfer patients.
Emergency Pandemic Plan	The General Inspectorate for Emergency Situations	Romania	Preparedness & Response in case of an influenza pandemic.	Strategy based on slowing the pandemic development and an enhanced medical intervention	Exemplary national strategy.

	Ministry of Health			effort.	
Surveillance Methodology of Influenza	Ministry of Health	Romania	Assessment of the epidemiological potential and disease monitoring.	Description of main objectives, reporting routines and the national Sentinel system.	Exemplary national approach.

3.6 Summary Assessment of Status Quo

The possibility of a rapid and world-wide propagation of infectious diseases and the potential for other natural or man-made major emergencies which do not stop at boundaries challenge national health care systems to the extreme. Integrated in a complex international health network and regulated by a multitude of corresponding procedures, national health systems reflecting national peculiarities have developed different structures and organisations as displayed in above portrays and in great detail in Annex 3. In addition, embedded in a joint disaster response framework, medical support is just one function besides others, albeit a most essential one.

The knowledge gained in this analysis process and large number of lessons learned – strengths, deficits and needs for improvement - are a valuable basis for better focusing the development of the PULSE platform and for setting up the right demonstration experiments. Much more details of the national analyses can be seen in Annex 3.

PULSE is not to fix divergent national aspects of medical support to major emergencies. Consequently, PULSE can enable a comparative reflection to a limited extent only as displayed in the following chapter 4. Nonetheless, this situation offers the unique possibility of reviewing a much broader range of PULSE relevant issues and procedures. However, PULSE must capitalize on common grounds, offering a consistent, flexible and customizable system architecture common to all potential end-users on local, regional, national and international level. Given the prerogative of existing systems and frameworks, PULSE cannot take a system-of-systems approach, but could offer a suite of mutually supporting, independently functioning useful systems compatible and/or complementary to others already in use.

4 Comparative Mapping of National Systems

In the early stages of a health-related crisis, the ability to respond depends on the level of preparedness of the local community and health services. An efficient and well-structured EMS system ensures the achievement and maintenance of the skills necessary to deal with disasters, while disaster preparedness helps to identify

organizational gaps."[15] As professional standards, organizational structures and coordination mechanisms vary widely across European Union (EU) Member States, it is necessary to comprehensively review this variety in order to be able to minimize the consequences of a hazardous event, mitigating the risk involved and avoiding potential crises. In consequence, identifying gaps also implies indicating potential means to improve harmonization, standardization, and cross-border interoperability. The four national systems and their characteristics are mapped against

- The ten PULSE core operational requirements which have been set in D2.1 (chapter 4.1),
- The two PULSE scenarios (chapter 4.2) and
- The cross-cutting basic features from D2.1, which we here call "Meta-SOPs" (chapter 4.3).

4.1 Mapping of National Systems to the PULSE Requirements

For each of the 10 operational requirement categories, the national systems are compared, showing one Table for each requirement area:

1. Intelligence and information gathering
2. Treat and risk analysis
3. Warning and alerting
4. Operational Picture Generation and Situation Assessment
5. Resources and capacity planning
6. Task planning, prioritization and execution control
7. Logistics and stockpiling
8. Coordination between different services, including cross-border support
9. Post-crisis evaluation and collection of good practices
10. Training and exercising

For each of the 10 requirements, a short definition and a comparative table is given in capers 4.1.1 to 4.1.10, A summary of best practices useful for PULSE is given in 4.1.11.

4.1.1 Intelligence and Information Gathering

„Sound and reliable information is the foundation of decision-making across all health system building blocks, and is essential for health system policy development and implementation, governance and regulation, health research, human resources development, health education and training, service delivery and financing". [16] Medical Intelligence in this sense relates to all activities regarding early identification of potential health threats, their verification, assessment and investigation in order to recommend public health control measures for controlling them.

Table 5: Intelligence and Information Gathering

[15] WHO, „Emergency Medical Services Systems in the European Union", 2008, available at: https://ec.europa.eu/digital-agenda/sites/digital-agenda/files/WHO.pdf

[16] Toolkit on monitoring health systems strengthening – Health Information Systems – WHO, June 2008, page 2.

Reviewed Findings	Germany	Ireland	Italy	Romania
Improvement Potential	Formalized procedure to push critical health information to all potential users and to automatically retrieve health data from the lower end of the health chain.	PULSE may provide advanced information and information on the situation deterioration.	SARS: Pulse may provide weak signal detection support. Stadium: Mobile App may provide a channel for real-time structured information.	For "Stadium" like incidents, Pulse may provide formalized procedure to collect information into preparatory stage of large scale events For "SARS" like incidents, Pulse may provide weak signal detection support
Could serve as basis for PULSE procedure	The National Health Information System and its integration in international bodies.	It will give us a clear guidance as to the crowd type and incident type.	SARS: Epidemiologic information should cover also veterinary domain. Stadium: Civil protection team includes Police.	For "Stadium" like incidents: incident and injury / victim classification For "SARS" like incidents it is used national sentinel system
IT systems used	German Health Monitoring Information System	Health Atlas	SARS: Influnet	SARS : TESSy reporting system

4.1.2 Threat and Risk Analysis

Threat and risk analysis are embedded in a sequenced process in which all elements are accompanied by corresponding risk communication with both, stakeholders and the public. This process provides information based on the analysis of data that describe the form, magnitude, and characteristics of a risk, i.e. the likelihood of harm to humans, and it is about taking decisions and respective measures to monitor, control, and to mitigate adverse health related effects.

Table 6: Threat and Risk Analysis

Reviewed Findings	Germany	Ireland	Italy	Romania
Improvement Potential	Formalized procedure to push critical health information to all potential users and stakeholders.	PULSE may provide an indication of potential crowd behaviour patterns.	SARS: Pulse may provide simulation support. Stadium: Pulse provides workflow and elaboration support (e.g. score calculation).	PULSE may provide data regarding the human resources, equipment, materials, processes, information (environmental, medical, needs etc.) to all users.
Could serve as basis for PULSE procedure	National Health Information System and its integration in international bodies.	Could provide a prediction as to the likely event of a crowd crush and the rate at which it may develop.	SARS and Stadium: Actual Roles and Actors as stated by the Italian Regulations.	Incident and victim classification, actual roles and actors as stated by the Romanian regulations.
IT systems used	German Health Monitoring Information System	No IT Systems currently in use for threat and risk analysis.	Stadium: No system currently in use to support the authorization phase.	No system in use to support this function.

4.1.3 Warning and Alerting

By providing information to and retrieving information from existing national and international systems, timely warnings and alerts facilitate exchange of situational reports and data for decision-making as far as necessary in real-time.

Table 7: Warning and Alerting

Reviewed Findings	Germany	Ireland	Italy	Romania
Improvement Potential	Fall-back solutions in cases of massive electronic disturbance or disruption.	PULSE may provide warning at 2 main stages: pre-event and after the event commences.	SARS: Pulse may provide automatic warning. Stadium: Pulse provides an additional channel (Mobile App).	Update of the national SOPs taking into consideration new types of risk, new technology developing.

Could serve as basis for PULSE procedure	Satellite-based communication	This will shorten the response time for the mobilisation of additional resources and allow for a realistic standby phase.	SARS: Alerting rules, as stated by the Italian Laws. Stadium: Alerting roles, as stated by the procedures. Actual Roles	Incident and victim classification, actual roles and actors as stated by the Romanian regulations.
IT systems used	NINA SatWaS MoWaS deNIS/deNIS^{plus}	No system currently in use in Ireland to support warning and alerting.	SARS Influnet	No system in use to support this function.

4.1.4 Operational Picture Generation and Situation Assessment

COP[17] is the key communication and information management element in emergency management and incident response. It relies on flexible communication and information systems that provide an overview and information of an incident or a series of incidents. It is created by gathering and collating data and information from the public, from media, stakeholders, organisations and authorities to emergency management personnel and their affiliated organizations. Resulting from analysed information shared intelligence enable the direction of effective health response, to manage assets, to obtain situational awareness, and to generate requests for additional resources.

Table 8: Operational Picture Generation and Situation Assessment

Reviewed Findings	Germany	Ireland	Italy	Romania
Improvement Potential	Monolithic information system architecture using uniform data model and software architecture for local response command and control centres.	The information gathered by PULSE will provide a good operation picture of the situation in a crowd event such as a stadium to include factors such as: crowd behaviour, numbers, weather,	SARS: The information gathering is well structured only on the “patient” side (via INFLUNET). No clear information flow for resource monitoring is defined, even if the need is stated.	PULSE enables the collection of the data from all participants and facilitates adaptability and scalability.

[17] Common Operational Picture

		influence of alcohol and drugs.	Pulse may provide the supporting tool. Stadium: PULSE allows input from all the actors, also via Mobile App.	
Could serve as basis for PULSE procedure	DV 100 - Manual on "Leadership and Command in Emergency Operations"	Viewing changes in the status quo if the situation deteriorates. Distinguishes between various parts of the stadium.	SARS: Minimal set of data to be collected on resources (chapter 7.3 of National Plan). In case of vaccination, data should include the status of vaccination campaign, per type of population (Tab.2 of National Plan) Stadium: Actual Roles and Actors as stated by the Italian Regulations.	Incident and victim classification, actual roles and actors as stated by the Romanian regulations.
IT systems used	deNIS^{plus} on national level. Länder (States) are using region-specific IT-systems such as ILIAS-HE in Hessia.	No system in use to support this function	SARS: INFLUNET gets input from general practitioners and paediatricians via internet. Stadium: The system allows geo representations.	No system in use to support this function.

4.1.5 **Resources and Capacity Planning**

In coping with the health related aspects of a major emergency, PULSE is to support decision-making. It aims at managing the incident and mitigating the effects to the extent possible. When scale and nature require a higher, more robust and more time-consuming level of response extending the initial capabilities employed to the incident scene, appropriate emergency management health authorities are required to plan and to provide for and to coordinate additional resources and capacities.

Table 9: Resources and Capacity Planning

Reviewed Findings	Germany	Ireland	Italy	Romania
Improvement Potential	Facilitation of access or data exchange on resources between separate or unconnected data bases.	PULSE may provide visibility on the resources required several weeks before an event takes place.	SARS: Pulse may provide visibility on resources and support decisions on optimal capacity. Stadium: PULSE provides elaboration, optimization and simulation capabilities.	Facilitation of access or data exchange on resources between separate or unconnected data bases.
Could serve as basis for PULSE procedure	DV 100 Manual on "Leadership and Command in Emergency Operations.	This will allow the PULSE the SOP to be used over a period of weeks, including the weeks of preparation. This will be achieved by a change in the risk score.	SARS: Decision making moments and relevant actors are identified. Pulse SOP and tools may refer to them. Stadium: Some "rules of thumb" may be useful to check the recommendation provided by PULSE actual Roles.	Especially for the disaster situation – the guide for medical triage.
IT systems used	deNIS^{plus} on national level. Länder (States) are using region-specific IT-systems such as ILIAS-HE in Hessia.	No system currently in place	Stadium: Systems used by the Emergency operational centres (118) provide only data storage and presentation.	"Stadium" like incidents: Romanian Single National Emergency Call System (112) provide only data storage and presentation

4.1.6 Task Planning, Prioritisation and Execution Control

Coping with a major emergency, PULSE is to support decision making during the preparedness and response phases in a collaborative planning process.

This process involves the whole range of stakeholders in various functions, at different levels of response and administration. Various planning techniques need to be observed. Concomitant procedures such as information management and

communication are included in the planning as well as in the subsequent execution process.

Table 10: Task Planning, Prioritisation and Execution Control

Reviewed Findings	Germany	Ireland	Italy	Romania
Improvement Potential	Uniform web-based digital technical communication system.	This will allow plans to be listed in a standardised format.	SARS and Stadium: Pulse may provide visibility on resources and support decisions on optimal on resource distribution and patient destination.	Specifying the level, quality and sizing of the necessary medical means when preparing the intervention in case of demonstrations or public gatherings with numerous people.
Could serve as basis fo PULSE procedure	DV 100 Manual on "Leadership and Command in Emergency Operations	This will allow to capture real time movement, it will allow the SOP to be captured in a real time movement.	SARS and Stadium: Actual Roles and Actors as stated by the Italian Regulations.	Incident and victim classification, actual roles and actors as stated by the Romanian regulations.
IT systems used	deNIS^{plus} on national level. Länder (States) are using region-specific IT-systems such as ILIAS-HE in Hessia	No system in place	SARS and Stadium: No system	No system in use to support this function.

4.1.7 Logistics and Stockpiling

The mapping of health related supplies and emergency stockpiles is a major part of the humanitarian efforts to improve the emergency response in affected areas. It provides a useful source of information to national emergency services, and is an interface to capacities and resources of health actors to respond to the needs of affected populations; placing increased emphasis on " who has what were " by region, sector, organisation and/or organisation type.

Table 11: Logistics and Stockpiling

Reviewed Findings	Germany	Ireland	Italy	Romania
Improvement Potential	Facilitation of access or data exchange on resources and stockpiles between separate or unconnected data bases.	PULSE may provide visibility and support logistics and necessary distribution and pre-positioning of emergency equipment.	SARS: Pulse may provide visibility and support decisions on optimal distribution. Stadium: Standardizations	Facilitation of access or data exchange on resources and stockpiles between separate or unconnected data bases.
Could serve as basis for PULSE procedure	DV 100 Manual on "Leadership and Command in Emergency Operations	This will allow for reviewing and updating of SOPs.	SARS: Vaccine management storage approach is set (chapter 7.2.2 of National Plan). Stadium: Lists of materials and tools, including the "standard" car, i.e. a vehicle equipped according to standard requirements.	Especially for the disaster situation – the guide for medical triage contains material management.
IT systems used	deNIS^{plus} on national level. Länder (States) are using region-specific IT-systems such as ILIAS-HE in Hessia	No system currently in use	Stadium: Emergency Centers (118) IT system stores data on resources.	No system in use to support this function.

4.1.8 Coordination between different services incl. cross-border

Coordination between stakeholders from various governmental, non-governmental, private-public, and commercial entities is essential to achieve sustainable health response results. It will be key to success in major emergencies. Expanding a coordination and facilitation "umbrella" over health related stakeholders helps forming collaborative partnerships across functions, sectors, cross border support, eliminates duplication and fragmentation and encourages coordinated implementation.

Table 12: Coordination between different services, incl. cross-border

Reviewed	Germany	Ireland	Italy	Romania

Findings				
Improvement Potential	Adherence to a uniform and unified command and control system providing a single-entry access to information exchange and coordination.	PULSE may provide information in a recognised situation format by which stakeholders, and potential stakeholders can view the situation in real time.	SARS: Pulse workflow may support for instance by identifying relevant actors and automatically proposing messages to be sent to them. Stadium: PULSE provides a common tool to all the actors involved.	Integration and harmonization of the hospitals' White plans in the county's Red plans.
Could serve as basis for PULSE procedure	DV 100 - Manual on "Leadership and Command in Emergency Operations"	If the situation requires cross border support, the details/nature of the incident can be provided in real time by giving a visible view to the supporting authorities.	SARS: The roles of "Civil Protection Operation Committee" and of "CCM-National Centre for Disease Prevention and Control" should be considered. Stadium: Actual actors to be involved.	Stadium: Incident and victim classification, actual roles and actors as stated by the Romanian regulations. SARS: Periodic reporting using TESSy system
IT systems used	deNIS^{plus} on national level. Länder (States) are using region-specific IT-systems such as ILIAS-HE in Hessia	E-mail and teleconference only.	No evidence of an IT system	"Stadium" like incidents: Romanian Single National Emergency Call System (112) works as an unique dispatch center which collects all the emergency calls and dispatch them according to their typology. SARS like incidents: TESSy reporting system

4.1.9 Post-crisis Evaluation and Collection of Good Practices

Recovery efforts in post-crisis situations are determined by the degree of success in making the transition from the emergency stage to rehabilitation and ultimately remedying of health problems. A great deal of this capacity can be created by combining evidence-based information systems concentrating on experiences from on-going and past health response interventions with a process of shared accountability focusing on programmes, guidelines, and good practices of other national or international health authorities and responders.

Table 13: Post-crisis Evaluation and Collection of Good Practices

Reviewed Findings	Germany	Ireland	Italy	Romania
Improvement Potential	Nation-wide common maintenance of a data log storing incident details, assessments, decisions, mission orders and tasks assignment & control, capabilities and resources employed or requested.	PULSE provides a dedicated tool for post event evaluation. This can be used in both the exercise format and after a real incident because it is a electronic system it will allow the information to be collected in a systematic fashion.	SARS: Pulse tool and SOP may support. Stadium: PULSE provides a dedicated tool.	Standardization update for: • response mode at the alert • the contact with Media • cooperation between counties • communications status
Could serve as basis for PULSE procedure		All participants at an incident/exercise can be invited to participate in the post incident analysis. It will allow the rapid collection of very specific data.	SARS: - Stadium: Actual actors to be involved.	N/A
IT systems used	deNIS^{plus} on national level. Länder (States) are using region-specific IT-systems such as ILIAS-HE in Hessia. Combination of complementary federal and state IT	No system currently being used which would support this function	No evidence of an IT system	No system in use to support this function.

	systems in operation			

4.1.10 Training and Exercising

Training educates and qualifies people; exercises test and validate procedures in possible scenario environments. Combined, both –qualification and tested procedures- aim to ensure that all organisations and authorities, including their respective staffs, are fully prepared for emergencies by practising and testing all elements of emergency plans. In short, training and exercising serves the following purposes:

- practice and develop individual and staff competencies,
- validate plans, and
- test established procedures and resources.

Table 14: Training and Exercising

Reviewed Findings	Germany	Ireland	Italy	Romania
Improvement Potential	Framework for integrated T&E addressing all potential stakeholders and administrative layers concerned, based on sample scenarios.	These are MPORG tools and these will allow exercising of key decision makers at several levels both in routine tactical decisions or very complex strategic decisions.	SARS: Pulse LMS may support. Stadium: MPORG based on PULSE tools.	Training methods depending on the incident type. Test and training of resource allocation.
Could serve as basis for PULSE procedure	LÜKEX exercise series concept and set-up.	Enforce crowd control regulations by all actors, including event organisers using the tool.	SARS: Training exercises topics and delivery models (chp. 7.5 of National Plan). Stadium: Actual actors to be involved.	N/A
IT systems used	deNIS^{plus} on national level. Länder (States) are using region-specific IT-systems such as ILIAS-HE in Hessia.	TES (Training and Exercise System supplied by Vector Command limited)	Stadium: MPORG tools are already used by some 118.	No system in use to support this function.

4.1.11 Summary of National Systems mapped to PULSE Requirements

Responding to everyday calamities as well as to major emergencies, existing health response systems had to develop and adjust to comparable requirements within national confines. Albeit the different detailed information provided, the comparative mapping also shows in almost all activity fields of countries selected, corresponding confirmatory results. That seems to be the result of following national guidelines and adopting international regulations gradually happening over time. Functionally bundling essential health support requirements, PULSE, for the first time, aims to invent a suite of mutually supporting tools. However, it will not and it cannot become a 'one size fits all' solution. Improving harmonization, standardization, and cross-border interoperability, the offer PULSE can make is to provide tools not existing or not implemented, to establish links not instituted, to grant access to knowledge not accessible so far, and to explore existing systems regarding their potential model role, which might have a bearing on PULSE functionality in ways such as:

- Affecting the lay-out of individual PULSE tools,
- Creating a network to combine similar systems/tools,
- Harmonizing and integrating functionalities,
- Building bridges and/or links to access and utilize external systems/tools.

Notwithstanding national peculiarities, best practices identified in above status quo tables include:

- National Health and Monitoring System (Germany),
- Health Atlas (Ireland),
- Satellite-based Information & Communication Systems (Germany),
- Incident Command & Control Management (Germany),
- Influnet (Italy),
- Guide for Medical Triage (Romania),
- Emergency Response Committees (Italy),
- Training and Exercising System (Ireland),
- LÜKEX Concept (a series of regular nation-wide German exercises with varied focus (e.g. pandemic, flood disaster; coordinated cyber attack etc.).

4.2 Comparative Mapping of National Systems to PULSE Scenarios

The two PULSE scenarios, a SARS pandemic and a major stadium crush have been chosen for testing and demonstrating the effects and performance of the PULSE system and tools in a range of rather different challenges. The characteristics of the scenarios have been developed in D2.2 and are, again, summarized in Table 20 under Annex 3. The main characteristics such as, dynamics, causes and effects are substantially different. This way they present quite a spectrum of different situations and tasks the PULSE system will have to prove its values on. Nevertheless, not all possible threat and risk situations can be tested within the limitations of the project.

The statements contained in Table **15** and Table 16 reflect the respective national status quo situations. On the one hand, the statements identify limitations and weaknesses of national systems, and on the other, they confirm their strengths in view of the two scenarios.

Table 15: Mapping to SARS scenario

National Systems	**Strengths** for covering the scenario requirements	**Limitations** (not covering specific scenario requirements)
Germany	Clear focus on nation-wide medical response and international collaboration.	Limited value regarding comprehensive incident management procedures.
Ireland	Have current accurate epidemiological data to drive the scenario Use of existing, disease warning and alerting structures.	The exercise has a large timescale, and it will be difficult to telescope whereby several weeks of an exercise will have to be reduced into a one day exercise. Lack of realism in the exercise, due to the real time, timelines Difficult to factor in the effects of vaccine and difficult to simulate the impact of cross border activity.
Italy	SOPs analysed make implicit reference to the situations described in six (out of nine) Pulse Use Cases. Two of these six are explicitly linked to USMAF emergency procedures. These Use Cases refer to important aspects of the Plans.	SOPs analysed do not cover the Post Emergency learning activity.
Romania	Pandemic plan and Surveillance methodology of Influenza, SARS covers at least partially , inter-pandemic, pandemic-alert and pandemic periods, mainly on: • Weak signal detection and surveillance • Identification of a new probable case in the community • Assessment of the medical resources available during the pandemic phase • ECDC Recommendations Periodic assessment of national authority.	Are not covered the requirements of the SARS Use Cases: - Post emergency at national level learning, - Post emergency at WHO level learning related of the post-pandemic period.

Table 16: Mapping to Stadium Scenario

National	**Strengths** for covering the scenario	**Limitations** (not covering specific

Systems	requirements	scenario requirements)
Germany	Offers full menu for traditional range of first responder, integration of and coordination with emergency medical services included.	Local focus only, limited implications with regard to national and international coordination/cooperation in particular.
Ireland	Based on combination of real events and a real stadium. Factors are variable: weather, crowd type, crowd behaviour, impact of environmental factors, drugs and alcohol can all be factored in.	Crowd events by their nature, tend to bring about one main type of injury. It will be difficult to simulate a real event on the scale required. A danger of lack of stakeholder involvement especially at strategic level. High demands on IT and IT infrastructure. Technology may distract from the main decision process/end-goal.
Italy	SOPs analysed make implicit reference to the situations described in five (out of eight) Pulse Use Cases. These Use Cases refer to important aspects of the Plans.	SOPs analysed do not cover: • Triage in Casualty Clearing Station [CCS] links with electronic patient care records [ePCR] • CCS (Casualty Clearing Station) operation. • Lesson learning.
Romania	The phases of "Preparation" and "Response" of the intervention are well covered by the: Red plan, White plan, Triage/ Evacuation and Patient transfer documents, mainly on: • How to mobilize the intervention teams and resources; • Management of intervention teams and resources; • Triage and transfer of the patients; • The mode of evacuation; • Data collection, reporting and analysis (non-automated)	Are not covered the requirements regarding the Post-Event, Post Exercise Evaluation Tool to identify lessons to be learned.

The two different PULSE scenarios, SARS pandemic and major stadium crush, by cause, dynamics and consequences, pose rather different challenges indicating the wide spectrum in which medical support, embedded in the course of major emergencies, is to offer effective services. Even though the testing and demonstration of PULSE tool functionality will take place in the distinct national environments of Italy and Ireland, results and findings are expected to also confer to other scenarios and environments.

4.3 Comparative Mapping of National Systems to the Meta-SOPs

Meta-SOPs are understood as common management concepts of information and supporting IT systems. They are mainly cross-cutting[18] system characteristics which facilitate and/or support the operation and future use of the PULSE System. They include knowledge management, standards and change management, and a set of sub-criteria as listed in the Table 17 below. When mapping the national systems against them, in some cases indicate lack of capability of national systems identified, while in most cases there is room for improvement. **This identifies opportunities for future PULSE intervention**. The proposals for PULSE SOPs made, reflect and confirm 'role models' already identified in Chapter 4.1.11.

Table 17:Mapping to Meta-SOPs

Characteristics of the "Meta-SOP" described in D2.1 *"must" = mandatory* *"should" = desirable*	**Covers the PULSE "Meta-SOP"**	**Improvement Potential**	**Could serve as basis for the PULSE SOP**
Knowledge management			
Knowledge management for standardized data collection (must)	Yes	**Germany** Different stakeholder to feed information into one joint data/information pool.	N/A
	Yes	**Ireland** PULSE will provide easily retrieved and indexed data, from both internal and external repositories.	N/A
	(Yes) Not in the SOPs analysed, but it is done	**Italy** PULSE SOP will provide formal structure, to all Regions and at National level (for SARS).	**Italy** SARS: Existing committees at Regional and National level may be the key "actors" in the KM process. Stadium: Regional Health Authorities may be the key "facilitators" of in the KM process both in each Region

[18] therefore "Meta"

			and across the Regions.
	Yes	**Romania** Different stakeholder to feed information into one joint data/information pool.	**Romania** N/A
Knowledge management for information/data sharing at European level (must)	Yes	**Germany** Not identified at national level.	N/A
	Yes	**Ireland** By producing an interoperable data sharing format.	**Ireland** For resources and capacities, logistics/stock piling.
	(Yes) Not in the SOPs analysed, but it is done	**Italy** PULSE SOP will provide formal structure, to all Regions and at National level (for SARS).	
	Yes	**Romania** Not identified at national level.	N/A
Standards			
Standardization/ standards used	Yes	**Germany** Development of specific regulations for emergency medical capabilities operating in complex multi-functional and multi-organizational environments.	**Germany** DV 100 Manual on “Leadership and Command in Emergency Operations
	Partly	**Ireland** PULSE will help to implement existing crowd guidance and event medical plans.	**Ireland** Management of crowd events guidance with particular attention to the triage of a mass casualty incident
	Partly	**Italy** A “best of breed” SOP across Italy, both for SARS and Stadium scenarios, might improve the emergency management practices.	**Italy** Actual Roles and Lists of equipment.
	Yes	**Romania** PULSE may help to update the current regulations for emergency medical capabilities operating in complex multi-functional and multi-	**Romania** Especially for the accident with multiple victims – the guide for medical management

		organizational environments.	and triage can be useful.
Interoperability/ interconnection with other systems (must[19])	Yes	**Germany** Connectivity to other nation's system.	N/A
	Partly	**Ireland** Will link to the mobilisation system of the fire, police and ambulance systems.	N/A
		Italy Connectivity to other nation's system.	
	No	**Romania** Connectivity to other nation's system.	N/A
Change management			
Adoption of new regulations (should)	Yes	**Germany** Strengthening and formalizing feed-back procedures.	N/A
	Partly	**Ireland** PULSE SOP will focused way with the change management procedures related to any new regulations, guidance and procedures.	N/A
	(Partly) Not in the SOPs analysed, but it is done	**Italy** If new regulations impact on decision making processes, then a widespread diffusion of PULSE (including MOORG and Learning Management System) in Regions and Provinces may facilitate their diffusion and adoption.	**Italy** Psychological support to sustain organizational change. The recent "Accordo Stato-Regioni" may be a case study on which to "test" the PULSE SOP.
	No	**Romania** Strengthening and formalizing feed-back procedures.	N/A
Alignment with new scenarios	Yes	**Germany** Streamlining exercise and training	**Germany**

[19] D2.1, 9.4, pg 69

(should)		in accordance with specific scenarios in a top-down approach.	LÜKEX scenario
	Yes	**Ireland** It will practice decision makers at each level, with 'what if' situations and modelling of potential events.	N/A
	(Partly) Not in the SOPs analysed, but it is done	**Italy** MPORG and Learning Management System may facilitate the alignment with new scenarios	
	Partly	**Romania** Providing data for the design of the training scenarios that: - should be as realistic as possible - have different difficulty and variability levels - use statistical analysis, retrospective and prospective, on potential consequences.	N/A
Public information and communication with media (should)	Yes	**Germany** Not identified.	N/A
	Yes	**Ireland** It will allow media liaison teams to fully appreciate the impact the event on the public and will support media liaison team by ensuring that key decision makers are aware of the impact of media inputs on an event.	N/A
	Yes	**Italy** PULSE may provide accurate information and in real time for the communication with media.	**Italy** Actual roles and Actors according to Italian Regulations.
	Yes	**Romania** PULSE may provide accurate information and in real time for the communication with media.	**Romania** Rules how to communicate with the media in case of accidents with multiple victims.

4.4 Conclusion

In the healthcare domain, professional standards, organizational structures and coordination mechanisms vary widely across EU Member States. Exactly on this level, PULSE aspires to contribute a suite of mutually supporting tools not existing or not implemented in the area of medical support in major emergencies so far. As a point of departure, it is necessary to comprehensively review this variety in order to be able to minimize the consequences of a hazardous event, mitigating the risk involved and avoid potential crises. In consequence, identifying gaps also implies indicating potential means to improve harmonization, standardization, and cross-border interoperability.

Responding to everyday calamities as well as to major emergencies, over time, existing health response systems had to develop and adjust to comparable requirements within national confines. The mapping of the four national systems and their characteristics identified that the way to the goal PULSE intends to go, is paved with traditional national systems already in operation. The comprehensive mapping of four different pronounced national systems to functional requirements, to the two chosen scenarios and the application of common management concepts did indicate strengths but also room for improvement, harmonization and standardisation. In order to further develop its functionality and to prove its value, PULSE must capitalize on this comprehensive analysis, recognizing specific national systems in place and taking into account existing best practices in particular. The room for manoeuvre for PULSE might extend to the establishment of networks and links not instituted, to granting access to knowledge not accessible so far, to harmonizing, coordinating and storing individual medical support functions, to the utilization of external expertise, and to the exploration of existing systems regarding their potential model role.

In addition, the following Chapter 5 (International Regimes) explores the international health care environment and its numerous regulations and agreements, with which national systems have interfaces and – depending on the scenario – need to cooperate. Accordingly, they also bring about challenges and opportunities for the range of functions of and processes supported by PULSE.

5 International Regimes

"In Europe, one of the core emergency response services to deadly threats such as pandemic disease and major terrorism attacks is the European Health Services (EHS). … It is crucial to the EHS that it remains in an excellent state of preparedness … . Moreover, in the response phase, EHS need consistent, coordinated and standardised advanced support methods and tools providing support in critical tasks … . Finally, at a pan European level, EHS also need an interoperable framework with the ability to provide a coordinated European response to any major medical

incident."[20]

Establishing above overall requirement for the PULSE project, its scope of work combines national emergency response services and regimes as established in the EU and by the WHO for the same reason. Complementary to the national aspects discussed so far, this chapter deals with:

- Bi- and multilateral agreements of nations (German samples given)
- The EU framework
- The UN framework

Findings summarized here are the extract of elaborate analyses provided in Annex 5.

5.1 Bi- and multi lateral agreements

The International Federation of the Red Cross (IFRC) spearheaded the development of the "Guidelines for the Domestic Facilitation and Regulation of International Disaster Relief and Initial Recovery Assistance" (IDRL Guidelines) which were unanimously adopted in November 2007. In addition to joining the consensus on the Guidelines, the EU Member States pledged in support of the use of these guidelines (see more in [54]). Since that time EU Member States started implementing the IDRL Guidelines.

Located in the middle of Europe, having territorial borders with nine countries, and densely populated regions extending across national borderlines, Germany is used as an example to demonstrate the range bi- and multi lateral agreements can have.

The amount of agreements, only the German ones, stand here as examples.

Pursuant to the German Basic Law, civil protection is a federal responsibility and in consequence resulted in a number of regulations and laws in the exceptional case of major disasters.

Following from there, regulation of disaster relief is an operational responsibility assigned to each of the 16 Länder (Federal States) which have promulgated different disaster relief acts containing mostly similar regulations for the conduct of emergency medical services, fire-fighting and for technical assistance.

In order to reduce cross-border procedural, factual, financial and technical obstacles, and to facilitate and improve mutual assistance in disaster response operations, Germany has entered into agreements with all its neighbouring states, as well with the Russian Federation, Hungary and Lithuania. The listing provided at Annex 5, chapter 13.1 gives an overview over the respective agreements [30]).

Länder (states) as well as local authorities, when directly bordering a neighbour state, with the consent of the federal authorities, have the right to conclude agreements with foreign countries authorities operating at a similar level of responsibility and response. A good example of cross-border agreements is the Dutch – North Rhine-Westphalia declaration on mutual assistance. Other state level agreements with neighbouring entities exist between the state of Brandenburg and Poland, between Saarland and

[20] PULSE DoW, A1/Project Summary/Abstract.

the French Departments of Moselle and Lothringen, between Mecklenburg-Western Pomerania and Poland, and between Saxon and the Czech Republic (compare [55]).

Agreements between the city of Aachen with the Dutch cities of Heerlen, Kelmis, Kerkrade, and Vaals in terms of mutual disaster response assistance are examples of cooperation at municipal level.[21]

In addition, the EU Protection Mechanism (CPM) offers another avenue requesting assistance and support from member states complementing bilateral and regional agreements on disaster response and relief.

5.2 The European Union

There are National (MS), EU and UN organisations that have responsibilities in the health area and although these will be explained separately, it must be understood that they overlap in complex ways and are related to each other.

The most significant point to note is that Civil Protection and Health Protection have different structures.

For that reason EU Civil Protection and EU Health Protection will be considered separately and when considering UN and WHO, the same logic will apply to the analysis. Although each organisation and structure are described separately, it must be emphasised that they are inter-related and in most cases interdependent.

5.2.1 EU CIVIL PROTECTION MECHANISM

In 2001, the EU Civil Protection Mechanism was established, fostering cooperation among national civil protection authorities across Europe. The Mechanism currently includes all 28 EU Member States in addition to Iceland, Montenegro, Norway, Serbia, and the former Yugoslav Republic of Macedonia. Turkey has recently signed the agreements to join the Mechanism.

The Mechanism was set up to enable coordinated assistance from the participating states to victims of natural and man-made disasters in Europe and elsewhere.

The EU CP Mechanism's tools are:

- Emergency Response Co-Ordination Centre (ERCC)
- Common Emergency and Information System (CECIS)
- Training programme
- Civil Protection module

The ERCC

The EU EMERGENCY RESPONSE COORDINATION CENTRE (ERCC) is the operational hub to facilitate a coherent European response during emergencies inside and outside Europe. When Member States are affected by a crisis that overwhelms their response capacity, they can activate the ERCC in the framework of the Solidarity

[21] Ibid.

Clause (Article 222 of the TFEU). The ERCC keeps direct links to the civil protection and humanitarian aid authorities in Member States which enables a smooth and real-time exchange of information.

The ERCC has the following Monitoring tools

- **GDACS:** Global Disaster Alert And Coordination System
- **EFAS -** European Flood Awareness System used for Floods forecasting and Flood alerts
- **EFFIS** – European Forest Fire Information System used for fires forecasting
- **GMES -** Global Monitoring for Environment and Security for Initial Operations (GIO) Emergency Management Service / COPERNICUS.[22]

The Common Emergency Communication and Information System (CECIS)

CECIS is a web-based alert and notification application. It provides an integrated platform to send and receive alerts and notifications, details of assistance required, to make offers of help and to view the development of the on-going emergency as they happen in an online logbook.

EU Civil Protection Modules

The aim of these modules are to create pre-defined specific and interoperable assistance capabilities that can be dispatched at very short notice. Currently there are 17 types of modules/for different disasters. MS have registered 150 Civil Protection Modules and 10 Technical Assistance and Support Teams (TAST).

United Nations Disaster Assessment and Coordination (UNDAC)

The United Nations Office for the Coordination of Humanitarian Affairs (OCHA) mobilizes and coordinates humanitarian action for people in need, in partnership with national and international actors. OCHA ensures that each actor can contribute to the overall response effort. OCHA delivers its mandate by coordinating emergency relief, and by organizing and monitoring humanitarian funding, policy development, information management and advocacy. EU Civil Protection assets can be made available by MS and provide assistance to other international organisations, especially the UN. United Nations Disaster Assessment and Coordination is the main mechanism by which the OCHA delivers a response.[23]

INTERPOL – Disaster Victim Identification (DVI)

The INTERPOL DVI Guide provides guidelines for use by Interpol Member States in the identification of disaster victims. It can serve as a basis for Interpol Member States which do not have their own DVI teams or have never been confronted with such

[22] For more and detailed information on the ERCC see: http://ec.europa.eu/echo/what/civil-protection/emergency-response-coordination-centre-ercc_en

[23] For more and detailed information see: http://www.unocha.org/what-we-do/coordination-tools/undac/overview

operational situations to set up a DVI Team and to manage DVI operations. It also provides important supplemental information for Interpol Member States which have DVI teams of their own. The most important requirement for victim identification work is the application of international standards, which are the common basis for the work in multinational DVI operations.[24]

European Space Agency (ESA)

The Copernicus Emergency Management Service aims to reinforce Europe's capacity to respond to emergency situations. Wide swath Sentinel-2 data can support the build-up and frequent update of globally consistent background reference maps to be used for impact assessments. It will also contribute monitoring land-use change that triggers erosion, forest and wildfires, and the onset of floods.

Combining information on vegetation, the location of water bodies and other variables, the mission can also assist in monitoring the prevalence and spread of malaria, and the prediction of disease outbreaks.[25]

5.2.2 HEALTH EMERGENCIES – EU

In the EU health matters remain a MS issue. Under the Lisbon Treaty Art. 168 on Public Health it requires that the EU action shall respect the responsibilities of the Member States for the definition of their health policy and for the organisation and delivery of health services and medical care.

However it shall encourage cooperation between the Member States in the areas referred to in this Article and, if necessary, lend support to their action. It shall in particular encourage cooperation between the Member States to improve the complementarity of their health services in cross-border areas and situations.

