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**PANDEM**

Pandemic Risk and Emergency Management

## **D3.1 Identification and mapping of key stakeholders**

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## 1. INTRODUCTION

The aim of the PANDEM project is to identify innovative concepts to strengthen capacity building for pandemic risk and emergency management in the European Union (EU). The overall objective is to reduce morbidity, mortality, environmental and economic damage from future pandemics by identifying improvement needs for technologies, procedures and systems. Specific attention is being given to enhancing capacity for collaboration on cross-border risk assessment, response and recovery at local, national and EU level. As pandemics are by definition global events, the project is also looking at the needs for strengthening pandemic management beyond Europe and how the EU can support capacity at international level.

The specific objectives of the project are to:

1. Assess current practice, tools and systems for pandemic management at national, EU and global level in priority areas including risk assessment and surveillance, communication, governance and legal frameworks;
2. Identify gaps and improvement needs through consultation with users and stakeholders;
3. Identify and describe innovative solutions for capacity strengthening, efficient use of resources and better integration;
4. Identify and describe demonstration concepts and future research and development needs to be integrated in a roadmap for a phase II demonstration project.

The project is building on previous research and development efforts and will provide recommendations for the Directorates General (DG) HOME and SANTE at the European Commission (EC), in addition to other DGs and agencies at a global and national level.

### 1.1. PANDEM work approach

PANDEM has brought a highly skilled group of senior experts from the security, defence, public health, microbiology, communications, information technology and emergency management fields together to develop innovative concepts for pandemic management. The consortium is identifying current best practice, user needs and research priorities in the areas of risk assessment and surveillance, communication and governance. The structure of the PANDEM work approach is shown in Figure 1.

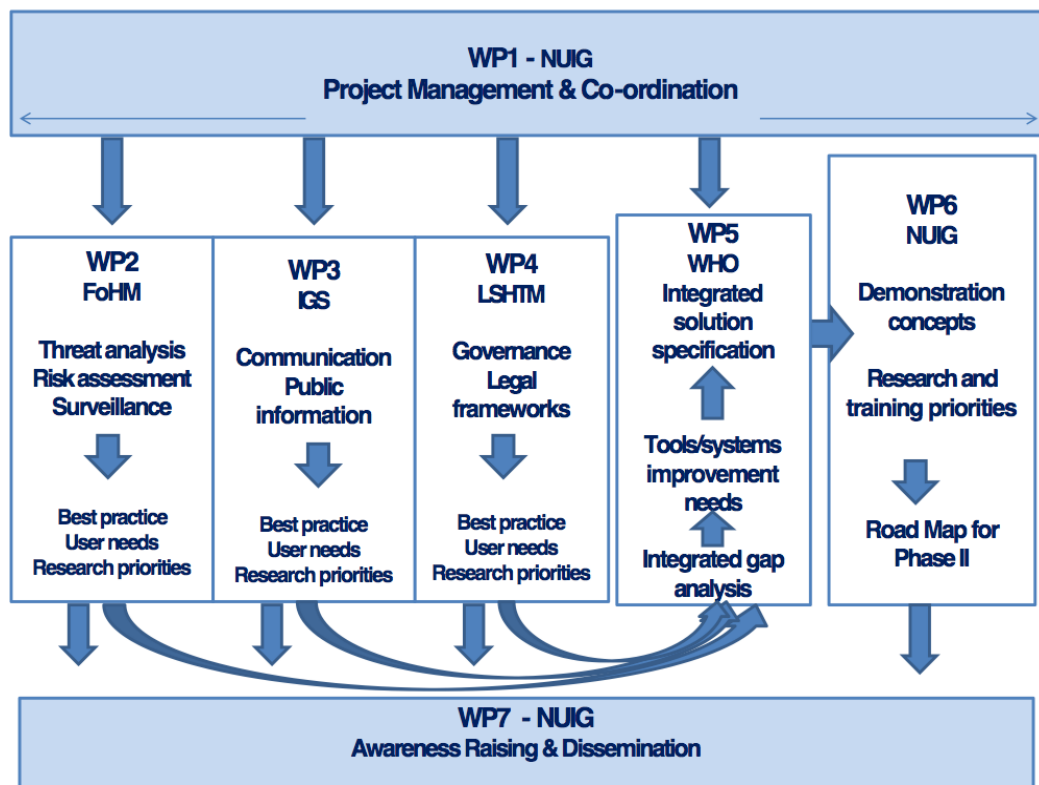


Figure 1. Graphical Presentation of the Components - the PANDEM Work Approach

Specifically the project is:

- Conducting a **comprehensive analysis of current and possible future threats** (air-, water-, food- and vector-borne diseases) including agents with potential for accidental/deliberate release;
- Analysing the actions taken by regional, national, EU and global actors during the Ebola outbreak, the H1N1 pandemic and other major epidemic responses at regional, national, EU and global level;
- Assessing **user needs and gaps** as well as identifying **requirements** to improve pandemic risk and emergency management capacity;
- Leveraging **available tools and systems** developed by research projects for risk assessment, communication, education and governance to improve cooperation between science and society and identifying innovative solutions;
- Examining and developing **mechanisms to strengthen existing networks** in the EU to support member states to work together inter-operably across borders;

- Enhancing **international cooperation** by incorporating input from international research partners to address a major global threat;
- Ensuring **consultation with and participation of a wide number of stakeholders** at regional, national and EU levels including end-users, industry, universities, citizens groups, governments, the EC and its agencies.

Given the cross-border and multi-sectoral context of the health and security challenge for building pandemic management capacity, a systems-based methodology is being applied to:

- Assess current capacity for prevention, preparedness, mitigation, response and recovery;
- Support the gathering of user needs and requirements to improve capacity at transnational level;
- Identify opportunities to improve the process of early detection and response to pandemics.

PANDEM will develop a **roadmap for investments** in research and system developments that result in **demonstrator topics** to be realised in the phase II demonstration project. The objective of the **Phase II project** will be to produce a product, prototype or demonstrator of value to all EU Member States.

## 1.2. PANDEM expected results and impact

The proposed impact of the project is:

**Impact 1: Identification of research gaps and priorities for improving capacity-building** at transnational level with a view to prepare for a phase II demonstration project involving all relevant stakeholders, including SMEs;

**Impact 2: Identification of innovative concepts that would allow better integration of existing tools and systems** to build capacity for health and security protection in case of large-scale pandemics;

**Impact 3: Preparation for a future phase II demonstration project** on large-scale pandemics;

**Impact 4: Increased security** for European citizens.

## 2. OBJECTIVE OF THE REPORT

Stakeholders and users involved in pandemic risk and emergency management come from a wide variety of backgrounds. *Stakeholders* can be defined as groups that have a role and interest in the objectives and implementation of a programme or a project [1].

This report identifies and maps all key stakeholders, involved directly or indirectly in pandemic risk and emergency management. Diseases with pandemic potential spread across international boundaries with potential to affect the health sector worldwide as well as global security and economy [2]. Key stakeholders are listed (see Annex 1) and mapped according to their role and/or function in pandemic management at the international, European and Member State level. Considering the number of stakeholders, their complex relationships and the dynamic nature of their interactions depending on the type, intensity and dynamics of each health crisis, it is beyond the scope of this report to describe all stakeholder inter-relationships. Consequently, this document focuses on the broad group of key stakeholders who would have a role in preparing for, or responding to, a future pandemic. Stakeholder inter-relationships of particular importance to the PANDEM project will be thoroughly reviewed and analysed elsewhere, for instance when addressing selected PANDEM scenarios.

## 3. IDENTIFICATION OF STAKEHOLDERS

Stakeholders in this report were first identified by analysing official documents on pandemic preparedness and response issued by major organisations including the EC and related DGs, the World Health Organisation (WHO), United Nations (UN), European agencies, and national authorities or institutions. At the next level, key partners directly interacting with these organisations, agencies and institutions were identified as the “pandemic stakeholder community” (see Annex 1).

Following identification, three distinct stakeholder mappings were undertaken according to their respective tasks and missions (section 4.1). A top-down approach has been applied for mapping these stakeholders starting at the international level through European, national and local levels. A second mapping illustrates the European early warning system. A third mapping focuses on dynamic interactions and interface between all stakeholders involved in pandemic preparedness and response in the European Union including policy-makers, research and technology suppliers and all types of users.

## 4. MAPPING OF STAKEHOLDERS

### 4.1. Methodological approach for mapping stakeholders

The stakeholders involved in pandemic management form a wide and complex community. Ideally mapping should reflect and integrate this multiplicity and complexity [3]. Considering the close link between this type of crisis and security, mapping of pandemic management stakeholders will use a methodology used in security projects [4, 5]. The successive steps will be to define taxonomy of PANDEM stakeholders, to categorise them accordingly, and to identify their respective interaction during a pandemic.

### 4.2. Stakeholders taxonomy

*Stakeholders* are groups that have a role and interest in the objectives and implementation of a programme or a project; they include target groups, users (direct beneficiaries), those responsible for ensuring that the results are produced as planned, and those that are accountable for the resources that they provide to that programme or project [6].

Analysis of pandemic scenarios and preparedness plans enabled identification of key functions (Fig.2) [7-10]. Within this document, stakeholders are categorised under these seven key functions of pandemic risk and emergency management:

- 4.2.1 Preparedness
- 4.2.2 Surveillance
- 4.2.3 Case management
- 4.2.4 Prevention
- 4.2.5 Maintaining essential services
- 4.2.6 Research and evaluation
- 4.2.7 Capacities and resources

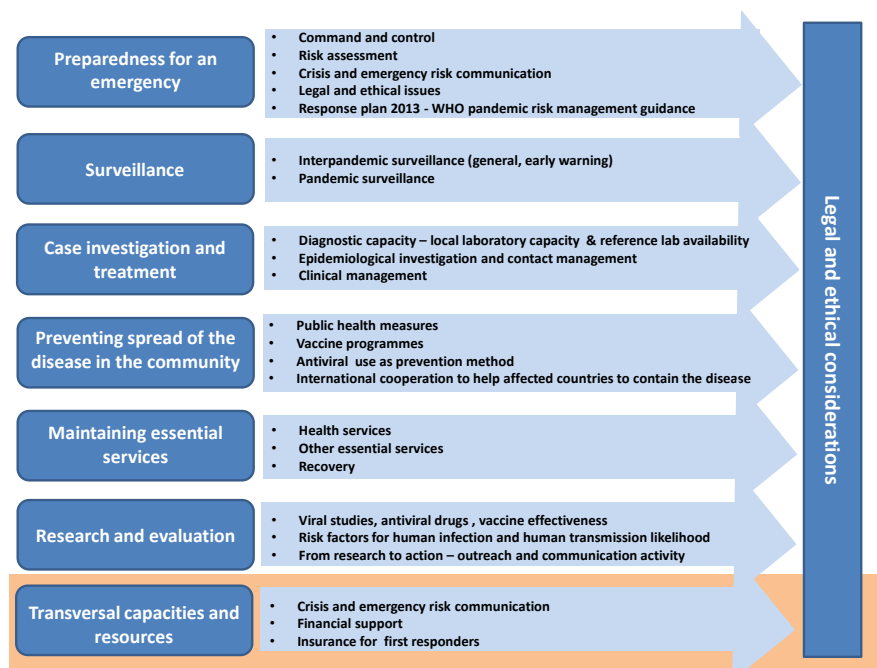


Figure 2. Pandemic risk and emergency management

The following groups of stakeholders are involved under each key function:

#### 4.2.1 Preparedness

- i. Command and control
- ii. Risk assessment
- iii. Crisis and emergency risk communications
- iv. Legal issues - International Health Regulations, drugs regulations, as well as decisions to close schools and other public places, stop public transport, etc.
- v. Ethical issues - treatment of vulnerable population groups, cultural and religious specificities, psychological support
- vi. Response plan according to 2013 WHO pandemic risk management guidance.

Policy-makers and regulators mainly fill these duties. It is of note that the terms “regulators” and “regulatory” are used and understood here in a broad sense, *i.e.* a *regulatory body*, regulatory authority, regulatory agency or regulator is understood as a public authority or government agency responsible for exercising autonomous authority over some area of human activity in a regulatory or supervisory capacity [11-13]. Although these terms may be considered by some stakeholders in a very restricted legal way in their work practice, we do not restrict their use in this report to “legal enforcement” but include recommendations on best practice, harmonization or standardization of protocols and methodologies.



**International level:**

- World Health Organization (WHO), including its Global Outbreak Alert and Response Network (GOARN), its Strategic Health Operations Centre (SHOC) and its Unit on Disease Control in Humanitarian Emergencies (DCE);
- United Nations (UN) Security Council, Office for the Coordination of Humanitarian Affairs (OCHA) and Office for Disaster Risk Reduction (UNISDR);
- Inter-Agency Standing Committee (IASC);
- UN Economic, Social Council (ECOSOC): assessment of socio-economic impact and long-term impact on families.

**European level:**

- European Centre for Disease Prevention and Control (ECDC);
- Health Security Committee (HSC);
- Health and Food Safety Directorate-General (DG-SANTE) from the European Commission (EC) and its Health Emergency Operations Facility (HEOF);
- EU crisis management capacity: EU emergency and crisis coordination arrangements (EU-CCA); Integrated EU arrangements for crisis management with cross-border effects (EU-ICMA);
- At the EC level, Alerte Rapide, Globale et Sûre, (ARGUS) is a confidential safety reporting system which links all specialised systems for emergencies;
- Emergency Response Coordination Centre (ERCC), EC's Humanitarian aid and Civil Protection Department (DG ECHO).

**National level:**

- Ministry of Health;
- Ministry of Home/Internal Affairs;
- Civil protection;
- Ministry of Defence;
- Ministries in charge of transportation, energy, communication, agriculture and animal health;
- National Emergency/Crisis Committee and Crisis Centre (structure of these centres, their hierarchical dependency, autonomy and type of activities may vary from country to country depending on the organisation of the state political leadership, either centralized [federal] and/or decentralized);
- Competent authorities for epidemiological surveillance and members of the HSC interacting with ECDC to launch alerts and determine required measures;
- Public and private providers of essential services and goods.

**Local level:**

- Local health authorities, European Regional and Local Health Authorities (EUREGHA) Local crisis centre;
- Public Health Emergency Operations Centre (EOC NET) coordinated in a network by WHO Department of Global Capacities, Alert and Response (GCR);
- Other types of stakeholders such as academia, civil society groups, NGOs, policy institutes, open forum and think tanks can provide input on preparing for an emergency, by advising policy makers, including on ethical issues (academia, civil society groups, NGOs), or by drawing lessons learned from application of emergency plans and suggesting practical improvements (health care managers, health care workers, civil society groups, NGOs);
- Training is also essential to be prepared to respond to pandemics. Organisations involved in training include: Associations of Schools of Public Health in the EU Region (ASPHER), Centre for Health Sciences Training, Research and Development (CHESTRAD), European Programme for Intervention Epidemiology Training (EPIET), European Public Health Microbiology Training Programme (EUPHEM), Global Health Action (GHA), Institute for International Medical Education (IIME), Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET), World Federation for Medical Education (WFME), European Union Institute for Security Studies (EUISS).

**4.2.2 Surveillance**

- i. Inter-pandemic surveillance (seasonal influenza, early warning related to novel influenza virus or new emerging disease)
- ii. Pandemic surveillance.

The first line of surveillance include general practitioners and emergency and intensive care specialists who diagnose cases and are required to report cases of pandemic prone diseases to local and national surveillance networks. This information is transmitted through disease-specific national centres and public health institutes and then to EU and global surveillance networks.

**International level:**

- International Health Regulations (IHR): Event Information Site (EIS) platform for IHR National Focal points;
- WHO: Global Influenza Surveillance and Response System (GISRS);
- Non-profit organisations, such as the International Society for Disease Surveillance (ISDS);
- Surveillance of animal disease by the World Organisation for Animal Health (OIE);
- International Association of National Public Health Institutes (IANPHI).

Connecting Organizations for Regional Disease Surveillance (CORDS). Currently, CORDS is composed of:

- APEIR - Asia Partnership on Emerging Infectious Diseases Research;
- EAIDSNet - East African Integrated Disease Surveillance Network;
- MBDS - Mekong Basin Disease Surveillance;
- MECIDS - Middle East Consortium on Infectious Disease Surveillance;
- SACIDS - Southern African Centre for Infectious Disease Surveillance;
- SECID - Southeast European Centre for Surveillance and Control of Infectious Diseases.

**European level:**

- The European Centre for Disease Control (ECDC) is a EU agency which aim is to identify, assess and communicate current and emerging threats to human health posed by infectious diseases. In order to achieve this mission, ECDC works in partnership with national health protection bodies across Europe to strengthen and develop Europe-wide disease surveillance and early warning systems. By working with MS experts, ECDC delivers scientific assessment of the risks posed by current and emerging infectious diseases. In this respect, ECDC activity is linked to the Epidemic Intelligence Information System (EPIS) communication platform and European Commission early warning and rapid alert systems in the field of health threats. The mission of EPIS is to ensure early detection and coordinated response to multi-state food and water outbreaks. An updated version of this restricted web-based communication platform has recently been launched ECDC-EPIS: [http://external.ecdc.europa.eu/EPIS\\_FWD/](http://external.ecdc.europa.eu/EPIS_FWD/)
- EPIS-FWD: <http://www.foodqualitynews.com/Lab-Technology/Updated-EPIS-FWD-platform-launched-by-ECDC;>

- Rapid alert Systems
  - **EWRS** - the Early Warning and Response System was initially used in the context of communicable diseases threats. According to Decision No 1082/2013/EU EWRS has recently been upgraded to improve the coordination of the response to serious cross-border threats to health (no more restricted to communicable diseases) in liaison with the Commission. EWRS has now become the main alert system.
  - **RAS BICHAT**- Despite being still mentioned in several open access documents placed on EC website, including recent updates, the Rapid Alert System for bio or chemical terrorist attack does not exist anymore or is no more functional; today all alerts are placed under the scope of Decision 1082/2013 and therefore posted on EWRS which is now EU multi-hazard Early Warning System, mirroring this put into place by the UN. (MHEWS)
  - **RAS CHEM** - the rapid alert system for chemical threats is no more an alert system. The-comment addressed here above about RAS-BICHAT also applies to RAS CHEM: it is now a discussion forum coordinating chemical networks. In that respect, RAS-CHEM has a function of surveillance very comparable to the role played by EPIS for communicable diseases.
  - **RASFF** - the Rapid Alert System for Food and Feed.

#### National level:

- National surveillance institutes and public health agencies;
- Coordinating Competent Body (CCB) designated in each Member State and directly interacting with ECDC.

There are also monitoring systems (InfluenzaNet) or online scientific tools and databases (MedISys, Flunewseurope, HealthMap, ProMED, InSTEDD) that can improve surveillance or communication around disease monitoring.

#### **Inter-pandemic surveillance: the case of influenza**

Inter-pandemic surveillance is currently being done for influenza through the reporting of mild disease i.e. acute respiratory infections (ARI) or influenza-like illnesses (ILI) by general practitioners and severe disease in hospitalised cases by modelling excess all-cause mortality and/or using internet-based surveillance etc. The purpose is to provide early warning of cases and baseline data on risk groups for disease, impact and severity.

The purpose of inter-pandemic surveillance is to detect the emergence of new/zoonotic influenza viruses infecting humans in the EU or elsewhere in the world as well as the reporting of initial cases diagnosed in EU Member States. This early warning surveillance system enables experts to study parameters of transmission, severity and risk factors of persons infected. EU Member States report seasonal influenza surveillance data from ARI, ILI and hospital systems to the joint ECDC-WHO/Europe influenza bulletin *Flu News Europe*. While risk assessment is undertaken by ECDC, there is no EU or global database to collect, analyse and disseminate data on early cases hence there is no mechanism for countries to share case data or subsets/aggregates of case data for early risk assessment. This is a gap with regard to a future pandemic.

#### 4.3.3 Case investigation and treatment

- i. Diagnostic capacity - Local laboratory capacity and reference laboratory availability

##### **International and European level:**

WHO is responsible for the definition of procedures and protocols for disease diagnostics, while the responsibility of ECDC is risk assessment and scientific advice. WHO and the European Commission through the HSC issue recommendations for health management during high impact epidemics and pandemics.

ECDC, has developed a real capacity for assessment of outbreaks inside and outside the EU either on its own or as part of the European Medical Corps (see next paragraph); To better fulfil its missions, this EU agency has developed the European Programme for Intervention Epidemiology Training (EPIET) and the European Programme for Public Health Microbiology Training (EUPHEM),

- EPIET provides state-of-art training in field epidemiology to medical practitioners and public-health professionals from EU.
- EUPHEM provides training and practical experience in public health microbiology.

<http://ecdc.europa.eu/en/aboutus/jobs/Pages/fellowships.aspx>

In case of outbreak inside or outside the EU, epidemiologists from ECDC may rapidly be deployed for first risk assessment in order to analyse the public health risk and the needs, and to advice on measures to be taken, or to carry out specific tasks (i.e. vaccination campaigns and training).

European Medical Corp (EMC)s: As a direct response to the Recent Ebola outbreak in West Africa, the European Union has set up a European Medical Corps through which teams and equipment from the EU Member States can be rapidly deployed to provide medical assistance and public health expertise in response to emergencies inside and outside the EU. The European Medical Corps is part of the existing European Emergency Response Capacity [EERC] (also known as "voluntary pool"), established under the EU Civil Protection Mechanism [EUCPM]. The EMC includes:

- emergency medical and public health teams,
- mobile biosafety laboratories,
- medical evacuation capacities,
- medical assessment and coordination experts,
- logistical support and coordination teams.

These teams can be mobilised for any type of emergency with health consequences, at short notice, whenever needed: Emergency medical teams provide direct medical care to the population affected by a disaster. These teams have to meet the high standards set up at WHO level for international deployments. Public Health teams.