At EU level, the legal basis for addressing health threats is EC Treaty Article 152, which states that Community action shall complement national policies directed towards improving public health, preventing human illness and diseases, and obviating sources of danger to human health. Accordingly, EU action has focused on coordinating information and measures on communicable diseases and substances related to chemical, biological and radio-nuclear (CBRN) agents. The EU has established a system for epidemiological surveillance and reporting of communicable diseases and it is one of the key mechanisms for Europe-wide coordination on diseases between the Member States, the WHO and relevant public health agencies. The Global Health Security Initiative (GHSI) is an international partnership of like-minded countries to strengthen health preparedness and the global response to threats of CBRN substances and pandemic influenza. The World Health Organisation leads the implementation of the revised International Health Regulations (IHR), which entered into force on 15 June 2007 and requires members of the World Health Organisation to report certain disease outbreaks and public health events to the

[24] For more and detailed information see: http://www.interpol.int

[25] For more and detailed information see: http://www.esa.int/ESA

WHO. A total of 194 States Parties to the IHR have implementing these global rules to enhance national, regional and global public health security.

Health Emergency Operations Facility (HEOF)

The Commission Health Emergency Operations Facility is designed to provide for a coordinated management of public health emergency at EU level. The Health Emergency Operations Facility is composed of two teams, one in Luxembourg and the supporting one in Brussels.

HEOF is intended to ensure the coordination between the Commission, Member States, other associated countries (candidate countries, EEA countries), Agencies, such as European Centre for Disease Prevention and Control (ECDC), European Food Safety Agency (EFSA) and European Agency for the Evaluation of Medicinal Products (EMEA), and international organisations (such as WHO) during an emergency situation. The International Health Regulations (IHR) Focal Points group is also associated with this process. HEOF's role is also to provide the Commission and Member States with an overview of the situation.

ARGUS - a general European rapid alert system

ARGUS complements the other sectoral Rapid Alert Systems established by the Commission and operates in the event of multi-sector crises requiring action at Community level (such as the pandemic (H1N1) 2009).

ARGUS has been set up with the aim to assure a coordinated and effective management of major multi-sector crises that require a reaction at the European Community level. It is an EU network. Member States and external bodies are connected through sector-specific rapid alert systems.

Surveillance and detection of signal: MedISys

MedISys (Medical Intelligence System) is an internet based monitoring and analysis system developed by the Commission's Joint Research Centre (JRC) for the Health and Consumer Protection Directorate General (DG SANCO) to identify potential threats to the public health using information from the Internet. These 'threats' include both communicable diseases and chemical, biological and radio- nuclear threats which could have a widespread impact on the health of the European Community.

Early warning and rapid alert systems: EWRS, RAS- BICHAT and RAS-CHEM

In order to ensure a rapid and effective response by the EU to a wide range of emergencies, the Commission has put in place several early warning and rapid alert systems. These systems allow public health authorities in Member States and the Commission to receive and trigger an alert as well as exchanging other relevant information regarding events likely to affect public health at EU-level, and coordination of measures.

HEDIS – Situation Awareness

HEDIS is a restricted Web-based tool supporting the Member States and the Commission during disease outbreaks and health emergencies, providing an overview of the situation on an identified health threat. For each new crisis a dedicated sub-portal is generated where stakeholders can find all information related to the threat.

DG SANCO Internal Crisis Intranet

The DG SANCO internal crisis intranet is the place where the Commission decision makers will find all the needed information for the taking of coherent and adapted decisions, adaptable to the scenario circumstances and environment.

Vulnerability assessment: MATRIX

MATRIX is a web-based tool allowing Member States to assess their vulnerability against specific biological and chemical agents. The assessment is based on replies given to a wide range of pre-defined questions related to the threat. It facilitates also their evaluation of level of risk.

5.2.3 ECDC – HEALTH EMERGENCIES

European Centre for Disease Prevention and Control ECDC

ECDC is an independent agency of the EU. ECDC's main role as an agency of the European Union is to strengthen Europe's defences against communicable diseases. It serves the need for a better coordination of the Member States' response to the outbreak and scientific advice on options to control such an outbreak and spreading at EU level.

One of the biggest achievements has been to make available Europe-wide data to all stakeholders, with the launch of the European Surveillance System (TESSy). ECDC centralised the previous Dedicated Surveillance Networks and replaced the 17 data collection systems into one system for the collection, validation, cleaning, analysis and dissemination of data from all EU/EEA countries.

The full complement of the information regarding EU concepts and procedures are provided at Annex 5, chapter 13.2. For ease of reference belowTable 18summarizes the essentials in an executive style fashion.

The consequences of this analysis for PULSE is summarized in the right column. Operationally, they are described in the Use Cases of D2.2, and will be reflected in the SOP analyses and diagrams of D5.2.

Table 18: SOP Status Quo Summary European Union

Source	Issuing / Parent Organization	Geo-Area covered	Operational focus	Characteristics	Conclusions for PULSE
Emergency Response Coordination Centre (ERRC)	European Commission Humanitarian Aid and Civil Protection Department (ECHO)	EU	Facilitation of a coherent European response during emergencies	The ERCC collects and analyses real-time information on disasters, monitors hazards, prepares plans for the deployment of experts, teams and equipment, works with Member States to map available assets and coordinates the EU's	Exchange of intelligence & information Access to plans regarding expert teams and equipment identification & utilization of interfaces

				disaster response efforts	
Global Disaster Alert and Coordination System (GDACS)	UN & EC	World	Improvement of alerts, information exchange and immediate disaster coordination	GDACS is a cooperation between the UN, the European Commission and disaster managers worldwide providing post-disaster maps, social media and disaster monitoring through mobile applications and disaster event feeds	Exchange of intelligence & information Access to and utilization of the various disaster event feeds Register PULSE mobile apps for GDACS purposes
Common Emergency Communication and Information System (CECIS)	EC/DG ECHO	EU	Better protecting citicens form natural and technological hazards	Communication system between the ERCC and national authorities, hosting a database on potentially available assets, used to handle requests of assistance, to exchange information, and for documentation of actions and messages	Access to stored data & information
Disaster Victim Identification Unit - INTERPOL	INTERPOL	Member States	Victim identification	Provisions of guidelines and international standards for nations not having own victim identification capabilities	Access to information
COPERNICUS Emergency Management Service	European Space Agency (ESA)	EU	Provision of globally consistent reference maps	Building up and frequently up-dating background imagery based on fast data dissemination which can also be used for the purpose of impact assessments in the course of major emergencies	Retrieving of data Formulation and statement of data required identification & utilization of interfaces
Health Emergency Operations	EC / DG SANCO	EU	Coordinated management of public health	HEOF consists of a Senior Management Team supported by 4 operational teams	Exchange of intelligence & information

Facility (HEOF)			emergency at EU level	ensuring coordination between the Commission, Member States, other associated countries, and international organisations and providing an overview of the situation	
European Rapid Alert System (ARGUS)	EC	EU	Coordinated and effective management of major multi-sectoral crises that require reaction at European Community level	Information and alert exchange in the EC, activation of the Crisis Coordination Committee, source of information for the Commission to communicate with the public	Link into the EC alert cycle and source of information for the public
Medical Intelligence System (MedISys)	EC / DG SANCO	EU	Identification of potential threats to the public health	Monitoring, collecting, analysing, and storing information from various source categories of the internet, filtering out keywords aiming at generating alerts	Sharing information Observed as addressee for alerts
Early Warning and Response System (EWRS)	ECDC	EU	Threats related to communicable diseases	Notification of the Commission and the Member States of outbreaks, regulations on exchange of information and discussion about the coordination of response measures	Exchange of intelligence & information
Rapid Alert System on the Release of Biological, Chemical and Radio-nuclear Agents (RAS-BICHAT)	ECDC	EU	Threats related to B,C,and R/N agents	Exchange of information and notification of stakeholders on health threats due to the deliberate relase of B,C, or R/N agents	Exchange of intelligence & information
Health Emergency & Disease Information System (HEDIS)	EC / DG SANCO	EU	Overview of the situation on an identified health threat	Web-based portal offering a central destination and jumping off point for all the information derived from various sources	Sharing of information Access to the portal

				communication tools, access to Geographic Information Systems (GIS) and modeling applications allowing European stakeholders responsible for health threats response to consult and exchange health-related information	
Vulnerability Assessment (MATRIX)	EC / DG SANCO	EU	Assessment of vulnerability against specific biological and chemical agents	MATRIX gives access to: A library of guidelines and documents in the field of health threats; A table for the classification of events and incidents with health consequences; Algorithms applicable for the handling of a crisis; Specialised sites, databases and encyclopaedias	Sharing information Access to sites, databases and encyclopaedias
European Centre for Disease Prevention and Control (ECDC)	EU	EU	Strengthen Europe's defence against communicable diseases	In partnership with national health protection bodies across Europe: (a) search for, collect, collate, evaluate and disseminate relevant scientific and technical data; (b) provide scientific opinions and scientific and technical assistance including training; (c) provide timely information to the Commission, the Member States, Community agencies and international organisations active within the field of public health;	Exchange of intelligence & information Access to scientific expertise and technical data Contribution to the European networking activities

				(d) coordinate the European networking of bodies operating in the fields within the Centres mission, including networks arising from public health activities supported by the Commission and operating the dedicated surveillance networks; (e) exchange information, expertise and best practices, and facilitate the development and implementation of joint actions.	
The European Surveillance System (TESSy)	ECDC	EU	Reporting and retrieving health surveillance data	Indicator-based surveillance platform for systematic collection, analysis, interpretation and dissemination of indicators for public health action.	Exchange of intelligence & information

5.3 UN and WHO

Again, an elaborate description can be found in Annex 5

5.3.1 World Health Organisation (WHO)

The WHO has an essential role to play in supporting Member States to prepare for, respond to and recover from emergencies with public health consequences. Its primary role is to direct and coordinate international health within the United Nations' system.

These are main areas of work:

- Health systems
- Promoting health through the life-course
- Non-communicable diseases
- Communicable diseases
- Corporate services
- Preparedness, surveillance and response

Emergency Response Framework (ERF)

The ERF sets out WHO's core commitments in emergency response which are those actions that WHO is committed to delivering in emergencies with public health consequences to minimize mortality and life-threatening morbidity by leading a coordinated and effective health sector response.

The ERF elaborates the steps WHO will take between the initial alert of an event and its eventual emergency classification, including event verification and event risk assessment.

The ERF describes WHO's internal grading process for emergencies including the purpose of grading, the definitions of the various grades, the criteria for grading, and the steps to remove a grade.

WHO's obligations under the International Health Regulations (2005)

In response to the exponential increase in international travel and trade, and emergence and re-emergence of international disease threats and other health risks, 196 countries across the globe have agreed to implement the International Health Regulations (2005) (IHR). This binding instrument of international law entered into force on 15 June 2007.

The renewed and enhanced commitments of Member States and WHO under the International Health Regulations (IHR) (2005) have defined the obligations of countries to assess, report and respond to public health hazards, and established a number of procedures that WHO must follow to uphold global public health security. PHEIC procedures

Global Outbreak Alert and Response Network

During outbreaks, the Global Outbreak Alert and Response Network (GOARN) ensures that the right technical expertise and skills are on the ground where and when they are needed most.

Strategic Health Operations Centre

The WHO Strategic Health Operations Centre (SHOC) monitors global public health events around the clock, and facilitates international collaboration during public health emergencies.

Public Health Emergency Operations Network

Through the Public Health Emergency Operations Network (EOCNET), WHO supports countries in setting up or improving their EOCs, to strengthen their coordination and response systems.

The full complement of the information regarding UN and WHO concepts and procedures are provided at Annex 5. For ease of reference and overview, below table summarizes the essentials in an executive style.

Table 19: SOP Status Quo Summary UN and WHO

Source	Issuing / Parent Organization	Geo-Area covered	Operational focus	Characteristics	Conclusions for PULSE

Emergency Response Framework (ERF)	WHO	World	Coordinated and effective health sector response to minimize mortality and life-threatening morbidity	Initial alert, emergency classification, event verification and event risk assessment Grading process Performance standards and critical functions for emergency response Global Emergency Management Team Emergency Response Procedures Essential emergency policies	Exchange of intelligence & information Access to standards, procedures, and policies Identification & utilization of interfaces
International Health Regulations (IHR)	WHO	World	International community to prevent and respond to acute public health risks having the potential to cross borders and threaten people worldwide	Binding instrument of international law obligating member nations to strengthen inter alia: disease prevention, surveillance, control and response systems public health security WHO global alert and response system management of specific risks	Exchange of intelligence & information Identification & utilization of interfaces
Global Outbreak Alert and Response Network (GOARN)	WHO Strategic Health Operations Centre	World	Improving the coordination of international outbreak responses and providing an operational framework for the delivery of support	Assist with disease control efforts by technical support to affected populations Investigate and characterize events and assess risks of emerging epidemic disease threats Support national outbreak preparedness and containment of epidemic threats	Exchange of intelligence & information

As mentioned before, national systems established and international regulations adopted by the EU and WHO Member States have led to a complementary multi-faceted healthcare environment with numerous systems and tools in operation. The challenge for PULSE is to recognize this situation, to identify room for manoeuvre and

improvement and to attune development and implementation of its tools to serve in this environment.

6 Conclusions and outlook

The overarching disaster response objectives and for medical support in major emergencies primarily hinges on the protection and saving of human life and the alleviation of suffering. Consequently, medical professionalism regulated by national and international standards is a collective aspect to all health operators across different health sectors/professions and diverse nationalities. However, guided by national requirements and numerous national and international regulations, EU Member States have developed their own country specific concepts and procedures for medical support in major emergencies. Representing a fair cross-section of the members of the European Union, the status quo analysis of the four nations selected for the PULSE project proves that at present the EMS status of a country depends on its peculiar national environment and medical settings. In consequence, no single European-wide EMS model exists.

Acting on the assumption of a European-wide necessity for a platform like PULSE providing not only decision support but also knowledge management in health related decision making during major emergencies, the analysis of existing national and international systems and respective procedures sets the framework conditions for specific PULSE operational procedures emerging from the findings and the recommendations given by the contributors to the report on what functionalities may be supportive for PULSE in two ways:

- the positive lessons learned and conclusions for PULSE which are communicated to the tool designers and
- the identified gaps or weaknesses which serve as recommendations where PULSE should concentrate its future effort

Both experiences will be incorporated in the WP5 follow-on work for D.5.2 on the PULSE SOPs.

Including key stakeholders such as hospitals, community health services, pre-hospital emergency care services, medical suppliers, rescue services, health related voluntary services and others, any European-wide health support system needs consistent, coordinated and standardised advanced support methods and tools providing assistance in critical tasks (early threat detection, common operational picture, creation of surge capacity e.g.). At pan- European level the requirement includes an interoperable framework with the ability to provide a coordinated European response to any major health related incident. In the context of this larger healthcare domain, PULSE must aim to meet these challenges.[26]

[26] See: PULSE DoW, A1: Project Summary.

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8 Terms, Definitions, Acronyms

8.1 Glossary of terms and definitions (for D5.1 and D5.2)

Term	Definition
Actor/Action tables	Tables that for each action specify who are the actors and which role they play (e.g. accountable, responsible, consulted, informed). They are also known as RACI tables or matrices
Architecture	See: *System Architecture*
CCS	Casualty Clearance Station It is located at a safe distance away from the incident, to safely manage casualties delivered from the scene. It serves as a point for secondary triage and for provision of life saving treatments to safely package the casualties for transport to hospital.
Consequence	Mandatory measures taken in re-action to the effects of a particular action or set of conditions.
Consequence Management	To prevent the impact of an incident escalating. It manages wider consequences and services such as maintaining or restoring transport and communication networks, restoring other essential public services, providing emergency relief to administrations, businesses, and individuals affected by the consequences of an incident. Informed by crisis management at national (strategic) level, Consequence Management is understood to happen at regional (operational) level.
Crisis	A difficult or dangerous situation that needs serious attention.
Crisis Management	Preventing or averting an imminent emergency, to mitigate its effects, to prevent further damage or disruption. It also includes law enforcement operations, legislative provisions, assurance of public health, safety and welfare, the coordination of overall response efforts, disseminating public information, and national and international cooperation. Crisis management is understood to happen at national (strategic) level guiding Consequence Management at regional (operational) level.
Disaster	A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the community or society to cope using ist own resources.
Disaster Response	The systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster.
DoW	Description of Work

	The official document, version 2013-10-11, that states PULSE project scope and content
ECM	Event Medical Co-ordinator. The person with the task of overall control and coordination of medical/first-aid provision at the event. That person is the single point of contact in relation to the event medical plan.
Ethics	Ethics is the systematic reflection on right and wrong conduct according to norms and values that we think should be adhered to.
Ethical Impact Assessment	An EIA is a process during which an organisation – or project consortium, as in the case of PULSE – together with stakeholders (and, in particular, end-users) considers the ethical issues or impacts posed by a new project, technology, service, programme, legislation, or other initiative, to identify risks and solutions.
Ethical issues	Ethical issues refer to the issues concerning some aspects that raise ethical questions.
Functionality	Any service that a product or a software can do for a user.
Guideline	Guidelines are meant to guide emergency response to risks, threats or incidents. A guideline is a statement of policy and procedure or advice on policy. Consequently the guidelines contained in this document do not prescribe specific actions at a certain time or in a specific situation as a detailed SOPs would do.
IHR	International Health Regulations The International Health Regulations (2005) are legally binding regulations (forming international law) that aim to assist countries to work together to save lives and livelihoods endangered by the spread of diseases and other health risks, and avoid unnecessary interference with international trade and travel.
Incident	An occurrence that requires a response to protect life or property. Incidents may include major disasters and public health and medical emergencies, and other occurrences requiring an emergency response.
Incident Commander	The person in charge with the incident overall management.
Incident Management	Measures to neutralize, isolate, contain and/or resolve a specific threat or act. The objectives are to stop and stabilize the incident and to minimize its effects, to limit the number of casualties, facilitate recovery, and to take all measures in order to support regaining normalcy as soon as possible.
Interoperability	A property of a product or system, whose interfaces are completely understood, to work with other products or systems, present or future. A more broad definition also takes into account social, political, and organizational factors.

LEPPI Officer	Legal Ethical, Privacy and Policy Issues Officer The LEPPI Officer is the coordinator of all the activities related to legal, ethical, and privacy and policy issues. In particular, LEPPI Officer would be in charge of monitoring that the tools and models developed within PULSE whel operationally implemented respect the national, European and international legislation; ensuring that the privacy directives are respected when implementing health services support systems due to the information handled; promotion awareness of ethical principles and legal requirements within the project work package WP8 and dissemination of PULSE best practice with respect to the LEPPI applied during the project.
LMS	Learning Management System Software application for the administration, documentation, tracking, reporting and delivery of e-learning education courses or training programs. LMS typically are accessible through a standard web browser from which the courses being managed can be accessed and taken. In PULSE, the LMS system will store and deliver training courses to the different categories of end users.
LRS	Learning Record Store. Stores learning records, allows reporting against the records, and allows for exporting of raw learning data.
Meta-SOP	Specification of procedures for e.g. identifying and handling changes, managing information at international level, interoperability etc. In the context of PULSE they are called Meta-SOPs. In addition to and beyond the operationally required procedures (SOPs) these cross-cutting characteristics also need to be analysed and described.
Methodology	in PULSE project, methodologies are mainly procedures which will be adequate to improve the operation and success of the healthcare system in challenging disaster situations where combined operations are required at local, regional, cross border and international levels.
MIC	Medical Incident Commander Key task is to coordinate and organise the medical resources at the scene of an incident allocating tasks and roles.
Model	An abstraction of reality with the aims of better understanding it, mostly described in mathematical/ analytical, also sociological or philosophical terms and methodologies. (see also PULSE Model)
MPORG	MultiPlayer Online Role Playing Game Multiple people participate and interact in the same virtual world in parallel. MPORG system are typically accessed via the internet and used by end users in disparate locations. Within PULSE an MPORG system and environment will be used to train personnel

	within the stadium crush scenario where individuals will assume the roles of different resource personnel involved in such a scenario.
Phase	A subset of a Scenario. Each PULSE Scenario is split in two Phases: Preparedness and Response. Identified, for instance in terms of time (e.g. before the incident) and/or location (e.g. Hospital) and/or type of population involved(e.g. people in “uncertain” status in a SARS like epidemic), and/or purpose (prepare, recover)
Platform	see *PULSE Platform*
Policy	Documents that provide high level guidelines, in terms of actors and responsibilities; they may also specify key phases. The "*Decision No 1082/2013/EU of European Parliament and of the Council of 22 October 2013 on serious cross-border threats to health"* is an example of Policy.
Preparedness	Response activities involve a combination of planning, resources, training, exercising, and organizing to build, sustain, and improve operational capabilities conducted well in advance of an incident. Preparedness is the process of identifying personnel, training, and equipment needed for a wide range of potential incidents, and developing specific preparations for delivering capabilities when needed for an incident. Preparedness activities should be coordinated among all involved agencies and stakeholders, as well as across the EU and Member States.
Procedure	A document describing a sequence of actions that, in the end, produce an output; a procedure normally specify the flow diagram (logic and time sequence of the actions), the actors (who does the action) and the software tools used to do the action.
PULSE	Platform for European Medical Support during Major Emergencies
PULSE End-user	Any actor that is expected to interact with the PULSE Platform. Interaction with the Tools may consist in: provide input, launch simulations/elaborations, get output
PULSE Model (see also Model)	A software routine, based on mathematical models/algotythms for describing phenomena (e.g. processes, problems,...) and for helping to find solutions. In PULSE project, in order to avoid confusion with the genaral meaning of the term "Model" (see definition), the term "PULSE Model" is introduced.
PULSE Platform	PULSE System + PULSE SOP
PULSE Project	The Project that will specify, design, implement and validate the PULSE Platform
PULSE System	The entirety of all software and data produced in PULSE, their cooperation and

	communication, including the presentation of results.
REACT	Communication system that uses a variety of available technologies ranging from wireless broadband, TETRA, through to satellite communication.
Requirements	Justified characteristic needs, formulated by users and experts. For IT systems, usually one distinguishes between technical and operational (possibly strategic) requirements
Response	Ability to limit or inhibit effects of an incident. Effective response relies on disciplined processes, procedures, and systems to communicate timely, accurate, and accessible information on the incident's cause, magnitude, and current situation to the public, responders, and other stakeholders as appropriate. Well-developed command and control protocols, resource management arrangements, legal provisions, public information strategies, and communication plans help to ensure that response activities are coordinated and communicated to numerous diverse stakeholders and audiences in a consistent, accessible, and timely manner.
SARS-like	Infectious Respiratory Disease
Scenario	Description of an incident in terms of background, occurrence and the course of a incident, including response and other related processes of relevance. In PULSE we consider two Scenarios: SARS-like epidemics and Stadium crush-like incident.
SOP	Standard Operational Procedure[27] Established or prescribed methods to be followed routinely for the performance of designated operations or in designated situations.
SOP area	Function or process for which a set of SOPs is in place or may be produced. PULSE Platform includes 9 SOP areas
Standard	A standard provides requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose.
Stakeholder	A person or group that has a stake or interest in something.
Strategic Procedures	Procedures/processes on "very high" level. Decisions on political level; international cooperation.
System	Collection of interrelated components.
System architecture	The structure of a system described in terms of scope, components, relationships to each other and relationships of the system to the environment. The level of detail of the description is dictated by the "granularity" of the

[27] Definition for Pulse. Other definitions used elsewhere: Standard Operating Procedure; Standing Operational Procedure

	components breakdown. In this document the components of the PULSE Platform are the 8 Tools and the 9 SOP areas.
Tactical Preparedness sub-phase	Activities that prepare the response to a specific adverse event ; the sub-phase starts when the situation that may generate the event is announced and ends when the event happens or the situation is no more in place. Lesson learning after the end of the response phase are included in the Tactical Preparedness sub-phase.
Tool	Any helping software instrument, including input/output interfaces with users or other tools or systems (mostly software). A tool may use PULSE Models. A software tool may also be identified with a set of functionalities. PULSE Platform includes 8 tools.
Use Case	A sample materialization of a scenario quantitatively described, including hazardous event or attack event lines, organizations involved, response procedures, numbers and classes of victims, responder and health resources etc.

8.2 Generally used Acronyms (for D5.1 and D5.2)

API	Application Programming Interface
ARI	Acute Respiratory Infections
C2 or C&C	Command and Control
CCS	Casualty Clearing Station
CDC	Center for Disease Control and prevention (USA)
CECIS	Common Emergency Communication and Information System
CIMIC	Civil-Military Cooperation
CM	Crisis Management
COP	Common Operational Picture
DM	Disaster Management
DoW	Description of Work (of the PULSE project)
DSVT	Decision Support & Validation Tool
DVI	Digital Victim Identification
ECDC	European Centre for Disease Prevention and Control
EEI	Essential Element of Information
EEMI	Essential Element of Medical Information
EHS	European Health System (as used in the FP7 Call Text)
EMS	Emergency Medical Service
EMT	Emergency Medical Technician
ENSIR	Event Evolution Model for Biological Events

EOD	Explosives Ordinance Disposal
ERCC	Emergency Response Co-Ordination Centre
EU	European Union
GMES	Global Monitoring for Environment Security
GOARN	Global Outbreak Alert and Response Network
GUI	Graphic User Interface
HEDIS	Health Emergency & Disease Information System
IAT	Intelligence and Analysis Tool
ICS	Incident Command System
ICT	Information and Communication technology
IED	Improvised Explosive Device
IHR	International Health Regulation(s)
KM	Knowledge Management
LT	Logistics Tool
MERS	Middle East Respiratory Syndrome
MoD	Ministry of Defence
MoE	Measures of Effectiveness
MoP	Measures of Performance
MPORG	Multi Player Online Role Game
MRMI	Medical Response to Major Incidents
MS	Member State (EU)
NGO	Non-governmental Organisation
OODA	Observe-Orient-Decide-Act
OSCE	Organization for Security and Co-operation in Europe
PCET	Post Crisis Evaluation Tool
PIO	Public Information Officer
PPP	Public-Private Partnership
RCS	Recognized Current Situation, may be synonymously user with COP
SARI	Severe acute respiratory infections
SARS	Severe Acute Respiratory Syndrome
SCGT	Surge Capacity Generation Support Tool
SLD	Swim Lane Diagrams
SOP	Standard Operational Procedure
TESSy	The European Surveillance System
TT	Training Tool
WHO	World Health Organization
WP	Work Package of the PULSE Project

8.3 Germany -specific acronyms

AFKzV	Federal Committee on Fire Protection, Disaster Response & Civil Protection
AKNZ	Academy for Crisis Management, Emergency Planning and Civil Protection
ASB	Workers Samaritan Federation
ATF	Analytical Task Force
BBK	Federal Agency of Civil Protection and Disaster Assistance
BMG	Federal Ministry of Health
BMI	Federal Ministry of the Interior
deNIS	German Emergency Preparedness Information System
DLRG	German Life Saving Association
DRK	German Red Cross
DV 100	Manual on Leadership and Command in Emergency Operations
EUCREW	Euregional Meuse-Rhine Commission/Working Group & Steering Committee
EUMED	Euregional Emergency Medical Assistance Plan
EMRIC	Euregio Meuse-Rhine in Crises
FRG	Federal Republic of Germany
GMLZ	Federal Joint Information and Situation Centre
ILIAS-HE	State of Hessia Command & Control System
JUH	St. John Ambulance Services
LÜKEX	Inter-ministerial and Interstate Crisis Management Exercise
MHD	Maltese Order Emergency Service
MoWaS	Modular Warning System
NINA	Emergency Information and News Application
PEI	Paul-Ehrlich Institute
RKI	Robert-Koch Institute
SatWaS	Satellite-based Warning System
THW	Federal Agency for Technical Relief
TRBA	Technical Rules for Biological Agents

8.4 Ireland-specific acronyms

NECC	National Emergency Command & Control Centre
LA	Local Authority

AGS	An Garda Síochána (Police)
HSE	Health Service Executive
HEOF	Health Emergency Operations Facility
MEM	Major Emergency Management
TES	Training and Exercise System

8.5 Italy-specific acronyms

AIFA	Agency for Vaccine Management
ARES/AREU	Regional EMS Systems
ASL	Local Health Care Agency
CCM	National Centre for Disease Control and Prevention
CIRI	Inter-University Research Centre on Influenza
CJSU	County Committee for Emergency Situations
CNSCBT	National Centre for Surveillance and Control of Transmissible Disease
CRSP	Regional Centres for Public Health
DSP	Public Health Direction
EMTr	Mobile Team for Triage
HEMS	Helicopter Emergency Medical System
IACRS	See ARI
ICS	Incident Command System
IGSU	General Inspectorate for Emergency Situations
IJJ	County Gendarmerie Inspectorate
IML	Institute of Forensic Medicine
INFLUNET	Surveillance Influenza-like Network
ISS	National Public Health Institute
IPJ	County Police Inspectorate
IPFJ	County Border Police Inspectorate
ISU	Inspectorate for Emergency Situations
ISUJ	County Inspectorate for Emergency Situations
IZS	Institute for Food and Animal Control
MIA	Ministry of Interior
MoD	Ministry Of National Defence
PIO	Public Information Officer
PLC	Wounded Concentration Points

PMA	Advanced Medical Point
RTS	Revised Trauma Score
SABIF	Service Bucharest (Ilfov) of Ambulance
SAJ	County Ambulance Service
SARI	Severe acute respiratory infections
START	Simple Triage and Rapid Treatment
UCSC	Catholic University Medical School, Rome
UMS	Management Support Unit
UPU	Emergency Receiving Unit
USMAF	Border Health Control Offices

8.6 Romania-specific acronyms

CJSU	Consiliul Judetean pentru Situatii de Urgenta (County Committee for Emergency Situations)
CNSCBT	Centrul National de Supraveghere si Control al Bolilor Transmisibile (National Centre for Surveillance and Control of Transmissible Disease)
CRSP	Centru Regional pentru Sanatate Publica (Regional Centres for Public Health)
DSP	Directia de Sanatate Publica (Public Health Direction)
EMTr	Mobile Team for Triage
ESI	Emergency Severity Index
HEMS	Helicopter Emergency Medical System
IACRS	See ARI
IGSU	Inspectoratul General pentru Situatii de Urgenta (General Inspectorate for Emergency Situations)
IJJ	Inspectoratul Judetean de Jandarmerie (County Gendarmerie Inspectorate)
IML	Institutul de Medicina Legala (Institute of Forensic Medicine)
INSP	National Public Health Institute
IPJ	Inspectoratul de Politie Judetean County Police Inspectorate
IPFJ	Inspectoratul de Politie de Frontiera Judetean County Border Police Inspectorate
ISU	Inspectoratul pentru Situatii de Urgenta (Inspectorate for Emergency Situations)
ISUJ	Inspectoratul Judetean pentru Situatii de Urgenta (County Inspectorate for Emergency Situations)
MIA	Ministry of Interior

PLC	Wounded Concentration Points
PMA	Advanced Medical Point
RTS	Revised Trauma Score
SABIF	Serviciul de Ambulanta Bucuresti – Ilfov (Bucharest - Ilfov Ambulance Service)
SAJ	Serviciul de Ambulanta Judetean (County Ambulance Service)
SALVAMONT	The National Association of Mountain Rescue in Romania
SARI	Severe Acute Respiratory Infection
SMURD	Serviciul Mobil de Urgenta Resuscitare si Descarcerare (Mobile Emergency Services for Resuscitation and Extrication)
START	Simple Triage and Rapid Treatment
UMS	Management Support Unit
UPU	Unitate Primire Urgente (Emergency Receiving Unit)

ANNEXES

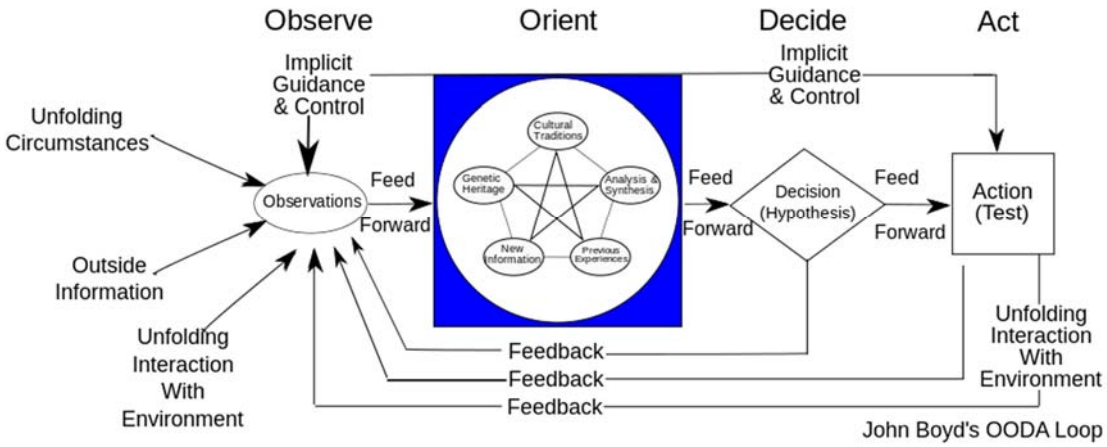
Annex 1

9 Further models and tools for preparedness and response

9.1 Preparedness and response -The OODA[28] model

In order to demonstrate for the range of models of describing CM processes, we here selected another fairly developed concept: A widely accepted approach mainly in the Anglo American sphere is the so called OODA-model [20].

Figure 7 The "OODA-Loop"



It originates from the military domain. It describes the main functions of response and some of preparedness in the four phases of:

1. Observation
    a. Monitoring
    b. Collection of information
2. Orientation
    a. Evaluation/assessment of developing situation
    b. Planning of counter and protection measures
3. Decision
    a. Tasking of forces and assignment of resources
4. Action
    a. Execution of measures and control of results
    b. Feedback and reiteration

Although originating from the military, the concept is of general character. so it can as well be applied to many tasks in homeland security and civil defence.

[28] Observ, Orient, Decide, Act

9.2 Preparedness and response: the CDC model

The US Center for Health Preparedness and response (CDC) provides a well elaborated healthcare system description [6] with the "Chapters" (each an individual document) on community preparedness and recovery, Emergency Operations Coordination and Public Information & Warning, fatality management, information sharing Mass Care and Countermeasures, medical Material and medical surge management and four more chapters on supporting functions.

In the comprehensive list of chapters, those which have a bearing on the PULSE objective and PULSE system functionality are marked.

1. Community Preparedness
2. Community Recovery
3. Emergency Operations Coordination
4. Emergency Public Information and Warning
5. Fatality Management
6. Information Sharing
7. Mass Care
8. Medical Countermeasure Dispensing
9. Medical Materiel Management and Distribution
10. Medical Surge
11. Non-Pharmaceutical Interventions
12. Public Health Laboratory Testing
13. Public Health Surveillance and Epidemiological Investigation
14. Responder Safety and Health
15. Volunteer Management

Documents are recommended as supporting information when developing the procedural guidelines in PULSE D5.2.

9.3 Healthcare system supporting means

In addition to the "Macro" procedures as discussed for disaster management (see e.g. Figure 5), and in addition to the list of procedures above, it must be clear to all involved in PULSE that there are numerous supporting and assisting functions needed which run in the background of such a complex system.

Here we list some basic supporting functions, methods and tools which cannot be elaborated in detail in the chapters of 3 and 5, but which are basically common to all regimes.

These supporting means and functions describe facilities, equipment and processes needed to successfully perform the crisis management in general and the healthcare preparedness and response procedures in particular. They include but, depending on the use case, may not be limited to:

- Alerting system, equipment and rules
- Liaisons to peer and supporting organizations (volunteers, NGOs, individuals, ...)
- Securing and containment (e.g. of basic supplies, disaster areas, transportation routes)
- Communication rules and facilities
- Detailed plans and role models; Tactical/ operational rules, checklists, lookup tables, forms...
- Information processing and communication means, including computers,

networks, APPs,...

- Information management: E.g. avoidance of information overload, avoidance of false positives/negatives; Structuring, storage and distribution management, sorting, filtering, displaying and securing information, ...
- Logistics and maintenance (e.g. material, supplies, equipment, vehicles)
- System and standards for lessons learned collection, assessment and best practices documentation and use
- Quality control procedures
- Training and exercising means, scenarios,
- Rules and conventions on communication with the public and with the media, including communication with, and active use of social media [13]
- Psychological support (of victims, relatives and friends, the society as a whole)
- Legal ad-hoc advice and support from specialized expert groups

Only parts of these supporting functions will be implemented in PULSE (e.g. selected logistics, training and information management functions), others will be realized via assumptions or external interfaces (e.g. alerting, media communications, communication rules), and others will not be modelled explicitly in the PULSE system and scenarios, e.g. psychological operations or specialized expert groups.

Annex 2

10 Relevant frameworks to be considered for PULSE

The main outcome of PULSE WP5 will be the procedures which should be finally followed in the PULSE system application. The basic internal reference documents to build upon are D2.1, the requirements, and D2.2, the use cases. In the process of generating the procedures for PULSE, this D5.1 describing the status-quo is only the baseline to learn from. The PULSE procedures themselves will be developed in D5.2.

10.1 Procedures based on the Requirements

The process of designing the PULSE procedures will follow the steps listed below:

- A basic SOP layout and notation will be developed based on MS OFFICE standards; a "one-meets all" SOP structure will not be possible
- Focus will be on the PULSE objectives as formulated in the DoW, on the core PULSE SOP requirements as defined in D2.1, chapter 8.5 and chapter 9.3.3, and on the improvements in preparedness and response of the European heath system (EHS).
- This is why the status quo here in D5.1 will already reflect the PULSE requirements. I.e. it will state what of the status quo analysis can be useful for and applied to PULSE (see Tables in chapters 4.x.2).
- The status quo description follows the structure model of the so called **operational** SOP areas as defined in D2.1, apter5.3 and tables in 9.6:
    1. Intelligence and information gathering
    2. Treat and Risk analysis
    3. Warning/Alerting
    4. Operational picture generation and situation assessment
    5. Resources and capacities planning,
    6. Task planning, prioritization and execution control
    7. Logistics and stockpiling
    8. Coordination between different services/stakeholders, incl. cross-border support
    9. Post-crisis evaluation and collection of good practices
    10. Training and exercising
- We also regard in the status quo reports the overarching cross cutting requirements defined in D2.1, chapter 8.5.:
    - information sharing
    - interoperability
    - standardization
    - change management
    - communication
- They will focus, according to D2.1 chapter 9.3.3, on guidelines for
    - knowledge management for standardized data collection[29] (must)
    - knowledge management for data sharing at European level (must)
    - Interconnection with other systems (should)
    - Adoption of new regulations [30] (should)

[29] "For the SARS scenario, PULSE SOPs must **comply with the Decision** No 1082/2013/EU of European Parliament and of the Council of 22 October 2013 on serious cross-border threats to health" see also [19]

- alignment with new scenarios (should)
- communication with the media (should) - including the public

"The **SOPs[31] will be described mainly as Policies**, intended as documents that provide high level guidelines, in terms of actors, actions and responsibilities".

10.2 Reflection of the 2 PULSE scenarios

The scope of PULSE will address improvements which will be validated in two rather different scenarios. They have been described and broken down into detailed use cases in D2.2. Although PULSE cannot produce a "general purpose" solution for all healthcare situations, its performance will have to prove in two scenarios which purposely differ in many essential parameters. Due to this diversity of the scenarios, PULSE will demonstrate its effectiveness and performance in a large range of crisis parameters which are summarized in Table 20.

Its contents is taken from D2.2 The columns 3 and 5 added here already indicate how scenario characteristics will have an impact on the PULSE procedures. And this relevance is partially different in the two scenarios.

Table 20: The main characteristics of the two different PULSE scenarios

Threat scenario and response Characteristics	**Scenario 1) SARS Incident**	**Relevance for PULSE procedures**	**Scenario 2) Stadium crush**	**Relevance for PULSE procedures**
Likelihood	Between likely and unlikely		Likely	
Impact	Very serious to catastrophic[32]		Very serious[1]	
Total risk class	Major emergency		Major emergency	
Affected area	From local up to international		Regional/national/international	
Escalation time profile	Developing over days / weeks	med	Arising within minutes; lasting several hours maximum	high
Alerting of the public	Gradually progressing	high	No alerting possible	no
Alerting/ instructing responder services	Long preparation & pre-alerting phase	high	Immediately; through emergency dispatching centres	high
Importance of international coordination	Very extensive	high	Only if event is located close to a border	low
Type of international coordination/ collaboration	Sharing of the • Identification of source of agent • scientific investigation of the agent type • Investigation of infection route(s) • hospital resources	high	Coordination: Search and Rescue-Teams; Equipment , and Know How; Transfer/ distribution/ allocation of very seriously injured persons	low

[30] "-a new change management SOP."

[31] The term "SOP" taken from D2.1 Chapter 9.3. Here we better talk about "Procedures"

[32] for definitions see D2.2

	• special treatment • resources like Medications (Vaccines; antibiotics; ...) • sharing/mutual support in transportation of patients, ...			
Political relevance	High; on local / national government to international level	high	Low to medium; High impact on local level if there had been pre-alerts of a threat[33]	med
Societal public perception	Very high	high	Limited	low
Societal reactions	Very intensive, depending on spread and seriousness of infections	med	Locally limited concerns	low
Societal consequences/ impact on social order, peace	May escalate to panicking; undue withholding of medication; hoarding; looting;	med	Limited	no
Ethical and psychological implications	Broad; may cause deep doubts and mistrust against public admin. and healthcare system	no	Limited; psychological treatment of relatives	no
Economic impact	May be very serious (loss of working force, ...)	no	Locally limited	no
Environmental impact	Possible impact on local, regional animal populations (if susceptible to the disease)	no	None to minor	no
Impact on vital infrastructures	On hospitals and ambulance services Collapse of health care sector due to loss of work force on the one side and high numbers of patients in need of intensive care. Possible collapse of supply chains due to loss of work force	high	Local stadium and possibly some surrounding infrastructure	no
Priority requirements: **Preparedness**	Medication stocks Early warning indication system Capacity planning Quality of diagnosis Hospital surge capability Communication strategies International coordination regulations	high	Resilience of stadium and site infrastructure Quality of first responders Real-time indicator monitoring Adaptive response capability	low
Priority requirements: **Response**	Alerting of medical and public order services Forecasting of development and spreading Public communication Inter-services and international cooperation Monitoring of criminal escalations	high	Very short-term decision making On-site communication Monitoring of critical spots and events First aid capability Fast reinforcement of security staff	high

[33] Depends on whether this scenario is caused by "internal" tensions or "external" trigger (e.g. terroristic)

10.3 Legal frameworks

The legal framework for such a system of tasks, rules and responsibilities is usually a huge cross-jurisdictional compound which will be discussed in more detail in WP8 and its deliverables. In the example of Germany again, it rests on the following pillars [3]

- National level/state level legislation
- Local level legislation
- Unions and trade associations
- Private sector: privacy and civil rights protection and private duties
- Inclusion of and cooperation with Volunteers and NGOs.
- International law and international level agreements, above all UN and EU
- Bilateral agreements (e.g. in Germany with 12 neighbouring states) allowing regional agreements

The legal framework for such a compound of tasks, rules and responsibilities is nation specific. This limits opportunities for standardization on an international scale, however it calls for harmonization and the improvement of interoperability.

Legislation in security, furthermore, needs to be rather dynamic because it continuously needs to be adapted to changing threats and risks. The downside of this is that this sometimes leads to overreaction and inadequate legal action (see e.g. [24]).

10.4 Public-Private Partnership (PPP)

PPPs in civil protection cover the cooperation of public security organisations and services, NGOs, volunteer organizations, private and commercial security organizations and services. In Germany partnerships covers 6 volunteer organizations and 3 NGOs [3]. In strategic security dimensions, PPPs are becoming more and more essential. Typical current examples are treatment of refugees or the joint protection of critical infrastructure. In both cases, however, workable legal frameworks for PPPs are still in infancy status at best, while in healthcare, public-private cooperation and partnership rest on very old and grown traditions.

In a wider sense, in health care, political-societal frameworks, private and public organisations include e.g. hospital structures, ambulance, health treatment, health insurance and risk and liability insurance. These regulations widely vary across different countries [7], e.g. in terms of political/societal frameworks (hospital structures, ambulances, paramedics, insurance system) or public vs. private coverage of health risks.

10.5 Interoperability

The PULSE DoW in WP 5 sets the objective for interoperability "...in challenging disaster operations where combined operations are required at local, regional, cross border and international levels". This requires that systems working for and fitting to cross-organisational, cross-border an international cooperation need to be interoperable. It is also a requirement stated in D2.1. The focus of PULSE is on

improving collaborative procedures.

Interoperability is often a prerequisite for effective collaboration. It is, however, a very challenging and in many cases unsolved issue. Interoperability of the PULSE solutions will be mainly realize by offering standard interfaces which will be defined in the tool design and implementation (WPs 3 and 4). A general layout of what needs to be regarded in and what should be expected from an interoperability concept is given by ENISA [28]. The status-quo chapters under chapter. 3 will give some indication on what the state of the art of interoperability is in existing healthcare systems.

An interoperability concept needs to cover standards and commonly agreed terms, processes, data, software architecture, module and communications protocols at all levels of a disaster and/or crisis management hierarchy, from political level down to technical standards. Interoperability is not further detailed here but will be discussed as one of the supporting concepts of the PULSE architecture.

10.6 Operational Concepts

A comprehensive disaster response system rests on the integration of response actors and stakeholders and the seamless coordination of response operations. In this context, key concepts include:

- Enhanced preparedness
- Crisis action planning
- Situational awareness
- Collective operational approach
- Unified action
- Command & control arrangements to conduct multi-agency coordination and support, and crisis management
- Public information strategies
- Resource management, rapid surge of resources
- Mutual aid and assistance
- Layered and mutually supporting capabilities
- International cooperation and collaboration
- Integration of individuals and households, private sector and non-governmental organizations, public-sector agencies and institutions, professional and volunteer responder entities, and policy- and decision maker at all levels of administration
- Interoperability of processes and technical systems

Further models on preparedness and response and components needed for preparedness and response can be found in Annex 1.

Annex 3

11 Sample Healthcare concepts and procedures in view of PULSE

Chapters 3 and 4 of the main document form the core of D5.1. Summaries presented there are based on detailed analysis and referencing as documented in this Annex. Here, sample healthcare systems are described. In order to allow for better comparison and evaluation, each chapter describing national procedures mainly uses the same basic structure and tables as set here in chapter 11.1. The description and discussion of the four nations represented in PULSE follow in chapters:

11.2 for Germany

11.3 for Ireland

11.4 for Italy and

11.5 for Romania.

11.1 Standard Descriptions in this document

This chapter provides for common understanding of the process and scheme on how to describe existing procedural samples, at national level. It gives also some guidelines and templates for structuring and evaluating existing procedures.

For the purposes of PULSE we should have in view the ultimate result of WP5, which is the description of the PULSE procedural guidelines. The requirements of PULSE for selected new and /or improved procedures have been set in D2.1. This status quo report should not just describe what is documented in national regulations anyway (Task 5.1) but should identify improvement potential (Task 5.2). For that purpose, four selected national systems are described, and their features are reflected against the requirements. This is a first assessment which will be the basis for describing the PULSE-specific procedural guidelines in D5.2.

The "standard" for describing sample existing national procedures in this document follows maily the same scheme Deviations are possible if national specifics need to be regarded.

11.1.1 Procedures analysed

- Source references
- Brief description of procedures and source material
- Main areas and entities (org., resources, supplies, ...)covered
- Main Functions covered
- Cooperation and interoperability (see objective 2 of DoW)

11.1.2 Assessment in view of PULSE operational requirements

Discussion of the national procedures in view of the expected performance of the PULSE system:

- Strengths and positive experience
- Weaknesses, gaps, deficiencies
- Improvement potential (in the sense of PULSE objectives)
- Mapping of national procedures to the PULSE "SOP" requirements

Table 21: Template - Mapping of national systems to the PULSE requirements

Procedures described in D2.1	**Covers the Pulse "SOP"s** yes partly no	**Improvement Potential**	**Could serve as basis for the PULSE procedure**	**IT systems used?** **Briefly describe**
1. Intelligence and information gathering				
2. Treat and Risk analysis				
3. Warning/Alerting				
4. Operational picture generation and situation assessment				
5. Resources and capacities planning,				
6. Task planning, prioritization and execution control				
7. Logistics and stockpiling				
8. Coordination between different services/stakeholders, incl. cross-border support				
9. Post-crisis evaluation and collection of good practices				
10. Training and exercising				

11.1.3 **Use Case Applicability**

Applicability or adequacy of the national procedures to the PUSE scenarios:

Verbal discussion plus summary table.

Table 22: Template - Mapping of national systems to the PULSE scenarios

Pulse scenario	**Strengths** for covering the scenario requirements	**Weaknesses** (not covering specific scenario requirements)
1. SARS		
2. Stadium		

11.1.4 "Meta" SOPs covered

The PULSE project not only asks for improving the operational processes in the EHS. D2.1 also asks for the specification of "SOP"s which are necessary for the introduction of procedures for e.g. identifying and handling changes, managing information at national abd international level, interoperability etc. We call these Meta-SOPs. Therefore, in addition to the above operationally required procedures, these cross-cutting characteristics also need to be analysed and described whether and how they are reflected in the national systems and how they could be improved when applying a PULSE-like system.

Table 23: Template - Mapping of national systems to the "Meta-SOP"s

Characteristics of the "Meta-SOP" described in D2.1 *"must" = mandatory* *"should" = desirable*	**Covers the PULSE "Meta-SOP"** Yes partly no	**Improvement Potential**	**Could serve as basis for the PULSE SOP**
Knowledge management			
• knowledge management for standardized data collection (must)			
• knowledge management for Information/data sharing at European level (must)			
Standards			
• Standardization/standards used			
• Interoperability/interconnection with other systems (must[34])			
Change management			
• Adoption of new regulations (should)			
• alignment with new scenarios (should)			
communication with media (should)			

[34] D2.1, 9.4, pg 69

11.1.5 **Possible further benefits for PULSE**

Identification of how the discussion. of and experience from the national system could contribute to enhance and/or enlarge the PULSE system functionalityl

11.1.6 **Summary evaluation**

A brief verbal summary of the national system analysis w.r. to PULSE.

11.2 Germany - Disaster Response Concepts and Structures

11.2.1 Legal Framework

In Germany, a nation with a distinct federal structure, emergency preparedness and response are taken forward by a layered legislative system characterized by a joint federal – state responsibility for the management of emergencies. The German crisis management system is based on a consistent, nationwide, systematic approach to incident management applicable at all levels of government and administration, nongovernmental organizations (NGOs), the public and private sector, and across functional disciplines in an all-hazards context[35].

Civil protection is a legislative obligation and is assumed by the Federal Government in the first place. The federal level takes responsibility for **civil protection** (formerly known as civil defence) in that it plans and assigns resources and executes crisis and coordination management when emergencies are of national/international significance or impact across state boundaries.

Initiated and informed by federal law on hazard prevention and civil protection,[36] each of the 16 States have issued their own legislation focussing on resource management and operational crisis- and coordination management.

The state level (16 states) including local administrations (districts, counties, county boroughs and major cities) executes and controls what is now called **disaster response,** dealing with domestic situations.

A wide range of federal support (information, coordination, advice and resources) for the states is provided in case of impact on an especially large scale or of national significance. At the same time, depending on the situation, there is close federal – state coordination on vulnerability assessments and the appropriate measures 0.

In view of PULSE health care regarding rescue organisations and emergency medical services and disaster control fall exclusively within the jurisdiction of the 16 German States.

11.2.2 Incident Management

Founded on the basic premise, that incidents are handled at the lowest level capable and controlled and sustained at the highest level necessary, local communities (counties/county boroughs and major cities) form the ‘Lower Disaster Response Authority’ executing incident management and local operations. Länder (states) form the ‘Higher Disaster Response Authority’ in charge of consequence management primarily. They coordinate and control local response efforts, support and sustain response operations and take care of the public, media and politics.[37]

In the order of sequence medical actions originated by major emergencies may flow as follows:

- Emergency life support,

[35] covering a very large spectrum of risks

[36] Gesetz über die Gefahrenabwehr bei Katastrophen – Katastrophenschutzgesetz KatSG www.bbk.bund.de/SharedDocs/Downloads/BBK/DE/FIS/DownloadsRechtundVorschriften/RechtsgrundlagenBundeslaender/KatSG%20Berlin.pdf

[37] Ibid.

- Emergency calls,
- First Aid,
- Sustained medical support,
- Transport,
- Intensive care / medical treatment,
- Rehabilitation.

In this context, one particular issue determining structure, functions and operational standards also for the EU is the adherence to Anglo-American or Franco-German EMS systems. The latter system, which is followed by Germany, is a "… Physician-EMS-based model that enables a Doctor and EMS to evaluate and treat a patient on the scene of a medical emergency. The patient can be taken to a hospital or clinic if further evaluation is required. The Anglo-American model, on the other hand, consists of ambulances staffed with Emergency Medical Technicians (EMTs) and Paramedics trained in Basic, Intermediate and Advanced life support. They provide pre-hospital emergency care, including stabilization, intervention and the transport of the patient to a hospital or clinic for further evaluation by emergency Doctors or Physicians."0
Nevertheless, above medical chain might be embedded into and coordinated with other response operations happening the same time and at the same site such as:

- Securing and cordoning the incident site,
- Controlling traffic in the hazard zone,
- Search teams conducting surveys and searches for victims,
- Utility companies cutting off or securing services,
- Removal of debris by heavy equipment,
- Rescue from the immediate hazard zone,
- Reception and tasking of additionally arriving rescue assets and relief teams,
- Establishment of and command by an incident command organisation,
- Dealing with press and media0.

Actors in support of the overall incident response effort could include:

- Medical rescue organisations such as:
    i. DRK – German Red Cross,
    ii. MHD – Maltese Order Emergency Service,
    iii. JUH – St. John Ambulance Services,
    iv. ASB – Workers Samaritan Federation,
    v. DLRG – German Life Saving Association,
- NGOs and private rescue/relief organisations,
- State as well as privately owned hospitals, other medical facilities and research institutions,
- Technical relief teams (Federal Agency for Technical Relief/THW),
- Emergency medical teams,
- Police (Federal Police and State Police),
- Armed Forces Capabilities,
- Volunteer Organisations (local Fire Fighting forces) ,
- Professional municipal and/or industrial/company Fire Fighting Teams,

- Specialised Rescue assets such as Airmobile Rescue Teams[38] or Mobile Analysis Teams,
- Investigation Teams.

With so many organisations and actors from federal, state, municipal and private level involved, the disaster response working appears to be a miracle. Consequently, administrative and operational pillars have been introduced to facilitate unified incident management services.

- On the one hand it is the service regulation 100 “Leadership and Command in Emergency Operations”[1] which regulates basic principles for the German incident command system. It describes the command system, elaborates the command organization, the command process and according means. This regulation ensures the cooperation between different services, organizations, institutions and authorities at the site of an incident, still giving room for regional particularities.
- On the other hand it is the implementation of a nationwide system of integrated 24/7 rescue coordination centres in 295 counties and 107 county boroughs.

Local Command and Control in major emergencies is executed on county/county borough level. The district administrator is the sole executive individual directing the work of a crisis staff (administrative component) and the incident command (operational/tactical component).

11.2.3 **Disaster Response Coordination and Support**

Depending character and scale of an incident, on state and on federal level so-called ‘Inter-governmental Coordination Groups’ may be established on short notice to execute control and to sustain the on-going operation. While the coordination on federal level[39]also actively includes the states, the coordination on state level[40] primarily concerns state ministries.
Emphasizing civil protection as a cornerstone of national security the following instruments and resources have been established for the provision of supplement to the capabilitiy pools of states and municipalities.

- **Federal Office of Civil Protection and Disaster Assistance (BBK)**

A superior federal authority; primary responsibilities include:

- Planning and preparing civil protection (emergency preparedness and contingency planning),

[38] In Germany air rescue in coordinated by the 16 states, which can resort to 74 air rescue stations controlled by a number of different private operators.

[39] Federal level: „Geschäftsordnung der Interministeriellen Koordinierungsgruppe des Bundes und der Länder (GO IntMinKoGr)“. www.innenministerkonferenz.de/IMK/DE/termine/to-beschluesse/07-06-01/07-06-01-anlage_zu_nr_20.pdf

[40] As an example the Terms of Reference of one federal state (North-Rhine-Westfalia), “Geschäftsordnung der Koordinierungsgruppe der Landesregierung für Großschadensereignisse und großflächige Gefahrenlagen”. Insert titel into a search engine.

- Planning and preparing cooperation between the Federal Government and the federal states,
- Basic and advanced training for decision-makers and top executives from the field of civil security preparedness, including civil protection and disaster response.

- **Federal Agency for Technical Relief (THW)**

In accordance with the federal civil protection and Disaster Relief Act, the agency

- provides technical relief in emergencies in Germany and abroad on behalf of the government,
- manages disasters, public emergencies and large-scale accidents.

99% of THW's manpower of approximately 80.000 located in 668 local THW units are volunteers.[41]

- **Federal Joint Information and Situation Centre (GMLZ)**

In the event of large-scale disasters or similar incidents of national importance, the centre provides situational and resource management information to the states and concerned organisations. GMLZ missions include:

- 24/7 operation.
- Generation of regularly updated awareness of the global situation for the federal inter-ministerial co-ordination group and similar centres of the state's ministries.
- Preparation of qualified and validate hazard and damage predictions.
- Placement of shortage resources for hazard prevention to national and international users.
- Support of co-operation in disaster control missions in the context of the mechanism of the EU.

- **German Emergency Preparedness Information System (deNIS)**

deNIS is a computer-assisted crisis management system cross-linking federal and state systems down to county level. Its database system facilitates:

nation-wide information, operations, resource and reporting management,

- rapid and comprehensive operational picture,
- prioritization and synchronization of response measures,
- work from virtual crisis management staffs,
- improvement of decision making on all levels involved.

Supported by satellite imagery and weather data, the system provides situational maps, damage overviews and risk analysis and it maintains a response log.

In extension of the basic deNIS, deNIS ^{plus} for Crisis Situation Centres has been implemented, addressing decision makers in the event of large-scale disasters.

It is a comprehensive geographical information network providing data in support of the work of crisis situation centres in real operations as well as for training and

[41] See: www.bmi.bund.de/EN/Topics/Civil-Protection/THW/

exercises.[42]
Based on a EU Council Decision for the intensified co-operation between disaster management authorities, an Emergency Response Coordination Centre (ERCC) has been installed. deNIS is the interface to the ERCC on the German side.

- **Satellite-based Communication System**

In facilitation of warning the public in an appropriate, timely, efficient and comprehensive manner, the so-called **SatWaS** (Satellite-based Warning System)[43] has been launched. It allows the transfer of warnings to all connected radio and television stations, media providers, internet and paging service providers, as well as to German Railway (Deutsche Bahn) within a few seconds. Connected alarm devices can also be triggered at the same time.
In addition, since 2013 a modular warning system (**MoWaS**) has been in operation, improving SatWaS.
For retrieving information and data from MoWaS, 2013 BBK introduced a public Warn-App called **NINA**[44]. It runs on iOS (version 7.0 and higher) and on Android (version 4.0 and higher). For other systems a specific website is available.
Nationwide, NINA warns against hazards and major emergencies by pushing information to the user, and the Warn-App also contains hazard-specific rules of conduct and emergency-related pieces of advice.

- **Information System of the German Federal Health Monitoring**

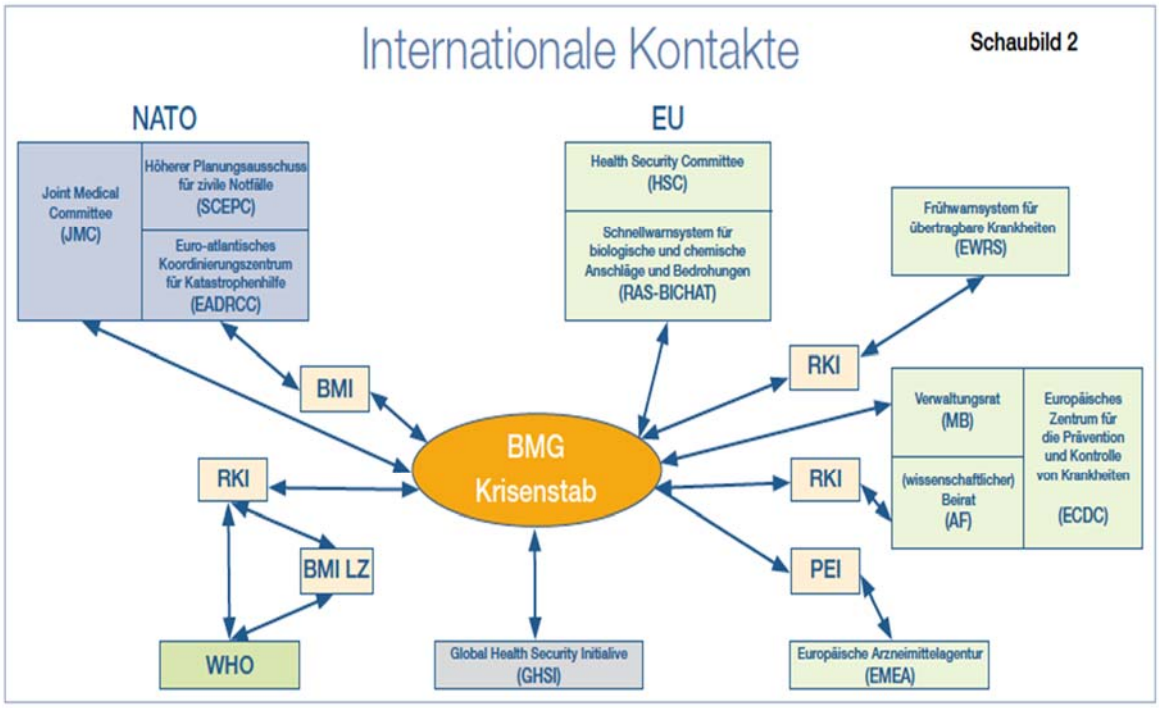
Integrated into a network of international contacts displayed below, the Federal Ministry of Health (BMG) and its crisis staff is the national information hub supported by the Robert-Koch Institut (RKI) as Coordinating Component Body for the respective EU health agencies.

Figure 8: International Contacts Germany[45]

[43] http://www.bbk.bund.de/SharedDocs/Downloads/BBK/EN/booklets_leaflets/Flyer_Satellite-based-Warning-System.pdf?

[44] http://www.bbk.bund.de/DE/NINA/Warn-App_NINA.html

[45] BBK, "Nationales Krisenmanagement im Bevölkerungsschutz", page 30, http://www.bbk.bund.de/SharedDocs/Downloads/BBK/DE/Publikationen/Praxis_Bevoelkerungsschutz/Band_1_Praxis_BS_Nationales_Kr_management_im_BS.html



Providing an on-line health data base and comprehensive health information, under the authority of the Federal Ministry of Health (BMG), the German health information system[46] is run by the Federal Statistical Office together with the Robert-Koch-Institut. Operating under the auspices of the European Surveillance System (TESSy)[47], the technical platform for EU communicable disease surveillance hosted by the ECDC, the German system closely collaborates with the European Centre for Disease Prevention and Control (ECDC)[48].

Indicator based surveillance reports, web-based data submission, data storage and dissemination, health data resources and tools, including epidemic intelligence information, facilitate early indications, rapid risk assessment and evaluation of counter measures. BMG, then, performs as the national node for the information exchange to other federal ministries and agencies, the states ministries of health including all relevant public and private health response stakeholders.

- **Academy for Crisis Management, Emergency Planning and Civil Protection (AKNZ)**

In terms of disaster response, AKNZ[49] is the central federal authority for:

- Disaster response leadership education and training, including remote learning courses,

[46] http://www.gbe-bund.de

[47] http://ecdc.europa.eu

[48] Ibid.: http://www.bmi.bund.de/SharedDocs/Downloads/DE/Broschueren/2009/Nat_KM_BVS.pdf

[49] http://www.bbk.bund.de/DE/AufgabenundAusstattung/AKNZ/aknz_node.html

- Evaluation of national and international major emergencies,
- Evaluation of related publications, studies and documents,
- Conduct of studies and research,
- Preparation, execution and evaluation of disaster response seminars and exercises,
- Participation in and collaboration with national and international authorities in preparing and issuing conceptual documents.

- **Analytical Task Force**

The Task Force[50] is highly specialised mobile operational group with appropriate special competences which go beyond the possibilities of daily municipal threat defence. The Task Forces is stationed at 7 locations across Germany connected with already available CBRN competence centres. It is possible to take them quickly to the scene of the mission together with their equipment which can be transported by air. For the time being, the task force concentrates on CRN-related issues. A pilot project on biological hazards has been launched in 2012.

- **Training and Exercises**

Following federal and state regulations, crisis management exercises from federal down to regional level also including critical infrastructure in private hand are to be conducted on a regular basis. LÜKEX[51], a German Crisis Management Exercise involving federal and state authorities together with private stakeholders, runs on a bi-annual cycle focusing on varying threat scenario topics. LÜKEX 2007, for example, concentrated on an Influenza pandemic. The exercise set-up also allows operations from virtual command locations.

11.2.4 Specific Medical Concepts and Procedures

Public health protection lies in the responsibility of the health departments. Depending on the federal states the responsible structures to address emergency situations reach from the single county levels to the level of the state´s governments. So there are no standard operation procedures as well.
But like the fire service regulations there are regulations for handling biological agents and the minimal security measures to treatment of patients with highly contagious diseases.
The German Federal Institute for Occupational Safety and Health developed and published technical rules for biological agents (TRBA). Among those are the TRBAs 100, 130 and 250.
The ´TRBA 100 Protective measures for activities involving biological agents in laboratories´ regulates technical and organisational safety measures for the work with biological agents in laboratories.

[50] Source only available by inserting „Die Analytische Task Force (ATF)“ in a search machine.

[51] http://www.bbk.bund.de/DE/AufgabenundAusstattung/Krisenmanagement/Luekex/TT_Luekex_ueberblick.html

The ´TRBA 130 Protective measures for imminent biological emergencies´ regulates technical and organisational safety and protective measures for e.g. first responders.
The ´TRBA 250 Biological agents in the public health sector´ regulates technical and organisational safety and protective measures for the management and the treatment of patients with highly contagious diseases in i.e. special isolation units.

The Robert Koch-Institute, the central scientific institutions for health protection in Germany has developed guidelines for several biological emergencies involving infectious diseases. For example the ´German Pandemic Influenza Preparedness Plan´ or the ´Framework Ebola Virus Disease – Intervention Preparedness in Germany´. But these only have guideline character since the Robert Koch-Institute as a federal organization only has consulting functions in the reaction to biological emergencies.
The Framework 'Ebola Virus Disease – Intervention Preparedness in Germany´ is a good example for an overall approach. The guideline is concerned with the definition and description of a coping strategy of Ebola virus disease cases in Germany. It is divided into the sections ´ Aims´ (chapter 1), ´ Intended Audience´ (chapter 2), ´Risk Assessment´ (chapter 3), ´Pathogen Characteristics and Clinical Picture´ (chapter 4), ´Recognition´ (chapter 5), ´Assessment of Potential Further Spread´ (chapter 6), ´Management´ (chapter 7), ´Communication´ (chapter 8), and ´Evaluation´ (chapter 9). These guidelines cover the whole process from the first responders on site to preparation and coordination of second line structures, like hospitals, and the operative as well as the administrative management of these situations.

11.2.5 **Assessment in view of PULSE operational requirements**

The major challenge Germany is confronted with, rests on its federative system. This very much so determines preparation and conduct of response operations in crises situations and major emergencies.
While official crisis management authorities and health care officials closely follow this scheme, hierarchically organised from top federal down to local levels of administration, the actual conduct of response operations rests on:

- public as well as on private stakeholders;
- volunteer and professional organisations;
- governmental capabilities and authorities substantiating or supporting response efforts in terms of planning, education, training, exercising, specialised assets and satellite based communication systems including nationwide accessible smart phone applications; and
- non-governmental organisations.

In order to make this a seamlessly working system, civil protection and disaster response is embedded into the legislative process on federal and state level supported by respective acts and regulations on all levels. On the one hand this system ensures adherence to nation-wide objectives and standards while respecting local or regional peculiarities at the same time, and on the other hand it facilitates international cooperation and collaboration.

Nevertheless, each and every stakeholder engaged in response operations, health care and EMS included, works on their own regulations, which are based on national or even international standards. The problems of inter-connecting the different stakeholders in a given case is threefold.

4. The first issue is concerned with technical communication.
5. The second issue deals with common decision making, and last but not least,
6. number three lies in unified command and control.

A realistic case-study of these issues and deficits based on a real disaster in Germany has been presented in [29]. (though from 2008, many findings are still valid).

Apart from the fact, that lessons identified and learned from recent real disaster response operations in Germany and that training and exercising is maintained and conducted on high standards throughout the system, primary improvement potential by PULSE is assessed to lie in the three areas as discussed above.

Table 24: Mapping of national systems to the PULSE requirements

Procedures described in D2.1	**Covers the Pulse "SOP"s** yes partly no	**Improvement Potential**	**Could serve as basis for the PULSE procedure**	**IT systems used?** **Briefly describe**
1. Intelligence and information gathering	Yes	Formalized procedure to push critical health information to all potential users and to automatically retrieve health data from the lower end of the health chain.	The National Health Information System and its integration in international bodies.	
2. Threat and Risk analysis	Yes	Formalized procedure to push critical health information to all potential users.	National Health Information System and its integration in international bodies	
3. Warning/ Alerting	Yes	Fallback solutions for cases of massive electronic disturbance or disruption	Satellite-based communication	NINA SatWaS/ MoWaS deNIS
4. Operational picture generation and situation assessment	Yes	Monolithic information system architecture using uniform data model and software architecture for local response command and control centres	DV 100 - Manual on “Leadership and Command in Emergency Operations”	
5. Resources and capacities planning,	Yes	Facilitation of access or data exchange on resources		

		between separate or unconnected data bases		
6. Task planning, prioritization and execution control	Yes	Uniform web-based digital technical communication system	DV 100 Manual on "Leadership and Command in Emergency Operations	
7. Logistics and stockpiling	Yes	Facilitation of access or data exchange on resources and stockpiles between separate or unconnected data bases		
8. Coordination between different services/ stakeholders, incl. cross-border support	Yes	Adherence to a uniform and unified command and control system using the same technical communication assets.		
9. Post-crisis evaluation and collection of good practices	Yes	Maintenance of a data log storing incident details, assessments, decisions, mission orders and tasks assignment & control, capabilities and resources employed or requested.		
10. Training and exercising	Yes	Framework for integrated T&E addressing all potential stakeholders and administrative layers concerned, based on sample scenarios	LÜKEX concept and set-up	

11.2.6 **Use Case Applicability**

The two PULSE scenarios differ[52] from each other in that

- the STADIUM scenario offers one tangible local incident, occurring in a short period of time, at a narrowly definable location
- the SARS scenario consists of a multitude of incidents spread over both, an extensive widespread geographical area and time span with national and

[52] for more details, see D2.2

international scale.

- the STADIUM catches responders by surprise and may overburden the initial response operation, while
- the SARS scenario, apart from the very first patient, could offer time and capabilities for preparation and actual conduct as required.

Table 25: Mapping of national systems to the PULSE scenarios

Pulse scenario	**Strengths** for covering the scenario requirements	**Weaknesses** (not covering specific scenario requirements)
1. SARS	Clear focus on nation-wide medical response and international collaboration	Limited value regarding comprehensive incident management procedures
2. Stadium	Offers full menu for traditional range of first responder, integration of and coordination with emergency medical services included.	Local focus only, limited implications with regard to national and international coordination/cooperation in particular.

11.2.7 Meta SOPs covered

The Meta-SOPs as required for PULSE in D2.1 are mostly covered sufficiently in the German system.

Table 26: Mapping of national systems to the "Meta-SOP"s

Characteristics of the "Meta-SOP" described in D2.1 *"must" = mandatory* *"should" = desirable*	**Covers the PULSE "Meta-SOP"** Yes partly no	**Improvement Potential**	**Could serve as basis for the PULSE SOP**
Knowledge management			
• knowledge management for standardized data collection (must)	Yes	Different stakeholder to feed information into one joint data pool	
• knowledge management for Information/data sharing at European level (must)	Yes	Not identified at national level	

Standards			
• Standardization/ • standards used	Yes	Development of specific regulations for emergency medical capabilities operating in complex multi-functional and multi-organizational environments	DV 100 Manual on "Leadership and Command in Emergency Operations
• Interoperability/ • interconnection with other systems (must[53]) •	Yes	Connectivity to other nation's system	
Change management			
• Adoption of new regulations (should)	Yes	Strengthening and formalizing feed-back procedures	
• alignment with new scenarios (should)	Yes	Streamlining exercise and training in accordance with specific scenarios in an top-down approach	LÜKEX scenarios
• public information and communication with media (should)	Yes	Not identified	

11.2.8 **Possible further benefits for PULSE**

In order to demonstrate improved cross-border coordination and collaboration even "local incidents" like the stadium crush or a similar incident could be placed close to a national border. This would directly trigger cross border emergency and rescue operations in the first place, and for international coordination it would involve authorities at state and highest government levels. The densely populated Euregio Meuse-Rhine (EMR), combining efforts across the borders of Belgium, Germany, and the Netherlands, is a **role model** for international mutual support in the case of large scale disasters. Three bilateral agreements concluded on cross-border assistance are the relevant legal basis.

Under cover of its EMRIC project (EMR Disaster Management) the EUMED project (Euregional Mecial Assistance) comprising the elements of ‚Routine Rescue Operations', ‚Large Scale Disasters' and ‚Further Training Measures/Exercises' has been implemented. [53].

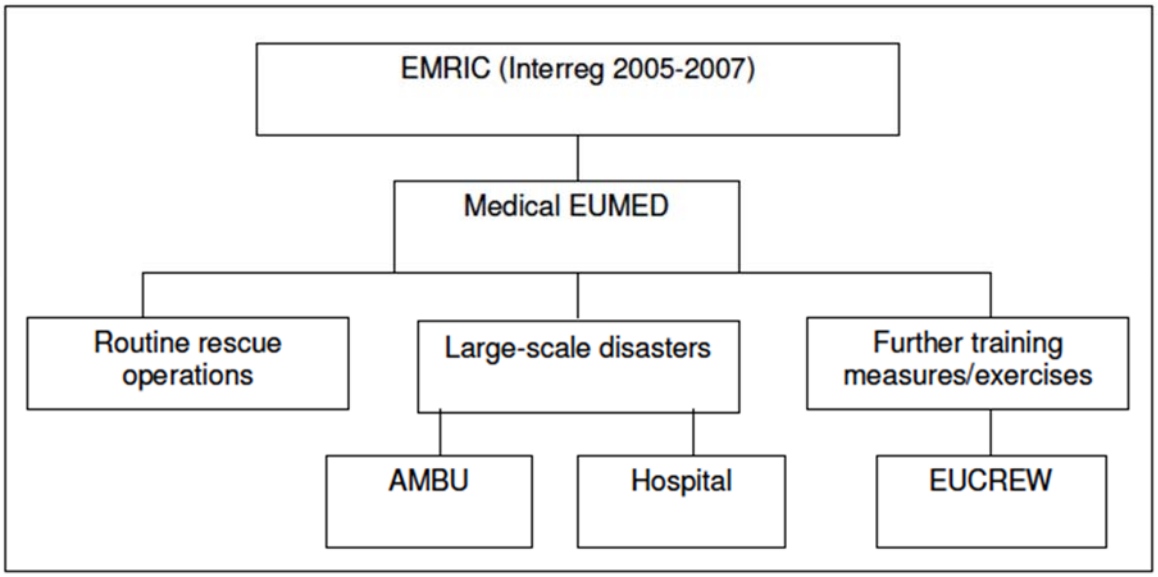
In the meantime this project rests on below pillars:

- EUCREW (Meuse-Rhine Commission/Working Group and Steering Committee),
- EUMED Ambu Concept (Euregional Emergency Medical Assistance Plan),
- EUMED Hospital (Euregional Plan on the distribution of casualties),

[53] D2.1, 9.4, pg 69

- Purpose-built practical training centre in Heerlen/NL, and
- Euregional pscho-social assistance plan (under preparation).