[http://ec.europa.eu/echo/files/aid/countries/factsheets/thematic/European\\_Medical\\_Corps\\_en.pdf](http://ec.europa.eu/echo/files/aid/countries/factsheets/thematic/European_Medical_Corps_en.pdf)

#### **National level:**

In accordance with the IHR, local government (Ministry of Health, public health agencies) are advised to provide and maintain a diagnostic capacity (i.e., resources, equipment, infrastructures).

The diagnostic capacity consists of laboratory agencies and networks (EU-RL, EDPLN, EBLN, EMBL, ENHPB, European Network of P4 Laboratories), including, whenever possible, at least one reference laboratory for each specific disease as well as a sentinel laboratory network.

The health technology industry (quoted among stakeholders as *technology suppliers*) provides diagnostic tests and equipment.

New diagnostic tests, in case of a new emerging disease, can be developed by public health agencies, academia, research teams and/or by industry.

#### **ii. Epidemiological investigation and contact management**

- National surveillance institutes and public health agencies.

### iii. Clinical management

- Civilian and military hospitals. While first cases may be handled in specialized medical facilities requiring containment, rapid extension of a pandemic may overwhelm the civilian hospitals and require triage and deployment of field hospitals when available. In some countries, the Ministry of Defence can provide this capacity. Military organisations will therefore be involved in the case of major crises requiring involvement of military doctors and infrastructures as well as strong logistic support (e.g., National Defence Ministries, European Defence Agency (EDA), North Atlantic Treaty Organisation (NATO));
- Health care managers, European Hospital and Healthcare Federation (HOPE), International Hospital Federation (IHF);
- Health care workers: general practitioners (frontline clinicians), respiratory disease specialists, virologists, emergency and intensive care specialists, nurses, pharmacists, epidemiologists;
- National and regional public health authorities including curative and diagnostic services; European Medicines Agency (EMA) and national drug regulatory authority; disease-specific national centre(s); and representatives of health workers associations (WHPA, UEMO, CPME, WMA, EFN, ICN, EAHP, FIP, PGEU, AVC, FVE, WVA);
- Industry/Private sector - Personal protective equipment, vaccines producers and distributors: European Association of Pharmaceutical Full-Line Wholesalers (GIRP), European Confederation of Pharmaceutical Entrepreneurs (EUCOPE), European Federation of Pharmaceutical Industries and Associations (EFPIA) and its specialised group “Vaccines Europe”, International Federation for Animal Health Europe (IFAH), health technology, drugs.

### 4.3.4 Prevention

#### i. Public health measures

#### International and European level:

- Recommendations issued by WHO and the European Commission through HSC and implemented locally (Ministry of Health, Ministry of Defence, Health care managers);
- Security organisations and Emergency response organisations (SHOC, UNISDR, HSC, National Emergency/Crisis Committee and Crisis Centre, local crisis centres, civil protection);

- EU-DGs: SANTE, Environment (ENV), Migration and Home Affairs (HOME), Mobility and Transport (MOVE), Taxation and Customs Union (TAXUD);
- Intergovernmental agencies: ECDC, European External Action Service (EEAS), Europol, Frontex (European Agency for the Management of Operational Cooperation at the External Borders), European Agency for Safety and Health at Work (EU-OSHA), Consumers, Health, Agriculture and Food Executive Agency (CHAFEA).
- Policy and legal preparedness and response frameworks have been thoroughly reviewed and presented in Deliverable 4.1. Regulations are proposed at the international and national levels in the following main relevant domains:
  - Safety and regulation of the transport of specimens as controlled by regulatory bodies (modal organizations, regional bodies and national governments) and according to UN recommendations, and guided by a set of legal instruments (international: IMDG, RID, IATA; European: ADR, AND, Directive 2008/68/EC). This especially applies the transport of dangerous goods (e.g. list and nature of the agents, packaging, marking, mode of transport)
  - Diagnostic: in the EU, in vitro diagnostic (IVD) medical devices are regulated following the Directive 98/79/EC of the European Parliament and of the Council of 27 October 1998. an update is in progress; several quality systems are also implemented institutions proposing a testing service (ISO 15189, ISO 17025, or ISO 13485)
  - Biosafety and Security: at the international level, a biosafety legal framework is set by the “*Cartagena Protocol on Biosafety to the Convention on Biological Diversity*” complemented by the *Nagoya-Kuala Lumpur supplementary Protocol and Liability and Redress*” biosecurity governance at the international level are guided by conventions and resolutions: Biological Weapons Convention (BWC), - United Nations Security Council Resolution 1540 and the International Health Regulations (IHR). Biosecurity policy measures have also been reviewed by the European Biosecurity Awareness Raising Network (EUBARnet);
- Sharing pathogenic biological material: there are several legal frameworks for biological material sharing, among which the Convention on Biological Diversity (CBD), the Pandemic Influenza preparedness (PIP) Framework and the Trade-Related Aspects of Intellectual Property Rights (TRIPS)



**National level:**

- Public health authorities and Health Protection Agency's;
- Communication of health measures taken during the outbreak to the public and professionals by the communication services of public health agencies, national spokesperson and diseases specialists. Communication is done through agency websites, traditional media (TV, radio, newspapers, journals), social networks and dedicated scientific media.

ii. Vaccine programs as a prevention method and antiviral use as a curative method

**International and European level:**

- Regulatory bodies: drug regulating authorities, international and national health regulations authorities. In the case of a pandemic, WHO can facilitate and accelerate the appropriate clinical testing and experimental intervention (generation of quality data of potential therapeutic interventions) for the pandemic disease by setting up a Scientific and Technical Advisory Committee, as illustrated during the Ebola outbreak in West Africa;
- European Medicines Agency (EMA);
- Civil societies and NGO's (Agence de Médecine Préventive (AMP), Cooperative for Assistance and Relief Everywhere (CARE), Epicentre, Global Alliance for Vaccines and Immunizations (GAVI), Global Health Technologies Coalition (GHTC), Task for Global Health).

**National level:**

- Research Institutes and RTOs;
- Industry/Private sector (health technology, drugs, vaccine producers and distributors).

iii. International cooperation and coordination to help affected countries to contain the disease

- WHO, ECDC;
- Ministry of Health, Ministry of Foreign/External Affairs, Ministry of Finance;
- EC-DG: International Cooperation and Development (DEVCO), Humanitarian Aid and Civil Protection (ECHO);
- European Mobile Laboratories;

- Military support: Ministry of Defence, EDA, North Atlantic Treaty Organization (NATO) including centre of excellence for Civil-Military Cooperation (CIMIC), Crisis Management and Disaster Response (CMDR), Joint Chemical, Biological, Radiological, & Nuclear Defence (JCBRN) and Military Medicine (MILMED);
- UN Office for the Coordination of Humanitarian Affairs (OCHA);
- International Red Cross and Red Crescent Movement (RCRC Movement), International Committee of the Red Cross (ICRC), International Federation of Red Cross and Red Crescent Societies (IFRC), National Red Cross societies, Medecins sans Frontiers (MSF).

#### 4.3.5 Maintaining essential services

The key essential services that need to be maintained during a pandemic include health, defence, law and order, finance, transport, communications, energy, food, and water [14].

The maintenance of these services requires well designed business continuity plans. These plans should be based on a risk assessment of the potential effects of a pandemic on the ability to maintain or expand essential service and business operations. The risk assessment should include consideration of vital components outside specific organizations, such as resilience of supply chains for essential goods and services. The plans can be used to manage business interruptions, including significant absences of staff or disruption of supplies.

Figure 3 illustrates these nine key essential services encompassing the whole-disaster management continuum of mitigation, prevention, preparedness, response, and recovery at all levels.

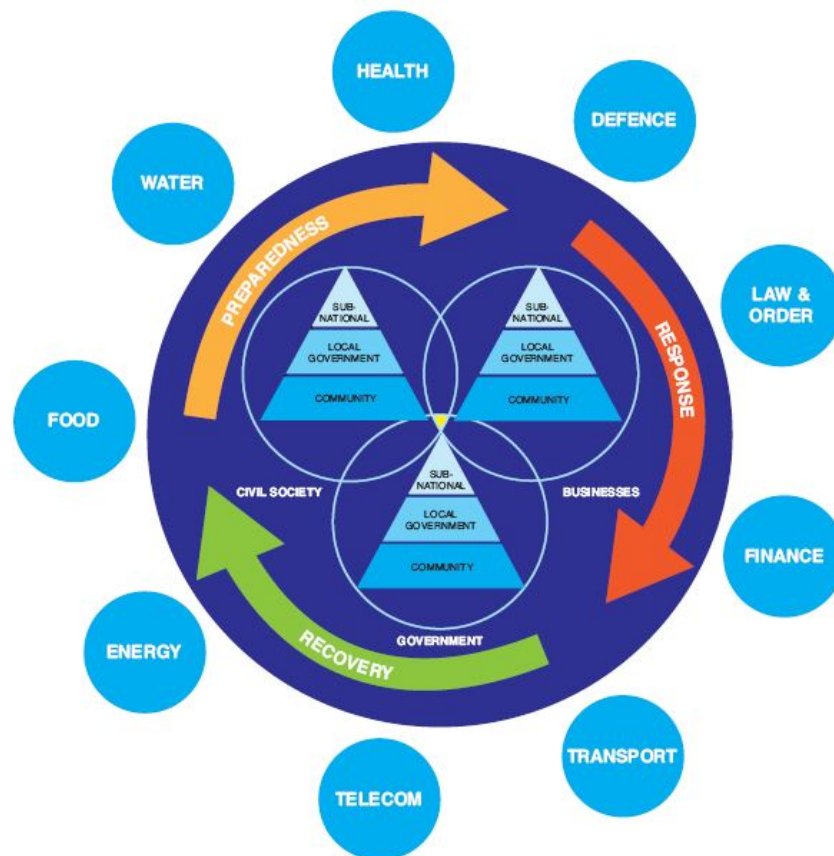


Figure 3. Key essential services [14]

Maintenance of health services is particularly critical and involves stakeholders as follows:

- (a) Ministry of Health, Ministry of Home/Internal Affairs; Ministry of Economy;
- (b) Public health authorities;
- (c) Health care workers and health institutions managers;
- (d) Suppliers of personal protective equipment, diagnostic tools and medicines;
- (e) Social service administrations;
- (f) Civil protection and defence (national CP, national defence authorities, NATO, EDA).

There are critical interdependencies among essential services at the national level. Public and private providers of essential services rely on the goods and services of other sectors in order to sustain their operations. Pandemic plans should therefore take into account potential failures generated by interdependencies. These include failures of individual businesses or small numbers of businesses representing the sole providers of an essential good or service. Interdependencies need to be identified by each individual essential service provider [14].

At the international level, UNITED NATIONS Economic and Social Council (ECOSOC) is one of the principal UN organs, responsible for coordinating the economic, social and related work of UN specialized agencies. ECOSOC serves as the central forum for discussing international economic and social issues, and for formulating policy recommendations addressed to member states and the UN system. ECOSOC develops partnerships in support of strengthening health systems, preventing future pandemics or building resilience for future pandemics.