Figure 9: Elements of the “Medical EUMED“ project[54]



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11.2.9 **Summary evaluation**

Notwithstanding the very well organized, structured and resourced German disaster response and crisis management set-up, the procedures, concepts and structures described in this chapter mirror the legal and constitutional framework of Germany. Based on the understanding that PULSE is designed for EU-wide application and exploitation, and ultimately for covering a wider range of potential scenarios, the findings from the German system

- nation-wide adherence to a uniform concept of ‘Leadership and Command in Emergency Operations,
- high-level crisis management education, training, and exercise concept,
- satellite-based communication links providing applications for first responder and for public warning, and
- cross-border emergency assistance as practiced between Belgium, Germany and the Netherlands can serve as role models in particular

11.3 **Procedures in Ireland**

11.3.1 **Procedures analysed**

REPUBLIC OF IRELAND

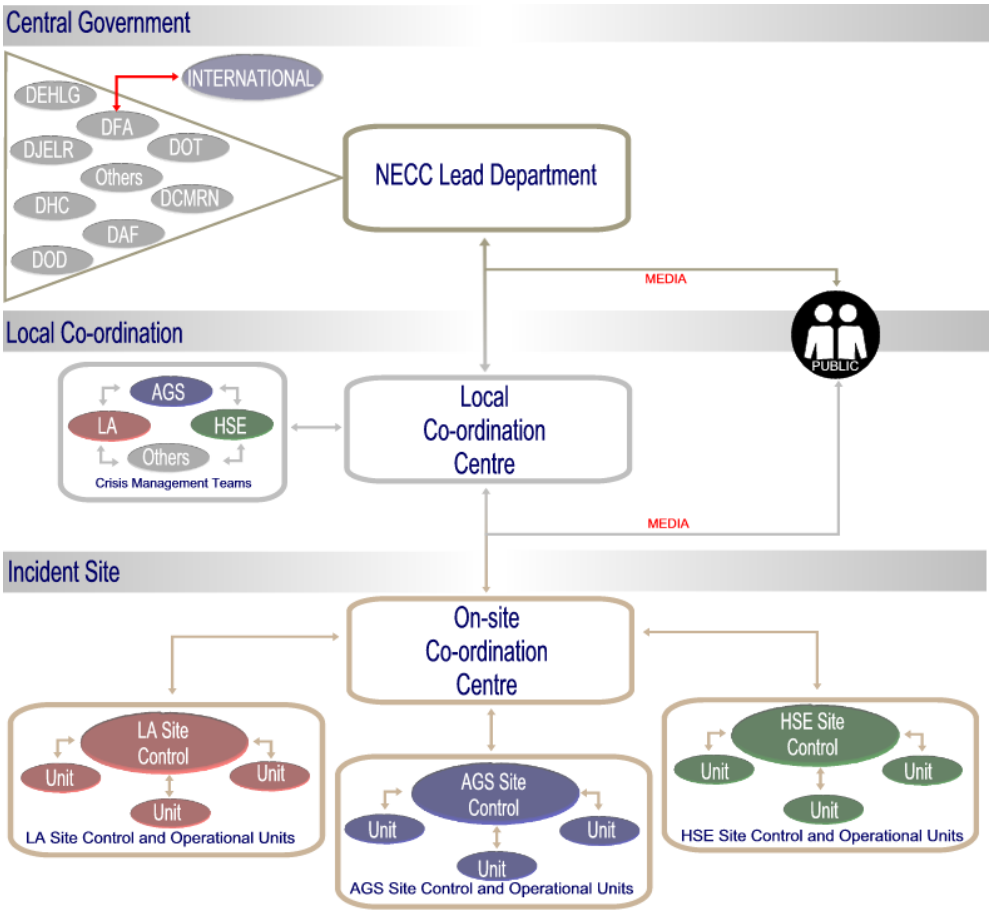
[54] sub-project of the ”EMRIC“ framework project; see also Ibid, page 4.

MAJOR EMERGENCY MANAGEMENT STRUCTURES

The Republic of Ireland has no dedicated legislation in place for civil protection. However there is a major emergency management framework document which is the result of government decision and it sets out a framework enabling the police, the health service and local authorities to prepare for and make a co-ordinated response to major emergencies resulting from events such as fires, transport accidents, hazardous substance incidents and severe weather

The 2006 framework was the foundation block for the development of a new generation of major emergency plans by the principal response agencies. This document sets out mechanisms for co-ordination at all levels of major emergency management - on site, at local level and at regional level, it defines a common language or terminology to make inter-agency working simpler and it introduces a system to immediately determine a lead agency in every emergency situation. It also provides for linking to national level emergency management.

Figure 10 The Ireland Framework



In Ireland the smallest administrative area is the county and it is referred to as LOCAL Government. Hence, when the term Local Co-ordination is mentioned it refers to **County** Level Co-ordination. On-site co-ordination is established at the site by Fire, Ambulance and Police. There are three **Principal Response Agencies** – Police,

Health and Local Government. Police [AGS I An Garda Síochána] are a national police force. The Fire and Rescue Service belongs to Local Authority (LA) and the National Ambulance Service belongs to the Health Service Executive (HSE)

An Garda Síochána is the national police service of Ireland. The Mission of An Garda Síochána is Working with Communities to Protect and Serve**.**
Following the establishment of the Irish Free State in 1922, the Dublin Metropolitan Police merged with the recently established An Garda Síochána in 1925.
Today, An Garda Síochána is a community based organisation with over 14,500 Garda and Civilian employees, who serve all sections of the community
Some of An Garda Síochána's core functions include:

- the detection and prevention of crime;
- ensuring our nation's security;
- reducing the incidence of fatal and serious injuries on our roads and improving road safety;
- working with communities to prevent anti-social behaviour;
- promoting an inter-agency approach to problem solving and improving the overall quality of life.

Local Authority: In Ireland there are 31 local authorities with a total of 949 members known as councillors. Under the Local Government Reform Act 2014 the town authorities were replaced by a system of 95 municipal districts, integrating town and county governance, and certain local authorities were merged.
There are 26 county councils and they are responsible for local government in 24 geographical counties including the county of Dublin. Dublin County has 3 county councils. There are 2 city and county councils. They are responsible for local government in Limerick and Waterford. There are 3 city councils and they are responsible for local government in the cities of Dublin, Cork and Galway.
The council has jurisdiction or control throughout its administrative area.
Each council has a chief executive, previously known as city or county manager, who is the manager of the local authority.

Health service Executive
The HSE is a large organisation of over 100,000 people, whose job is to run all of the public health services in Ireland. The HSE manages services through a structure designed to put patients and clients at the centre of the organisation.
The HSE Code of Governance provides an overview of the principles, policies, procedures and guidelines by which the HSE directs and controls its functions and manages its business, it is intended to guide the Board, the management team and all those working within the HSE and the agencies funded by the HSE, in performing their duties to the highest standards of accountability, integrity and propriety.

An Garda Síochána, the Health Service Executive and the Local Authorities are the agencies charged with managing the response to emergency situations which arise either locally or regionally. They provide and operate Ireland's principal emergency services, which respond to emergencies on a daily basis. The principal emergency services have protocols and procedures in place to support their work at a range of events, from small, routine occurrences to large-scale incidents.

The Framework was designed primarily to provide for the protection, support and welfare of the public in times of emergency. Effective arrangements to ensure public safety in times of emergency also have the benefit of helping to safeguard the

environment, the economy, infrastructure and property.

The Framework deals with major emergencies which may occur in Ireland. However, an emergency occurring near the border with Northern Ireland could impact across the border and vice versa. In such a situation, effective information sharing and co-ordination with corresponding response services in Northern Ireland are required. The Framework is intended to support and enhance the existing liaison and co-operation between the principal response agencies in border areas.

The Framework is constructed around the internationally accepted five-stage systematic frame for emergency management – referred to as the "Safety Chain" in the Netherlands, "Integrated Emergency Management" in the United Kingdom.

The Principles of Strategic Emergency Planning that inform MEM policy in Ireland are:

- 'Lead Government Department' to be identified for any emergency;
- Service delivery should take place at the lowest possible level with coordination at the most appropriate level;
- Emergency planning should be encompassed within existing Governmental and Departmental structures.

While the responsibility for co-ordination maybe shared, in any given situation responsibility for leading cooperation belongs specifically to one of the three principal response agencies. The lead agency has both the responsibility and mandate for the co-ordination function.

Two mechanisms exist for determining and designating the lead agency.

- The first is by pre-nomination set out in a protocol.
- The second is a default arrangement, where the categorisations in the pre-nomination protocol table do not seem to apply and the lead agency is not obvious. In these situations, which should be rare, the Local Authority will be the "default" lead agency".

Each agency is represented at the On Site Coordination group by an On-site Controller, the Onsite controller from the lead agency becomes the On Site Co-ordinator.While the On-Site Co-ordinator is empowered to make decisions, decisions are arrived at generally by the consensus of the On-Site Co-ordination Group. Where consensus is not possible, the On-Site Co-ordinator will only make decisions after hearing and considering the views of the other two Controllers.

The Framework was designed to fit with the 'all hazards' approach to emergency management, and was developed to reflect best international practice, customized to suit Irish conditions. In Ireland, one of the main purposes of the Framework for Major Emergency Management is to set out the working relationship between the various elements which make up the front line emergency response.

The Approach to Co-ordination in the Framework

The additional structures, arrangements and facilities, which are required to make co-ordination happen successfully are set out in the Framework. It is necessary to make sure that the co-ordination process is effective and streamlined, so that it fits in with current practice and structures, and with the requirements of differing emergency situations. Viewing co-ordination as a progressively expanding task, as the scale / complexity of the emergency increases, is regarded as crucial, as well as;

- Defining key roles and co-ordination;
- Defining and setting the parameters/boundaries for the mandate/authority given with the co-ordination responsibility;

- Identifying physical spaces to provide for and support co-ordination;
- Appropriate communication facilities;
- Co-ordination of media liaison ; and
- Information management systems.

Since the mid-1980s the principal response agencies have prepared Major Emergency Plans in accordance with a standard framework which enables them to respond to incidents that fall within the definition of a major emergency. Each principal response agency's individual Major Emergency Plan is regularly reviewed for inter-operability with the plans of its partner principal response agencies and for consistency with the Framework by the relevant Regional Steering Group on Major Emergency Management.

In certain circumstances, the Framework provides that the local response to a major emergency may be scaled up to a regional level. To provide for this, a Plan for Regional Level Co-ordination should be developed and agreed by all of the principal response agencies within each of the eight emergency planning regions.

As well as being activated for local and regional-scale events, the structures and resources available within the Framework for Major Emergency Management may be activated by appropriate national bodies in certain circumstances. National bodies, operating in accordance with National Emergency Plans, may call upon the principal response agencies to assist in responding to, or to perform their normal functions/ roles arising from, a national level emergency. The envisaged roles can include:

- monitoring and/or reporting on the impact of the emergency in the functional area of the agency;
- undertaking pre-assigned roles in National Emergency Plans, such as coordinating/ implementing certain countermeasures in their functional area;
- undertaking relevant tasks following an emergency/crisis; or
- acting as a communications and co-ordination conduit.

There are both legislative and procedural arrangements, which require that emergency plans be prepared for specific sites or events (e.g. SEVESO sites, airports, ports, major sports events, etc.). Arising from the risk assessment process, each Major Emergency Plan identifies sites/events in the section where specific plans/ arrangements exist for responding to emergencies. The generic response arrangements set out in the Major Emergency Plan will govern the principal response agencies' response to such sites/events, whether a major emergency is declared or not. It should be confirmed in each Major Emergency Plan that complementary sub-plans/standard operating procedures are in place for specific sites and events.

The effectiveness of the response to any major emergency will depend on the individuals within the organisations who undertake specific key co-ordination and lead roles. The key roles identified in the Framework include –

- Controller of Operations
- On-Site Co-ordinator
- Chair of Crisis Management Team
- Chair of Local Co-ordination Group
- Chair of Regional Co-ordination Group
- Information Management Officers
- Media Liaison Officers
- Action Management Officers

A fundamental element of major emergency preparedness is to ensure that competent individuals are identified, trained and matched to these key roles in the response and formally nominated for these roles. Arrangements are also made to ensure that suitable alternatives to persons in key roles are available.

The major elements of response include:

- Declaration of a Major Emergency;
- Mobilisation of Resources;
- Command, Control and Co-ordination of Response;
- Information Management Systems;
- Management of the Site of the Emergency;
- Casualty Management;
- Protecting Exposed Populations; and
- Public Information.

Command and Control Arrangements on Site

The Framework provides that:

- Each principal response agency exercises command over its own resources in accordance with its normal command structure, command systems and arrangements;
- Each principal response agency should exercise control over:
  - Its own services operating at the site; and
  - Other services (other than the other principal response agencies) which it mobilises to the site.

The Framework recognises that there are usually a number of levels of command and control of emergency operations at large and/or complex incidents. These include Strategic Level, Tactical Level and Operational Level[55], which are catered for within existing command and control systems to varying degrees, with officers empowered to make decisions appropriate to these levels. (These command and control levels are referred to in Northern Ireland and the United Kingdom as Gold, Silver and Bronze Command/Control levels).

Controller of Operations

Each principal response agency should have a "Controller of Operations" at the site (or at each site) of the emergency. The officer in command of the initial response of each principal emergency service should be the principal response agency's Controller of Operations until relieved through the agency's pre-determined process.

The practice of co-ordination by the lead agency at a major emergency should grow from the "normal" range of emergencies. While co-ordination of multi-service response at normal emergencies is implicitly in place, the Framework makes ownership of the coordination role in the "normal" emergency range explicit. In this way, responsibility

[55] other countries use the terms in the hierarchical level sequence strategic – operational - tactical

for an inter-agency co-ordination role at “normal” emergencies is clearly assigned. As a result, the skills and culture of co-ordination can be practised at hundreds of normal emergencies annually, rather than being introduced for the first time at infrequently declared major emergencies.

Being assigned the lead agency role means that a specific principal response agency is assigned responsibility for the co-ordination function (in addition to its own functions) and should lead all co-ordination activity associated with the emergency (on-site, off-site, etc.) and make every effort to achieve a high level of co-ordination using the arrangements of the Framework. The co-ordination function for any emergency includes:

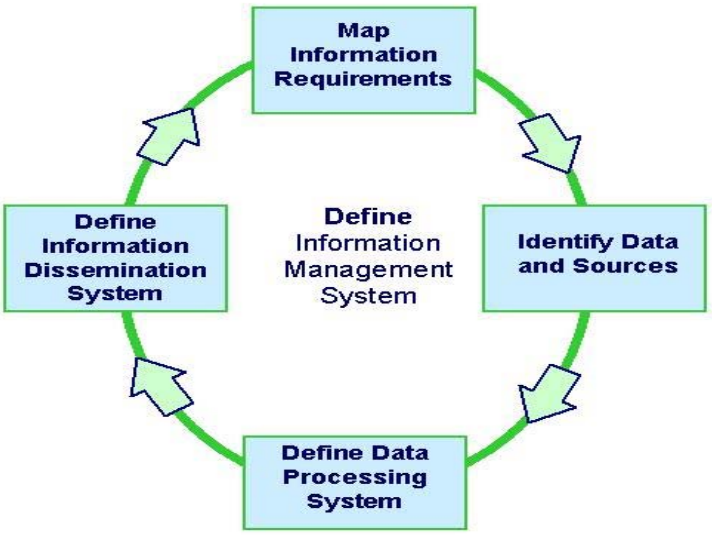
- ensuring involvement of the three principal response agencies and the principal emergency services in sharing information on the nature of the emergency situation;
- ensuring involvement of the range of organisations (other than principal response agencies) who may be requested to respond in co-ordination activities and arrangements;
- ensuring that mandated co-ordination decisions are made promptly and communicated to all involved;
- ensuring that site management issues are addressed and decided;
- ensuring that public information messages and media briefings are co-ordinated and implemented;

Information Management Systems: Purpose of Information Management

The purpose of information management in a major emergency is to facilitate decision making. The quality of the information that is presented to decision-makers is crucial to effective decision-making, and is recognised as a key determinant of outcome. Decision makers in major emergency situations are likely to have to make critical decisions based upon incomplete information. Thus, great efforts should be made to generate information for decision-makers that is as timely, accurate and clear as possible.

What decision-makers need is organised contextual presentation of what is happening, qualified by the major steps by which this situation has come about, and not a plethora of incoming raw data. Confronted with a deluge of unfiltered data, key managers and decision-makers in major emergencies often tend either to become themselves immersed in making sense of it, to the detriment of timely decision-making and delivery, or simply to focus upon obviously salient perspectives and operate reactively, based upon their personal experience.

Figure 11: The Information Management Cycle



The On-Site Coordinator and the Chairs of the Local/Regional Co-ordination Groups should hold information sharing sessions at regular intervals with the other members of their coordination groups. It is important that all members of a co-ordinating group at any centre can jointly view the full array of available information. To enhance inter-agency communication, it is important that agencies adhere to the agreed common terminology and avoid the use of their own abbreviations.

There should be a readily available facility to exchange information between different elements involved in the response. Therefore, a generic information management system is needed which is common and used by all co-ordination centres from on-site upwards, through local and regional and on to national co-ordination levels, where appropriate.

The common generic information management system reflects the regime of mandates, thus defining the responsibilities and authority/hierarchy of the matrix of co-ordination centres in terms of delivery and support

The Defence Forces (Permanent Defence Forces consisting of the Army, Air Corps, Navy and Reserve Defence Forces)

The Defence Forces can provide a significant support role in a major emergency response. The Defence Forces capabilities can be employed across a wide spectrum of activity in a major emergency. However, these capabilities are primarily deployed in a military role at home and in peace support operations overseas and their deployment in a major emergency situation may require a lead in time to facilitate redeployment. Provision of Defence Forces capabilities is dependent on the exigencies of other demands and on prior agreed arrangements through Memorandums of Understanding and Service Level Agreements between the Department of Defence, the Defence Forces and relevant Government Departments. In addition, the Defence Forces have a key role in responding to all emergency incidents involving improvised explosive devices (IED), when they are called upon by An Garda Síochána, by the provision of Explosive Ordinance Disposal (EOD) teams, in an Aid to the Civil Power role.

The Civil Defence service is a statutory organisation of volunteers, which can provide a very important resource for use in major emergencies in support of the principal response agencies. Civil Defence services, which include over 3,000 active volunteers, are structured on a county basis and are operated by the Local Authorities. A Civil Defence Board, with a national Civil Defence Headquarters, oversees and assists the development of the Local Authority based Civil Defence organisation.

The voluntary emergency services sector provides a significant potential resource to assist the principal response agencies in major emergency response. They may provide a pool of persons with relevant skills, vehicles and useful equipment and facilities.

The normal range of voluntary emergency services includes the Order of Malta Ambulance Corps, St John's Ambulance Service, Mountain Rescue Teams, Cave Rescue Teams, Search and Rescue Dog Associations, River Rescue Units, Community Inshore Rescue Units, RNLI, Sub-Aqua Units, etc. Their ongoing service to the public includes attendance at public events, as well as searches for missing persons and rescue of persons in distress.

Utilities

Utilities are frequently involved in the response to emergencies, usually to assist the principal response agencies in making situations safe. They may also be directly involved in restoring their own services, for example, electricity supply in the aftermath of a storm. It is important that there is close co-ordination between the principal response agencies and utilities involved in/affected by an emergency. Utilities operate under their own legislative and regulatory frameworks but, during the response to an emergency, they need to liaise with the On-Site Co-ordinator. It is also recommended that representatives of individual utilities on site should be invited to provide a representative for the On-Site Co-ordination Group. It is recommended that individual utilities be invited to attend and participate in relevant work of Local Co-ordination Groups.

The Private Sector

Private sector organisations may be involved in a major emergency situation in two ways. They may be involved through, for example, ownership of the site where the emergency has occurred or through ownership of some element involved in the emergency e.g. an aircraft, bus, factory, etc. They may also be called on to assist in the response to a major emergency by providing specialist services and equipment, which would not normally be held or available within the principal response agencies.

Northern Ireland

There is a long-standing tradition of mutual assistance between the emergency services in Northern Ireland and the border counties. The April 2002 agreement between the British and Irish Governments provides for a range of co-operative measures between An Garda Síochána and the Police Service of Northern Ireland.

Existing arrangements between individual emergency services in both jurisdictions should continue to operate as they do at present. During an emergency, agencies should inform the Local/Regional Co-ordination Centre of any unilateral activation of

arrangements with services in Northern Ireland.

Where a Local/Regional Co-ordination Group determines that additional assistance, above that arranged by the individual services, should be sought or that information on a situation should be made available to authorities in Northern Ireland, the request/information should be transmitted by An Garda Síochána to the Police Service of Northern Ireland, in accordance with internal code procedures of An Garda Síochána.

Where appropriate, representatives of the equivalent of the principal response agencies in Northern Ireland should be invited to participate in Local/Regional Co-ordination Groups.

11.3.2 **Assessment in view of PULSE operational requirements**

Turning the provisions of the PULSE platform into working, major emergency management plans will involve a significant level of development activity, both within the individual principal response agencies and jointly with their local and regional partners. It is only when all of these plans are in place that the development phase of the pulse platform will be completed. Thereafter, the challenge will be to continuously monitor developments and modify the platform to ensure that it is always up to date with the latest risks. It is through this continuous process and through regularly carrying out exercises to test the system that we can be sure that the platform is as prepared as possible to protect should a disaster strike.

Table 27 Mapping of national systems to the PULSE requirements

Procedures described in D2.1	**Covers the Pulse "SOP"s** yes partly no	**Improvement Potential**	**Could serve as basis for the PULSE procedure**	**IT systems used?** **Briefly describe**
1. Intelligence and information gathering	Yes	PULSE may provide advanced information and information on the situation deterioration	It will give us a clear guidance as to the crowd type and incident type	Health Atlas
2. Treat and Risk analysis	Yes	PULSE may provide an indication of potential crowd behaviour patterns	Could provide a prediction as to the likely event of a crowd crush and the rate at which it may develop.	
3. Warning/Alerting	Yes	PULSE may provide warning at 2 main stages: pre-event and after the event commences.	This will shorten the response time for the mobilisation of additional resources and allow for a realistic standby phase	
4. Operational picture generation and	Yes	The information gathered by PULSE	We will be able to see changes in the	We will be able to take

situation assessment		will provide a good operation picture of the situation in a crowd event such as a stadium to include factors such as: crowd behaviour, numbers, weather, influence of alcohol and drugs,	status quo if the situation deteriorates. We will also be able to distinguish between various parts of the stadium.	existing video footage from the stadium security cameras.
5. Resources and capacities planning,	Yes	PULSE may provide visibility on the resources required several weeks before an event takes place.	This will allow the PULSE the SOP to be used over a period of weeks, including the weeks of preparation. This will be achieved by a change in the risk score.	
6. Task planning, prioritization and execution control	Yes	This will allow plans to be listed in a standardised format.	This will allow to capture real time movement, it will allow the SOP to be captured in a real time movement.	
7. Logistics and stockpiling	Yes	PULSE may provide visibility and support logistics and necessary distribution and pre-positioning of emergency equipment.	This will allow for reviewing and updating of SOPs	
8. Coordination between different services/stakeholders, incl. cross-border support	Yes	PULSE may provide information in a recognised situation format by which stakeholders, and potential stakeholders can view the situation in real time.	If the situation requires cross border support, the details/nature of the incident can be provided in real time by giving a visible view to the supporting authorities.	E-mail only
9. Post-crisis evaluation and collection of good practices	Yes	PULSE provides a dedicated tool for post event evaluation. This can be used in both the exercise format and after a real incident because it is a electronic system it will allow the information to be collected in a	All participants at an incident/exercise can be invited to participate in the post incident analysis. It will allow the rapid collection of very specific data.	

		systematic fashion.		
10. Training and exercising	Yes	These are MPORG tools and these will allow exercising of key decision makers at several levels both in routine tactical decisions or very complex strategic decisions.	It will allow us to enforce crowd control regulations by all actors, including event organisers using the tool.	TES (Training and Exercise System supplied by vector command limited)

11.3.3 **Use Case Applicability**

Although the two PULSE scenarios are different they have similar applications to emergency management. Both the SARS and stadium scenario pose a realistic threat that engage strategic decision makers. Added to this, both scenarios utilise a combination of real events in a real situation. Due to the nature of both PULSE scenarios, it will be distributed table top exercises which in itself have realistic inputs, adding to the realism. Notwithstanding the fact that both PULSE scenarios will be benchmarked against existing data and performance of stakeholders.

Table 28: Mapping of national systems to the PULSE scenarios

Pulse scenario	**Strengths** for covering the scenario requirements	**Weaknesses** (not covering specific scenario requirements)
1. SARS	Have current accurate epidemiological data to drive the scenario Use of existing, disease warning and alerting structures.	The exercise has a large timescale, and it will be difficult to telescope whereby several weeks of an exercise will have to be reduced into a one day exercise. Lack of realism in the exercise, due to the real time, timelines Difficult to factor in the effects of vaccine and difficult to simulate the impact of cross border activity.
2. Stadium	Based on combination of real events and a real stadium. Factors are variable: weather, crowd type, crowd behaviour, impact of environmental factors, drugs and alcohol can all be factored in.	Crowd events by their nature, tend to bring about one main type of injury. It will be difficult to simulate a real event on the scale required. A danger of lack of stakeholder involvement

		especially at strategic level. High demands on IT and IT infrastructure. Technology may distract from the main decision process/end-goal.

11.3.4 **Meta SOPs covered**

The meta SOPs as required for PULSE in D2.1 and in accordance with the DoW, are largely covered under the Irish framework. However, this system is primarily paper based and could benefit hugely from an automated/electronic system, which would in turn complement the PULSE platform. The use of social media could potentially prove beneficial in terms of improving how the public are notified and also for data mining which could potentially improve how authorities deal with incidents in Ireland.

Table 29: Mapping of national systems to the "Meta-SOP"s

Characteristics of the "Meta-SOP" described in D2.1 *"must" = mandatory* *"should" = desirable*	**Covers the PULSE "Meta-SOP"** Yes partly no	**Improvement Potential**	**Could serve as basis for the PULSE SOP**
Knowledge management	Yes		
• knowledge management for standardized data collection (must)	Yes	PULSE will provide easily retrieved and indexed data, from both internal and external repositories.	
• knowledge management for Information/data sharing at European level (must)	Yes	By producing an interoperable data sharing format	For resources and capacities, logistics/stock piling.
Standards			
• Standardization/standards used	Partly	PULSE will help to implement existing crowd guidance and event medical plans	
• Interoperability/interconnection with other systems (?)	Partly	Will link to the mobilisation system of the fire, police and ambulance systems.	
Change management			
• Adoption of new regulations (should)	Partly	PULSE SOP will focused way with the change management	

		procedures related to any new regulations, guidance and procedures.	
• alignment with new scenarios (should)	Yes	It will practice decision makers at each level, with 'what if' situations and modelling of potential events.	
• communication with media (should)	Yes	It will allow media liaison teams to fully appreciate the impact the event on the public and will support media liaison team by ensuring that key decision makers are aware of the impact of media inputs on an event.	

11.3.5 **Possible further benefits for PULSE**

Due to the fact that we have selected use cases which have a degree of universal application they have the potential to apply in the following scenarios:

- Major agricultural disease outbreak such as foot and mouth
- Major zoonotic disease outbreak such as bird flu
- Major environmental incidence – volcanic eruption leading to atmospheric dust clouds,
- Space weather
- Major earthquake
- Tsunami
- Wide spread forest fire
- Regional and interregional mass flooding
- Significant loss of critical infrastructure caused by: severe weather, or volcanic activity leading to earthquakes

11.3.6 **Summary evaluation**

Emergency management in Ireland is well governed under the Framework for Emergency Management 2006. The purpose of the framework is to put in place arrangements that will enable the three principle emergency response agencies, the local authorities, the police and the health service executive to co-ordinate their efforts whenever a major emergency occurs. The PULSE platform building on the existing data from the Irish framework will be the foundation block for the development of a new generation of emergency management in Ireland. The pulse platform will set out the mechanisms for co-ordination at all levels of major emergency management – on site, at local level and at regional level. The PULSE platform will define a common language/terminology to make inter-agency work simpler and it will introduce a system that will immediately determine a lead agency in every emergency situation. The final key to the PULSE platform in the Irish context is that it will allow for a link to be created at national emergency management level which is currently unavailable.

11.4 Italy

11.4.1 Procedures analysed

The analysed procedures operational in Italy are clearly related to the two PULSE scenarios:

SARS-like Scenario	STADIUM Scenario
• ***National*** *Plan for preparation and response to influenza pandemic* • ***Regional*** *Plans for preparation and response to influenza pandemic* • ***Local*** *Plans for preparation and response to influenza pandemic*	• ***National Guidelines*** *on the sanitary organization to be set-up in case of disasters* • ***Italian Stadiums'*** *"Plan of Sanitary Assistance"* • *Regional* ***118 Plans*** *for "Maxiemergency" management*

In the following, for each Scenario, the key contents of above documents are analysed.

11.4.1.1 SARS-like scenario

In Italy, the management of pandemic is regulated by a cascade of "Plans" articulated at three geographical and administrative levels: national, regional, local.

In addition there are SOPs regulating the operations of the territorial branches of the Minstry of Health, the USMAF (Uffici di Sanità Marittima, Aerea e di Frontiera- Border health control Offices).

While the regional level corresponds to the Region as an administrative and government entity (20 Regions + 2 Special Provinces), the "local" level corresponds to the ASL (Azienda Sanitaria Locale-Local Healthcare Agency), whose perimeter is normally the Province (the administrative and government entity), but in some cases covers only part of the provincial territory (there are 139 ASL, covering the entire Italian territory)

1) **Piano nazionale di preparazione e risposta a una pandemia influenzale** (CCM - Centro nazionale per la Prevenzione e il Controllo delle Malattie del Ministero della Salute, 2006)

[*National Plan for preparation and response to influenza pandemic (CCM-National Centre for Disease Prevention and Control*]

The CCM is a public body reporting to the Italian Minister of Health. Its role is to link the Minister with the Regions with regard to the health related emergencies. CCM produced the Plan following the WHO recommendation and guidelines after the 2003 avian influenza A/H5N1. The Plan has the purpose to establish a common approach across the Regions for the management of pandemics.

It is divided into the sections: Introduction (chapter 1), Rationale (chapter 2), Principles (chapter 3), Document structure (chapter 4), WHO Periods/Phases/Levels of risk (chapter 5), Objectives (chapter 6), Key actions (chapter 7), Coordination roles and mechanisms (chapter 8), Status of implementation of the actions; Actors and Responsibilities per Period/Phase/Level (chapter 9), Guidelines for the regional plans (Annex).

For each of the first three WHO Periods (Inter-pandemic, Pandemic alert, Pandemic), Phase and Level, the document identifies

- actions and/or areas of responsibility
- Actors involved.

It does not provide guidelines for the last Period, the Post-Pandemic Period (e.g. lesson learning).

The document defines guidelines on coordination entities, epidemiologic surveillance, preventive measures (e.g. vaccination), resources management (medical equipment, drugs, vaccines, hospital beds, and human resources), training, alerting procedure and communication to the population.

The document builds the pandemic management system around three pillars:

- **INFLUNET**: Is a sentinel surveillance network for influenza-like illness in Italy. It is carried out through collaboration of different parties: Regions, Istituto Superiore di Sanità (ISS, the National Institute of Health in Italy), Centro Interuniversitario di Ricerca sull'Influenza (CIRI, the Inter-University Research Centre on Influenza), reference Laboratories, general practitioners and paediatricians. They ensure the coverage of at least 2% of the Italian population.

General practitioners and paediatricians may input data via internet either to the ISS (Istituto Superiore di Sanità) or to CIRI (Centro Univesitario per la Ricerca sulla Influenza). Collected data are elaborated and analysed by the ISS.

- **Key actors**: CCM (at national level) and the 22 Regional Health Authorities are the backbone of the pandemic management system.

The CCM

  - In the inter-pandemic period, it provides guidelines for preparedness and monitors the implementing actions
  - In the pandemic alert and pandemic periods, it ensures continuous risk assessment (thanks to data flows from INFLUNET) and is expected to have full visibility on all available resources
  - Is supported by specialised institutions (e.g. ISS for data analysis, AIFA for vaccine management, IZS for food and animal controls, other Health Ministries Directorates for Communication)
  - Ensures coordination with other ministries and relationship with WHO and European entities.

The map below shows the involvement of all the actors, according to the Plan. The yellow colums indicate who are the main actors performing functions all phases

Table 30: Actors and tasks

	Government			non Health Ministries		Ministry of Health					Scientific/Statistical bodies		Regional/Local level entities			
WHO Period Activity domain	Prime Minister	Government	Prime Minister Staff	Foreing affairs Ministry	Other Ministries	CCM (CCM-National Centre for Disease Prevention and Control)	Other Health Ministry Directorates	ISS (National Institute of Health)	AIFA (Italian Medicines Agency)	IZS (Food control Institutes)	Scientific and Research Institutes/Universities	ISTAT (Italian National Institute of Statistics)	Prefecture	Regional Health Ministers (Assessori Sanità)	Regional Health Authority	INFLUNET
Inter-pandemic																
Coordination and control					x	x	x	x	x	x		x			x	
Monitoring and evaluation						x		x		x					x	x
Prevention and containement					x	x	x		x	x					x	
Health-care systen response					x	x		x							x	
Communication			x		x	x	x								x	
Pandemic alert																
Coordination and control	x		x	x	x	x	x				x		x		x	
Monitoring and evaluation				x	x	x	x	x	x	x	x				x	x
Prevention and containement					x	x		x	x		x				x	
Health-care systen response	x				x	x		x			x			x	x	
Communication			x		x	x	x								x	
Pandemic																
Coordination and control	x	x			x	x								x	x	
Monitoring and evaluation		x			x	x						x			x	x
Prevention and containement					x	x			x						x	
Health-care systen response		x			x	x									x	x
Communication		x	x		x	x	x								x	

1

- **Coordination with other forces:** in the response phase the "commander in chief" is the Prime Minister; he asks the activation of the Comitato Operativo della Protezione Civile (**Civil Protection Operation Committee**), where all the relevant bodies are represented, both from National and Regional level. The **Ministry of Health and Regio**nal Health Authority are represented in the Committee. If needed they may involve the Assessori alla Sanità (Regional Health Ministers) and spec**ialized entities (e.g. ISS).**

Additionally, the plan specifies the moments and the purpose of involvement of all other Ministries, even if the specific contribution of each Ministry is not clearly stated.

2) Piani regionali di preparazione e risposta a una pandemia influenzale [*Regional Plans for preparation and response to influenza pandemic]*

We have analysed and compared eight Regional Plans (Piemonte, Lombardia, Liguria, Veneto, Emilia Romagna, Lazio, Calabria, Sicilia). They have different tables of contents and different levels of detail. Some focus more on medical guidelines (e.g. vaccine doses) other on organizational issues. Anyway, the typical topics are:

- Organization
- Monitoring
- Prevention measures
- Resources lists
- Communication
- Training

From the organizational point of view, two schemes are normally set up:

- For WHO phase 1-5 a Regional Pandemic Committee and Local Pandemic Committees are always in place; their members come from the healthcare system, including representatives from USMAF and of General Practitioners and of Paediatricians

- For WHO phase 6 (Pandemic), the chain of command moves to the wider process of Civil Protection. Both at Regional and at Local level there is a Civil Protection Operation Committee; the Committees operate along 14 functional areas (e.g. Transportation, Telecommunications) of the so called "Augustus Method"; Healthcare is the Function No. 2 and Healthcare representatives are part of these Civil Protection Committees, ensuring the link with the Regional and Local Pandemic Committees.

3) **Documenti locali per l'attuazione del Piano regionale di preparazione e risposta a una pandemia influenzale** [*Local Plans for preparation and response to influenza pandemic]*

Every ASL (Local Healthcare Agency) is expect to have a Pandemic Plan. This plan (e.g. ASL of Brescia Plan, December 2013) typically contains more detailed information than the Regional Plan, with regard to:

- Offices and persons actually involved (with reference details)
- Detailed information flows to/from General Practitioners, Paediatricians, Hospitals, Laboratories
- Time windows of medical resources availability
- Measures to be applied to some categories of workers at risk (e.g. farmers, butchers, nurses)
- Medical guidelines to identify and treat suspect cases
- Measures to cope with massive access to public hospitals, including agreements with private sector hospital healthcare providers and NGO providing home assistance
- Quantification of special equipments (e.g. protective masks), vaccines and other substances (e.g. antiviral) and instructions on how to store and manage them, including prioritization rules with respect to different types of population.

11.4.1.2 STADIUM scenario

In Italy, the management of health emergencies during mass events programmed and not programmed is regulated by a Plan of the Civil Protection"

1) "**Linee guida sull'organizzazione sanitaria in caso di catastrofi sociali",** (*National Guidelines on the sanitary organization to be set-up in case of social disasters)* released by the Department of Civil Protection in June 1997. This plan has been updated and an agreement has been subscribed with the Italian Regions in August 2014. This agreement establishes that, as in normal emergency medical assistance, the Regional 118 (i.e. Regional EMS system, differently addressed as AREU, ARES 118 in different Regions) takes care of the events and manifestations and furnishes EMS assistance finalized to guaranteeing a level similar to that present in ordinary situations.

Events are divided in Programmed and Not Programmed (spontaneous crowd aggregation). To simplify the SOPs we will divide in these two phases.

Programmed events such as concerts and sport matches.

In the preparatory phase the **Organizer** (private or public) of the event must:

- Ask for appropriate Authorizations from the Authority of Public Security and from the Commission of Vigilance on Public Events (at city council and provincial level)
- Identify and declare the level of risk of the event in this document)
- Communicate to the Regional 118 the “Piano di soccorso sanitaria relative all’evento/manifestazione” (Plan of emergency medical response relative to the event)
- Communicate to the Regional 118 the event in the appropriate timing
- Communicate the method for communication (some Italian Regions are utilizing TETRA, others are not)

Table 31: Risk level and timing

Score	Risk Level	Timing of communication
<18	Very low/low	15 days
18-36	Moderate/high	30 days before
37-55	Very high	45 days before

In case of Moderate/high risk events the Organizer must await the approval of the 118 and eventually comply to its directives.

In case of high and very high risk level events the Organizer must wait for the approval of 118 of the formal “Piano di soccorso sanitaria relative all’evento/manifestazione” (Plan of emergency medical response relative to the event).

In case of any other level of risk the Organizer must wait for the approval of the Commission of Vigilanza (Commission of vigilance).

Regional 118

Regional 118 must take care of:

1) primary medical assistance;

2) coordination and management of medical intervention;

3) having the necessary resources for intervening events such as a major incident or CBRNe event.

In case of programmed private events such as Concerts, Football matches, etc, the Organizer will take care of the EMS present at the event.

The Regional 118 will be in charge of coordinating and managing the EMS supplied and sponsored by the Organizer.