#### 4.3.6 Research and evaluation

- i. Viral studies, antiviral drugs, vaccine effectiveness
- ii. Risk factors for human infection and human transmission likelihood
- iii. From research to action - outreach and communication activity
- Research, education and training - universities, education centres, training centres, public health institutes;
- Specialised scientific journals, journalists and health communication researchers.

#### 4.3.7 Capacities and resources

##### i. Crisis communication

These resources include cross-cutting functions, which may be used in different stages of pandemic management (preparedness and response) and implies the intervention of a distinct set of stakeholders among which operators are as follows:

- Command and control centres and SatCom operators;
- WHO Emergency Preparedness Integration Centre (EPIC);
- World Food Programme (WFP) Emergency Telecommunications Cluster (ETC);
- European Space Agency (ESA) - earth observation, surveillance with numerous Copernicus services and seamless space-based communications such as SPEED - satellite system for public safety and security domains, etc.;
- Private operators and SMEs may play an important role as illustrated in recent crises across the world (Ebola in West Africa, earthquake in Nepal, flooding in Vanuatu).

## ii. Financial support

In time of crisis, rapid access to funding is crucial to allow swift capacity building. Several sources of funding can be identified to support a rapid response to serious cross-border threats to health involving infectious diseases:

- WHO and the World Bank Group (WBG): The WBG is working closely with WHO and many other partners to design a global Pandemic Emergency Financing Facility (PEF) in order to have the financial resources necessary for deployable capacities (trained health workers, equipment, medicines) for the benefit of affected countries, international organizations or civil society organizations;
- International Bank for Reconstruction and Development (IBRD) and the International Development Agency (IDA);
- International Monetary Fund (IMF);
- UN (OCHA): two types of pooled funds are available - the Central Emergency Response Fund (CERF) and Country-Based Pooled Funds (CBPFs);
- European Commission has developed several financial instruments to provide for humanitarian aid and long-term development, DG ECHO and the EU Civil Protection Mechanism that were a major source of funding during the Ebola outbreak in West Africa crisis; DG DEVCO can also ensure a financial management of logistic support operations. The European Investment Bank (EIB) supports EU development cooperation policies, through mechanisms such as the FEMIP (Facility for Euro-Mediterranean Investment and Partnership) and the EU-Africa Infrastructure Trust Fund. The European External Action Service (EEAS) can assist countries and regions confronting natural disasters and provide specific financial resources and financing instruments complementary to humanitarian aid and long-term cooperation instruments;
- Private foundations (e.g. Bill and Melinda Gates Foundation) and citizens contribution to charitable trusts and NGOs.

### 4.3 Stakeholder mapping and interactions

With the identification and classification of stakeholders, the next step is to understand how they interact. Interactions among a wide and diverse stakeholder community has been assessed in the framework of crisis management and climate change [15, 16], but with major emphasis on legal and political frameworks and governmental positions.

During the response to a pandemic, the interactions between stakeholders will depend on the scenario (nature and size of the threat, geographic location, evolution in time and other factors). It will also depend on WHO phases and government response stage (preparedness, emerging threat, geographically evolving threat, declaration of pandemic, recovery). Understanding and mapping such a dynamic network of stakeholders is therefore a real challenge. Actually, the interaction of all stakeholders during a pandemic is considered to be as yet unresolved by some and the need for improved coordination and networking between stakeholders has been reported by EU Member States as a major requirement to strengthen pandemic preparedness and response [17].

This mapping will focus on specific components of pandemic management. Here follows three mappings, representing interactions in health crisis coordination, early warning alert mechanism and pandemics preparedness and response in the European Union.

#### 4.3.1 Stakeholders in health crisis coordination

Pandemic stakeholders involved in health crisis coordination are presented using a top-down approach, starting from the international level to European and national levels (Fig. 4). This mapping reflects the importance and the level of action of stakeholders in the coordination of pandemic management, but does not aim at establishing any hierarchy between them.

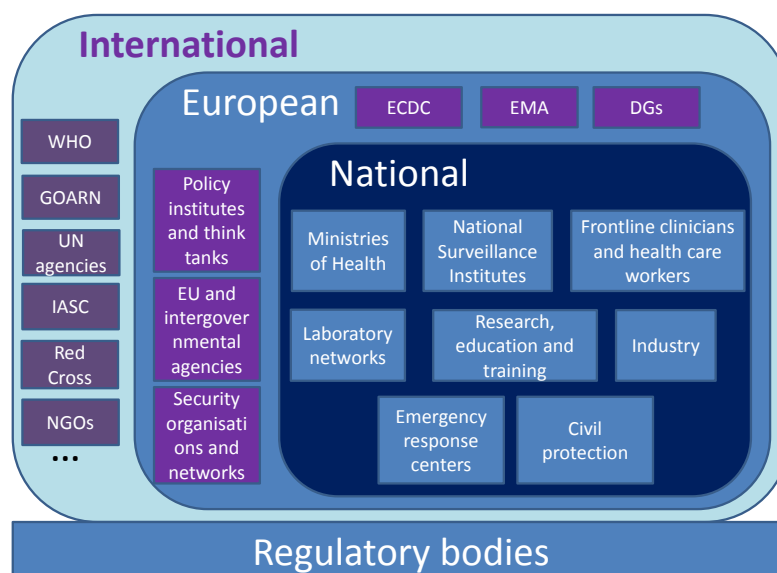


Figure 4. Overview of some key international, European and national (Member States) pandemic stakeholders

***Major mechanisms of response and role of key stakeholders in case of a serious cross-border threat to health due to a communicable disease***

There is a need to coordinate the response when facing novel and emerging threats (sudden and large scale threats) like novel influenza, Ebola, SARS or MERS. This would also be the case in a newly emerging unknown pandemic disease. Here, emphasis is placed on a number of stakeholders at the global and EU level, as identified in earlier sections of this document. The aim is not to be exhaustive but rather to highlight and briefly explain the main role of these key stakeholders in a future pandemic. The mission of key EU stakeholders will continue to evolve based on a recent report from the European Commission to the European Parliament and Council regarding the EU decision on serious cross-border threats to health [17, 18].

**International level:** WHO coordinates international outbreak response using resources from the Global Outbreak Alert and Response Network (GOARN). During high impact epidemics and pandemics, GOARN ensures that the right technical expertise and skills are on the ground where and when they are needed most. GOARN is an international collaboration of over 200 existing institutions and networks that remain constantly alert and ready to respond. The network pools human and technical resources for rapid identification, confirmation and response to outbreaks of international importance and will therefore play a pivotal role in the global reaction to the next pandemic. WHO also plays the coordinating role in International Health Regulations (IHR) and, together with its partners, helps countries to build capacities. IHR is an international legal instrument that is binding for 196 countries across the globe. Through IHR, countries have agreed to build their capacities to detect, assess and report public health events. IHR also includes specific measures at ports, airports and land borders to limit the spread of health risks to neighbouring countries, and to prevent unnecessary travel and trade restrictions so that traffic and trade disruption is kept to a minimum. WHO work in coordinating IHR implementation is led by the Department of Global Capacities, Alert and Response (GCR) at WHO/HQ in Geneva. GCR collaborates closely with WHO Regional Offices and the designated IHR National Focal Point in each country.

In case of a major outbreak due to suspected use of Biological Warfare Agents, NATO is also developing their “Rapidly Deployable Outbreak Investigation Team” (RDOIT) with an aim to immediately react at epidemiological, medical and analytical levels [19].

**European level:** For cross-sectorial crises the EC’s Secretariat-General holds a coordinating role between different Directorates General (DGs) and services by operating a web-based network (ARGUS: *Alerte Rapide, Globale et Sûre*). ARGUS is a confidential

safety reporting system linking all specialised systems for emergencies acting as an internal cross-sectoral network for rapid information sharing between rapid alert systems of the EC and its services, hence contributing to coordination across sectors in case of major emergencies and ensuring high-level political coordination. All DGs have a designated point of contact for ARGUS. Member States (MS) permanent representations to the EU and the Council Secretariat may have access to non-classified information in case of a crisis.

In order to improve health security in the EU and the protection of EU citizens from communicable diseases including a pandemic, key elements of the EC response to a health crisis have recently been assessed by the Commission and decisions taken for improvement, as summarized hereafter [17, 18]. The Commission is currently preparing an Implementing Decision specifying the necessary procedures for the uniform implementation of information exchange, consultation and coordination with the Health Security Committee. The aim is to integrate and coordinate a comprehensive approach for preparedness, risk assessment and crisis response. Emphasis is now put on the need to improve and strengthen the coordination of Member State national response.

In case of a cross-border threat to health such as a pandemic, the role of the EC is to provide a risk assessment of the potential severity of the threat to public health, including possible health measures to HSC and to competent MS authorities promptly. The key elements of alert, first risk assessment and management and coordination of response are the Early Warning Response System (EWRS), the Epidemiological Surveillance Network (ESN), the European Centre for Disease Prevention and Control (ECDC) and the Health Security Committee (HSC).

#### **Monitoring communicable diseases and coordination of response:**

- European Centre for Disease Prevention and Control (ECDC) ensures epidemiological surveillance of communicable diseases and of related special health issues. ECDC operates and coordinates a network including the EC and Member States. It provides risk assessment of public health threats caused by communicable disease, including “options for actions” in terms of possible public health measures.
- Early Warning and Response System (EWRS) enables the EC and Member State health authorities to rapidly communicate in the case of an event matching the definition of a serious cross-border threat to health. It is the key channel to launch an alert on the emergence or development of a serious cross-border threat to health (e.g., infectious diseases and pandemics), to assess public health risks, to



determine the measures to be taken to protect public health, and to notify on the measures undertaken by the MS. EWRS access is limited to a strict “user-access” policy, now granted through the EC Authentication Service (ECAS). In February 2015, IT infrastructure of EWRS was expanded to enable EC Services and EU bodies responsible for other sectors potentially impacted by serious cross-border threats to health (e.g., food safety, animal health, medical devices, and medicines) to access EWRS information. EWRS is thereby linked with and complements other alert systems such as Rapid Alert System for Food and Feed (RSFF) and Rapid Alert System for Biological and Chemical Agent (RAS BICHAT).