The Regional 118 must:

- Evaluate and check the criteria of accreditation/regional authorization, educational standards, certification of personnel working for private EMS.
- Check the name of the person responsible for the EMS sponsored by

the Organizer

- Know the communication system utilized by the EMS sponsored by the Organizer and check that it is interfaced with the 118

In the preparedness phase:

- It will receive the "Plan of emergency medical response relative to the event"
- It will control the evaluation made by the Organizer
- In case of moderate/high risk events it must, with specific evaluations and parameters, quantify more precisely the risk of the event and prepare the adequate resources for assistance. (Table 2 in the document: mettere algoritmo di Mauer, all 2 del Piano)

Not programmed events

Not programmed events are similarly regulated but the preparedness phase is not applied for all the Authorizations required by the Law. The Authority in charge of the evaluation of risks is the Police Force. Regional 118 will comply with its directives. Police force utilizes the same risk Table contained in the Annexes.

2) The Plan of Sanitary Assistance

Even though not regulated by Law, most **Italian Stadiums have their own "Plan of Sanitary Assistance"**, which are written by the Owners of the Stadium and the Emergency Medical Services sponsored from time to time, according to Regulations of Public Security reported in the afore mentioned Plan. We here analyse the Plan of the Olympic Stadium in Rome (capacity 72.000 seated places).

In this case the "Piano Assistenza Sanitaria" was written by the person responsible for the Health Emergency Services for the Spectators, Prof. Rodolfo Proietti of the Policlinico Gemelli, Catholic University of the Sacred Heart[56]. of Rome Italy

The plan is divided in Chapters describing:

a) The organizers with their duties and responsibilities.
b) The emergency medical staff
c) The kind of emergency medical system organization:
   i) localization of the EMS ambulances and the emergency teams according to the different stadium sectors.
   ii) Types and number of ambulances and minicars
d) How the EMS are activated
e) Description of the operational procedures (who
f) General behavioural rules (for Units alfa, bravo, Charlie, tango
g) SOPs for EMS teams (Tango – Charlie)
h) SOPs for Transport Teams (Bravo)
i) Specification of telecommunication techniques

[56] PULSE consortium member

j) Map of the stadium
k) Itineraries for hospital admittance
   i) Preferred
   ii) Secondary
   iii) Tertiary
l) Major emergency procedures
m) Series of action cards and check lists for personnel on field, drugs, backpacks, medical devices with related specifications and operational instructions

The single Stadium Plans vary from one Stadium to another and are basically dependent on the capacity and logistics of the Stadium structure.[57]

3) Regional 118 Plans

There are Regional 118 Plans for Maxiemergency for every Region in Italy. Some are however not available here for analysis. We analyse herein the Plan for the Region of Piedmont issued according to the "Linee guida sul Sistema di emergenza sanitaria in applicazione del D.P.R. 27 Marzo 1992" revised by the Ministry of Health in May 1996. These plans have the aim of giving guidelines to every single Dispatch Centre of the 118.

According to the level of the event, activation will be of

a) local Dispatch Centre
b) Regional Dispatch Centre
c) Civil Protection Operational Centre (Law No.255/1992)

However, Major incidents and disasters are defined in Italy by the D.M. 13 February 2001 that - in the "Criteria of maximal security for the organization of sanitary assistance in disaster" - distinguishes:

a) Catastrophic events with limited impact or major incidents that benefit from the integrity of the sanitary structures on the territory and that resolve in 12 hours
b) Catastrophic events that overwhelm the integrity of the sanitary structures due to the high number of victims, have difficulty in communication and require more sanitary personnel than available on the field.

The Piedmont Region adopts numerical criteria to identify the patients involved in accidents and makes an attempt to stratify the weight of every single accident with the required EMS resources. (see Table below, taken from the document).

Table 32: Classification scheme

[57] For training purposes (MPORG) it would be interesting to evaluate in parallel the Stadium Sanitary Procedures for a few different Stadiums in Europe.

Colore Gravità	Incidente multiplo	Incidente maggiore	Catastrofe
Rosso	2-4 pazienti	5 ≤ pazienti ≤ 10	pazienti >10
Giallo	6-12 pazienti	13 ≤ pazienti ≤ 26	pazienti > 26
Verde	10-20 pazienti	21 ≤ pazienti ≤ 50	pazienti > 50
TOTALE	Max 36 pazienti	Max 86 pazienti	> 86 pazienti

The document also contains formulas, based on simple assumptions that allow to calculate, the number of ambulances to be sent to the scene of the Incident.

The procedures listed in the plan are:

a) coordination and management activities of the Dispatch Centre of the 118 competent for the selected territory

b) the modality of activation, logistics, human resources, sanitary presidia and communication systems utilized during the emergency response

c) the reciprocal alerting mechanism inside the EMS

d) the alerting system outside the EMS toward other responders involved in the catastrophe response.

11.4.2 Assessment in view of PULSE operational requirements

11.4.2.1 SARS-like scenario

Table 33: Mapping of national systems to the PULSE requirements

Procedures described in D2.1	**Covers the Pulse "SOP"s** yes partly no	**Improvement Potential**	**Could serve as basis for the PULSE procedure**	**IT systems used?** **Briefly describe**
1. Intelligence and information gathering	Yes	Pulse may provide weak signal detection support	Epidemiologic information should cover also veterinary domain	INFLUENET gets input from general practitioners and paediatricians via internet
2. Threat and Risk analysis	Yes	Pulse may provide simulation support		

3. Warning/Alerting	Yes	Pulse may provide automatic warning	Alerting rules, as stated by the Italian Laws	
4. Operational picture generation and situation assessment	Yes	The information gathering is well structured only on the "patient" side (via INFLUNET). No clear information flow for resource monitoring is defined, even if the need is stated. Pulse may provide the supporting tool.	Minimal set of data to be collected on resources (chapter 7.3 of National Plan). In case of vaccination, data should include the status of vaccination campaign, per type of population (Tab.2 of National Plan)	INFLUNET gets input from general practitioners and paediatricians via internet
5. Resources and capacities planning	Yes	Pulse may provide visibility on resources and support decisions on optimal capacity	Decision making moments and relevant actors are identified. Pulse SOP and tools may refer to them	
6. Task planning, prioritization and execution control	Yes	Pulse may provide visibility on resources and support decisions on optimal on resource distribution and patient destination	Decision making moments and relevant actors are identified. Pulse SOP and tools may refer to them	
7. Logistics and stockpiling	Yes	Pulse may provide visibility and support decisions on optimal distribution	Vaccine management storage approach is set (chapter 7.2.2 of National Plan)	
8. Coordination between different services/stakeholders, incl. cross-border support	Yes	Pulse workflow may support for instance by identifying relevant actors and automatically proposing messages to be sent to them	The roles of "Civil Protection Operation Committee" and of "CCM-National Centre for Disease Prevention and Control" should be considered	
9. Post-crisis evaluation and collection of good practices	No	Pulse tool and SOP may support		
10. Training and	Yes	Pulse LMS may	SARS: Training	

exercising		support	exercices topics and delivery models (chp. 7.5 of National Plan).	

11.4.2.2 STADIUM Scenario

Table 34: Mapping of national systems to the PULSE requirements

Functions described by the SOP presented	**Covers the PULSE SOP** Yes partly no	**Improvement Potential**	**Should serve as basis for the PULSE SOP**	**IT systems used** **Briefly describe**
1. Intelligence and information gathering	Yes		Civil Protection team includes Police	
2. Threat and Risk analysis	Yes	Pulse provides workflow and elaboration support (e.g. score calculation)	Actual Roles and Actors as stated by the Italian Regulations	No system currently in use to support the authorization phase
3. Warning/Alerting	Yes	Pulse provides an additional channel (smartphone app)	Alerting roles, as stated by the procedures Actual Roles	
4. Operational picture generation and situation assessment	Yes	PULSE allows input from all the actors, also via smartphone app	Actual Roles and Actors as stated by the Italian Regulations	The system allows geo representations
5. Resources and capacities planning	Yes	PULSE provides elaboration, optimization and simulation capabilities	Some “rules of thumb” may be useful to check the recommendation provided by PULSE Actual Roles and Actors as stated by the Italian Regulations	Systems used by the Emergency operational centres (118) provide only data storage and

				presentation.
6. Task planning, prioritization and execution control	Yes	Pulse may provide visibility on resources and support decisions on optimal on resource distribution and patient destination	Actual Roles and Actors as stated by the Italian Regulations	No
7. Logistics and stockpiling	Yes	Standardizations	Lists of materials and tools, including the “standard” car, i.e. a vehicle equipped according to standard requirements	
8. Coordination between different services/stakeholders, incl. cross-border support	Yes	PULSE provides a common tool to all the actors involved	Actual actors to be involved	
9. Post-crisis evaluation and collection of good practices	(YES) Not in the documents analysed, but it is done	PULSE provides a dedicated tool	Actual actors to be involved	
10. Training and exercising	(YES) Not in the documents analysed, but it is done	MPORG based on PULSE tools	Actual actors to be involved	MPORG tools are already used by some 118.

11.4.3 **PULSE Meta SOPs covered**

Table 35: Mapping of national systems to the "Meta-SOP"s

Characteristics of the "Meta-SOP" described in D2.1 *"must" = mandatory* *"should" = desirable*	**Covers the PULSE "Meta-SOP"**	**Improvement Potential**	**Could serve as basis for the PULSE SOP**

	Yes partly no		
Knowledge management	(YES) Not in the SOPs analysed, but it is done	PULSE SOP will provide formal structure, to all Regions	Existing committees at Regional and National level may be the key "actors" in the KM process
• knowledge management for standardized data collection (must)	no		
• knowledge management for Information/data sharing at European level (must)	no		
Standards			
• Standardization/standards used	partly	A "best of breed" SOP across Italy, both for SARS and Stadium scenarios, might improve the emergency management practices	Actual Roles and Lists of equipments
• Interoperability/interconnection with other systems (?)			
Change management			
• Adoption of new regulations (should)	(partly) Not in the SOPs analysed, but it is done		Psychological support to sustain organizational change. The recent "Accordo Stato-Regioni" may be a case study on which to "test" the PULSE SOP
• alignment with new scenarios (should)	(partly) Not in the SOPs analysed, but it is done		
• communication with media (should)	yes	PULSE may provide accurate information and in real time for the communication with media.	Actual roles and Actors according to Italian Regulations

11.4.4 UseCase Applicability

11.4.4.1 SARS-like scenario

Comparison between the SARS Use Cases and the Italian Plan indicates that Pulse Use Cases are related to some of the activities of the Plan, as shown in following table.

Table 36: Mapping of national systems to the PULSE SARS Use Cases

SARS Use Cases			WHO Preriods and Phases			
#	Short description	WHO phases applicability	Inter-pandemic (Phases 1-2)	Pandemic alert (Phases 3-4-5)	Pandemic (Phases 6)	Post-pandemic
1	Weak signal detection and surveillance	2 and 3	Monitoring and evaluation	Monitoring and evaluation		
2	An airplane is landing in Italy. A probable case is now identified	3 and 4		Monitoring and evaluation		
3	A ship is arriving in Italy. A passenger has been identified	3 and 4		Monitoring and evaluation		
4	Identification of a new probable case in a community	4 and 5		Monitoring and evaluation	Monitoring and evaluation	
5	Assessment of the available medical resources during the	5 and 6		Monitoring and evaluation	Monitoring and evaluation	
6	ECDC recommendations	4, 5 and 6		Coordination and control	Coordination and control	
7	National Authority periodic assessment	5 and 6		Health-care system response	Health-care system response	
8	Post emergency learning at national level	Post-pandemic				Lesson learning
9	Post emergency learning at WHO level	Post-pandemic				Lesson learning

Yellow cells indicate that the Plan covers the SARS scenario and, at least partially the use cases, inside the specified activity; e.g. Use Case SA-2 is partially included inside the Monitoring and Evaluation procedures, WHO Phase 4 Level 0, as “Evaluate whether and how to activate controls at the frontier”.

Use Cases SA-2 and -3 are fully compliant with USMAF emergency procedures (they were designed with the collaboration of one of the 12 USMAFs).

The conclusion is that Pulse Use Cases (and related Tools and SOPs):

- will deal with some important parts of the National Plan: weak signal detection, frontier monitoring, situation assessment and evaluation (of both resources and “patients”), resources management
- will cover activities not specified in the National Plan: lesson learning at National and European level, and coordination with EU level.

One issue is related to Use Case SA-4: we assume that the General Practitioner (the “sentinel”) will input the data on suspect cases in the community in the DSVT (one of the Pulse Tools). In Italy this is done via internet in some data base of INFLUNET.

This indicates that in Italy, should the Pulse Tools be adopted, a way to relate Pulse with the INFLUNET must be defined.

11.4.4.2 STADIUM scenario

Comparison between the STADIUM Use Cases and the SOPs analysed indicates that

Pulse Use Cases are related to the SOPs, as shown in following table.

Table 37: Mapping of national systems to the PULSE Stadium Use Cases

STADIUM Use Cases		SOP Analysed		
#	Short description	• National Guidelines on the sanitary organization to be set-up in case of disasters	• Italian Stadiums' "Plan of Sanitary Assistance"	• Regional 118 Plans for Maxiemergency management
1	Scoring System in the Event Medical and Other Plan Preparation Phase	YES	YES	YES
2	Usage of a (serious) Multi-user Online Role-Playing Game as a Simulation Training Tool	NO	NO	YES
3	User wishes to mobilise additional resources from Public, Private, Voluntary and Response Assets from other member states. Via surge capacity tool.	NO	NO	YES
4	Hospital Surge Capacity and Bed Management	NO	NO	YES
5	Triage in Casualty Clearing Station [CCS] and links to PULSE proposals on electronic patient care records [ePCR].	NO	NO	NO
6	Input critical data for the RCS on Site and from other relevant off-site sources	NO	NO	YES
7	Post-Event, Post Exercise Evaluation Tool to identify lessons to be learned.	NO	NO	NO
8	Casualty Bureau Operation searchable data base created for specific multi casualty incident.	NO	NO	NO

Green cells indicate if the SOPs cover the Use Case.

The conclusion is that Pulse Use Cases (and related Tools and SOPs):

- will deal with some important parts of the more operational SOP (Regional 118 Plans)
- will cover three activities not specified in the SOPs that we have analysed: we have no evidence that in Italy some formal SOP regulate these activities.

11.4.4.3 Scenario coverage summary

Table 38: Mapping of national systems to the PULSE scenarios

Pulse scenario	**Strengths** for covering the scenario requirements	**Weaknesses** (not covering specific scenario requirements)
1. SARS	SOPs analysed make implicit reference to the situations described in six (out of nine) Pulse Use Cases. Two of these six are explicitly linked to USMAF emergency procedures These Use Cases refer to important aspects of the Plans	SOPs analysed do not cover the Post Emergency learning activity
2. Stadium	SOPs analysed make implicit reference to the situations described	SOPs analysed do not cover the CCS (Casualty Clearing

	in five (out of eight) Pulse Use Cases. These Use Cases refer to important aspects of the Plans	Station) operation

11.4.5 Summary evaluation

Current SOPs and tools may greatly benefit from PULSE functions and tools. Improvements may be related, for both scenarios, to:

- Standardization of the content and level of detail across Regions
- Remote input to the system by all the involved actors
- Elaboration of big quantity of data
- Simulation capability
- Optimization capability of resources allocation (mainly for STADIUM)
- Post event lesson learning
- MPORG related to PULSE tools
- Knowledge management
- Change management

It is expected that the findings of this national analysis and the reflection against the expected PULSE capabilities will be of mutual benefit. As shown in the discussion and some Tables, the Italian system could greatly benefit from the PULSE system if implemented or if components would be implemented. On the other hand, procedures were identified in the Italian system which can be used as instigation for further developing the PULSE procedural guidelines (D5.2).

Particularly beneficial will be that UCSC has both roles in the PULSE team: It has done this national analysis and it represents THE end-user stakeholder in the project.

11.5 Romania

11.5.1 SOPs analysed

In Romania, emergency assistance for collective accidents, calamities and disasters is regulated by Law no. 95 of 14 April 2006 regarding the healthcare reform [32]. Emergency assistance is coordinated by counties emergency inspectorates, respectively of the Bucharest municipality, or directly by the General Inspectorate for Emergency Situations (IGSU) according to the approved national plans.

For collective accidents, calamities or disaster situations, particularly for those with serious consequences, joint actions with other institutions involved in these tasks will be drawn up and will be implemented at the request of the IGSU. IGSU may request, for limited time/period, emergency ambulance services and medical support to the counties and Bucharest municipality as well as to other ministries and institutions.

Main procedures and documents, according to which the Romanian emergency

system operates in cases with multiple casualties, are listed below:

A. LAW No. 95 / 2006 HEALTHCARE (Title IV-EMERGENCY) RULES AND IMPLEMENTING RULES: The general legal framework[33]
B. RED PLAN: Mode of action at the county level in the event of disaster and collective accidents
C. WHITE PLAN
D. The **Index of Coding** for emergency calls through the 112 emergency phone number
E. TRIAGE AND EVACUATION: The triage and evacuation mode including:

- **E1. MANAGEMENT OF MEDICAL EMERGENCY;**
- **E2. MEDICAL TRIAGE- GUIDE;**
- **E3. MEDICAL PROTOCOL OF TRIAGE;**

F. PATIENTS TRANSFER: The transfer of the patients, with details in:

- **F1. INTERCLINIC PATIENTS TRANSFER ORDER**
- **F2. INTERCLINIC TRANSFER PROCEDURE;**

G. PANDEMIC PLAN: Mode of action at the county level in the event of pandemic
H.SURVEILLANCE METHODOLOGY OF INFLUENZA, SARS: The methodology used in case of SARS
I. OTHER DOCUMENTS:

- **I1. AMBULANCES TYPES I2. IGSU PRESENTATION**
- **I3. SMURD PRESENTATION**

Procedures A. to F. mainly apply to the PULSE's Stadium crush scenario, while procedures E. and F. apply to the PULSE's SARS scenario.

Main participating entities in ROMANIAN Healthcare are:

- IGSU - as coordinator of activities;
- Medical Units within the Ministry of Health;
- Medical Units from the structure of other ministries or institutions;
- Private Medical Units;
- Mobile Emergency Service for Resuscitation and Extrication (SMURD);
- Others (Red Cross, NGOs, volunteers, etc.).

In the following chapters, the contents of the above mentioned documents are briefly described:

11.5.1.1 A: Law no. 95 / 2006 HEALTHCARE SYSTEM REFORM

Law no. 95 of 14 April 2006 regards the healthcare reform -TITLE IV - The national system of emergency care and qualified first aid. **[32][33]**

This is the framework for the national health care system. It is divided in the following chapters:

Chapter 1, *General Provisions*: Terms and definitions, Basic first aid and trained first aid, Public emergency healthcare, Private emergency healthcare

Chapter 2, *Medical and technical emergency public assistance and qualified first aid*

Chapter 3, *Private emergency medical healthcare*

Chapter 4, *Ambulances services of the counties and Bucharest municipality*

Chapter 5, *Mobile Emergency Resuscitation and Extrication Services (SMURD)*

Chapter 6, *Emergency healthcare in the event of casualties, calamities and disasters in the pre-hospital phase*

Chapter 7, *Final dispositions*.

11.5.1.2 B: Red Plan[34]

Purpose

Ensuring a coordinated response of all structures with means of intervention in the case of collective accidents and/or calamities, with extremely fast manifestations and limited effects over time, resulting in multiple victims or having the potential to produce multiple victims.

Responsible Institutions:

a) institutions involved at local and county level (including Bucharest city) are:

- Ministry of Interior, the units of the IGSU / SMURD;
- the Prefecture institutions;
- Local components of structures with responsibilities in public order and safety;
- County emergency hospitals and public service of county ambulance (SAJ) / Bucharest (Ilfov) ambulance service(SABIF);

b) institutions that cooperate at national level:

- Ministry of Interior, through the IGSU, the General Inspectorate of Aviation, General Inspectorate of Romanian Police, General Inspectorate of Border Police and the General Inspectorate of the Gendarmerie;
- Ministry of Defence, through units of the Romanian Air Force.

Activation of the Red Intervention Plan[35]

The Red Intervention Plan is activated at the request of Chief Inspector of ISU by the prefect of Bucharest or prefect of the county in which the event takes place, based on the information obtained from:

a) the emergency dispatcher through the 112 emergency phone number ;

b) the first intervention teams arrived at the intervention area;

c) monitoring systems connected to medical dispatchers, ISU, Police and Gendarmerie dispatchers or other monitoring stations involved in this field.

Responsibilities and functions of authorities

a) public services of pre-hospital assistance and qualified first aid:

- give the first aid and the advanced emergency medical assistance and make preparations for the evacuation;
- provide triage, qualified first aid and transportation;
- provide medical triage of victims at the advanced medical post;
- organize the evacuation triage and evacuation of the patients.

b) ISU staff together with the medical staff which will serve in the advanced medical posts:

- install the medical posts;
- organize the triage and evacuation of the patients together with other public medical emergency services.

c) Local public authorities, in collaboration with the Police and Gendarmerie:

- identify and transport the deceased to the temporary morgue or to Forensic Medicine Institute (IML);
- ensure cooperation in disaster zone with research bodies, including with representatives of territorial IML;
- ensure measures for public order and safety;
- ensure communication with families of the victims and information about missing persons;
- provide psychological assistance, in collaboration with other structures, including volunteers, for victims, their families and intervention staff.

d) Staff of emergency rooms (UPU):

- prepares the victims reception at the level of the emergency departments in emergency hospitals and other hospitals in the accident area.

e) Executive director of the public health county direction (or Bucharest city):

- triggers the white plan in involved hospitals.

The units involved provide:

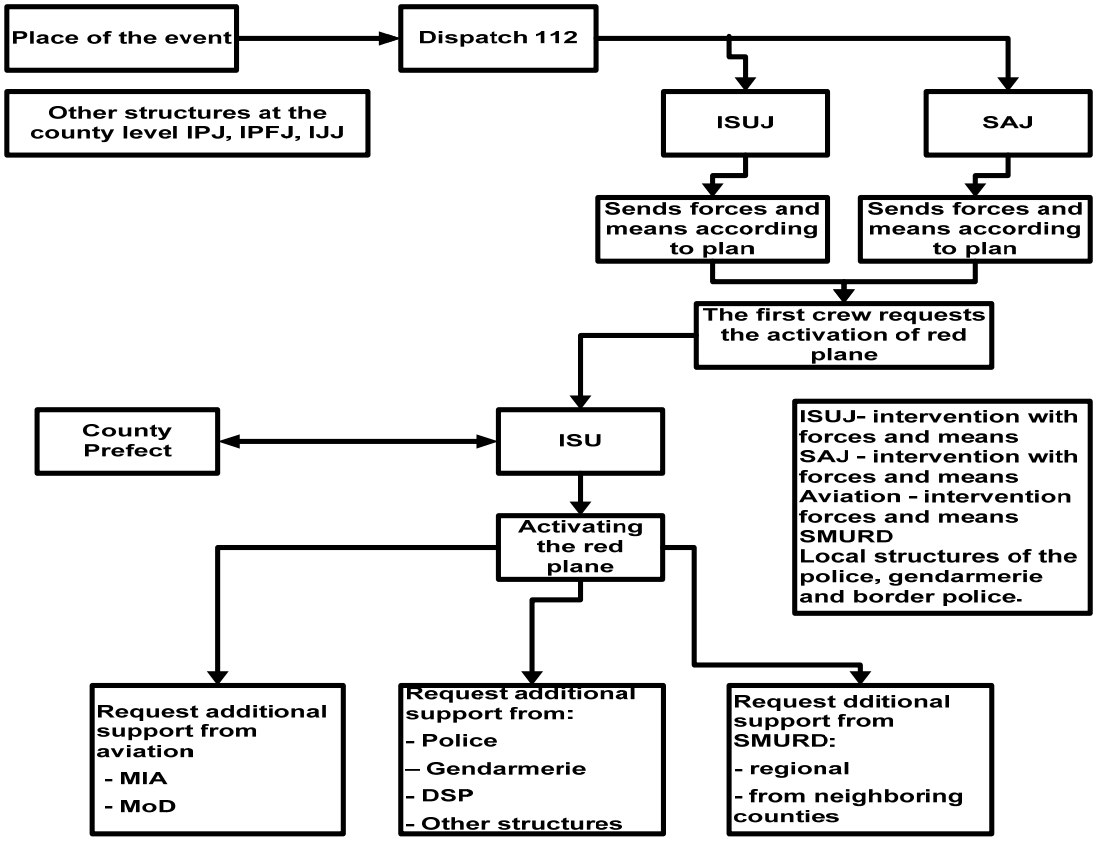
- command and control in the event of triggering the intervention Red Plan;
- communications (with the county prefect and with the intervention crew commanders);
- informing the public and the media.

Additional procedures:

- method of alerting of service personnel on duty and personnel from free shifts
- collaboration and alerting the crew of support services for triggering red intervention plan;
- installing the advanced medical stations;
- triage and evacuation of casualties (.

Figure 12: Information and decision flow shows the information and decisional flow in triggering the red intervention plan

Figure 12: Information and decision flow



11.5.1.3 C: WHITE PLAN[36]

C1. PURPOSE

This plan aims to provide a mode of action by which a county hospital, can carry out both an effective response to disasters and continuous care of the current patients who could not be evacuated to other hospitals or released from the hospital.

C2. CONTENT

Disasters intervention plan: This plan consists of the following basic plans - from Plan A to Plan M as presented in section C4 below.

C3. RESPONSIBILITIES

a. Command

Director or persons designated to take this role are responsible for initiating and carrying out the activities provided in the hospital disaster intervention plan.

b. Saving, evaluation of losses from the disaster and repair

(Unit 1) - Head of Technical Service will oversee the operations of release, saving, evaluating losses from the disaster and will lead the investigation team.

c. Clinical Services

(Unit 2) - Deputy Medical Director is responsible to distribute and to allocate all medical teams necessary for intervention depending on the specific disaster.

d. Office of internments

(Unit 3) - coordinates registration of the disaster victims and assigning them to hospital services. Also the registration of the existing valuable goods (money, jewelry, personal documents etc.) of the victims is done here.

e. Information officer on victims

(Unit 4) - Will appoint a responsible person that will give information to relatives, the media and authorities about victims.

f. Logistics

(Unit 5) - Head of logistics is responsible for providing all necessary technical materials for disaster intervention. The pharmacist is responsible for providing all necessary drugs, equipment and medical supplies.

g. Dietetics

(Unit 6) - The dietician medical assistant is responsible for ensuring all necessary diets for patients, victims and hospital staff.

h. Provisioning of personnel

(Unit 7) – The head of human resources and work organization is responsible for gathering and registering the staff not included in the plan and for reporting this reserve staff to head of the hospital; also responsible for the organization of work in shifts of personnel involved in the intervention.

i. Security service

(Unit 8) - The chief of guard is responsible for the preparation of the hospitals security and order management plan.

j. Advanced mobile medical unit

(Unit 9) - The chief doctor of the emergency department is responsible for the preparation of the pre-hospital management plan of the disaster's victims and for the organization of the triage, stabilization and transportation of victims to the hospital.

C4. PROCEDURES

In this chapter are presented the general plans and procedures.

Individual PLANS

Only plans B and K, which are relevant for the PULSE scenarios, are detailed below.
Plan A - Intervention plan for a national disaster

Plan B - Intervention plan for a disaster outside the hospital (of the community)

Definition

The actions undertaken to provide medical help in case of a major disaster, with no substantial destructions of the hospital.

General instructions

In this paragraph are stipulated how to trigger the plan and how to alert the personnel. It also sets out how

- the command post and all emergency units, will organize the entry into action to limit the effects of the disaster.
- all treatment areas set out in the Plan will be prepared to receive victims as soon as possible after the alarm.

General Procedures

a. All the chiefs of the disaster units will report directly to the command post.

b. All the staff on duty at the time of the disaster will be required to work overtime under the leadership of their chiefs when such a need arises. The staff which is not on duty at the hospital will be called when necessary. The hospital management takes measures of accommodation and feeding of the personnel which is brought to service, especially for those staff who lives far from the hospital, or who cannot return at home because of the disaster.

c. All hospital staff will have their badge at sight. This measure is necessary to limit unauthorized access to the hospital.

d. The emergency beds will be freed. When a number of specialized beds (paediatrics, burnsetc.) are not available, the victims of the categories will be treated, stabilized and transferred to the nearest hospital, which has such beds.

e. . After all victims were received, the command post will issue the alarm termination signal.

Plan C - Intervention plan in case of summer storm or blizzard

Plan D - Intervention Plan in case of earthquake

Plan E - Intervention Plan in the event of flooding or dam breaks

Plan F - Intervention Plan in case of chemical accident

Plan G - Intervention Plan in case of nuclear accident

Plan H - Cooperation Plan with the Ministry of National Defence (war, state of emergency or state of siege)

Plan I - Operational Plan

Plan J - Action Plan in case of faulty phone communications

Plan K - Management plan a mass influx of victims

Definition

The massive influx of victims is a situation which results in a large number of wounded in critical condition which exceeds the capacity of the receiving medical facilities. ***The purpose of management of a mass influx of victims***

The main objective of the management of a mass influx of wounded is to provide care to a large number of people affected by disaster.

To achieve this goal doctors and the hospital will have to avoid time and materials consuming procedures and techniques and to use such procedures allowing a large number of injured, particularly slightly injured, to return to the community.

Plan L - Intervention Plan in the event of public disorder

Plan M - Intervention Plan in case of attack with bombs or explosives

11.5.1.4 D: INDEX OF CODING OF THE EMERGENCIES[37]

Index of Coding describes the rules of allocation of resources and the means of intervention upon the degree of urgency through the 112 emergency phone number.

The document mainly refers to the mode of action in case of emergencies of singular type of medical problems (E.g. : obstetrics - gynaecology, thermal / electrical burns, fallings and other accidents, road accident, allergies etc.)

11.5.1.5 E: TRIAGE AND EVACUATION

E.1. Management of emergency medical care- principles[38]

1. OPERATIONAL OBJECTIVES

1.1. General notions regarding the triage and insurance of emergency care

In cases of large numbers of dead and wounded, when the capacity of the local health network is exceeded, an effective mechanism for available resources in other adjacent areas must be put into operation.

Emergency medical aid can be divided into three main phases:

- Phase I = survival (in minutes);
- Phase II = rescue (hours on the first day);
- Phase III = recovery (days).

The best known method of sorting and classifying of the medical cases to determine treatment and transport priorities is **the triage**.

Advanced medical formations who are acting in the intervention area organize a **triage centre.** It is organized at a distance of about 1 km from each point of intervention (in chemical and nuclear accidents outside the contaminated area) in buildings, tents or other provisional spaces.

The incoming cases are divided by **priorities for assistance**:

- persons with serious injuries that require immediate medical attention and stabilization prior to be transported to hospital;
- persons with injuries that can be sent directly to the hospital;
- persons easily affected and who will not be sent to the hospital:
- deceased persons.

1.2 Organization of emergency care in the disaster intervention area

For a better organization of actions to grant emergency medical first aid to victims, the intervention area is divided into four sectors, as follows:

1. impact area = is located centrally and occurs due to the impact of the disaster, characterized by highest rates of mortality and morbidity;
2. hazardous area = is located immediately after the impact and presents a much smaller number of victims and material damages;

3. migration area = is the displacement space of toxic cloud, floods, fires etc;

4. marginal area = area without significant damage, but where circulate a large number of person (injured, displaced and evacuated) from the other areas.

1.3. The specific mission of mobile medical team for triage and evacuation

The specific mission of mobile medical team for triage and evacuation during these crises can include:

- Medical

1) Triage

2) Treatment in area and the stabilization

3) Community assistance

- Administrative

1) Registration at the control point, the treatment area, the area of transportation and waiting areas and supply

2) Management Support Unit (UMS) for supply the mobile medical team for triage and evacuation

- Providing psychosocial support

1) Stress relieving of the situation during the crisis

2) Post-crisis summary

- Communications

- Needs assess and advice team. It includes doctors, medical assistants, and maintenance personnel.

- Research / Education

2. ORGANIZATION OF THE TEAM

Medical team for triage and evacuation is structured into two modes of operation.

- Preparedness mode uses an Executive Committee to conduct daily activities.
- Active mode is based on the Incident Command System (ICS) specifically designed for this team and used in training and mission.

2.1. Active mode:

The structure of Mobile Team for Triage (EMTr):

- **Staff:** specialist doctors**,** medical assistants (trained for the emergency), stretcher and ambulance drivers.
- **Means of transport:** ambulances, one equipped with medical apparatus and trailers with disaster intervention materials.

Materials: materials and medicines needed for medical assistance for 100 victims of variable severity.**2.2. Preparedness mode:**

An Executive Committee will ensure the continued representation of all specialties in mobile medical team of triage and evacuation, as well as the representation of each participating hospital. Within the active module, the Executive Committee may establish to support the commander of the unit and his deputy in the decision-making process.

2) Attributions of the Executive Committee within the framework of preparedness mode are:

- to prepare the mobile medical team for triage and evacuation for either nationally or locally;
- to develop and maintain policies and procedures to be followed by team members
- to ensure the acquisition and maintenance of all equipment and materials.
- to plan and lead the training activities.;
- recruit, review and retain new members;
- maintain effective communication with members of the team during the training activities and through writing and through other postal communications;
- maintain effective communication with the medical commander of operations, with the support hospitals, with local and central authorities and others;
- to develop and maintain the resources necessary for the fulfilment of these attributions;
- to promote active the team in public opinion, among the prospective members and sponsors and among the appropriate institutions;
- to assess and maintain the discipline and chain of command.

3. TEAM STRUCTURE

- Commander of Unit
- Executive Officer (Deputy)
- Chief of Medical Operations
- Chief of Logistics
- Supervisor for ambulatory care / pre-hospital
- Supervisor health care
- Supply Officer
- Public Information Officer (PIO)
- Staff Officer
- Treasurer
- Preparedness Officer
- Officer with critical stress management of the incident
- Group leader of communications
- Group head of safety-security
- Team leaders
- Members

3.1. MISSION

The mobile medical team for triage and evacuation will be prepared for a mission within 12-24 hours. The following activities will be undertaken:

1) Pre-alert: When a disaster information are obtained, no matter which way, the Commander of Unit or the Executive Officer or by a majority vote of the Executive Committee may take the option to put the Executive Committee in the State of "pre-alert". Typically pre-alert will precede the notification but it is possible to occur at the same time.

2) Notification/Alert: This occurs just after contact between the applicant institution and the commander of the unit. At the moment, an alarm system is put into operation and the staff team is announced to be available for the mission or for the base team operations.

3) Activation: For a national mission, mobile medical team triage and evacuation will be activated under the conditions of the memorandum signed between central authorities and local authorities.

3.2. MEDIA RELATIONS

The media will gather and strive to obtain information, photographs and interviews about how the wounded and deceased were cared by mobile teams for triage and evacuation.

Team members are called upon to coordinate with the PIO to ensure that the information about the team presented to the media is adequate, complete and correct.

Team members must be prepared to give short interviews without a prior detailed preparation.

3.3. COMMUNICATIONS

In active mode, if activation is local (up to 100 Km from base), all communications of the team will be done through landlines phones, mobile phones or by pager. Internal Communications will be in the incident place and will take place in the ICS terminology and procedures.

3.4. TRIAGE

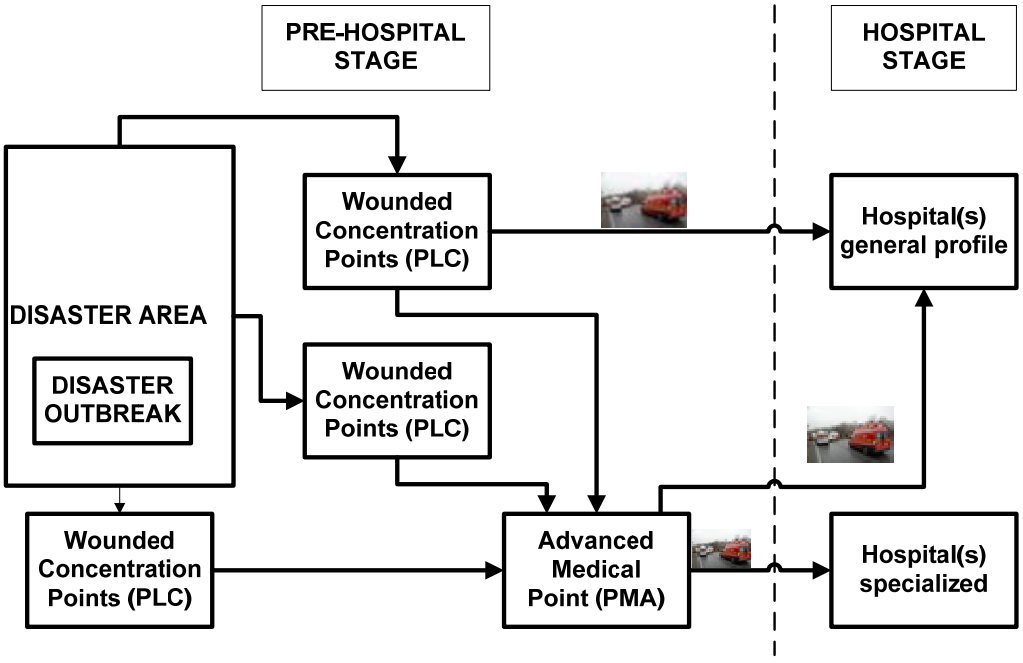
Triage is done in accordance with the documents presented below at sections E2 and E3.

E.2. Medical triage-guide[39]

In **Chapter II** of the Medical triage-guide, are presented the basic principles of public medical assistance in case of multiple casualty incidents or disasters. The process of medical care in the event of multiple casualty incidents and disasters (hereinafter disasters) is divided into two stages (see figure below):

- **pre-hospital stage**, which means healthcare provided in the proximity and in the area of the disaster also during transportation of victims to the medical institutions,
- **hospital phase**, which means healthcare provided in the medical institutions (usually hospitals) which are receiving the victims

Figure 13: Triage Workflow



Principle diagram of medical management of a multiple victims disaster

In case of excessive influx of casualties or when the distance from outbreak of the disaster to the nearest hospital is large, on the evacuation routes advanced Medical Points (PMA) are set up, designed for:

- medical assistance;
- performing an intermediary triage.

The purpose of PMA is to avoid overcrowding of hospitals in which the evacuation takes place. Typically, PMA is conducted in buildings and rooms adapted which have resisted the impact and which have kept functionality, or if the case is distributed or remote, also in tents.

The principle diagram of PMA include: triage point, triage area, area for victims with minor injuries, dressing room and / or resuscitation room for victims with serious and medium injuries, dressing room for victims with minor injuries, area (room) for waiting the evacuation, area (room) to treat the moribund and a makeshift morgue.

If necessary, sanitary treatment terrain, insulator for infectious patients and for people with acute psychiatric disorders are arranged.

Simultaneously in the PMA victims will be retained temporarily:

- who need immediate medical attention, separated from those who can temporarily be detained at the PMA;
- with minor injuries and / or moderate, moribund, deceased etc.

Also, medical care is given to stabilize and prepare victims to be evacuated later, to prevent possible complications, alleviating suffering etc.
In **Chapter III** of the Medical triage-guide are presented the concept, purpose and types of the medical triage in case of incidents with multiple victims or disasters. It covers circumstances in which **the delivery of healthcare in full capacity to all the people affected is impossible.**
Depending on the place (stage) where triage is performed, it is divided into **pre-hospital triage** and **hospital triage (inside the hospital)**.

- Pre-hospital triage is performed in the area (partly in the outbreak) of disaster and on the evacuation routes to the health care facility, with the aim of assessing the degree of priority and volume of emergency care, which would ensure the maintenance of vital functions and evacuate victims promptly and properly.
- Hospital Triage (inside the hospital) is carried out by medical institutions to determine the opportunity of treatment inside the institution, and to establish the order, urgency and the subdivision of institution where the treatment will be administered.

In **Chapter IV** are presented the triage groups. Depending on the severity and nature of the lesions and the degree of emergency medical assistance and of the evacuation, triages are defined and colour coded **in 5 triage groups**

It is a guide made in Romania and has been developed and edited with the support of the Regional Office for Europe of the World Health Organization

Table 39 Triage Levels definition

Triage group	***Color Code***	***Category of victims***
I Absolute urgency	**RED**	Victims with injuries, diseases, intoxications or contamination, serious and very serious compromising the vital functions that require immediate stabilization measures of airways, breathing and hemodynamic, as well as priority evacuation (in the first phase) under assisted medical transport. Until the vital functions are stabilized, the victims are not transportable.
II Relative urgency	**YELLOW**	Victims with injuries, diseases, intoxications or contamination, serious or moderate, with vital functions retained, but with the risk of developing serious complications in short time. Requires urgent medical assistance, but not immediate. In some instances healthcare may be postponed. The evacuation is carried out in second phase (after "Red") with assisted medical transport.
III Minor urgency	**GREEN**	Victims with light injuries, diseases, intoxications or contamination showing no health hazard, can be treated later, usually in ambulatory conditions. They can be evacuated with non-assisted medical transport or independently

IV Moribund	**GRAY**	Victims in the agony/terminal state, with injuries, intoxications or contamination very serious, incompatible with the vital functions of the body. They cannot be saved in specific circumstances of time and place, and keeping them alive will consume much time and medical resources. Requires only symptomatic therapy and relieving suffering. The evacuation is carried out in a second stage or, if the situation permits, primarily with assisted medical transport.
V Deaths	**BLACK**	Victims who died (breathing and pulse missing, corneal and photo-motor reflexes are absent, total mydriasis).

Triage is done directly in the disaster outbreak by the rescuers, fire fighters and medical teams. The colour codes in the table above are used, therefore, in the disaster outbreak triage area.

This model is similar to the model START (Simple Triage and Rapid Treatment) [48], except the group "Moribund" in gray-colour. This division, on the triage groups, is based on verification of a limited number of parameters (pulse, blood pressure, reaction to stimulus) and simultaneously will be given the first aid to victims (dressings, splints etc.).

In **chapter V** is detailed how to make the triage process is detailed, for pre-hospital phase and hospital phase, based on the triage groups presented above.

In **chapter VI** the **Medical triage sheet** is presented, and how to proceed with it according to the triage groups.

In **chapter VII** are presented the **Ethical aspects of medical triage in disaster**. In this context disaster medical personnel actions are detailed in Disaster Declaration on Medical Ethics (Annex no. 3 to the Guidelines which expressly establishes a number of key concepts that serve as landmarks in ethical compliance by staff involved in conducting medical triage).

E.3. Medical triage-protocol[40]

This protocol is based on the Emergency Severity Index (ESI) triage algorithm [49]. ESI triage is based on the acuity of patients' health care problems and the number of resources their care is anticipated to require. The concept of a "resource" in ESI means types of complex interventions or diagnostic tools, above and beyond physical examination. Examples of resources include X-ray, blood tests, sutures, and intravenous or intramuscular medications.

ESI is a five-level emergency department triage algorithm, with level one indicating the greatest urgency. The levels are as follows: Resuscitation (1), Emergent (2), Urgent (3), Less Urgent (4), Non-urgent (5).

Triage is done in the hospital or other receiving units by medical teams. The colour codes mentioned below are used, therefore, upon receiving the victims at the hospitals or the other receiving units.

In **Chapter I** of this protocol, is presented the role of triage and also where, when, how triage is performed, also the algorithm for triage.

Triage Level: Includes all patients with the same degree of priority depending on the severity and / or acute nature of their pathology and resources.

Level I **- RESUSCITATION (red code) –** including the interventions of life saving**:**

- the patient who requires now intervention of life saving.
- the maximum time of takeover to treatment: 0 minutes

Level II - CRITICAL (**yellow code**)

- The patient who has a high risk situation or altered mental status (acute modification) or any severe pain or major discomfort
- The maximum time of takeover to treatment: 10 minutes

Level III - URGENT (**green code**)

- the patient with stable vital functions but who require two or more of the resources defined below
- the maximum time of takeover to treatment: 30 minutes

The *Resources* are those interventions that involve evaluating or performing a procedure that requires more time from emergency medical personnel and / or involve staff outside the emergency department. The resources that require a long time (intravenous medication administration, insertion of a chest drain, etc.) or require staff or resources outside the emergency department (x-rays, surgical consult) increase the stay time of the patient in the emergency department and indicate the degree of complexity; therefore triage category will be increased by one level. The essence of this part of the algorithm is to distinguish the patients with complex pathology from those with simple problems.

Level IV - NON-URGENT (blue code)

- The patient showing stable vital functions and requires one of the previously defined resource (Level III)
- The maximum time of takeover in the area of treatment: 60 min.

Level V - CONSULT (white code)

- The patient that requires no emergency medical assistance and none of the resources defined above.
- The persons who show the following:
  - vaccination
  - social case without clinical complaints
  - clinical and administrative problems (medical certificates, prescriptions, etc.)
- The maximum time of takeover in the treatment area: 120 minutes.

Chapter II presents the triage algorithm.

Chapter III presents the triage protocol assessment **,** including the monitoring and evaluation parameters**:**

- Precision of the triage categories appreciated by the triage medical assistant
- The rates of over and under assessment of the triage level
- The percentage of cases with unfavourable evolution due to incorrect triage
- The average waiting time for each triage category
- Proportion of patients with waiting times greater than that recommended for each triage category
- The percentage of patients by the levels IV and V who are hospitalized

The assessment is made by the hospital management who ensures the triage to improve the quality of emergency department activity.

11.5.1.6 F: PATIENT TRANSFER

F.1. The Order of the inter-clinic patients transfer [41]

In case of the critical patients requiring emergency intervention from a different hospital in order to save their lives , the hospital doctor who requests the transfer has the right to request aerial rescue crew or, where appropriate, a mobile intensive care crew, a crew of neonatal transfer or emergency crew without prior consent of the hospital which will receive the patient in question with the condition to provide the information, in the shortest possible time, to the doctors of the receiving hospital.

Each sending and receiving health unit provides access to a fax 24/24, 7/7.

All locations of medical dispatcher stations, of integrated dispatchers, the central headquarters of the counties and Bucharest ambulance services, and the mobile emergency resuscitation and extrication services, including all air rescue bases, will be equipped with 24/24 7/7 fax machines.

- **F.2. Inter-clinic transfer procedure**

The main elements of this procedure are [42]:

- Preliminary points: Primary purpose of the transfer is to ensure optimal patient care and acceptance of the receiving hospital before the start of the transfer unless the patient needs an emergency transfer.
- Persons responsible for assessing the patient and transfer organization.
- Responsibilities of the doctor who requests the transfer.
- Providing care during the transfer.
- Minimum information that must accompany the patient.
- Criteria, indications and contraindications for aerial transfer.
- Annexes:
  - Revised Trauma Score (RTS) – (Annex 1)
  - Score of Paediatric Trauma – (Annex 2)
  - Medical sheet for inter-clinic transfer of critical patient – (Annex 3).

11.5.1.7 G: EMERGENCY PLAN IN A PANDEMIC SITUATION [43]

The **emergency plan in a pandemic situation** presents [44] the notions of influenza, pandemic, propagation mode as well as their effects. The plan's goal is population protection against an influenza pandemic by:

- preparation of the authorities and the public in case of an influenza pandemic;
- virus appearances detection and spreading control;
- ensuring the best means of population prevention and care;
- public authorities attributions;
- material and human resources inventory;
- maintaining public confidence in the competence of public authorities;
- using the experience from the previous similar events;
- maintaining the operational capacity of the structures involved.

In case of suspected or confirmed influenza virus, the new virus symptoms and propagation ways are determined as well as the measures that should be taken in

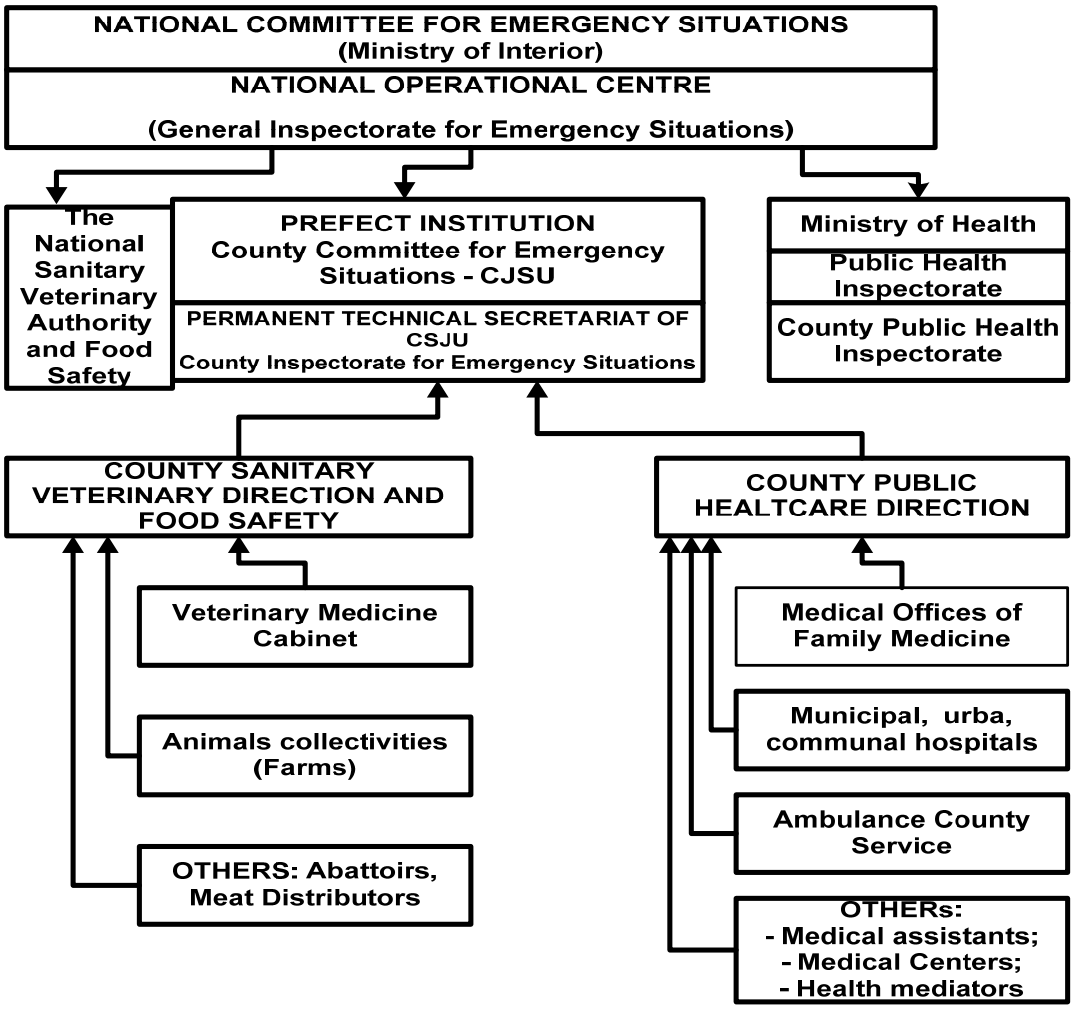
order to limit the new virus spread.

The main objectives of the **strategy to slow the pandemic development** are to limit the epidemic at the source and to reduce the virus's spread and, as much as possible, the number of infected and deaths. In order to efficiently reach those objectives both organizational and human resources (training and equipping the response teams, prepare the population for vaccination etc.) as well as material resources (complete emergency stocks) related measures are taken.

The **sanitary intervention strategy** in case of a pandemic establishes that the medical system must continue to take care of the regular pathologies while the patients affected by the new pandemic will be treated at home in the initial stages of the disease providing the following services: monitoring, medical consultations and treatment at home, preventive education and information. If complications appear, the patient will be transferred into the hospital where the following services will be provided: isolation, treatment, medical transport etc.

At county level, the **health sector is primarily responsible** for the **crisis management** by providing the required healthcare services and information in order to reduce the spread of the pandemic and to protect and support the medical staff during the pandemic. On the other hand, the population must take measures to ensure the access to the information and resources (food, water and medicines). The public authorities with responsibilities in controlling the disease are the Prefect Institution in collaboration with the County Council and local councils; all those are responsible for defining the local policies, providing material and financial means necessary to implement the measures. A detailed diagram of informational - decisional flow for the management of the emergency situations caused by the pandemic at county level is presented in Figure 14

Figure 14: Information flow in the Romanian system



The emergency plan in a pandemic situation will also specify the mode of intervention and the available medical personnel, the location of the treatment areas, the hospitals and the number of available beds, the number and type of available ambulances and anti-epidemic teams allocation.

The County Public Health Direction and each hospital have a permanent stock of medical supplies, disinfectants, vaccines, disposable protective equipment. The Public Health Laboratory must be ready to harvest / operate/ send to national reference laboratories both biological products as well as food and water samples, etc.
Local authorities, institutions and operators in the county have the obligation of provisioning of the materials, products and equipment including disinfectants to protect their staff and citizens.

The following prevention / public information actions are also part of the plan:

- Pandemic specific symptoms population awareness as well as the obligation to present to the doctor / hospital in case of illness.
- Informing the people who intend to travel to countries affected by the pandemic.
- Food chain economic operators communication and control activities.

11.5.1.8 H: SURVEILLANCE METHOD. OF INFLU., SARI [45]

The clinical illness compatible with influenza, acute respiratory infections (ARI) and severe acute respiratory infections (SARI) are reported weekly to the European Centre for Disease Prevention and Control (ECDC) – in the TESSy reporting system.

The main objective is assessing the epidemiological potential and monitoring the influenza and ARI; the main activities are:

- Monitoring of the morbidity and the severity;
- Monitoring the movement of human influenza viruses with pandemic potential;
- Monitoring of resistance to antiviral of the influenza virus;
- Monitoring and etiological investigation of outbreaks;
- Monitoring the evolution of indirect indicators of influenza activity (medical leave);
- Recommendation of measures and actions of the public health, evidence based.

Influenza activity is characterized by: frequency of clinical cases of influenza, acute upper respiratory tract infection and laboratory confirmation. The outbreak of influenza season is declared 10% of the tested samples /week are positive for the same subtype / version.

Sentinel physicians will record, take samples and report cases; the case classification is done by the epidemiologists as it follows:

- Possible case: a case that meets the clinical criteria;
- Probable case: a case that meets the clinical criteria and is epidemiologically linked to a laboratory confirmed case;
- Confirmed case: a case that meets the clinical and laboratory criteria.

The sentinel system for surveillance of the acute respiratory infections and of the clinical affections compatible with influenza

The sentinel system is organized in 15 counties and in Bucharest and includes at least 193 family doctors. The surveillance is done continuously during the year and the following data are collected:

- number of consultations and home visits per week and per age group;
- number of cases per week and per age group, of all consultations and home visits;
- number of physicians who participated;
- total number of assisted persons;
- number of short-term medical certificates (<10 days);
- number of samples sent for testing the influenza.

The reporting statistics of the morbidity will consist in:

- number of cases with influenza, IACRS, pneumonia, per week and per age group, how many cases hospitalized;
- number of deaths from influenza, pneumonia and IACRS;
- number of samples collected and sent for testing influenza.

The reporting of the data collected, as well as the reporting of the morbidity, is done weekly, every **Tuesday**, for the previous week. The reporting and processing of data will be done as follows:

- At local level to Public Health Direction (DSP);

- At regional level to Regional Centres for Public Health (CRSP);
- At national level to National Centre for Surveillance and Control of Transmissible Disease (CNSCBT).

CNSCBT will conduct weekly epidemiological analysis and this will be send to the Ministry of Health. The analysis also will be posted on its website.
The authorities will regularly inform the public and media, as well as the national /international bodies.

Sentinel system for surveillance of severe acute respiratory infection (SARI)

The sentinel system for surveillance of severe acute respiratory infection (SARI) has two objectives:
Objective 1 - Monitoring the severity of SARI cases, mainly those with confirmed influenza virus
Objective 2 covers the following directions:

- monitoring the aetiology of SARI cases
- identifying, with priority, the influenza viruses associated with severe clinical pictures and their resistance to anti-viral;
- monitoring circulation and the antiviral resistance of human influenza viruses with potential pandemic and epidemic ;
- detecting emerging severe respiratory disease

For the first objective, the surveillance period will be established by the CNSCBT, according to the evolution of epidemiological situation.

The reporting is done nominal in 24 hours after detection; numerically reporting is done monthly to National Public Health Institute (INSP). The reporting and processing of data will be done as follows:

- at local level by DSP;
- at regional level by CRSP;
- at national level by CNSCBT.

CNSCBT will conduct weekly epidemiological analysis and this will be send to the Ministry of Health. The analysis also will be posted on its website.
The authorities will regularly inform the public and media, as well as the national /international bodies.

11.5.1.9 I: OTHER DOCUMENTS AND SOURCES

This chapter just references:

- I1 - Ambulances types
- I2 - General Inspectorate for Emergency Situations - Short presentation[51]
- I3 - Mobile Emergency Services of Resuscitation and Extrication - Short presentation **[50]**

11.5.2 Assessment in view of PULSE operational requirements

Strengths and positive experience

- In Romania the intervention activity in case of accidents with multiple victims and pandemic is regulated;

- In this respect, there are procedures for intervention and other support documents (plans, guides etc.);
- The documents described in the section 4.5.1. can be used for the implementation of the scenarios:
    - Stadium crush scenario - documents from A to F)
    - SARS scenario - documents from G to H and .

Weaknesses, gaps, deficiencies

- There is still no software to support intervention activities;
- Documentation is done manually and then transmitted by telephone, fax or e-mail to the authorized organizations for analysis and evaluation;
- Ther is need for an automatically updated common operational picture over the incident (intervention teams and resources location, situation of the material means and the human forces etc.).

Improvement potential (in the sense of PULSE objectives)

- Implementing PULSE would increase the efficiency of intervention activities;
- It would support a more efficient use of the human resources and means of intervention;
- It would improve the cooperation between participating intervention units, namely:
    - intervention of the emergency personnel from a county in an incident in another county;
    - interventions at a trans-boundary incidents.

Table 40: Mapping of national systems to the PULSE requirements

Procedures described in D2.1	**Covers the Pulse "SOP"s** yes partly no	**Improvement Potential**	**Could serve as basis for the PULSE procedure**	**IT systems used?** **Briefly describe**
1. Intelligence and information gathering	yes			-
2. Treat and Risk analysis	yes	PULSE may provide data regarding the human resources, equipments, materials, processes, information (environmental, medical, needs etc.) to all users		No system in use to support this function
3. Warning/Alerting	yes	Update of the national SOPs taking into consideration new types of risk, new technology developing		-
4. Operational picture generation and situation	yes	PULSE enables the collection of the data from all participants and		No system in use to support this

assessment		facilitates adaptability and scalability		function
5. Resources and capacities planning,	yes		Especially for the disaster situation – the guide for medical triage (chap. 4.5.1.5. pts. E2 and E3)	-
6. Task planning, prioritization and execution control	yes	Specifying the level, quality and sizing of the necessary medical means when preparing the intervention in case of demonstrations or public gatherings with numerous people.		-
7. Logistics and stockpiling	yes		Especially for the disaster situation – the guide for medical triage contains material management	-
8. Coordination between different services/stakeholders, incl. cross-border support	yes	Integration and harmonization of the hospitals' White plans in the county's Red plans		-
9. Post-crisis evaluation and collection of good practices	partly	Standardization update for: • response mode at the alert • the contact with Media • cooperation between counties • communications status •		-
10. Training and exercising	partly	Training methods depending on the incident type Test and training of resource allocation		-

11.5.3 Applicability to the PULSE Scenarios

Applicability or adequacy to the PUSE scenarios:

Verbal discussion plus summary table below.

By analyzing the Romanian SOPs used for the management of the emergency situations, we consider that there are aspects which may be applicable to the PULSE scenarios, but also weaknesses which can be covered using PULSE outcome.

Regarding the SARS scenario, the Romanian emergency plan in a pandemic situation it is a good reference for the SOPs related to intelligence and information gathering, warning/alerting, resources and capacities planning and task planning, prioritization and execution control.

Regarding Stadium scenario, the Romanian SOPs for triage/ evacuation and patient transfer as well as the resource planning (White plan – hospital level, Red plan – county level) may be applicable for PULSE.

On the other hand, the Romanian SOP's may benefit from the PULSE post-crisis evaluation and collection of good practices and training and exercising.

Table 41: Mapping of national systems to the PULSE scenarios

Pulse scenario	**Strengths** for covering the scenario requirements	**Weaknesses** (not covering specific scenario requirements)
1) SARS	Pandemic plan and Surveillance methodology of Influenza, SARS (chap. 4.5.1.7.pt.G and 4.5.1.8. pt. H) covers at least partially , inter-pandemic, pandemic-alert and pandemic periods, mainly on: • Weak signal detection and surveillance • Identification of a new probable case in the community • Assessment of the medical resources available during the pandemic phase • ECDC Recommendations Periodic assessment of national authority	Are not covered the requirements of the SARS Use Cases: - Post emergency at national level learning -Post emergency at WHO level learning related of the post-pandemic period
2) Stadium	Are well covered the phases of "Preparation" and "Response" of the	Are not covered the requirements regarding the Post-Event, Post Exercise Evaluation Tool to identify lessons to be learned

	intervention by the: Red plan, White plan, Triage/ Evacuation and Patient transfer documents (chap. 4.5.1.2.pt.B, and 4.5.1.3. pt. C chap. 4.5.1.5 pts.E1,E2,E3 and 4.5.1.6. pt. F) , mainly on: • How to mobilize the intervention teams and resources; • Management of intervention teams and resources; • Triage and transfer of the patients; • The mode of evacuation; • Data collection, reporting and analysis (non-automated)	

11.5.4 Meta SOPs covered

Table 42: Mapping of national systems to the "Meta-SOP"s

Characteristics of the "Meta-SOP" described in D2.1 *"must" = mandatory* *"should" = desirable*	**Covers the PULSE "Meta-SOP"** Yes partly no	**Improvement Potential**	**Could serve as basis for the PULSE SOP**
Knowledge management			
• knowledge management for standardized data collection (must)	yes		
• knowledge management for Information/data sharing at European level (must)	yes		
Standards			
• Standardization/standards used	yes		Especially for the accident with multiple victims – the guide for medical

			management and triage can be useful (chapter.4.5.1 subchap. E and F) For the accident with multiple victims – the guide for medical management and triage can be useful (chap. 4.5.1.5 pts.E1,E2,E3 and 4.5.1.6. pt. F).
• Interoperability/interconnection with other systems (?)	no		
Change management			
• Adoption of new regulations (should)	no		
• alignment with new scenarios (should)	partly	Providing data for the design of the training scenarios that: - should be as realistic as possible - have different difficulty and variability levels - use statistical analysis, retrospective and prospective, on potential consequences	
• communication with media (should)	yes	PULSE may provide accurate information and in real time for the communication with media.	Rules how to communicate with the media in case of accidents with multiple victims (chap. 4.5.1.2.pt.B, and chap. 4.5.1.5 pts.E1)

11.5.5 **Possible further benefits for PULSE**

The leading benefits have been identified and described in chapters 11.5.2, 11.5.3 and 11.5.4 above.

11.5.6 **Summary evaluation**

The current SOPs in Romania include both, the preparedness and response phases covering major incidents as well the pandemics situations. The most advanced section is related to task planning, prioritization and execution control (See : Red Plan - Mode of action at the county level in the event of disaster and collective accidents- pct. 11.5.1.2./ chap. B; White Plan - mode of action at the hospital level in the event of disaster and collective accidents - pct. 11.5.1.3/chap .C; Management of emergency medical accidents - pct. 11.5.1.5chap.E1.; Medical triage- guide; - pct. 11.5.1.5/chap.E2.; Romanian protocol of triage - pct. 11.5.1.5/chap.E3.). They are particularly well developed at county level (region), valid for 40 counties and the municipality of Bucharest.

The terms and the measurements that must be collected, processed and reported in case of interventions at incidents with multiple victims and pandemic situations can be used as reference for PULSE.

Annex 4

12 PPP[58], CIMIC[59] and other Cooperation

It has become clear from the analysis of national healthcare systems and international regimes that they comprise complex networks of cooperation between public, semi-private[60] and private organizations, and in major disasters and crises, also strong intra-governmental and inter-departmental collaboration. These require dedicated agreements, MOUs and in most cases also dedicated legislation. Here we discuss the principles of PPPs and give some samples of cooperation with the military and other dedicated organizations.

Many procedures in healthcare investigated in the chapters above and below are usually including or are based on operational settings which are important but which lie outside the scope of the PULSE project.

12.1 Public-private partnerships (PPPs)

12.1.1 General Discussion of PPP

Public-private partnerships are in many areas indispensible in modern developed countries. Good examples are rail and air transportation, telecommunications or energy supply. Generally in the security domain, however, PPPs are reaching limits and are often hard to realize because

- objectives and interests of the public and the private sector may widely differ: While government institutions are responsible for protecting individuals and society as a whole, commercial industries need primarily to follow their business interests.
- disclosure of sensitive industry information (e.g. on incidents) to state organizations is met with great reluctance
- Sharing of responsibilities, of risks and liabilities, of resources and of power often meets unsolved or unsolvable legal barriers

In Healthcare, fortunately, public-private collaboration, sharing of tasks, burdens and responsibilities has a long-standing tradition and it works. In most (European) countries, we have a well established, meshed, organized public system and structures of public help and rescue services, first responders organizations, public hospitals, crisis management staffs, scientific experts organizations etc. This is supported by semi-private and private organizations from insurances to doctors to private hospitals to private rescue services and ambulances, including the large number of NGOs.

Although the PULSE project is not explicitly tasked to investigate the specific needs and requirements of PPP in healthcare, the PULSE system will have to fit into such a complex PPP structure and needs to regard this in the setup of its demonstration experiments. Ultimately, a system like that of PULSE will have to serve both, the public and the private users.

[58] Public-private-partnership

[59] Civil-military cooperation

[60] e.g. privately operated but under strong governmental control

In this status quo report, we give only one example (Romania) of a typical existing PPP setup.

In Romania, the private emergency assistance in the event of collective accidents, calamities and disasters is regulated by Law no. 95 of 14 April 2006 regarding the healthcare reform.

In this regard, pre-hospital emergency assistance will be assured under contract.

For the patients with threatened vital functions, private hospitals are obliged to provide free of charge the first aid until safe transfer to a public hospital.

Private emergency healthcare in pre-hospital phase is provided with ambulances, and equipment complies with the minimum standards imposed to the public pre-hospital emergency services.

Private pre-hospital emergency services are not allowed to subcontract to the public services to cover areas or activities that may not be covered by its own capability. Private medical emergency hospital services are organized in the structure of private hospitals.

Emergency medical services private hospital are required to stabilize any patient who arrives in the critical status or with suspicion of a serious acute illness, regardless of the financial capacity to pay the costs of treatment, and she/he can be transported to a public hospital, in appropriate circumstances, only after stabilization of vital functions and providing emergency treatment urgenţă. In case when the private hospitals do not have guard services, private hospitals are obliged to provide first aid and alert the public emergency services through the 112 emergency phone number.

The chief inspectors of emergency inspectorates, if necessary, may request the assistance of private ambulance services in the conditions stipulated by law.

Also, in the rules for the application of Title IV the following aspects are detailed:

- Providing the private medical emergency assistance at pre-hospital level is done by:
  - non-profit private ambulance services that are called and coordinated through the public 112 emergency phone number.
  - commercial private ambulance service, that are called and coordinated through their numbers.
- Private ambulance services, commercial and non-profit, are obliged to respect the rules for public services in terms of staff training and competence required for each type of activity performed.
- Activities performed by commercial private ambulance services include:
  - Provide emergency consultations at home
  - Medical transport
  - Emergency medical assistance.
- In private hospitals, emergency medical assistance is granted based on direct contracts with patients or their families, based on collective agreements with the companies where they work under contracts with private insurances and / or at the direct request of the patient or family.
- Private hospitals that have emergency services are obliged to stabilize any patient arrived, regardless of patient's ability to pay costs, up to securing his/her transfer to a public hospital.

Not granting of emergency medical care to a patient without possibility or capability of paying costs, who is in critical condition, or symptoms of disease causing acute and

potentially life threatening, triggers the immediate withdrawal of the operating license of the hospital concerned and the interdiction to provide the emergency medical assistance.

12.1.2 Private sector involvement samples

For Ireland, the specialized and voluntary forces, utilities and private sector are discussed under chapter 11.3 and for Romania under 11.5.

12.2 Civil-Military Cooperation (CIMIC)

For **Ireland**, there is a separate chapter under 11.3 where the use of and cooperation with the military defence forces is described.

For **United Nations** humanitarian-military coordination see also under chapter 13.3.1.

The following section gives a summary of the role of defense forces in disaster management in **Romania**:

According to the ordinance Nr. 47/ 12.08.1994 regarding the protection against disasters, the Ministry of National Defence has the following specific responsibilities:

- It aims to prepare evacuation plans for population and animal material goods in cases of disaster
- Participates at the elaboration of training programs for population protection and intervention in case of disaster
- Lead the training exercises of population and economic entities(regardless of ownership)
- Verify the applicability of the plans in case of disaster
- Participates with own forces and means in the disaster areas, the actions of intervention to confine and clear effects.

Also in the Red Intervention Plan, the procedures are specified, of requesting military helicopters for transportation of materials and personnel and / or for ensuring evacuation of victims from the place of intervention.
Also within this plan contact details are provided of the units within the Air Force General Staff under the National Defence Ministry from the county area and the name, place, type and capacity of the air transportation means.

If appropriate, through district military centres technical means and equipment provided in the plan will made available to the intervention units by military units.

In the disaster intervention plan of county hospital - (White plan) there is a special annex respectively PLAN H - Plan for cooperation with the Ministry of Defence which is valid only in case of war.

12.3 Specialized services Examples

For Ireland, the specialized and voluntary forces, utilities and private sector are discussed under chapter 11.3.1Some examples of special services in Romainia include:

SMURD: Mobile Emergency Service for Resuscitation and Extrication [50]
SMURD is an emergency rescue service in Romania. The first SMURD unit was created in 1991 in Târgu Mureş, a city in the centre of historic Transylvania province.
In October 1996, the service received legal recognition under the Military Firemen Corps law no.121. Until that date, it served as a national pilot centre.

Now SMURD is a complementary service, with bases covering many parts of the country, still expanding. It deals with the critical emergency cases, in a very good collaboration with the regular Ambulance Service.

Also Helicopter Emergency Medical System (**HEMS**) was enforced in six cities (Targu Mures, Bucharest, Iasi, Arad, and Constanta), while in other cities the system is only *ambulance based*. Depending on the situation, police and army helicopters are also being used.
The emergency system used by this service is based on the European 112 emergency phone number, now also used in Romania for all the first responders (police, fire fighters, ambulance).
Starting in 2007 the service has been expanding step by step to cover whole Romania. As of today, the service is active on the whole national territory (together with the regular Ambulance Service). Every department now has its own SMURD service managed by the county fire fighting services, integrated with the county ambulance services and other emergency services, thanks to new integrated "112" dispatch county stations.
Other projects are the implementation of the **Telemedicine** system (already available in many regions) and an emergency **airplane** for long distance patient-transport.

The **SMURD** activity is regulated by Law 95/2006, Title IV. Thus, in Chapter 5 is presented:

- The definition of service;
- Overall structure and detailed component of the intervention crews;
- Ways of coordinating;
- How to ensure the equipments, resources and financing.

Also, in the rules for the application of Title IV the following aspects are detailed:

1. Mobile emergency services, intensive care and extrication organized, in medical terms, at regional level
2. The regional organization
3. SMURD management structure (regional, county and local)
4. Types of crews and structure:
    - Qualified first aid crews
    - First aid and rescue (rescue specific equipment / extrication) crews
    - Intensive care mobile crews
    - Air rescue crews
    - Intervention Crews collective at the accidents and disasters
    - Rapid Intervention Crews
5. Mobile Emergency Resuscitation and Extrication Services

RED CROSS FROM ROMANIA[46]

The duties that the Red Cross has according to the Government Decision no. 2288/2004 approving the distribution of main supporting functions that are ensured by the ministries, other central institutions and NGOs on prevention and emergency management are:

- Evacuating people or property in danger;
- Provide emergency medical assistance;
- Prevention of mass disease;
- Provide water and food to people affected or evacuated;
- Providing accommodation and to shelter people affected or evacuated;
- Logistics intervention;

- Rehabilitation of the affected area;
- Provide first aid, compensation and social and religious assistance.

Also, the Red Cross is involved in: organization and development of the first aid exercises, contests and competitions, the training and education activities and actions of voluntary and unpaid blood donation.

SALVAMONT: The National Association of Mountain Rescue in Romania[47] -

Mountain rescue squad has the following main responsibilities:

- Emergency operations at the requested site, rescuing injured or sick person, providing the medical first aid and its transport to the place specified, where to be taken over by specialized medical staff;
- Preventive patrolling in mountainous areas with high tourist flow, high degree of danger and in mountain tourist resorts with intensive practice of the winter sports;
- Any other tasks that are required by the terms of the contract under which the association was engaged.

Also, the SALVAMONT is involved in:

- Coordination of technical mountain rescue activity across the country, with the power to issue binding technical standards in mountain rescue work;
- Organization of professional teams and training for mountain rescuers.

Annex 5

13 International

13.1 Bilateral agreements

(for textual analysis of bilateral agreements, see chapter 5.1)

Table 43: Germany bilateral agreements

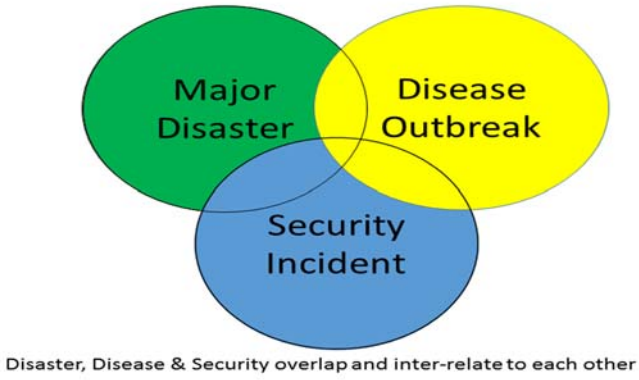
Country	Title	Content
Belgium	Gesetz zum Abkommen vom 6. November 1980 zwischen der Bundesrepublik Deutschland und dem Königreich Belgien über die gegenseitige Hilfeleistung bei Katastrophen und Unglücksfällen vom 30. November 1982	Federal bill (dated 6 Nov 1980) on the agreement between Germany and Belgium regarding mutual support and assistance in catastrophic situations and accidents (dated 30 Nov 1982)
Denmark	Gesetz zum Abkommen vom 16. Mai 1985 zwischen der Bundesrepublik Deutschland und dem Königreich Dänemark über die gegenseitige Hilfeleistung bei Katastrophen und Unglücksfällen vom 17. März 1988	Same title as above Germany/Denmark 16 May 1985/17 Mar 1988
France	Gesetz zum Abkommen vom 3. Februar 1977 zwischen der Bundesrepublik Deutschland und der Französischen Republik über die gegenseitige Hilfeleistung bei Katastrophen und Unglücksfällen vom 14. Januar 1980	Same title as above Germany/France 3 Feb 1977/14 Jan 1980
Lithuania	Gesetz zum Abkommen vom 15. März 1995 zwischen der Bundesrepublik Deutschland und der Republik Litauen über die gegenseitige Hilfeleistung bei Katastrophen und Unglücksfällen vom 12. Januar 1996	Same title as above Germany/Lithuania 15 Mar 1995/12 Jan 1996
Luxembourg	Gesetz zum Abkommen vom 2. März 1978 zwischen der Bundesrepublik Deutschland und dem Großherzogtum Luxemburg über die gegenseitige Hilfeleistung bei Katastrophen und Unglücksfällen vom 7. Juli 1981	Same title as above Germany/Luxembourg 2 Mar 1987/7 Jul 1981
The Netherlands	Gesetz zum Abkommen vom 7. Juli 1988 zwischen der Bundesrepublik Deutschland und dem Königreich der Niederlande über die gegenseitige Hilfeleistung bei Katastrophen und Unglücksfällen vom 20. März 1992	Same title as above Germany/The Netherlands 7 Jul 1988/20 Mar 1992
Austria	Gesetz zum Abkommen vom 23. Dezember 1988 zwischen der Bundesrepublik Deutschland und der Bundesrepublik Österreich über die gegenseitige Hilfeleistung bei Katastrophen und Unglücksfällen vom 20. März 1992	Same title as above Germany/Austria 23 Dec 1988/20 Mar 1998
Poland	Gesetz zum Abkommen vom 10. April 1997 zwischen der Bundesrepublik Deutschland und der Republik Polen über die gegenseitige Hilfeleistung bei Katastrophen und Unglücksfällen vom 7. Juli 1998	Same title as above Germany/Poland 10 Apr 1997/7 Jul 1998
Russian Federation	Gesetz zum Abkommen vom 16. Dezember 1992 zwischen der Bundesrepublik Deutschland und der Russischen Föderation über die gegenseitige Hilfeleistung bei Katastrophen und Unglücksfällen vom	Same title as above Germany/Russia 16 Dec 1992/18 Oct 1994

	18. Oktober 1994	
Switzerland	Gesetz zum Abkommen vom 28. November 1984 zwischen der Bundesrepublik Deutschland und der Schweizerischen Eidgenossenschaft über die gegenseitige Hilfeleistung bei Katastrophen und Unglücksfällen vom 22. Januar 1987	Same title as above Germany/Switzerland 28 Nov 1984/22 Jan 1987
Czech Republic	Gesetz zum Abkommen vom 19. September 2000 zwischen der Bundesrepublik Deutschland und der Tschechischen Republik über die gegenseitige Hilfeleistung bei Katastrophen und Unglücksfällen vom 16. August 2002	Same title as above Germany/Czech Republic 19 Sep 2000/16 Aug 2002
Hungary	Gesetz zum Abkommen vom 9. Juni 1997 zwischen der Bundesrepublik Deutschland und der Republik Ungarn über die gegenseitige Hilfeleistung bei Katastrophen und Unglücksfällen vom 7. Juli 1998	Same title as above Germany/Hungary 9 Jun 1997/7 Jul 1998

13.2 Detailed EU analysis

An analysis of the existing structures for disaster response must recognise that the response mechanisms for major disasters, disease outbreak and incidents of a security nature are separate but closely related.