- Health Security Committee (HSC) plays a central role in reinforcing health-security measures in the EU, i.e. the coordination and sharing of best practice and information on preparedness activities. Originally formed as an informal advisory group on health security, HSC has now evolved to a permanent communicator’s network and working group on preparedness. Following an EWRS alert regarding a serious cross-border threat to health, MS have to consult each other through the HSC in order to coordinate their national response and communicate to health care professionals and the public. The goal is to provide consistent and coherent information adapted to MS’s needs and circumstances. The same process is activated in the case of a declaration of public health emergency of international concern by WHO in accordance with IHR. The EC now has the authority to recognize its own situation complying with a public health emergency according to specified criteria and coordinates response through the Health Security Committee.
- Directorate General for Health and Food Safety (DG SANTE) plays a major role in EU public health crisis management (generic preparedness planning, stockpiling, vaccination strategies, training and table top / command exercises, etc.). The Emergency Operations Facility (HEOF) which is part of the Health Threats Unit of DG SANTE, is an operational centre aiming to coordinate the management of public health emergencies at EU level. Indeed, HEOF is intended to ensure the coordination between the Commission, Member States and Agencies (ECDC; EFSA EMEA) and international organisations (WHO) during an emergency situation. Two committees, dealing with serious cross border threats to health and in which Member States are represented (EWRS and HSC) 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. In this respect, HEOF has the role to monitor and respond to pandemic outbreak, as was the case during the 2009 H1N1 influenza pandemic.

- Emergency Response Coordination Centre (ERCC) of DG ECHO (formerly known as the Monitoring and Information Centre (MIC)) plays key operational roles in a major crisis. ERCC can be involved in the rapid response to a pandemic by: monitoring - using early warning and rapid provision of geo-spatial information (satellite images through the Copernicus Emergency Management Service); information on aerial data through the Common Emergency Communication and Information System (CECIS); coordination - the deployment of EU civil protection teams, UN and other partners and transport facilitation. Moreover, ERCC contributes to rapid deployment through the Voluntary Pool Mechanism. ERCC is also the entry point for ARGUS, Crisis Coordination Arrangements (CCA) and "Solidarity Clause" activations. In case of a pandemic, it can bring medical support where needed as well as medical evacuation systems for cases and suspected cases of EU health workers or citizens from affected areas as illustrated during the 2014 Ebola outbreak. The Union Civil Protection Mechanism facilitates cooperation in civil protection assistance interventions in the event of major disasters inside and outside the EU. This was also illustrated during the 2014 Ebola outbreak with Ebola Task-Force meetings organized at the ERCC and involving HSC.

#### **Preparedness and response planning for communicable disease threats:**

- At the EU and Member State level, states are required to regularly provide the EC with an update of their preparedness and response planning at the national level, in accordance with the implementation IHR (IHR core capacities), interoperability between the health sectors and other sectors, and business continuity plans containing details on planning, response and recovery through all stages of a pandemic [17, 18]. However, cooperation and coordination between Member States and agencies could be improved and strengthened (i.e., country specific assessment of preparedness, cross-border exercises, coordinated funding, implementing a shared IT-platform to facilitate information flow among stakeholders, etc.). Member States must also designate competent authorities for epidemiologic surveillance, notifying alerts and determining the required measures as well as designate members of the HSC.

A new mechanism for joint procurement has been established enabling the advance purchase of medical countermeasures in the case of serious cross-border threats to health (e.g., personal protective equipment needed to treat patients with life-threatening infectious diseases).

- Directorate-General for Migration and Home Affairs (DG HOME) plays an important role in preparedness and response planning by:
  - Developing EU-policy for internal security. DG HOME carries out risk assessment by means of its strategic analysis capacity (STAR: Strategic Analysis and Response) in order to provide support for EU policies. STAR functions as a crisis centre and a risk analysis methodology provider. It conducts situational monitoring, but depends on intelligence from others to produce situational awareness during a crisis e.g. Frontex for external border crises.
  - Piloting EU-research for secure societies. This is undertaken through the Horizon 2020 program which funds research and innovation activities which have been prioritised in order to protect citizens, society and economy as well as infrastructures and services. This includes, but is not limited to, protection of European borders, enhancement of societal resilience to natural and man-made disasters, and development of novel solutions for the protection of critical infrastructure and innovative medicines.
- European Space Agency (ESA) and European Defence Agency (EDA) fund research for improving preparedness and response.

### ***Case study of Ebola - need for improved coordination between stakeholders***

The need for improved global, national and local coordination to respond rapidly and adequately to a pandemic crisis was highlighted during the 2014 Ebola outbreak in West Africa. Although Ebola is not a pandemic disease, it shares common features characterizing diseases with pandemic potential (e.g., high infectivity, rapid evolution, high mortality rate and poor availability of medical technologies for prevention or cure). Accordingly, this Ebola outbreak in West Africa is a useful model for assessment of the challenges the EU faces at all levels for pandemic management. A major lesson from the Ebola epidemic is the necessity for improved preparedness and more rapid response when facing future

pandemics. A poorly coordinated global response and the lack of a fast-disbursing financing mechanism substantially delayed support to Ebola-affected countries, worsening and prolonging the crisis. The current approach for mobilizing resources to respond to an outbreak of international importance is slow, fragmented and inefficient. Another lesson learned is the need for improved monitoring of pandemic disease crisis dynamics. Unlike other crises such as earthquakes or floods, pandemic crises are characterized by not having a day 0 or a day after impact characteristic, instead exhibiting fluctuating severity which may require a possible escalation of the reaction, thereby requiring continuous real-time information sharing and management.

At the international level, the response to Ebola was marked by a lack of preparedness and leadership as well as poor coordination. Several months after the outbreak onset, leadership for coordinating the international response was still lacking. WHO's declaration of a public health emergency was made only 6 months after official notification of the first cases of the outbreak. Consequently, there was lack of clarity surrounding which organisations were in charge of providing logistics (e.g., equipment, well trained and qualified staff, health experts, etc.), how funds were raised, what the available budget was, how it was spent and what the priorities were. In the affected countries, the weakness of their healthcare systems required urgent support and investment but this was not provided with sufficient speed or efficiency due to the lack of a coordinated strategy from global to national, and local levels. These problems illustrate the need for better coordination and quicker response for pandemic management at international level.

At the European level, similar challenges prevailed. There was no clear view about whether the EC should trigger early intervention in West Africa. According to the widely accepted view, coordination and capacity building was first expected from WHO. The ability to contribute to a global crisis differs among the Member States. Whereas strong focus was put on exchange of information, there was a striking lack of coordination for the response. In the early phase of the outbreak, when a centralized approach was lacking, there were many individual initiatives from Member States. The risk of individual initiatives is to detract from the efficacy of a more coordinated response. Moreover, the role of European framework nations (leading countries) in charge of coordinating the response in former colonies (e.g. United Kingdom in Sierra Leone and France in Guinea) was insufficiently defined. There was lack of clarity on a number of issues including leadership, coordination, facilitation, financing and logistic support of collaborative efforts, and global vision and regional planning of response and recovery. A few months after the onset of the outbreak, considering the rapid evolution of the situation, the EC launched a strong coordinated civilian and military capacity-building response at the EU

level while interacting closely with WHO. The EU coordinated approach was essentially organized through the Union Civil Protection Mechanism by DG ECHO and ERCC, with the operational centre supported by military liaison officers. HSC was also activated. DG SANTE, which is expected to play a substantial role in this major health crisis, remained less visible and did not efficiently coordinate with DG ECHO. This illustrates the need for improved reaction and better coordination at the EU level for future pandemics. Civil Protection is a competence of the EU Member States and there are no shared EU-assets. The same situation prevails for ECDC whose mission to “identify, assess and communicate current and emerging threats to human health posed by infectious diseases” relies mainly on national health institutions and experts across Europe.

At the sub-national and local level, similar difficulties in coordinating and organizing the response were observed due to the high number and diversity of actors (i.e. teams of experts and operators from WHO, UN, UNICEF, WFP, IFRC, NGOs, Member States) all interacting with often unprepared and poorly resourced local and national authorities. In an effort to coordinate and scale up the efforts and activities of responders from multiple organisations at the subnational and local level, the United Nations Secretary General created the UN Mission for Ebola Emergency Response (UNMEER) in September 2014 which operated until July 2015 but lacked resources and representativeness. The lack of a proper coordination mechanism and lead structure at subnational level led to inconsistent coordination between UN agencies and operators in the field.

In conclusion, lessons learned from the Ebola outbreak highlight the fact that international and EU disaster response and recovery functions are in place but are highly dependent on national assets and their will to contribute. Cooperation with other international organisations, especially UN and NATO, is crucial; they have structures for crisis management in case of pandemic. EU cooperation during a major health crisis needs to be improved and strengthened [17].

#### 4.3.2 Stakeholders in early warning alert mechanisms

A second mapping represents stakeholders in early warning alert mechanisms (Fig.5) which illustrates the diversity of agencies and institutions involved at national and international level in the initial detection of a high-impact epidemic or pandemic.