Figure 15: Incident Overlaps



There are National (MS), EU and UN organisations who have responsibilities in these areas and although these will be explained separately it must be understood that they overlap in complex ways and are related to each other. Disaster response can be within the EU and outside the EU borders and the relationships will vary depending on the location and the priorities of the EU and the Member States. When the crisis occurs in developing countries, civil protection assistance typically goes hand in hand with EU humanitarian aid.

Figure 16: Organizational Interaction

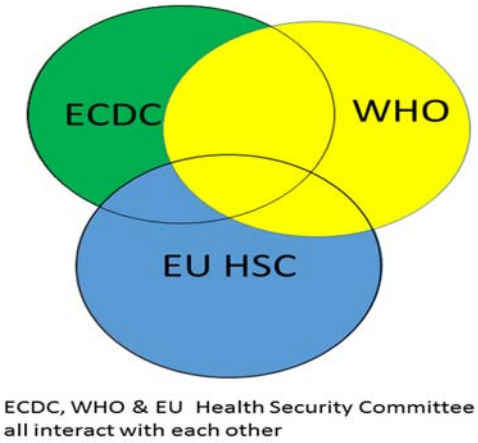
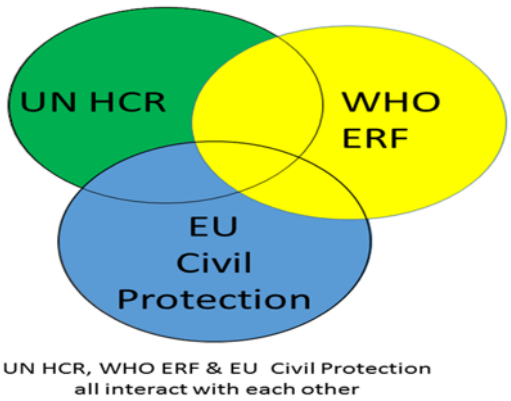


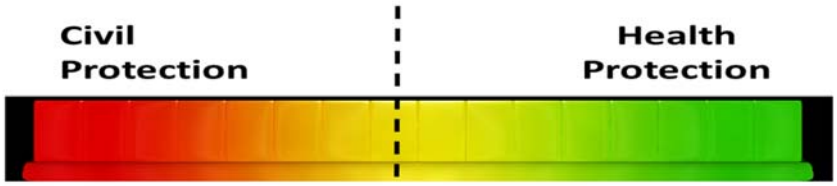
Figure 17: Task Interaction



The EU CO Mechanism for operational co-ordination fully integrated in UN OCHA overall co-ordination. For interventions outside EU there is close co-ordination with DG RELEX (external relations)

Security incidents can impact major disasters and the security mechanisms of the MS and the EU must also be included in any analysis. A simple example being Disaster Victim Identification [DVI] which is police/security function that arises in both accidents and deliberate attack.

The most significant point to note is that Civil Protection and Health Protection have different structures.



For that reason EU Civil Protection and EU Health Protection will be considered separately and when considering UN and WHO the same logic will apply to the analysis. Although each organisation and structure are described separately it must be emphasised that they are inter-related and in most cases interdependent.

13.2.1 SOP Status quo summary EU

Table 44: Statua quo summary EU

Source	Issuing / Parent Organization	Geo-Area covered	Operational focus	Characteristics	Conclusions for PULSE
Emergency Response Coordination Centre (ERRC)	European Commission Humanitarian Aid and Civil Protection Department (ECHO)	EU	Facilitation of a coherent European response during emergencies	The ERCC collects and analyses real-time information on disasters, monitors hazards, prepares plans for the deployment of experts, teams and equipment, works with Member States to map available assets and coordinates the EU's disaster response efforts	Exchange of intelligence & information Access to plans regarding expert teams and equipment identification & utilization of interfaces
Global Disaster Alert and Coordination System (GDACS)	UN & EC	World	Improvement of alerts, information exchange and immediate disaster coordination	GDACS is a cooperation between the UN, the European Commission and disaster managers worldwide providing post-disaster maps, social media and disaster monitoring through mobile applications and disaster event feeds	Exchange of intelligence & information Access to and utilization of the various disaster event feeds Register PULSE mobile apps for GDACS purposes
Common Emergency Communication and Information System (CECIS)	EC/DG ECHO	EU	Better protecting citizens form natural and technological hazards	Communication system between the ERCC and national authorities, hosting a database on potentially available assets, used to handle requests of assistance, to exchange information, and for documentation of actions and messages	Access to stored data & information
Disaster Victim Identification Unit - INTERPOL	INTERPOL	Member States	Victim identification	Provisions of guidelines and international standards for nations not having own victim identification capabilities	Access to information

Source	Issuing / Parent Organization	Geo-Area covered	Operational focus	Characteristics	Conclusions for PULSE
COPERNICUS Emergency Management Service	European Space Agency (ESA)	EU	Provision of globally consistent reference maps	Building up and frequently up-dating background imagery based on fast data dissemination which can also be used for the purpose of impact assessments in the course of major emergencies	Retrieving of data Formulation and statement of data required identification & utilization of interfaces
Health Emergency Operations Facility (HEOF)	EC / DG SANCO	EU	Coordinated management of public health emergency at EU level	HEOF consists of a Senior Management Team supported by 4 operational teams ensuring coordination between the Commission, Member States, other associated countries, and international organisations and providing an overview of the situation	Exchange of intelligence & information
European Rapid Alert System (ARGUS)	EC	EU	Coordinated and effective management of major multi-sectoral crises that require reaction at European Community level	Information and alert exchange in the EC, activation of the Crisis Coordination Committee, source of information for the Commission to communicate with the public	Link into the EC alert cycle and source of information for the public
Medical Intelligence System (MedISys)	EC / DG SANCO	EU	Identification of potential threats to the public health	Monitoring, collecting, analysing, and storing information from various source categories of the internet, filtering out keywords aiming at generating alerts	Sharing information Observed as addressee for alerts

Source	Issuing / Parent	Geo-Area	Operational focus	Characteristics	Conclusions for PULSE

	Organization	covered			
Early Warning and Response System (EWRS)	ECDC	EU	Threats related to communicable diseases	Notification of the Commission and the Member States of outbreaks, regulations on exchange of information and discussion about the coordination of response measures	Exchange of intelligence & information
Rapid Alert System on the Release of Biological, Chemical and Radio-nuclear Agents (RAS-BICHAT)	ECDC	EU	Threats related to B,C,and R/N agents	Exchange of information and notification of stakeholders on health threats due to the deliberate relase of B,C, or R/N agents	Exchange of intelligence & information
Health Emergency & Disease Information System (HEDIS)	EC / DG SANCO	EU	Overview of the situation on an identified health threat	Web-based portal offering a central destination and jumping off point for all the information derived from various sources communication tools, access to Geographic Information Systems (GIS) and modeling applications allowing European stakeholders responsible for health threats response to consult and exchange health-related information	Sharing of information Access to the portal
Vulnerability Assessment (MATRIX)	EC / DG SANCO	EU	Assessment of vulnerability against specific biological and chemical agents	MATRIX gives access to: A library of guidelines and documents in the field of health threats; A table for the classification of events and incidents with health consequences; Algorithms applicable for the handling of a crisis; Specialised sites, databases and	Sharing information Access to sites, databases and encyclopaedias

				encyclopaedias	
Source	**Issuing / Parent Organization**	**Geo-Area covered**	**Operational focus**	**Characteristics**	**Conclusions for PULSE**
European Centre for Disease Prevention and Control (ECDC)	EU	EU	Strengthen Europe's defence against communicable diseases	In partnership with national health protection bodies across Europe: (a) search for, collect, collate, evaluate and disseminate relevant scientific and technical data; (b) provide scientific opinions and scientific and technical assistance including training; (c) provide timely information to the Commission, the Member States, Community agencies and international organisations active within the field of public health; (d) coordinate the European networking of bodies operating in the fields within the Centres mission, including networks arising from public health activities supported by the Commission and operating the dedicated surveillance networks; (e) exchange information, expertise and best practices, and facilitate the development and implementation of joint actions.	Exchange of intelligence & information Access to scientific expertise and technical data Contribution to the European networking activities
The European Surveillance System	ECDC	EU	Reporting and retrieving health	Indicator-based surveillance platform for systematic	Exchange of intelligence &

(TESSy)			surveillance data	collection, analysis, interpretation and dissemination of indicators for public health action.	information

13.2.2 EU CIVIL PROTECTION MECHANISM

In 2001, the EU Civil Protection Mechanism was established, fostering cooperation among national civil protection authorities across Europe. The Mechanism currently includes all 28 EU Member States in addition to Iceland, Montenegro, Norway, Serbia, and the former Yugoslav Republic of Macedonia. Turkey has recently signed the agreements to join the Mechanism.

The Mechanism was set up to enable coordinated assistance from the participating states to victims of natural and man-made disasters in Europe and elsewhere.

The EU CP Mechanism's tools are:

- Emergency Response Co-Ordination Centre (ERCC)
- Common Emergency and Information System (CECIS)
- Training programme
- Civil Protection module

Types of disasters covered by EU CP Mechanism:

- Natural disasters
- Floods, earthquakes, forest fires, cyclones
- Manmade disasters
- Environmental disasters (Deepwater Horizon, HU alkali sludge accident 2010)
- Complex emergencies (Georgia 2008)
- Health emergencies
- H1N1 crisis (medical support Bulgaria, Ukraine)
- Assistance to consular support
- Terrorist attacks (medical evacuation Mumbai)
- Evacuation of EU citizens from Libya and TCN from Tunisia/Egypt

The EU EMERGENCY RESPONSE COORDINATION CENTRE (ERCC) is the operational heart of the EU Civil Protection Mechanism. ERCC plays a key role as a coordination hub to facilitate a coherent European response during emergencies inside and outside Europe. When Member States are affected by a crisis that overwhelms their response capacity, they can activate the ERCC in the framework of the Solidarity Clause (Article 222 of the TFEU).

The ERCC

-Operates 24/7

-provides faster and more efficient response to disasters in Europe and beyond - Improved coordination between the Brussels- based European Institutions, competent national authorities in Member States, and other international partners

- Enhanced monitoring and analytical capacity ensure better preparedness and a coherent European response that corresponds to needs

ERCC is a single operational hub mandated to facilitate the coordination of Member States' civil protection assistance during major emergencies The ERCC single entry point/offers a co-ordination platform and provides access to satellites imaging, experts, co-financing of transport operations in relief operations (50% - 85% EU co-financing)

ERCC key operational roles:

- Monitoring
- Information
- Coordination
- Technical Support
- Financial Support

The ERCC has the following Monitoring tools

- **GDACS:** Global Disaster Alert And Coordination System
- **EFAS -** European Flood Awareness System used for Floods forecasting and Flood alerts
- **EFFIS** – European Forest Fire Information System used for fires forecasting

GMES - Global Monitoring for Environment and Security for Initial Operations (GIO) Emergency Management Service / COPERNICUS.

Background to the ERCC

The Emergency Response Coordination Centre (ERCC) was established in 2013. Its predecessor, the Monitoring and Information Centre (MIC) was created in 2001 as the main operational tool of the EU Civil Protection Mechanism.

The ERCC provides a one-stop-shop of civil protection means made available by the participating states. It acts as a coordination hub between Participating States, the affected country and dispatched field experts. Any country inside or outside the EU affected by a major disaster can make an appeal for assistance through the ERCC. In response, the ERCC matches offers of assistance with the needs of the disaster-stricken country.

Main tasks of the ERCC Civil protection is cooperation and development of EU emergency response capacity The ERCC has established a fully staffed and trained 24/7 duty system.

24/7 presence ensures real time monitoring and immediate reaction day and night, no matter where. The ERCC manages a pre-identified pool of Member States' response assets - "civil protection intervention modules" - that can immediately be deployed to any large scale emergency. The countries participating in the Mechanism may commit resources on standby in a voluntary pool – ready to be instantly set in motion as part of a faster and more coherent European response when the need arises.

The quality of the response capacities is ensured through the establishment of quality criteria and a certification process. Better planning and the preparation of a set of typical disaster scenarios enhance the ERCC´s capacity for rapid response. The ERCC can initiate a process of identification of eventual gaps in the panoply of

European assistance and of proposals on how these gaps can be covered, through financial support from the EU. Under the Mechanism, the Commission can co-finance transport cost, thus enabling delivery of assistance to the country affected within a few hours with lesser budgetary impact on the Member States offering the assistance. Pooling and consolidating shipments from various countries to the affected country boosts the efficiency of the European response.

Common Emergency Communication and Information System (CECIS)

CECIS is a web-based alert and notification application. It provides an integrated platform to send and receive alerts and notifications, details of assistance required, to make offers of help and to view the development of the ongoing emergency as they happen in an online logbook.

Its main task is to host a database on potentially available assets for assistance, to handle requests for assistance on the basis of these data, to exchange information and to document all action and message traffic.

The following organisations are the end-users of CECIS:

• The ERCC managed by the Civil Protection Unit of the Directorate General for Environment of the European Commission;

• The National Contact Points in the EU Member States and in the Participating Countries (Iceland, Liechtenstein and Norway). These contact points are available on a 24 hr basis. Participating countries may opt to appoint different contacts for civil protection and marine pollution.

Coordination platform for civil protection and humanitarian aid.

The ERCC keeps direct links to the civil protection and humanitarian aid authorities in Member States which enables a smooth and real-time exchange of information. It ensures deployment of coordination and assessment teams composed of humanitarian aid and civil protection experts to conduct joint needs assessments.

The foundation pillars of EU Civil Protection are as follows:

- **Responsibility:** Member States are responsible for the security and the safety of their citizens and foreigners on their territory.

  • **Call for assistance.** Member States and third party countries can call for assistance when overwhelmed by a disaster. After their needs identification, they are responsible to receive/ and for the use of EU/foreign assistance.

  • **Solidarity:** Member States have the responsibility to support Member States affected by a disaster when needed. (Re-enforced by Lisbon Treaty Solidarity clause)

  • **Voluntary:** The level of support / assistance is determined by the Member State providing assistance.

  • EU supports preparation, facilitates cooperation & coordination and complements the MS response and capability. (Art 196 Treaty)
- EU Civil Protection Mechanism facilitates the provision and coordination of assistance provided by EU Member States and participating countries on a voluntary basis to other states (EU or participating states or third countries).

• The ERCC is a useful hub of information on validated information on needs assessment and a

clearing house on assistance offered/accepted / provided and a facilitator.

- The EU Civil Protection Mechanism requires an official request for assistance in a disaster (or imminent threat) to initiate a response.
- EU ERCC is not involved internal MS response planning.
- Assets provided are used in support of local emergency management civilian authorities and tasked by them.

Response, Preparedness and Prevention form the three basic tenets underpinning the EU civil protection mechanism

Response which is facilitating and supporting European civil protection assistance and solidarity in the event of a major disaster including financing of transport.

Preparedness which deals with training, exercises, exchange of experts, modules and projects.

Prevention includes risk assessment guidelines, Integration in EU policies (i.e. Environmental Impact Assessment, Nuclear safety, Cross border health threats; Regional Development Policy and Research).

EU Civil Protection Modules

The aim of these modules are to create pre-defined specific and interoperable assistance capabilities that can be dispatched at very short notice. Currently there are 17 types of modules/for different disasters. MS have registered 150 Civil Protection Modules and 10 Technical Assistance and Support Teams (TAST). These modules include:

High capacity pumping / Flood Containment.

Water purification

Medium and heavy urban search and rescue

Aerial forest fire fighting (helicopters + planes)

Advanced medical post / with surgery

Field hospital

Medical evacuation

Emergency temporary shelter

CBRN detection and sampling

Search and rescue in CBRN conditions

Host Nation Support (HNS)

HNS sets out the basic principles for receiving assistance and facilitating access, and operations. The EU CP mechanism has set out Host Nation Support Guidelines (EU HNSG) aim at assisting the affected Participating States to receive international assistance in the most effective and efficient manner.

The level of HNS may vary according to the severity of the situation and will be subject to a prior agreement between the requesting and offering Participating States. The guidelines are of a non- binding nature which aim to provide guidance and support.

The EU HNSG are based on experience and lessons learnt by Participating States during emergencies, exercises and trainings and incorporate the existing relevant international documents.

It also includes procedures for mutual information exchange between requesting, transit and assisting Participating States and the ERCC.

The main developments in Civil Protection in recent years have been:

Community Action Programme

Community Mechanism to facilitate reinforced Co-Operation in Civil Protection Assistance Interventions.

The mechanism covers interventions in the event of natural, technological and environmental disasters, inside and outside the European Union.

Programme to Improve Co-operation in the European Union for preventing and Limiting the Consequences of Chemical, Biological, Radiological or Nuclear (CBRN) terrorist threats.

The overall aim of the programme is to increase the efficiency of the measures taken at national and EU level with regard to terrorist CBRN threats.

Handbook (the Vade Mecum) dealing with civil protection in the Community which gives information on the emergency arrangements in Member States and lists contact points in the emergency

Expert Exchange Scheme between Member States to enhance the training and skills of senior emergency management personnel

Self-training workshops, practical exercises and seminars

Common European emergency telephone number 112. This number is in operation throughout the European Union (including Ireland where it operates in tandem with the existing 999 number) since 1st January 1997.

Supplementary activities

The EU CP Mechanism helps in marine pollution emergencies, where it works closely with the European Maritime Safety Agency (EMSA).

The Mechanism also provides participating countries with the opportunity to train their civil protection teams. By exchanging best practices and learning, teams increase their ability and effectiveness in responding to disasters.

Additionally, the Mechanism provides emergency communications and monitoring tools, overseen by the ERCC through the Common Emergency Communication and Information System (CECIS), a web-based alert and notification application enabling real time exchange of information between participating states and the ERCC.

Finally, the European Commission supports and complements the prevention and preparedness efforts of participating states, focusing on areas where a joint European approach is more effective than separate national actions. These include improving the quality of and accessibility to disaster information, encouraging research to promote disaster resilience, and reinforcing early warning tools.

United Nations Disaster Assessment and Coordination (UNDAC)

The United Nations Office for the Coordination of Humanitarian Affairs (OCHA) mobilizes and coordinates humanitarian action for people in need, in partnership with national and international actors. OCHA ensures that each actor can contribute to the

overall response effort. OCHA delivers its mandate by coordinating emergency relief, and by organizing and monitoring humanitarian funding, policy development, information management and advocacy. EU Civil Protection assets can be made available by MS provide assistance to other international organisations, especially the UN. United Nations Disaster Assessment and Coordination is the main mechanism by which the OCHA delivers a response.

In the immediate aftermath of a sudden-onset emergency, such as an earthquake or a flood, UNDAC is one of the UN's first-response mechanisms deployed to assist the immediate coordination of humanitarian assistance.

An UNDAC team can deploy within 12 to 48 hours' notice. A team is deployed following the request of the affected Government and the Resident/Humanitarian Coordinator in the country. The typical duration of an UNDAC deployment is between two and four weeks. UNDAC teams are equipped to be self-sufficient. They are trained in various skills, such as coordination, needs assessments and information management. The teams also advise and strengthen national and regional disaster response capacity.

When required, an UNDAC team establishes and runs an On-Site Operations Coordination Centre (OSOCC) and a Reception and Departure Centre (RDC), which provide a platform for cooperation, coordination and information management for international humanitarian response agencies and national responders. First responders use the Virtual OSOCC website for real-time information exchange during ongoing emergencies.

MANAGEMENT

The UNDAC system is managed by the Field Coordination Support Section (FCSS) in the Emergency Services Branch in OCHA Geneva. As well as working with OCHA regional offices and other parts of OCHA, FCSS works with UNDAC national focal points. FCSS also acts as the secretariat of the International Search and Rescue Advisory Group (INSARAG), which is the global network of countries and organizations dedicated to improving standards and coordination in urban search-and-rescue (USAR) preparedness-and-response operations.

UNDAC is

- Primarily for Natural Disaster Response
- Stand-by for Immediate deployment (12 – 24 Hours)
- On-site Coordination in first phase of disaster
- Assessment/Processing/Dissemination of Information
- Deployed for 2 – 3 weeks only
- In support of National Authorities and UN Resident

UNDAC members usually work in disaster management at the national level or in international humanitarian response. Member Governments are self-financing countries that hold UNDAC mission accounts with OCHA/FCSS, through which funds are deposited to cover the deployment costs of their national UNDAC staff. Participating countries are sponsored members of the UNDAC system.

UNDAC teams directly contribute to OCHA's key preparedness objectives: to

strengthen the capacity of national authorities and regional organizations to access and coordinate international humanitarian assistance effectively, and to become self-reliant in coordinating national humanitarian assistance in emergency response.

UNDAC teams also contribute to preparedness through capacity building activities during response missions, and by participating as associates in the capacity-assessment missions of other institutions. Team members also act as international observers, advisers or exercise controllers of emergency response simulation exercises.

Many team members help to prepare and host training courses for UNDAC teams, and for other regional and international humanitarian response organizations, such as the EU Civil Protection Mechanism and the ASEAN Emergency Rapid Assessment Team.

INTERPOL – DISASTER VICTIM IDENTIFICATION (DVI)

Disaster Victim Identification is an important phase in any response. The INTERPOL DVI Guide provides guidelines for use by Interpol Member States in the identification of disaster victims. It can serve as a basis for Interpol Member States which do not have their own DVI teams or have never been confronted with such operational situations to set up a DVI Team and to manage DVI operations. It also provides important supplemental information for Interpol Member States which have DVI teams of their own. The most important requirement for victim identification work is the application of international standards, which are the common basis for the work in multinational DVI operations.

In providing guidelines for the identification of disaster victims all measures are designed to contribute to the positive identification of victims. If a disaster occurs in a country which does not have its own DVI team, support by other DVI teams can be requested through Interpol. Experience has shown that cooperation with other DVI teams is advantageous when disaster victims of different nationalities are to be expected. If there are victims from other nations, the nation in charge should do its utmost to secure participation from those other nations, at least as liaison officers, particularly from the medical and dental specialties, but also from the police.

Additionally, a project is under way to create the first ever police database to identify and link missing persons and unidentified bodies on an international level. The Fast and Efficient International Disaster Victim IDentification (FASTID) Project was launched in 2010.

Led by INTERPOL and partly funded by the European Commission, the project will establish an international system to manage enquiries concerning missing persons and unidentified bodies in the event of disasters as well as day-to-day policing and will result in the creation of a global Missing Persons and Unidentified Bodies (MPUB) database.

The DVI Guide reflects the Interpol standard for DVI operations. It should be explicitly specified as the basis for DVI operations involving teams from different nations in advance of such operations.

International police cooperation to identify disaster victims is supported by Interpol's DVI AM and PM forms. These forms have been developed and periodically updated by the Interpol DVI steering group in coordination with the DVI standing committee. The DVI forms are structured in the following sections:

- Section A: Personal data (AM only),

- Section B: Recovery of body (PM only),
- Section C: Description of effects (clothing, jewellery, etc.);
- Section D: Physical description,
- Section E: Medical information.
- Section F: Dental information,
- Section G: Any further information.

The sections add up to seventeen A4 sides and 92 separate numbered rows for each of the AM and PM paper forms. Within each row multiple amounts of information is also often requested.

A comprehensive set of user roles and connected rights have been implemented reflecting the breadth of users foreseen to access the system. The identification workflow covers all the steps involved in identifying a missing person, connecting body parts or handling AM, PM or PUI duplicates; starting with the assumed identity of the two files, file disclosure handling, the comparison report, and the acceptance of the identification report. Three different types of textual searches are available to the user: quick searches, advanced searches and full text searches.

The system provides for different types of deoxyribonucleic acid (DNA) matching, but in general three kinds of DNA matching possibilities are considered: AM versus PM, AM versus PUI, and Blind Match. The system also allows for the storage and comparison of mtDNA from the hypervariable segments I and II (HVSI and HVSII) regions for a set of categories.

The system provides for dental matching by comparing all dental data in AM and PM or PUI files. The matching score is calculated from the different matching properties of the dental codes on each tooth and the uniqueness within the container population.

The system provides for fingerprint matching by sending a fingerprint match request to Interpol's AFIS system.The system is also integrated with the three modules targeting the use of 'images' as secondary identifiers as described below.

- Core MP / UB system for sale to national police forces

The core system is the central solution within the prototype described under the previous result. The system could be used for both DVI and MP / UB work of a national character and also interfaced to the Interpol hosted system once in production.

- Image retrieval module

The module applies methods to search in image databases by means of content-based image retrieval methods. During the FASTID project, it was developed for and parameterised with respect to tattoo retrieval i.e. to compare AM and PM tattoo images as a secondary means of identification. The underlying algorithms are however working for other domains of content-based image retrieval as well. The module was integrated with the prototype MP/UB system. The successful results of the image retrieval experiments as well as a live demonstration suggest that identification based on images of tattoos and other body modifications can be assisted by automatic image comparison algorithms.

- Identification of human skeletal remains using face recognition software (FRS) and craniofacial reconstruction (CFR) and craniofacial superimposition (CFS) module

The process includes the production of a CFR from an unknown skull, which is then compared with a MP / UB database of facial images using automated software. The resulting collection of possible matches is then further analysed using CFS to produce single or multiple possible matches that can then be checked using one or more of the

primary identifiers (DNA, dental, fingerprint). The module was integrated with the prototype MP / UB system. The craniofacial identification results cautiously suggest that FRS can be used to match a CFR to a MP/UB database, and that along with CFS will narrow the database so that the target is within the top 10 %.

- MP / UB face recognition module

The purpose of the module is to aid in the identification of persons based on AM and early PM images through biometric algorithms. Integration of multiple face images into an internal representation suitable for comparisons given large variations have been investigated and implemented. The module was integrated with the prototype MP / UB system. In order to establish meaningful performance estimation, the experiments including training and evaluation need to be repeated with an increased database size. AM and PM training and testing data is required to advance certain image matching techniques which is presently not available because of legal and ethical rules. The situation could be improved by establishing a legal basis for exchange of data between institutions, enhancing the data acquisition process and by providing a legal basis to store data on solved cases for research.

- MP / UB - DVI training module

The purpose of the module is to train organisations and international officers involved in DVI and MP / UB to adapt a common operational methodology and approach to data recording. The training programme follows the Interpol DVI standards and is aimed at promoting a common operational DVI methodology in Interpol member countries. The training programme is built around a virtual morgue. Training material is comprised of a number of media including slideshow presentations, real-time chat support facilities for participants, virtual 'bodies' to practice post-mortem data recording, interactive exercises to learn relevant terminology and guidance documents with additional instructions to complete the Interpol DVI forms. Results of the evaluation of the virtual training show that the aides developed have the potential to enhance commonality of approach.

- Assessment of developed systems

This result consists in an evaluation of the performance of the technology developed in the project, particularly with regards to the requirements of end users. This knowledge will be input into the re-engineering phases for production planned following the end of the project. The tests leading to the assessment were carried out by the consortium partners and volunteers from Interpol member countries. Only officials designated by Interpol member countries which officially confirmed their participation in the test phase through their national central bureaus (NCB) which included the signing of a none-disclosure agreement (NDA) were eligible as volunteer testers. The FASTID consortium partners were very pleased to be able to count on 21 countries (1 African, 2 American, 3 Asian, 13 European, 2 Middle Eastern and 1 Oceania) and 94 testers which ran tests on the system with police officers, pathologists and other experts. This is the greatest number of countries ever involved in the testing of a prototype system at Interpol. (secured Internet) communication systems. It will interface and synchronise with Interpol's I-link system to ensure coherent and consistent data in both systems.

A user’s guide will be provided to facilitate standard reporting and explain the terminology used in the Interpol forms to ensure the proper quality of the data recorded and its appropriate international use. This will also be content within a virtual

online training programme that will use the most effective and efficient means to guarantee that countries and organisations adopt a common recording methodology.

The most effective means of recording and searching for matches through bespoke image retrieval and processing methods with respect to faces, body modifications (e.g. tattoos), jewellery and personal effects, including clothing will be integrated into the system, following further positive assessment of their operational applicability.

Interpol has prepared an MP / UB implementation plan to implement the FASTID prototype at a production-level scale, without image matching (after one year) and adding further technical enhancements e.g. image matching techniques and interfacing with Interpol's own DNA databank.

European Space Agency (ESA)

The European Space Agency (ESA) is Europe's gateway to space. Its mission is to shape the development of Europe's space capability and ensure that investment in space continues to deliver benefits to the citizens of Europe and the world.

Disaster Mapping

The Copernicus Emergency Management Service aims to reinforce Europe’s capacity to respond to emergency situations, be they caused by extreme weather, geophysical hazards such as volcanoes, or events such as wildfires and humanitarian crises.

Wide swath Sentinel-2 data can support the build-up and frequent update of globally consistent background reference maps to be used for impact assessments. It will also contribute monitoring land-use change that triggers erosion, forest and wildfires, and the onset of floods.

The mission’s fast data dissemination also plays a key role, delivering imagery within a few hours of acquisition.

During humanitarian crises, Sentinel-2’s imagery can help identify suitable locations for large refugee camps, and be used to monitor these camps and assist humanitarian operations.

Combining information on vegetation, the location of water bodies and other variables, the mission can also assist in monitoring the prevalence and spread of malaria, and the prediction of disease outbreaks.

arthquakes, tsunamis, wildfires, floods, storms and industrial accidents can claim human lives and cause serious damage to property all over the world.

The Copernicus Emergency Management Service (EMS) aims to reinforce Europe's capacity to respond to emergency situations, be they caused by extreme weather, geophysical hazards such as earthquakes, manmade disasters such as oil spills and humanitarian crises.

EMS has been operational since April 2012 within GMES Initial Operations (GIO). It supports all phases of the emergency management cycle: preparedness, prevention, disaster risk reduction, emergency response and recovery. The service is provided free of charge and can be activated by authorised users such as national civil protection authorities.

The service can be provided in:

'rush' mode, for emergency management activities that require immediate response. This is available on a 24/7 basis and products are provided as soon as possible (from a few hours to a few days after the user request)

'non-rush' mode, to support activities that do not require immediate response, i.e. for prevention, preparedness, disaster risk reduction and recovery phases.

The emergency services and EU research projects are based on the provision of satellite imagery from contributing missions that are made available through the Space Component Data Access system operated by ESA since 2008.

Disaster management from space

In the future, the service will also be supported by the Sentinels. Sentinel-1 SAR imagery provides a major contribution for precise terrain deformation monitoring over landslide, seismic or subsidence areas by providing regular and frequent interferometric observations (every 12 days). It can also support impact assessment analyses for many types of hazard including hydro-meteorological and geological events by, for instance, providing rapid and wide-extent observations of plain flooding.

Wide swath Sentinel-2 data can support the build-up and frequent update of globally consistent background reference maps to be used for impact assessments. It will also contribute monitoring land-use change that triggers erosion, forest and wildfires, and slow onset floods. Sentinel-3, despite its relatively low-resolution, can complement activities where systematic monitoring is at stake (e.g. worldwide wildfire detection).

The EMS mapping service also collaborates with the International Charter Space and Major Disasters for major crises outside the EU area. An agreement has been set up to exploit the advanced crisis mapping capability of the EMS to support Charter requests pertinent to European policy sectors.

13.2.3 HEALTH EMERGENCIES – EU

In the EU health matters remain a MS issue. Under the Lisbon Treaty Art. 168 on Public Health it requires that the EU action shall respect the responsibilities of the Member States for the definition of their health policy and for the organisation and delivery of health services and medical care.

However it does shall encourage cooperation between the Member States in the areas referred to in this Article and, if necessary, lend support to their action. It shall in particular encourage cooperation between the Member States to improve the complementarity of their health services in cross-border areas

At EU level, the legal basis for addressing health threats is EC Treaty Article 152, which states that Community action shall complement national policies directed towards improving public health, preventing human illness and diseases, and obviating sources of danger to human health. Accordingly, EU action has focused on coordinating information and measures on communicable diseases and substances related to chemical, biological and radio-nuclear (CBRN) agents. The EU has established a system for epidemiological surveillance and reporting of communicable diseases and it is one of the key mechanisms for Europe-wide coordination on diseases between the Member States, the WHO and relevant public health agencies. Under EU legislation on communicable diseases, the European Commission has a role in coordinating the Member States' efforts to address health security threats in an effective and coherent way. To support European scientific and technical work on communicable diseases, the European Centre for Disease Prevention and Control has been working since 2005 to provide scientific opinions, technical data and scientific risk assessment for effective control of communicable diseases in Europe. 8 At international level, the Commission is also actively developing and strengthening existing relationships and collaborations on health security. The Global Health

Security Initiative (GHSI) is an international partnership of like-minded countries to strengthen health preparedness and the global response to threats of CBRN substances and pandemic influenza. The initiative was launched by the G7 countries (Canada, France, Germany, Italy, Japan, the United Kingdom and the United States) plus Mexico and the European Commission in November 2001. The World Health Organisation leads the implementation of the revised International Health Regulations (IHR), which entered into force on 15 June 2007 and requires members of the World Health Organisation to report certain disease outbreaks and public health events to the WHO. A total of 194 States Parties to the IHR have been implementing these global rules to enhance national, regional and global public health security.

Health Emergency Operations Facility (HEOF)

The Health Emergency Operations Facility (HEOF) is a part of SANCO public health emergency management structure, which consists of a Senior Management Team supported by 4 Operational Teams dealing with different aspects of the crisis management. This structure replaces the normal Management Structure for matters relating to the particular health emergency, as long as a red level is maintained.

The Commission Health Emergency Operations Facility is designed to provide for a coordinated management of public health emergency at EU level. The Health Emergency Operations Facility is composed of two teams, one in Luxembourg and the supporting one in Brussels.

HEOF ACTIVITIES HEOF is intended to ensure the coordination between the Commission, Member States, other associated countries (candidate countries, EEA countries), Agencies, such as European Centre for Disease Prevention and Control (ECDC), European Food Safety Agency (EFSA) and European Agency for the Evaluation of Medicinal Products (EMEA), and international organisations (such as WHO) during an emergency situation. Two committees, in which Member States are represented (the Early Warning and Response System (EWRS) committee for the prevention and control of communicable diseases and the Health Security Committee (HSC) dealing with chemical, biological and radio-nuclear threats, and generic preparedness and response issues), are part of the overall coordination structure. The International Health Regulations (IHR) Focal Points group is also associated with this process. HEOF's role is also to provide the Commission and Member States with an overview of the situation.

Each member state is responsible for the safety of its citizens and the management of emergency situations (in case of human and natural caused disasters which may impact public health safety). But communicable diseases and CBRN events do not respect national borders. It is therefore important to ensure a coordinated approach between EU countries for the public health management in emergency situations. For these reasons the EU Ministers of Health adopted the Health Security Programme, after a number of terrorist attacks in 2001. One of the priorities of this programme is the setting up of a "mechanism for information exchange, consultation and coordination for the handling of health-related issues linked to attacks in which biological and chemical agents might be used or have been used.

The legal basis for HEOF is currently laid down in the following EU texts: - EC-Treaty establishing the European Community (Article 152) - Decision 2119/98/EC of the European Parliament and the Council setting up a network for the epidemiological surveillance and control of communicable diseases in the Community. This decision addresses the need for co-ordinated action and sharing of information between the

Member States and Commission, and it is establishing a mechanism of early warning and response.

Public health programme defining objectives and strands of activities, contributing to the EU capacity to prevent and manage public health crisis. - Conclusions of the Health Council of 22 February 2007 on the transitional prolongation and extension of the mandate of the Health Security Committee.

This committee deals with preparedness activities at EU level:

- Preparedness and response to health-related threats resulting from attacks in which biological and chemical agents might be used or have been used
- Influenza preparedness and response. Generic preparedness for health emergencies

Two main tools were put in place at the very beginning of this activity: a **r**apid **a**lert **s**ystem called RAS-BICHAT dedicated to deliberate release of chemical, biological and radio-nuclear substances, and a Crisis room and Communication Centre facility for the management of alerts and emergencies notified by Member States. Following the constitution of the "Health Threats unit" in 2003, all operations in respect of the Network for the epidemiological surveillance and control of communicable diseases, established by Decision 2119/98/EC of the European Parliament and the Council, were also conducted in this facility which was an appropriate tool to deal with communicable diseases emergencies.