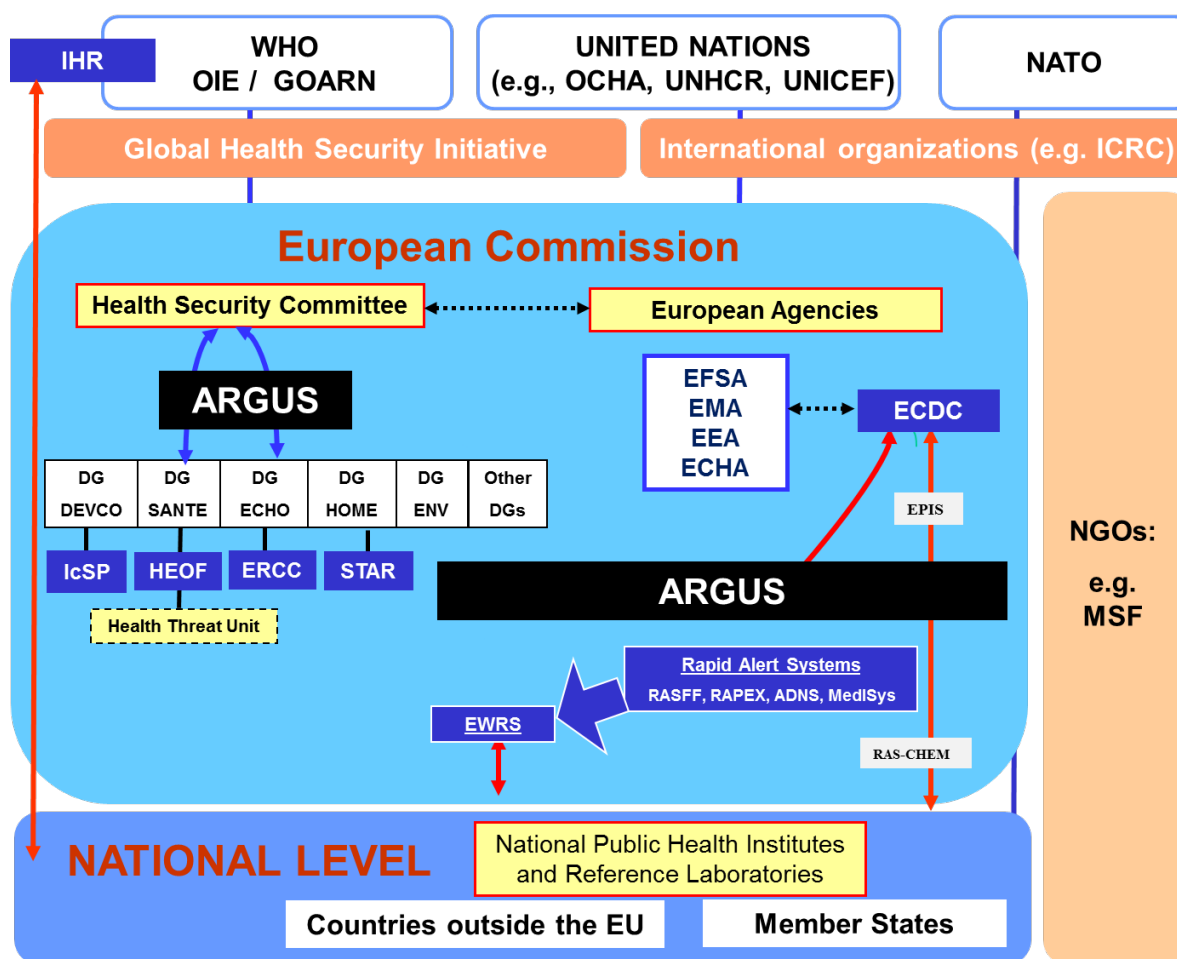


Figure 5. Overview of the European early warning mechanism

#### Coordination of European policy and activities beyond EU borders:

- European External Action Service (EEAS): The EEAS is the European Union's diplomatic service. It assists the EU's foreign affairs chief (i.e. the High Representative for Foreign Affairs and Security Policy/Vice-President of the European Commission (HR/VP) carry out the Union's Common Foreign and Security Policy (CFSP)). EEAS oversees EU's external policies, strategies, instruments and missions. EEAS and the 'Department for Crisis Response & Operational Coordination' play a central coordinating role in the EU's efforts and activities in crisis response. They ensure a consistent approach when a disaster strikes outside the EU and Commission instruments are needed to help affected countries. EEAS, which has a network of national and European diplomats in Brussels and around the world, can therefore streamline decision-making processes on a flexible way, i.e., orientation and definition of the strategic approach. EEAS can assist non-EU countries

confronting major crises or disasters to respond to new global challenges, such as pandemics.

- The Directorate-General for International Cooperation and Development (DG DEVCO): DG DEVCO is in charge of development cooperation policy in a wider framework of European international cooperation, adapting to the evolving needs of partner countries (i.e. developing countries). DG DEVCO is responsible for implementing the EU's aid instruments in case of major external disaster or emergencies which require ad-hoc decision-making. Whereas many EU policies have an impact on countries outside the EU, the role of DG DEVCO is to coordinate the actions of the EU institutions, the EU Member States and other EU actors. As good example related to serious threats with cross-border impact, the initiative of developing a “*EU mobile laboratory capacity*” was taken and financially supported by DG DEVCO. In ongoing dialogue with NGOs and other non-state actors, the aim of DEVCO is also to implement programmes and projects around the world. This is illustrated by the recent creation of the *CBRN Centers of Excellence (CoE)*, aiming at implementing a coordinated strategy for CBRN risk mitigation at the international, regional and national levels. Recently, a project specifically targeting infectious disease outbreaks and relevant to pandemic preparedness, has been implemented to the benefit of the non-EU countries members of the *CBRN-CoE* (i.e., *Improved Regional Management of Outbreaks in the CBRN Centres of Excellence Partner Countries of the African Atlantic Façade*).
- Instrument contributing to Stability and Peace (IcSP): IcSP, which came into force in 2014 [20, 21] and replaced the former Instrument for Stability (IfS) [22], is one of the key external assistance instruments that enable the EU to take a lead in helping to prevent and respond to actual or emerging crises around the world. IcSP can be mobilized to provide for urgent short-term assistance in countries where a crisis is unfolding, often complementing EU humanitarian assistance, and longer-term capacity building of organisations engaged in crisis response. It can also provide long-term support, notably to mitigate a variety of risks, tackle global and cross-border threats, and build capacity for lasting socio-economic development. IcSP is therefore the EU's main instrument supporting security initiatives and peace-building activities in partner countries.
-

### 4.3.3 Stakeholders in pandemic preparedness and response in the European Union

A third mapping represents interactions between European, national and sub-national major interdisciplinary stakeholders involved in pandemic preparedness and response in the European Union (Fig. 6, adapted from Mr Philippe Quevauviller, DG HOME). It highlights the parallel relationship which exists between research and policy-making and implementation. In this mapping, all stakeholders are compassed within the “users of research knowledge”.

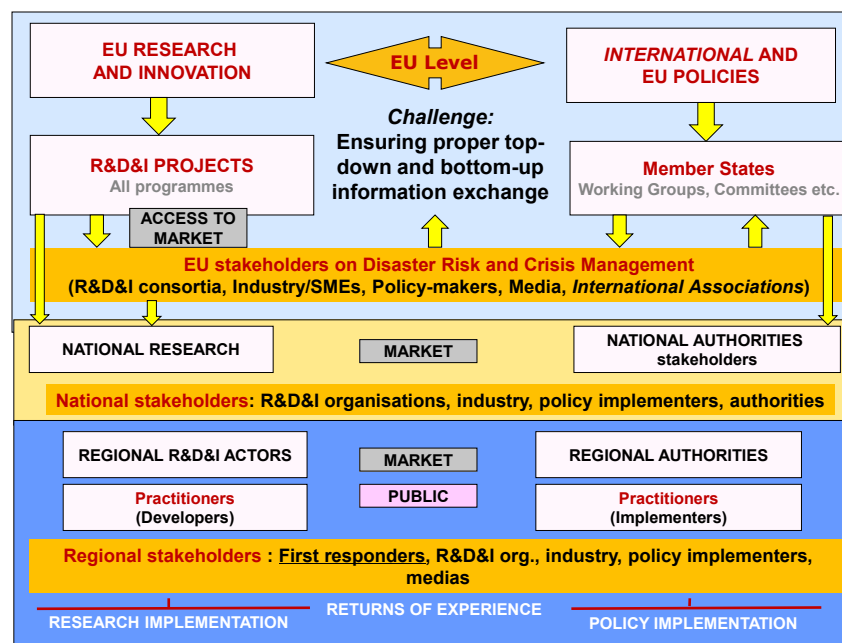


Figure 6. European Union mapping of major interdisciplinary stakeholders involved in pandemic preparedness and response (adapted from Mr Philippe Quevauviller, DG HOME).

### 4.3.4 Users as stakeholders in pandemic preparedness and response

For the purposes of the PANDEM project which aims to identify opportunities to improve the process of early detection and response to pandemics including the identification of novel tools and technologies, three categories of *users* are identified, adapted from an analysis of stakeholder groupings [4]. They are considered as users of technologies, services and processes developed by *suppliers* (industry and research) in the field of pandemic risk and emergency management:



**General public** - EU citizens who benefit from the health and security technologies and services and pay for them indirectly (e.g. through paying taxes, paying for health care services, buying drugs, receiving vaccines, etc.)

**Health care managers** - Persons, companies, or other public and private entities which take decisions on the kinds of technologies and services to be used by operators for the benefit of the public E.g. public health agencies, civil protection authorities, hospitals. Health care managers are interested in the functionality of innovative solutions and make decisions on uptake of such solutions.

**Operators** - Field experts who operate the health/security products, technologies and services purchased by customers in their everyday duties, e.g. first responders, medical doctors, nurses, laboratory technicians.

The general public today have increasing opportunities to influence the design, introduction and trajectory of new technologies and services in both private and public sector. They also have the ability to directly influence innovation and encourage the development of new technologies. In recent years, there has been a growing government emphasis on the importance of collaboration with citizens and service users to improve service delivery and as a driver for innovation [20].

PANDEM focuses mainly on health care managers and operators as direct beneficiaries and active participants of the innovation process in the field of pandemic risk and emergency management.

## 5. CONCLUSION

Pandemic stakeholders represent a wide and diversified community. Stakeholders have been identified and classified through a defined taxonomy into their respective functions. The key stakeholders in pandemic preparedness and response include WHO, ECDC, DG SANTE, Ministries of Health, local public health authorities, civil protection and defence, national reference laboratories, epidemiologists, health care workers and health policy experts. However, many other groups have an interest and a role to play right down to the individual citizen.

This stakeholder identification and mapping will support the work of other work packages in PANDEM and will inform the development of the Community of Users. It will ensure input is obtained from all key groups including users into the identification of gaps, needs and future solutions. This mapping with its broad review of stakeholders in many sectors including health, security, and emergency management will also facilitate the development of the roadmap for a phase II demonstration project on pandemic management.

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## ANNEX 1: Alphabetical list of relevant stakeholders

Action for Global Health - AfGH ([www.actionforglobalhealth.eu](http://www.actionforglobalhealth.eu))

African Field Epidemiology Network - AFENET (<http://www.afenet.net>)

Agence de Médecine Préventive - AMP (<http://amp-vaccinology.org>)

Association of Veterinary Consultants - AVC (<http://www.avc.at>)

Associations of Schools of Public Health in the EU Region - ASPHER (<http://aspher.org>)

Bill & Melinda Gates Foundation (<http://www.gatesfoundation.org>)

Biological Subgroup of the CBRN-E Advisory Group ([http://ec.europa.eu/dgs/home-affairs/what-we-do/policies/crisis-and-terrorism/securing-dangerous-material/index\\_en.htm](http://ec.europa.eu/dgs/home-affairs/what-we-do/policies/crisis-and-terrorism/securing-dangerous-material/index_en.htm))

Brookings (<http://www.brookings.edu>)

Centre for Disease Control and Prevention - CDC (<http://www.cdc.gov>)

Centre for European policy studies - CEPS (<https://www.ceps.eu>)

Centre for Health Sciences Training, Research and Development - CHESTRAD (<http://chestrad-ngo.org>)

Chatham House Centre on Global Health Security (<https://www.chathamhouse.org/about/structure/global-health-security>)

Communication media

Traditional media: Radio, television, newspapers, magazines, books, brochures,

Specific dedicated media:

Science journalism

Global Biodefense (<http://globalbiodefense.com>)

Global Health Network (<https://tghn.org>)

Health Emergency & Disease Information System - HEDIS

([http://ec.europa.eu/health/preparedness\\_response/generic\\_preparedness/planning/hedis\\_en.htm](http://ec.europa.eu/health/preparedness_response/generic_preparedness/planning/hedis_en.htm))

SciDev.Net (<http://www.scidev.net>)

Zadig S.r.l. (<http://en.zadig.it>)

Social media: Facebook, Twitter, YouTube

**Consolidation of the Mediterranean Programme for Intervention Epidemiology Training - MediPIET** (<http://medipiet.eu>)

Consortium of Universities for Global Health - CUGH (<http://www.cugh.org>)

Consumers, Health, Agriculture and Food Executive Agency - CHAFAEA (<http://ec.europa.eu/chafea>)

Cooperative for Assistance and Relief Everywhere - CARE (<http://www.care.org>)

Coordinating Competent Body - CCB

(<http://ecdc.europa.eu/en/aboutus/Competent%20bodies>)

ECDC in its relations with Member States cooperates with the following competent bodies:

Austria: Federal Ministry of Health (<http://www.bmg.gv.at>)

Belgium: Scientific Institute of Public Health (<http://www.wiv-isp.be>)

Bulgaria: National Centre of Infectious and Parasitic Diseases (<http://www.ncipd.org>)

Croatia: Croatian National Institute of Public Health (<http://www.hzjz.hr/epocetna.htm>)

Cyprus: Directorate of Medical and Public Health Services ([http://www.moh.gov.cy/moh/moh.nsf/index\\_en/index\\_en](http://www.moh.gov.cy/moh/moh.nsf/index_en/index_en))  
 Czech Republic: National Institute of Public Health (<http://www.szu.cz>)  
 Denmark: Danish Health and Medicines Authority (<http://www.sundhedsstyrelsen.dk>)  
 Estonia: Health Board (<http://www.terviseamet.ee>)  
 Finland: National Institute for Health and Welfare (<http://www.thl.fi>)  
 France: Institute for Public Health Surveillance (<http://www.invs.sante.fr>)  
 Germany: Robert Koch Institute (<http://www.rki.de>)  
 Greece: Hellenic Centre for Disease Control and Prevention (<http://www.keelpno.gr>)  
 Hungary: National Center for Epidemiology Albert (<http://www.oek.hu>)  
 Iceland: Centre of Health Security and Communicable Disease Prevention (<http://www.landlaeknir.is>)  
 Ireland: Health Protection Surveillance Centre (<http://www.hpsc.ie>)  
 Italy: Ministry of Health (<http://www.salute.gov.it>)  
 Latvia: Centre for Disease Prevention and Control (<http://spkc.gov.lv>)  
 Liechtenstein: Principality of Liechtenstein (<http://www.ag.llv.li>)  
 Lithuania: Ministry of Health (<http://www.sam.lt>)  
 Luxembourg: Health Directorate (<http://www.ms.public.lu>)  
 Malta: Superintendence of Public Health (<http://ehealth.gov.mt>)  
 Netherlands: National Institute for Public Health and the Environment (<http://www.rivm.nl>)  
 Norway: Norwegian Institute of Public Health (<http://www.fhi.no>)  
 Poland: National Institute of Public Health - National Institute of Hygiene (<http://www.pzh.gov.pl>)  
 Portugal: Directorate General of Health (<http://www.dgs.pt>)  
 Romania: National Institute of Public Health (<http://www.insp.gov.ro>)  
 Slovak Republic: Public Health Authority of the Slovak Republic (<http://www.uvzsr.sk>)  
 Slovenia: National Institute of Public Health (<http://www.ivz.si>)  
 Spain: Ministry of Health, Social Services and Equality (<http://www.msssi.es>)  
 Sweden: Public Health Agency of Sweden (<http://folkhalsomyndigheten.se>)  
 United Kingdom: Public Health England (Colindale) (<http://www.hpa.org.uk>)

#### Connecting Organizations for Regional Disease Surveillance - CORDS

(<http://www.cordsnetwork.org/>) Currently, CORDS is composed of:

- APEIR - Asia Partnership on Emerging Infectious Diseases Research
- EAIDSNet - East African Integrated Disease Surveillance Network
- MBDS - Mekong Basin Disease Surveillance
- MECIDS - Middle East Consortium on Infectious Disease Surveillance
- SACIDS - Southern African Centre for Infectious Disease Surveillance
- SECID - Southeast European Center for Surveillance and Control of Infectious Diseases

Council of Europe - CoE (<http://www.coe.int/en>)

Council on Health Research for Development - COHRED (<http://www.cohred.org>)

Deployment Health Surveillance Capability - DHSC (<http://coemed.org/coemed/about-us/structure/127>)

Eastern Mediterranean Public Health Network - EMPHNET (<http://www.emphnet.net>)

Epicentre (<http://www.epicentre.msf.org/en>)

Emergency Response Coordination Centre - ERCC ([http://ec.europa.eu/echo/what/civil-protection/emergency-response-coordination-centre-ercc\\_en](http://ec.europa.eu/echo/what/civil-protection/emergency-response-coordination-centre-ercc_en))

Emerging and Dangerous Pathogens Laboratory Network - EDPLN (<http://www.who.int/csr/bioriskreduction/laboratorynetwork/en>)

Epidemic Intelligence Information System - EPIS  
([http://ecdc.europa.eu/en/activities/epidemicintelligence/Pages/EpidemicIntelligence\\_Tools.aspx](http://ecdc.europa.eu/en/activities/epidemicintelligence/Pages/EpidemicIntelligence_Tools.aspx))

EuroHealthNet (<http://eurohealthnet.eu>)

European Association for Bio-industries - EuropaBio (<http://www.europabio.org>)

European Association of Hospital Pharmacists - EAHP (<http://www.eahp.eu>)

European Association of Pharmaceutical Full-Line Wholesalers - GIRP  
(<http://www.girp.eu/>)

European Biodefence Laboratories Network - EBLN

European Centre for Disease Prevention and Control - ECDC ([ecdc.europa.eu](http://ecdc.europa.eu))

European Commission - EC (<http://ec.europa.eu>)

The Commission is divided into several departments and services. The departments are known as Directorate-Generals (DGs). Here are the EU-DGs that are involved in health or can be involved in case of epidemic/pandemic crisis management:

- Agriculture and Rural Development (AGRI)
- Environment (ENV)
- Health and Food Safety (SANTE)
- Humanitarian Aid and Civil Protection (ECHO)
- Human Resources and Security (HR)
- Internal Market, Industry, Entrepreneurship and SMEs (GROW)
- International Cooperation and Development (DEVCO)
- Joint Research Centre (JRC)
- Migration and Home Affairs (HOME)
- Mobility and Transport (MOVE)
- Taxation and Customs Union (TAXUD)
- Research and Innovation (RTD)

European Commission early warning and rapid alert systems in the field of health threats  
([http://ec.europa.eu/health/preparedness\\_response/generic\\_preparedness/planning/rapid\\_alert\\_en.htm](http://ec.europa.eu/health/preparedness_response/generic_preparedness/planning/rapid_alert_en.htm))

- **EWRS** - the Early Warning and Response System used in the context of communicable diseases threats
- **RAS BICHAT** - previous Rapid Alert System for bio or chemical terrorist attack; no not functional any more despite still mentioned in many docuemnts found on EC websites
- **RAS CHEM** - rapid alert system currently under development for the exchange of information on incidents including chemical agents.
- **RASFF - the Rapid Alert System for Food and Feed**  
([http://ec.europa.eu/food/safety/rasff/index\\_en.htm](http://ec.europa.eu/food/safety/rasff/index_en.htm))

European Confederation of Pharmaceutical Entrepreneurs - EUCOPE  
(<http://www.eucope.org/en/>)

EU's crisis management capacity ([http://ec.europa.eu/dgs/home-affairs/what-we-do/policies/crisis-and-terrorism/crisis-management/index\\_en.htm](http://ec.europa.eu/dgs/home-affairs/what-we-do/policies/crisis-and-terrorism/crisis-management/index_en.htm))

- The EU emergency and crisis coordination arrangements (EU-CCA) define rules for interactions between EU institutions and affected EU States during a crisis.
- The integrated EU arrangements for crisis management with cross-border effects (EU-ICMA) facilitate practical cooperation between EU States.



- At EC level, the rapid alert system ARGUS was created to better coordinate the Commission's response capacity. ARGUS brings together all relevant Commission services to coordinate efforts, evaluate the best options for action and decide on the appropriate response measures during an emergency.

European Directorate for the Quality of Medicines and Healthcare - EDQM ([www.edqm.eu](http://www.edqm.eu))

European Disease Surveillance Networks - DSN

(<http://ecdc.europa.eu/en/aboutus/networks/Pages/networks.aspx>)

- European Antimicrobial Resistance Surveillance Network (EARS-Net)
- Healthcare-associated Infections Network (HAI-Net)
- European Surveillance of Antimicrobial Consumption Network (ESAC-Net)
- European Emerging and Vector-borne Diseases Network (EVD-Net)
- European Food- and Waterborne Diseases and Zoonoses Network (FWD-Net)
- European Creutzfeldt-Jakob Disease Surveillance Network (EuroCJD)
- European Legionnaires' Disease Surveillance Network (ELDSNet)
- European Network for HIV/AIDS Surveillance
- European Network for STI Surveillance
- European Hepatitis B and C Surveillance Network
- European Influenza Surveillance Network (EISN)
- European Tuberculosis Surveillance Network
- EUVAC-NET (Measles data, Rubella data, mumps data)
- European Network for Pertussis Surveillance\*
- European Invasive Bacterial Disease Surveillance Network (EU-IBD)
- European Diphtheria Surveillance Network (EDSN)

European Disease Surveillance Platform - TESSy

(<http://ecdc.europa.eu/en/activities/surveillance/Pages/index.aspx>)

European Federation of Nurses Associations - EFN (<http://www.efn.be>)

European Federation of Pharmaceutical Industries and Associations - EFPIA

(<http://www.efpia.eu/>)

European Food Safety Authority - EFSA (<http://www.efsa.europa.eu/en>)

European Health security committee - HSC

([http://ec.europa.eu/health/preparedness\\_response/hsc/index\\_en.htm](http://ec.europa.eu/health/preparedness_response/hsc/index_en.htm))

European Hospital and Healthcare Federation - HOPE (<http://www.hope.be>)

European Medicines Agency - EMA (<http://www.ema.europa.eu/ema>)

European Molecular Biology Laboratory - EMBL (<http://www.embl.fr/>)

European Mobile Laboratories:

- EMLab (<http://www.emlab.eu>)
- EUWAM-Lab

European Network for Diagnostics of Imported Viral Diseases - ENIVD

(<http://www.enivd.de>)

European Network for Highly Pathogenic Bacteria - ENHPB

([http://www.rki.de/EN/Content/Prevention/ENHPB/ENHPB\\_node.html](http://www.rki.de/EN/Content/Prevention/ENHPB/ENHPB_node.html))

European Network of P4 Laboratories (<http://www.euronetp4.eu>)

European Patient's forum - EPF (<http://www.eu-patient.eu>)

European Programme for Intervention Epidemiology Training - EPIET

(<http://ecdc.europa.eu/en/epiet>)

European Public Health Alliance - EPHA (<http://epha.org>)

European Public Health Association - EUPHA (<http://www.eupha.org>)

European Public Health Microbiology Training Programme - EUPHEM  
([http://ecdc.europa.eu/en/activities/training\\_activities/EUPHEM/Pages/index.aspx](http://ecdc.europa.eu/en/activities/training_activities/EUPHEM/Pages/index.aspx))

European Regional and Local Health Authorities - EUREGHA (<http://www.euregha.net>)

European Regions Research and Innovation Network - ERRIN (<http://www.errin.eu>)

European Space Agency - ESA (<http://m.esa.int/ESA>)

European Union - EU ([http://europa.eu/index\\_en.htm](http://europa.eu/index_en.htm))