Public health incident may occur at any time, and early warning and rapid alert systems are in place to exchange information on incidents within the EU and neighbouring or third countries. Three levels of public health emergency are defined:

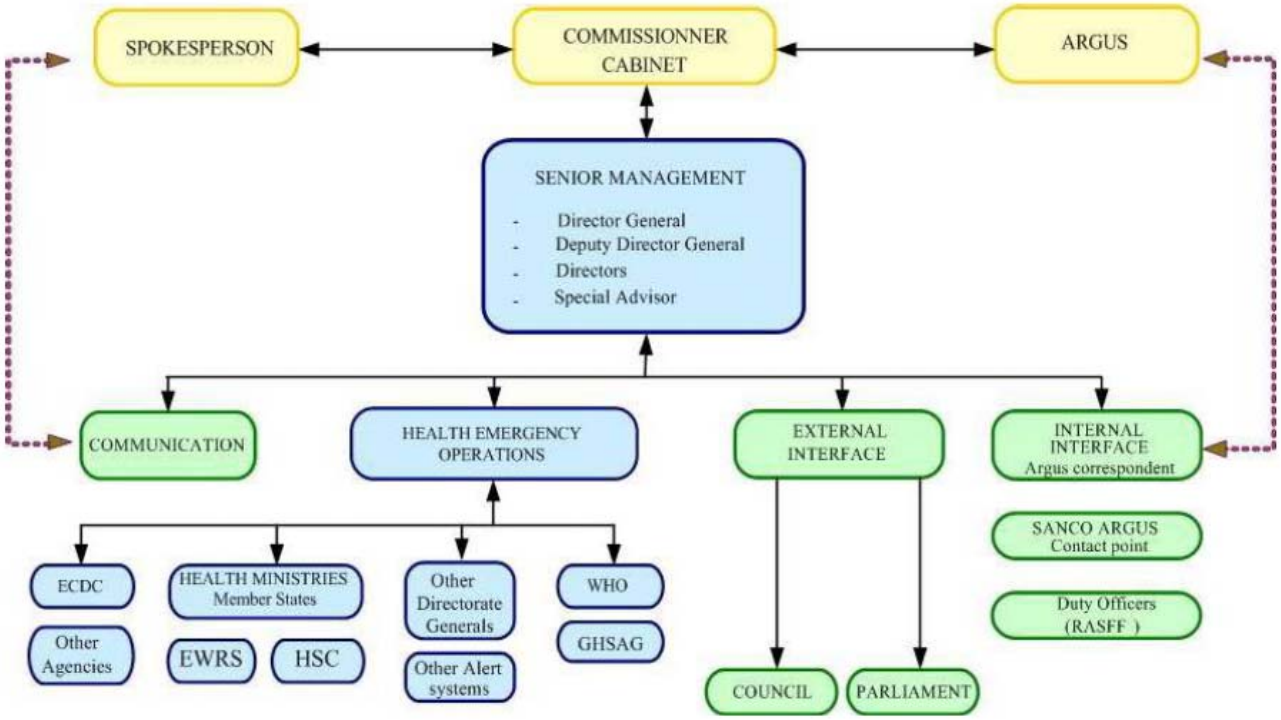
THREE ALERT PHASES

- Small sized events- a **green** phase: Health Threats Unit on-duty officer manages the response as a part of the regular monitoring mechanism.

- Medium or major sized events- a **yellow** alert phase: Health Threats Unit manages the response, using enhanced operating procedures.

- Acute crisis- a **red** alert phase, which cannot be managed using normal operating procedures, and where Senior Management decides to activate Health Emergency Operations Facility (HEOF) and SANCO's Public Health Emergency Management Structure:

Figure 18: The EHS



The Senior management team is responsible for triggering Public Health Emergency Operations and for the overall management and direction of SANCO's response, and leads the Emergency Management Team. It is liaising with the Commissioner and his Cabinet, coordinating the response and establishing policy lines.

The Communication team is in charge of producing press and media messages and interaction with the spokesperson and with the communication officers from other public health authorities (EU Member States, institutions and agencies and relevant international organisations). The External interface team is responsible for liaising with the Presidency, the Council and the Parliament and, if necessary, the Committee of Regions and Economic and Social Committee. The Internal interface team is in charge of coordinating activities with different Commission Directorates General and services through ARGUS, which is the Commission's internal mechanism aiming at ensuring a coordinated and effective management of major multi- sector crisis, such as terrorist attacks or tsunami like events, that require a reaction at the European Community level.

The Health Emergency Operations team, in liaison with the Member States' Ministries of Health, ECDC and International organizations, contributes to the coordination of health emergency management efforts. HEOF validates a level of threat, informs the Member States and the hierarchy on the situation and prepares policy briefings, and facilitates the decision making process concerning necessary measures.

COMUNICATION AND INFORMATION TOOLS

The Commission has set up various tools in order to support EU countries in their effort to tackle with threats from various origins such as communicable diseases, chemical, biological and radio- nuclear threats.

These tools are aiming at facilitating communication and providing the right information at the right moment to all stakeholders.

ARGUS - a general European rapid alert system

ARGUS complements the other sectoral Rapid Alert Systems established by the Commission and operates in the event of multi-sectoral crises requiring action at Community level (such as the pandemic (H1N1) 2009).

Recent major crisis such as the terrorist attacks or the tsunami have shown that a crisis rarely affects only one sector of activities. This is why the Commission decided to create a general European rapid alert system called ARGUS, with the capability to link all specialized systems for emergencies, and a central crisis centre (CCC) which would bring together all relevant Commission services during an emergency.

Although emergencies management is mainly the responsibility of the Member States, the European Commission has nevertheless a role to play when it is related to its domains of competences and can also offer its support to Member States.

ARGUS has been set up by a communication from the Commission in December 2005 with the aim to assure a coordinated and effective management of major multi-sectoral crisis that require a reaction at the European Community level. It is an internal network. Member States and external bodies are connected through sector-specific rapid alert systems.

More precisely, the system:

- Allows each Directorate General in the Commission to inform other Directorates General and services of a beginning or risk of multi-sectoral crisis via an alert exchange.
- Provides a coordination process that can be activated in case of crisis: the crisis coordination committee.
- Provides a common source of information that will be used by the Commission to communicate in an effective and coherent way with citizens.

Responsibility for handling and coordinating the response to the crisis including communication aspects should be taken by the relevant Directorate General, under the responsibility of the relevant Commissioner whose scope of activities usually includes this type of crisis because of its nature. The coordination with other directorate general is made via Argus network.

Surveillance and detection of signal: MedISys

MedISys (Medical Intelligence System) is an internet monitoring and analysis system developed by the Commission Joint Research Centre (JRC) for the Health and Consumer Protection Directorate General (DGSANCO) to identify potential threats to the public health using information from the Internet. These ‘threats’ include both communicable disease and chemical, biological and radio- nuclear threats which could have a widespread impact on the health of the European Community.

MedISys collects articles from various sources on Internet. Articles are classified in pre-defined categories. Statistics are stored on the filtered categories and an algorithm is used to detect ‘breaking news’ in a given category. Based on the level of new articles and the detected keywords, an alert may be sent to key persons by email or SMS.

Target audience: MedISys is available in two versions: a restricted version available for public health authorities and a public version.

Early warning and rapid alert systems: EWRS, RAS- BICHAT and RAS-CHEM

In order to ensure a rapid and effective response by the EU to a wide range of emergencies, the Commission has put in place several early warning and rapid alert systems. These systems allow public health authorities in Member States and the Commission to receive and trigger an alert as well as exchanging other relevant information regarding events likely to affect public health at EU-level and coordination of measures.

EWRS

EWRS is the EU Early Warning and Response System set up to address threats related to communicable diseases. Under Decision 2119/98/EC of the European Parliament and of the Council and Decision 2000/57/EC, the Member States should inform one another and the Commission about events likely to affect public health at the EU-level. These decisions also regulate the procedure for reporting and for the functioning of the system. Therefore, the EWRS is frequently used for notification of outbreaks, exchange of information and discussion about the coordination of measures among players. This system is hosted by the European Centre for Disease Control (ECDC). It is closely associated with the information of WHO and other contracting parties required under the International Health Regulations (IHR).

Target audience: members of the EWRS committee (public health authorities)

RAS-BICHAT

RAS-BICHAT is the EU rapid alert system used for exchanging information on health threats due to deliberate release of chemical, biological and radio-nuclear agents. It is a web-based tool that fulfils the same purpose as EWRS (notification of threats, exchange of information and coordination of measures among partners.) The procedures of exchange have been agreed between the members of the Health Security Committee. Unlike EWRS system, Commission plays a role of moderator. The Commission on-duty officer should acknowledge the message posted by contact points in Member States, authenticate the sender and verify the content of the message, call the sender to get more details and then notify all the stakeholders.

RAS-CHEM

RAS-CHEM is a rapid alert system currently under development. It is meant to link the various poison centres of the European Union and the Ministries of Health for the exchange of information on incidents including chemical agents relevant to terrorism and other events leading to release of chemicals, and consultation and coordination of counter-measures. As RAS BICHAT only deals with chemical threats in relation with terrorist activities, the Health Security Committee has identified the need of having a warning system which would cover the public health aspects in this area. It should be operated as a forum of exchange of information and advices, used for the identification and the rapid dissemination of information on incidents, outbreaks and illnesses caused by exposure to chemicals, including chemical events relevant to terrorism and other events leading to release of chemicals.

Target audience: EU poison centres and Ministries of Health

HEDIS - SITUATION AWARENESS

HEDIS is a restricted Web-based tool supporting the Member States and the Commission during disease outbreaks and health emergencies, providing an overview

of the situation on an identified health threat. For each new crisis a dedicated sub-portal is generated where stakeholders can find all information related to the threat:

- Relevant news, reports and scientific advice from various sources (Commission, ECDC, WHO, Europe Media Monitor)
- Maps locating events
- A logbook presenting a timeline of actions taken concerning the specific threat

The HEDIS platform also regroups a set of tools especially designed to communicate and share information:

- A forum for communication between stakeholders
- A secure document repository for sensitive document storage
- Questionnaires used for asking information to stakeholders on particular subjects and gathering answers
- Alert systems (E-mail, SMS, Fax)
- Calendar application for event scheduling
- A notice board to attract users' attention on latest and most important events or documents

Some tools have also been developed to allow HEDIS users to evaluate real or hypothetical situations:

Mathematical models have become important tools in analysing the spread and control of infectious diseases and to assist decision makers in taking proper preparedness and prevention measures.

- Interactive Disaster Analysis System providing analysis of the surroundings of a given event (population, activities, hospitals)
- Hospitals database containing location and other information about European hospitals.

Target audience: members of EWRS and HSC committees

DG SANCO INTERNAL CRISIS INTRANET

The DG SANCO internal crisis intranet is the place where the Commission decision makers will find all the needed information for the taking of coherent and adapted decisions. All DG SANCO units involved in health emergency management should provide information resulting from their actions.

Target audience: DG SANCO decision makers

Vulnerability assessment: MATRIX

MATRIX is a web-based tool allowing Member States to assess their vulnerability against specific biological and chemical agents. The assessment is based on replies given to a wide range of pre-defined questions related to the threat. It facilitates also their evaluation of level of risk.

In addition, MATRIX gives access to:

- A library of guidelines and documents in the field of health threats;
- A table for the classification of events and incidents with health consequences;
- Algorithms applicable for the handling of a crisis;

• Specialised sites, databases and encyclopaedias.

Target audience: members of the HSC and EWRS committee

13.2.4 ECDC – HEALTH EMERGENCIES

European Centre for Disease Prevention and Control ECDC

ECDC is an independent agency. ECDC's main role as an agency of the European Union is to strengthen Europe's defences against communicable diseases. Over the last ten years, ECDC has been working together with all EU/EEA countries in response to public health threats and emerging diseases.

ECDC was created in 2005 but the idea of creating a European public health agency emerged already in 2003 when the SARS outbreak posed a serious threat to Europe. It became clear that there was an urgent need for a better coordination of the Member States' response to the outbreak and scientific advice on options to control such an outbreak at the EU level.

One of the biggest achievements has been to make available Europe-wide data to all stakeholders, with the launch of the European Surveillance System (TESSy). ECDC centralised the previous Dedicated Surveillance Networks and replaced the 17 data collection systems into one system for the collection, validation, cleaning, analysis and dissemination of data from all EU/EEA countries.

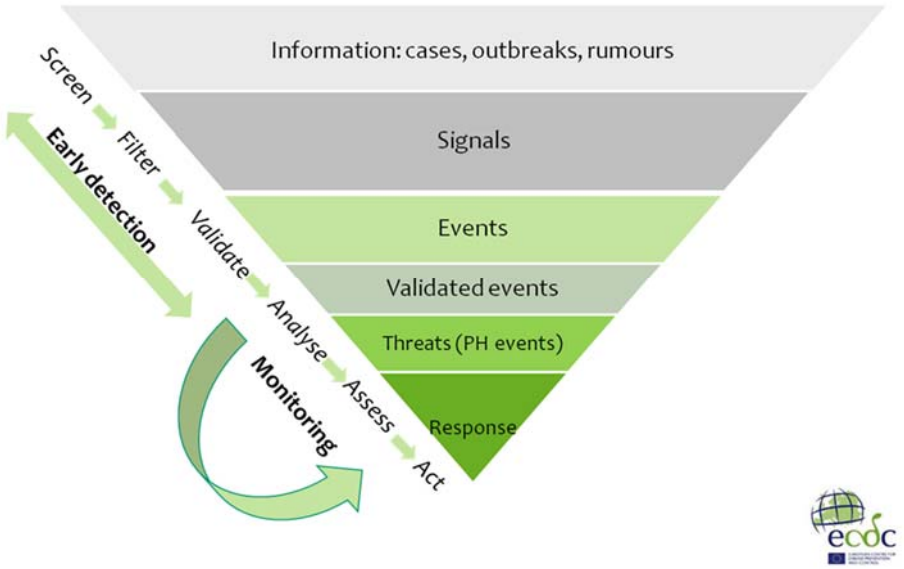
ECDC has the role of:

- Surveillance and epidemic intelligence
- Scientific opinions and studies
- Early Warning System and Response
- Technical assistance and Training
- Communication to scientific community
- Communication to the public

ECDC's key tasks

- to identify threats from current or emerging infectious diseases.
- a core function is capacity building.

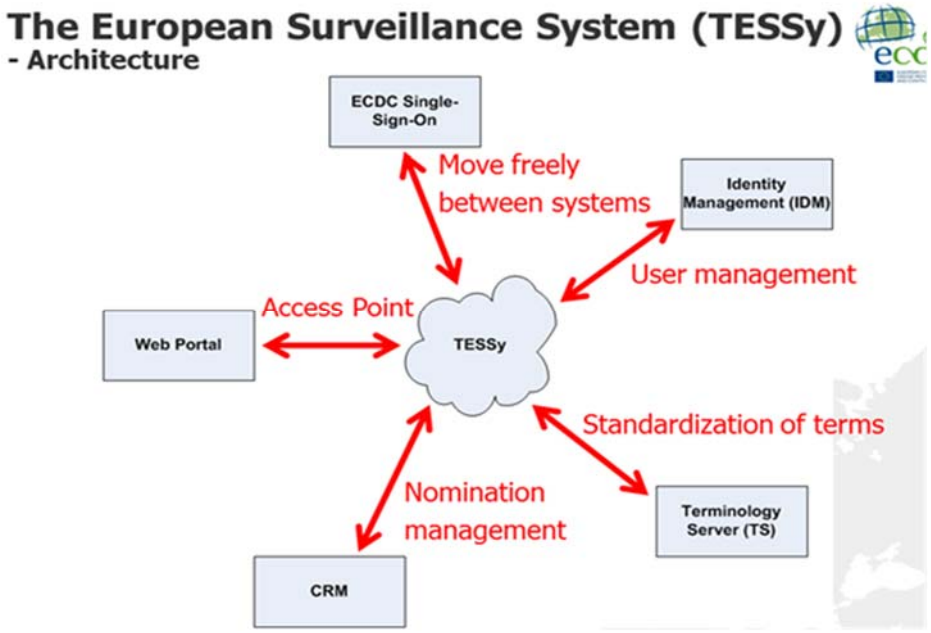
Figure 19: ECDC Work Structure



The operating system for epidemic intelligence is set out in the above diagram and consists of the following steps:

- Identify, assess and communicate current and emerging communicable disease threats
- Establish procedures for the identification of emerging health threats in cooperation with MS
- Inform EC and MS about emerging health threats requiring their immediate attention
- Communication on emerging health threats, including to the public

Figure 20: TESSY Architecture



The TESSy Mission is *"To strengthen European surveillance in order to reinforce detection, prevention and control of infectious diseases in Europe."*

TESSy is

- One single point for reporting and retrieving surveillance data
- Highly flexible web-based system and has taken over data collection of 17 separate Dedicated Surveillance Networks of 30 countries reporting data on over 60 diseases and other subjects of interest (antimicrobial consumption/ resistance, healthcare associated infections)
- Over different 1100 users
- Almost 30 million records have been uploaded
- Support strengthening of national surveillance systems
- Establish EU-wide standard case reporting
- Monitor trends of diseases across Europe to provide a rationale for public health actions in MS
- Disseminate the results to stakeholders for timely public health actions at EU and MS level
- Coordinate the integrated operations of the Dedicated Surveillance Networks

THREAT, RISK ASSESSMENT AND ALERTS

The ECDC is one of the main supports for the Health Security Committee in threat and risk assessment.

Following the improvement of capacities for rapid alerting and information communication, threat assessment by Member States is another key priority of the work plans that have been developed by the HSC. The HSC has enabled cooperation between Member States in sharing threat and risk assessment either by using the expertise of the ECDC or other relevant EU agencies such as the European Medicines Agency (EMEA) or the European Food Safety Authority (EFSA). The regular meetings of the HSC have provided the structure to identify in a coordinated manner the priorities for the Member States.

The ECDC Map Maker tool (EMMa) is a simple web-based GIS tool designed for communicable disease surveillance experts to help identify patterns in communicable disease surveillance data or during outbreaks investigations.

The ECDC issues Rapid risk assessments on current outbreaks usually triggered by surveillance information

ECDC is a resource of scientific advice on infectious diseases for the EU. Depending on the level of evidence provided and the methodology used, this advice is typically conveyed through a Guidance (based upon a systematic review of scientific evidence and appraised by a scientific panel of experts), a Systematic Review (report that identifies, appraises and synthesises the evidence) or an Expert Opinion (scientific view based on an informal review of evidence).

ECDC technical reports present the outcome of ECDC's scientific panels, consultation groups and working groups. Authored or co-ordinated by ECDC's scientists, the reports provide evidence-based answers to scientific, public health and operational questions, including risk assessments.

ECDC produces regular surveillance reports and peer reviewed publication on various

topics.

On specific request from Member States or the European Commission, ECDC convenes scientific panels to provide guidance for policymakers in the area of public health. These panels analyse the available evidence on a particular question in order to help European Union (EU) Member States to make policy choices. They highlight the issues that need to be considered and provide a list of policy options for each of these.

ECDC produces mission reports. In the event of a disease outbreak an investigation team may be sent from ECDC to assist the affected Member States. Reports from the ECDC outbreak assistance teams will be published here, together with reports about support missions on either general or specific issues concerning communicable diseases.

13.3 Detailed UN/WHO analysis

The WHO primary role is to direct and coordinate international health within the United Nations' system.

These are main areas of the WHO work:

Health systemsPromoting health through the life-courseNon-communicable diseases
Communicable diseases
Corporate services
Preparedness, surveillance and response

13.3.1 SOP Status Quo Summary UN and WHO

Table 45: UN & WHO status summary

Source	Issuing / Parent Organization	Geo-Area covered	Operational focus	Characteristics	Conclusions for PULSE
Emergency Response Framework (ERF)	WHO	World	Coordinated and effective health sector response to minimize mortality and life-threatening morbidity	Initial alert, emergency classification, event verification and event risk assessment Grading process Performance standards and critical functions for emergency response Global Emergency Management Team Emergency Response Procedures Essential emergency policies	Exchange of intelligence & information Access to standards, procedures, and policies Identification & utilization of interfaces

International Health Regulations (IHR)	WHO	World	International community to prevent and respond to acute public health risks having the potential to cross borders and threaten people worldwide	Binding instrument of international law obligating member nations to strengthen inter alia: disease prevention, surveillance, control and response systems public health security WHO global alert and response system management of specific risks	Exchange of intelligence & information Identification & utilization of interfaces
Global Outbreak Alert and Response Network (GOARN)	WHO Strategic Health Operations Centre	World	Improving the coordination of international outbreak responses and providing an operational framework for the delivery of support	Assist with disease control efforts by technical support to affected populations Investigate and characterize events and assess risks of emerging epidemic disease threats Support national outbreak preparedness and containment of epidemic threats	Exchange of intelligence & information

WHO has an essential role to play in supporting Member States to prepare for, respond to and recover from emergencies with public health consequences. WHO also has obligations to the Inter-Agency Standing Committee (IASC) as Health Cluster Lead Agency, to the International Health Regulations (2005) and to other international bodies and agreements related to emergency response.

The purpose of this Emergency Response Framework (ERF) is to clarify WHO's roles and responsibilities in this regard and to provide a common approach for its work in emergencies. Ultimately, the ERF requires WHO to act with urgency and predictability to best serve and be accountable to populations affected by emergencies.

The ERF sets out WHO's core commitments in emergency response which are those actions that WHO is committed to delivering in emergencies with public health consequences to minimize mortality and life-threatening morbidity by leading a coordinated and effective health sector response.

The ERF elaborates the steps WHO will take between the initial alert of an event and its eventual emergency classification, including event verification and event risk assessment.

The ERF describes WHO's internal grading process for emergencies including the purpose of grading, the definitions of the various grades, the criteria for grading, and

the steps to remove a grade.

Preparedness, surveillance and response

During emergencies, WHO's operational role includes leading and coordinating the health response in support of countries, undertaking risk assessments, identifying priorities and setting strategies, providing critical technical guidance, supplies and financial resources as well as monitoring the health situation. WHO also helps countries to strengthen their national core capacities for emergency risk management to prevent, prepare for, respond to, and recover from emergencies due to any hazard that pose a threat to human health security.

Humanitarian Civil-Military Coordination (UN-CMCoord)

When an emergency or natural disaster creates humanitarian needs, many countries will deploy their militaries or paramilitary organizations to respond. Bilateral support to disaster-affected States can also be provided through international deployment of foreign military actors and assets. When local and international humanitarian organizations are also involved in that response, it is essential that they can operate in the same without detriment to the civilian character of humanitarian assistance.

It is for this reason that United Nations Humanitarian Civil-Military Coordination (UN-CMCoord) facilitates dialogue and interaction between civilian and military actors, essential to protect and promote humanitarian principles, avoid competition, minimize inconsistency and, when appropriate, pursue common goals.

UN-CMCoord is a framework that enhances a broad understanding of humanitarian action and guides political and military actors on how best to support that action. It helps to develop context-specific policy based on internationally agreed guidelines, and it establishes humanitarian civil-military coordination structures, ensuring staff members are trained to make that coordination work. UN-CMCoord is particularly essential in complex emergencies / high-risk environments in order to facilitate humanitarian access, the protection of civilians, and the security of humanitarian aid workers.

WHO's obligations under the International Health Regulations (2005)

The renewed and enhanced commitments of Member States and WHO under the International Health Regulations (IHR) (2005) have defined the obligations of countries to assess, report and respond to public health hazards, and established a number of procedures that WHO must follow to uphold global public health security. The IHR (2005) cover a wide variety of public health events and are not limited to infectious diseases. The IHR (2005) defines the term event as a manifestation of disease or an occurrence that creates a potential for disease. Disease means an illness or medical condition that presents or could present significant harm to humans, irrespective of origin or source. In addition, a public health risk is defined in IHR (2005) as the likelihood of an event that may adversely affect the health of human populations, with emphasis on those that may spread internationally or may present a serious and direct danger, and potentially require a coordinated international response. The definitions of these terms are the building blocks of the expanded surveillance and response obligations of Member States and WHO under the IHR (2005). WHO's increased responsibilities under the IHR (2005) include:

1. designating WHO regional level IHR contact points;

2. coordinating global surveillance and assessment of significant public health risks and disseminating public health information to States Parties;

3. supporting States Parties to assess their existing national public health structures

and resources, and to build and strengthen their core public health capacities for surveillance and response;

4. determining whether particular events constitute a public health emergency of international concern, with advice from external experts;

5. developing and recommending measures for surveillance, prevention and control of public health emergencies of international concern for use by Member States

13.3.2 International Health Regulations

IHR (2005) is a revision of the International Health Regulations (1969). IHR (2005) represents a “paradigm shift” involving a number of major changes in focus, including: z from fixed diseases to all public health threats; z from control of borders to also containment at source; and z from pre-set measures to adapted responses. Many lessons were learnt about the effectiveness and limitations of international border health interventions and response capacities at POE during pandemic (H1N1) 2009.

In response to the exponential increase in international travel and trade, and emergence and re-emergence of international disease threats and other health risks, 196 countries across the globe have agreed to implement the International Health Regulations (2005) (IHR). This binding instrument of international law entered into force on 15 June 2007.

The stated purpose and scope of the IHR are "to prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and which avoid unnecessary interference with international traffic and trade." Because the IHR are not limited to specific diseases, but are applicable to health risks, irrespective of their origin or source, they will follow the evolution of diseases and the factors affecting their emergence and transmission. The IHR also require States to strengthen core surveillance and response capacities at the primary, intermediate and national level, as well as at designated international ports, airports and ground crossings. They further introduce a series of health documents, including ship sanitation certificates and an international certificate of vaccination or prophylaxis for travellers.

The responsibility for implementing the IHR rests upon all countries quickly Member States that are bound by the Regulations and WHO. The Member State is responsible, including all of its sectors, The IHR prepare all sectors for ministries, levels, officials and personnel for implementing the Regulations supports States potential emergencies through at the national level. WHO collaborates with and in the implementation of the Regulations. Coordination and information sharing. For effective national and global health security, the IHR should be a national responsibility, not just that of the Ministry of Health (MoH) or the National IHR Focal Point (NFP). The implementation of the IHR involves and has an impact on SECTORS MAY INCLUDE functions and responsibilities across many ministries, sectors, and governmental levels.

Core capacities are in place. Each Member State is required to develop, strengthen and maintain core public health Food Safety capacities for surveillance and response by using existing national resources, such as the national plans for influenza pan- Agriculture (incl. animal health) Transport (incl. dangerous goods) epidemic preparedness. Key sanitary and health services and Communication and media facilities are also to be developed at international airports, ports and ground crossings designated for this purpose. Public health authorities at state, provincial, regional

and local levels WHO supports Member States in their efforts to assess their National security existing national public health structures and resources, as well as to develop and strengthen the core public health capacities for surveillance and response, and at designated points of entry. Effective surveillance is established at Points of Entry (PoE).

Contact persons are identified and available. Under the IHR countries are required to notify and report events and other Mechanisms for detecting and responding to zoonoses, chemical emergencies, and radio-nuclear emergencies are established. Information is provided through their National IHR Focal Points (NFP) to a regional WHO IHR Contact Points. Focal Points and Contact Points must be available on a 24 hour-a-day basis, seven days a week. There are currently 194 National IHR Focal Points and six corresponding WHO IHR Contact Points in the WHO Regional Offices. 3. WHO is notified of health events and ensures coordination. The IHR provide an assessment tool to help Member States assess the severity of a health event, and provide a framework for consulting with and notifying WHO. This enables WHO to ensure appropriate technical collaboration for effective prevention of such emergencies or containment of outbreaks and, under certain defined circumstances, inform other Member States of the public health risks where action is necessary on their part.

13.3.3 **PHEIC procedures**

IHR Procedures concerning public health emergencies of international concern (PHEIC)

Some serious public health events that endanger international public health may be determined under the Regulations to be public health emergencies of international concern (PHEIC). The term Public Health Emergency of International Concern is defined in the IHR (2005) as “an extraordinary event which is determined, as provided in these Regulations:

- to constitute a public health risk to other States through the international spread of disease; and
- to potentially require a coordinated international response”. This definition implies a situation that: is serious, unusual or unexpected; carries implications for public health beyond the affected State’s national border; and may require immediate international action.

The responsibility of determining whether an event is within this category lies with the WHO Director-General and requires the convening of a committee of experts – the IHR Emergency Committee. This committee advises the Director General on the recommended measures to be promulgated on an emergency basis, known as temporary recommendations. Temporary recommendations include health measures to be implemented by the State Party experiencing the PHEIC, or by other States Parties, to prevent or reduce the international spread of disease and avoid unnecessary interference with international traffic.

The Emergency Committee also gives advice on the determination of the event as a PHEIC in circumstances where there is inconsistency in the assessment of the event between the Director-General and the affected country/countries. The Emergency Committee continues to provide advice to the Director-General throughout the duration of the PHEIC, including any necessary changes to the recommended

measures and on the determination of PHEIC termination. WHO maintains an IHR roster of experts and the members of an IHR Emergency Committee are selected from this roster and/or WHO expert advisory panels and committees. At least one member of the Emergency Committee should be an expert nominated by a State Party within whose territory the event arises.

Global Outbreak Alert and Response Network

During outbreaks, the Global Outbreak Alert and Response Network (GOARN) ensures that the right technical expertise and skills are on the ground where and when they are needed most.

Strategic Health Operations Centre

The WHO Strategic Health Operations Centre (SHOC) monitors global public health events around the clock, and facilitates international collaboration during public health emergencies.

Public Health Emergency Operations Network

Through the Public Health Emergency Operations Network (EOCNET), WHO supports countries in setting up or improving their EOCs, to strengthen their coordination and response systems.

Annex 6

14 Stakeholder Involvement

Both collecting information for the status quo analysis (D5.1Tto identify typical commonalities, differences, gaps and deficiencies among existing heterogeneous procedures) as well as the development of the Pulse's set of SOPs (D5.2) required external stakeholders involvement. A series of meetings and activities were conducted in order to collect the information and to gradually validate the work progress:

- Face to face meetings
- Phone calls and web teleconferences
- Completion of survey questionnaires
- Team experts contributions

Goals and experienced benefits, of the stakeholder engagements:

- A better and accurate view of the exiting procedures (written and enforced by laws and operational orders/directives etc) as well as the best practices (usually not-written but applied in day-by-day practice, leading to opportunities for SOP's improvements
- Presenting other countries experiences, focuses on current regional / international cooperation in order identify opportunities to foster cross border cooperation.
- A preliminary validation of the foreseen trials/validation means, including scenario and SOPs.

14.1 Stakeholder activities summary

14.1.1 Romania

In order to collect and validate the status quo analysis for the Romanian procedures emergency management were organized several meetings and phone call discussions with Mr. Marian Ilie - Project Implementation Officer at the General Inspectorate for Emergency Situations, covering mainly the procedures for the emergency management in case of assistance for collective accidents, calamities and disasters.

14.1.2 Germany

The German team member, Hans Kühl, is himself an expert in CBR&E threats and countermeasures, Previously consulted contacts have been maintained. For the purpose of PULSE that includes the professional fire brigades Hamburg and Dortmund, the State Ministry of the Interior Brandenburg and the BBK.

14.1.3 Italy

The Italian Partner UCSC is the project backbone of stakeholder involvement, first being a very competent stakeholder itself and second exploiting a large network of external operational and research partners.

During the first 18 months of the PULSE project, UCSC together with SES, has conducted interviews for end-user requirements, interviews with stake-holders, and also a preliminary usability testing with end users that will use the PULSE platform during the table top exercise.

For the SARS-like scenario

Preliminary telephone contacts were taken with Dr. Massimo Ciotti from ECDC and Prof. Germain Thinus from DG-SANCO to inform them about the construction of the PULSE platform. Both indicated to interview the Joint Research Center, Ec Europa EU, of Varese Italy. A physical meeting was organized and carried out with the group in Varese to have an overlook at epidemiological models for SARS-like epidemics and weak signal identification.

An interview was conducted with the Epidemiology Department of Hygiene of the Catholic University, to identify the precise stake-holders interested in case of an epidemic of SARS-like disease in a cross-border context. Prof. Moscato of the Institute indicate the prominent role played in Italy by the USMAF (the medial authority that controls the Airports and the Ports of Italy). A physical meeting was organized with the USMAF of Fiumicino (major Airport of Rome).

Interviews with Ministry of Health Authorities were requested, but at the moment have not been yet carried out.

For the Stadium scenario

The two EMS of Rome (Ares 118) and Milan (AREU) were contacted and interviewed with physical meetings. Standard operative procedure were collected and analyzed.

Further interviews were conducted with Private medical emergency management systems working in the Rome Monte Mario Olympic Stadium, that represent the interface with State EMS present outside stadium premises.

An interview was also conducted by the PULSE theme for a possible collaboration on MPORG with Prof. Pierluigi Ingrassia (Simnova, il Centro di simulazione in medicina e professioni sanitarie of the Università del Piemonte Orientale, Novara, Italy).

Table 46: Stakholder consultation IT

Name of organisation	Name of contact	Email id	WP during which contact initiated/ or if not contacted please mention - POTENTIAL SUGGESTION	Mode of consultation (i.e. email, interview, F2F meeting, workshop, other…)	Date/month of consultation
Joint Research Centre	Alessandro Annunziato	alessandro.annunziato@jrc.ec.europa.eu	WP2	Meeting	05/11/2014
118 Areu Milano	Enzo Albergoni	e.albergoni@areu.lombardia.it	WP2, WP4, WP5	Meeting	30/06/2015
USMAF	Francesco Paolo Maraglino	f.maraglino@sanita.it	WP2, WP4, WP5	Meeting	26/02/2015
118 Ares	Carlo Piccolo	cpiccolo@ares118.it	WP2, WP4,	Meeting	27/05/20

Roma			WP5		15
European Commission Public Health Directorate	Germain Thinus	germain.thinus@ec.europa.eu	WP2	Phone call interview	12/03/2015
Spallanzani Hospital	Giuseppe Ippolito	giuseppe.ippolito@inmi.it	WP4, WP5	Meeting	05/10/2015
Istituto di Igiene Policlinico Gemelli	Prof. Moscato			Meeting	10/02/2015
Istituto di Rianimazione - Assistenza Stadio Olimpico di Roma	Dott. Cosimo Caputo	caputocosimo@ymail.com	WP5	Meeting	15/03/2015
ECDC	Massimo Ciotti	Massimo.Ciotti@ecdc.europa.eu	WP2	Phone call interview	july 2014
Simnova, il Centro di simulazione in medicina e professioni sanitarie dell'Università del Piemonte Orientale	Pierluigi Ingrassia	pierluigi.ingrassia@med.uniupo.it	WP3	Meeting	January 2015

14.1.4 **Ireland**

During the inception of the PULSE project, the Inter-Agency Emergency Management office held several formal and informal meeting with emergency management professionals throughout the region in order to harmonize emergency management procedures throughout Ireland. The scope of these meetings ranged from inter-agency emergency management officers, emergency management officer and the chief emergency management officer. Emergency management in Ireland is in a unique position as the office of emergency management is a one-stop-shop for all regional end-users, 1st and 2nd responders and 1st receivers. In addition to obtaining the Irish perspective, IAEMO held focused interviews with the 2014 French National Institute of Advanced Studies security and justice (INHESJ) group in which they afforded the opportunity to solidify an international perspective in relation to emergency management and the PULSE project.

14.2 **Ethical and legal impact (Interface to WP8).**

Description of stakeholder engagement, benefits and methods of consultation-

Description of stakeholder engagement, benefits and methods of consultation-

WP8 of PULSE is being conducted in dialogue with both internal and external stakeholders and the PULSE Ethics Review Committee.

14.2.1 **Internal stakeholders**

Internal stakeholders consulted in WP8 include consortium partners: Skytek (**coordinator)** software development company that develops information and operation-based software tools; **CESS GmbH (Centre for European Security Strategies)**: supports public, private and multinational decision-makers with the development of scenarios and expertise to meet strategic threats, and offers strategic, operational and technical security and risk management expertise; **ONEST Solutions SRL**: Romanian R&D SME offers engineering and system integration services, hardware and software products development, and project management and consultancy; **Trilateral Research**: SME research and advisory consultancy, focussed on privacy and data protection; security and surveillance; crisis & disaster management; data science, and ethics and human rights; **Universita Cattolica Del Sacro Cuore:** The School of Medicine of UCSC provides healthcare at the Policlinico Universitario "A. Gemelli" in Rome, with 1,400 beds and a turnover of 70,000 patients annually, providing all clinical specialties. The activities are articulated in research, training and healthcare; **SELEX ES SPA**: Selex ES, a Finmeccanica company, with expertise in electronic and information technologies for defence systems, aerospace, data, infrastructures, land security and protection and sustainable 'smart' solutions; **Health Services Executive (HSE)/Inter Agency Emergency Management Office (IAEMO) Ireland**: whose responsibilities include the support of agencies in the planning and preparation for their response to major emergencies in the Cork and Kerry Area, review and issuing of the completed major emergency plans to Principal Response Agencies (PRAs) and the preparation of pre-test planning, public consultation, testing and reviewing of the 14 Upper Tier COMAH/SEVESO sites in the region.

Benefits: Assistance in planning and conducting the ethical impact assessment process; Deeper understanding of the ethical, legal and societal issues at play in relation to PULSE and its impacts. Better understanding of the technical potential of the PULSE tools and system. Input to, and feedback on deliverable.

Methods of consultation: face to face and virtual meetings, emails, reviews of deliverable.

14.2.2 **External stakeholders**

External stakeholders include:

- hospitals
- community health services
- pre-hospital emergency care services
- medical suppliers
- rescue services
- health-related voluntary services

- fire-fighters
- paramedics
- international organisations (e.g., WHO, European Centre for Disease Prevention and Control (ECDC)
- civil society organisations
- policy-makers and regulators (e.g., data protection authorities)
- industry (those who might commercialise the emergency app)
- medical ethics organisations and ethics professionals.

Benefits of stakeholder consultation: Independent views and perspectives on the legal, ethical, societal issues affecting PULSE and the impact of PULSE.

Methods of consultation to be employed: interviews via telephone or online, questionnaires or surveys, review of deliverable, PULSE End user workshops, emails.

14.2.3 Ethics Review Committee

Ethics Review Committee comprises three external, independent experts:

- *Dr. Javier Arias-Diaz*, Full Professor of Surgery, School of Medicine – San Carlos Clinic Hospital, Complutense University of Madrid
- *Prof. dr. Philip Brey*, Professor of Philosophy of Technology, Department of Philosophy of Technology, University of Twente
- *Ms. Zuzanna Warso*, Helsinki Foundation for Human Rights.

Benefits: independent impartial advice and guidance on legal, ethical and societal issues, feedback mainly on WP8 deliverables; see also D8.2, Review of ethical issues affecting PULSE (Ethical Impact Assessment Report).

Method of consultation: virtual meetings, email exchanges, report review.

14.3 Recommendations for future developments (trials/demonstrations)

Summary of recommendations for the project's further developments in regard to the end users / stakeholders involvement into the trials and demonstration sessions:

- Early engagements of the stakeholders upon trials setup detailing (scenario, location etc.).
- Collection of stakeholders feedback using questionnaires (see chapter. 6 of D5.2 for detailed information) during the trial demonstrations.

Organize training / introductory sessions for the stakeholders participating at the trials/demonstrations.