- Council of the European Union and the European Parliament are the **decision and law-making body**.
- The European Commission is the EU's **politically independent executive arm**.
- The European Economic and Social Committee (EESC) is an EU **advisory body** comprising representatives of **workers' and employers' organisations and other interest groups**.
- *The European External Action Service* (EEAS) is the EU's **diplomatic service**

Among the number of independent agencies set up by the EU to perform specific tasks, several agencies play an important role in health, security and crisis management:

- European Agency for Safety and Health at Work (EU-OSHA)
- European Centre for Disease Prevention and Control (ECDC)
- European Environment Agency (EEA)
- European Food Safety Authority (EFSA)
- European Medicines Agency (EMA)
- European Defence Agency (EDA)
- European Union Institute for Security Studies (EUISS)
- Consumers, Health, Agriculture and Food Executive Agency (CHAFEA)
- European Research Council Executive Agency (ERC Executive Agency)
- Executive Agency for Small and Medium-sized enterprises (EASME)
- Innovation & Networks Executive Agency (INEA)
- Research Executive Agency (REA)

European Union of General Practitioners/ Family physicians - UEMO  
(<http://www.uemo.org>)

European Union reference laboratories - EU-RL  
([http://ec.europa.eu/food/animal/diseases/laboratories/index\\_en.htm](http://ec.europa.eu/food/animal/diseases/laboratories/index_en.htm))

Europol (<https://www.europol.europa.eu>)

Federation of Veterinarians of Europe - FVE (<http://www.fve.org>)

Flunewseurope (<http://flunewseurope.org>) - Joint ECDC-WHO/Europe weekly influenza update

Fondations Mérieux (<http://www.fondation-merieux.org>)

Food and Drug Administration - FDA (<http://www.fda.gov>)

FRONTEX (<http://frontex.europa.eu>)

GBCHealth (<http://www.gbchealth.org>)

Global Alliance for Vaccines and Immunizations - GAVI (<http://www.gavi.org>)

Global Health Action - GHA (<http://globalhealthaction.org>)

Global Health Council - GHC (<http://globalhealth.org>)

Global Health South ([www.globalhealthsouth.org](http://www.globalhealthsouth.org))



Global Health Technologies Coalition - GHTC (<http://ghtcoalition.org>)

Global Health Workforce Alliance - GHWA (<http://www.who.int/workforcealliance/en>)

Global Influenza Surveillance and Response System - GISRS  
([http://www.who.int/influenza/gisrs\\_laboratory/en](http://www.who.int/influenza/gisrs_laboratory/en))

Global Outbreak Alert and Response Network - GOARN  
([http://www.who.int/ihr/alert\\_and\\_response/outbreak-network/en](http://www.who.int/ihr/alert_and_response/outbreak-network/en))

Heads of Medicines Agencies - HMA (<http://www.hma.eu>)

Health Alliance International - HAI (<http://www.healthallianceinternational.org>)

## **Healthcare workers and professionals**

Health Emergency Operations Facility - HEOF  
([http://ec.europa.eu/health/preparedness\\_response/generic\\_preparedness/planning/heof\\_en.htm](http://ec.europa.eu/health/preparedness_response/generic_preparedness/planning/heof_en.htm))

Healthmap (<http://www.healthmap.org/en>)

Health Sciences Online - HSO ([www.hso.info](http://www.hso.info))

IB-BIOALERTNET (<http://ib-bioalertnet.isciii.es>)

Infectious disease diagnostics Companies

Influenzanet (<https://www.influenzanet.eu>). Influenza netcollaborates with the US FluNearYou - <http://flunearyou.org> and the Australian FluTracking - <http://www.flutracking.net> participatory surveillance systems.

Innovative Support to Emergencies Diseases and Disasters - InSTEDD (<http://instedd.org>)

Institute for Healthcare Improvement - IHI (<http://www.ihl.org>)

Institute for International Medical Education - IIME (<http://www.iime.org>)

International Alert (<http://www.international-alert.org>)

International Alliance of Patients' Organisations - IAPO (<https://www.iapo.org.uk>)

International Association of National Public Health Institutes - IANPHI  
(<http://www.ianphi.org>)

International Committee of the Red Cross - ICRC ([www.ifrc.org](http://www.ifrc.org))

International Council of Nurses - ICN (<http://www.icn.ch>)

International Federation for Animal Health Europe - IFAH (<http://www.ifaheurope.org>)

International Federation of Red Cross and Red Crescent Societies - IFRC  
(<http://www.ifrc.org>)

International Health Partnership Plus - IHP+  
(<http://www.internationalhealthpartnership.net/en>)

International Hospital Federation - IHF (<http://www.ihf-fih.org>)

International Medical Corps - IMC (<https://internationalmedicalcorps.org>)

International Pharmaceutical Federation - FIP ([www.fip.org](http://www.fip.org))

International Red Cross and Red Crescent Movement - RCRC Movement  
([www.redcross.int/en](http://www.redcross.int/en))

International Society for Disease Surveillance - ISDS (<http://www.syndromic.org>)

Joint Research Centre - Institute for Health and Consumer Protection - JRC-IHCP  
(<https://ec.europa.eu/jrc/en/about/ihcp>)

Médecins Sans Frontières - MSF (<http://www.msf.org>)

Medical Emergency Relief International - Merlin (<http://www.merlin.org.uk>)

Medical Intelligence System - MediSys (<http://medisys.newsbrief.eu>)

Medicines and vaccines producers

National Academia and Schools

National Ambulances services

National Biological Reference Laboratories

National Civil protection

National crisis committee

National Emergency management officers

National Fire brigades

National Health care emergency services

National Institute of Social Security

National Medicines Regulatory Agency

National Ministry of Defence

National Ministry of the Environment

National Ministry of Foreign/External Affairs

National Ministry of Finance

National Ministry of Health

National Ministry of Home/Internal Affairs

National Public Health Institute - National Surveillance Institute for Public Health

National Red Cross and Red Crescent Societies ([www.ifrc.org](http://www.ifrc.org))

North Atlantic Treaty Organization - NATO (<http://www.nato.int>)

NATO Centre of Excellence - NATO-CoE (<http://www.act.nato.int/centres-of-excellence>)

Here are the different NATO-CoE that can have involvement in preparedness and management of epidemiological crisis:

- Civil-Military Cooperation (CIMIC)
- Crisis Management and Disaster Response (CMDR)
- Joint Chemical, Biological, Radiological, & Nuclear Defence (JCBRN)
- **Military Medicine (MILMED)**

One Health Initiative (<http://onehealthinitiative.com>)

Organisations and societies for medical professions and specialities

PATH (<http://www.path.org>)

Pharmaceutical Group of the European Union - PGEU (<http://www.pgeu.eu>)

Program for Monitoring Emerging Diseases - ProMED (<http://www.promedmail.org>)

Public Health Emergency Operations Centre Network - EOC-NET ([http://www.who.int/ihr/eoc\\_net/en](http://www.who.int/ihr/eoc_net/en))

RAND Corporation (<http://www.rand.org>)

RESAOLAB (<http://resaolab.globe-network.org>)

Save the Children (<http://www.savethechildren.org>)

Skoll Foundation (<http://skoll.org>)

Standing Committee of European Doctors - CPME (<http://www.cpme.eu>)

Strategic Health Operations Centre - SHOC  
(<http://www.who.int/csr/alertresponse/shoc/en>)

Surveillance Studies Network - SSN (<http://www.surveillance-studies.net>)

Task Force for Global Health (<http://www.taskforce.org>)

Training Programs in Epidemiology and Public Health Interventions Network - TEPHINET  
(<http://www.tephinet.org>)

Triangle Global Health Consortium - TGHC (<http://triangleglobalhealth.org>)

United Nations - UN (<http://www.un.org/en>)

The United Nations is composed of many organisations. Those that may be involved in pandemic management include:

- The General Assembly (GA) is the main deliberative, policymaking and representative organ of the UN. All 193 Member States of the UN are represented in the General Assembly, making it the only UN body with universal representation.
- The Security Council (SC) has primary responsibility for the maintenance of international peace and security. It has 15 Members, and each Member has one vote. Under the Charter, all Member States are obligated to comply with Council decisions.
- The Economic and Social Council (ECOSOC) is the United Nations' central platform for reflection, debate, and innovative thinking on sustainable development.
- The Secretariat, one of the main organs of the UN, is organized along departmental lines, with each department or office having a distinct area of action and responsibility. Offices and departments coordinate with each other to ensure cohesion as they carry out the day to day work of the Organization in offices and duty stations around the world. At the head of the United Nations Secretariat is the Secretary-General.

In the area of health and pandemic management, several offices and departments have a role:

- The Office for the Coordination of Humanitarian Affairs (OCHA)
- The Office for Disaster Risk Reduction (UNISDR)
- The Department of Economic and Social Affairs (DESA)
- The Department of Public Information (DPI)
- The Department of Safety and Security (DSS)

In order to tackle global issues, the UN created independent agencies. Among them, several agencies play an important role in promoting global health or responding in case of (health) emergencies:

- The World Health Organization (WHO)
- The Food and Agriculture Organization of the United Nations (FAO)
- The International Atomic Energy Agency (IAEA)
- The International Labour Organization (ILO)
- The International Organization for Migration (IOM)
- The United Nations Environment Programme (UNEP)
- The United Nations International Children's Emergency Fund (UNICEF)
- The United Nations Office on Drugs and Crime (UNODC)
- The United Nations Population Fund (UNFPA)
- The United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA)

- The World Bank Group
- The World Food Program (WFP)
- The World Organisation for Animal Health (OIE)
- The World Tourism Organisation (UNWTO)
- The World Trade Organisation (WTO)

Vaccines Europe (<http://www.vaccineseurope.eu>)

West African Health Organization - WAHO (<http://www.wahooas.org>)

West African Regional Disease Surveillance Capacity Strengthening - WARDS  
(<http://www.worldbank.org/projects/P125018/west-africa-disease-surveillance-response?lang=en>)

World Federation for Medical Education - WFME (<http://wfme.org>)

Member associations:

- AMEE - The Association for Medical Education in Europe
- AMEEMR - The Association for Medical Education in the Eastern Mediterranean
- AMEWPR - The Association for Medical Education in the Western Pacific Region
- AMSA - The African Medical Schools Association
- PAFAMS - The Pan-American Federation of Associations of Medical Schools
- SEARAME - South-East Asian Regional Association for Medical Education

World Food Program - WFP (<http://www.wfp.org>)

World Health Organization - WHO (<http://www.who.int/en>)

WHO's Communicable Disease Working Group on Emergencies - CD-WGE  
([http://www.who.int/disease\\_control\\_emergencies/working\\_group/en](http://www.who.int/disease_control_emergencies/working_group/en))

WHO's Disease Control in Humanitarian Emergencies - DCE  
([http://www.who.int/diseasecontrol\\_emergencies/en](http://www.who.int/diseasecontrol_emergencies/en))

World Health Professions Alliance - WHPA (<http://www.whpa.org>)

World Medical Association - WMA (<http://www.wma.net>)

World Veterinary Association - WVA (<http://www.worldvet.org>)