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# CYCLOPS

## CYber-Infrastructure for Civil protection Operative Procedures

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1.3	31/07/2007	More detailed description of each Civil Protection System	S. Sauvagnargues-Lesage V. Thierion	EMA - DDSC

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## I. EXECUTIVE SUMMARY

Above all, it seems important to explain that the realization of the Work Package 3 knew a lot of difficulties since the beginning of the project. The work to be done requires a collaborative work between each Civil Protection agencies involved in the Cyclops project, especially for the “Business Process Analysis” document (deliverable D6) and the “Existing Analysis” document (deliverable D8).

Several elements can justify these difficulties:

- Some strong administrative problems didn't allow the project to be signed before May 2007. So, the meetings held during the first months were mainly dedicated to these administrative aspects.
- The Cyclops project manager changed in the beginning of 2007. Roberto Sorani replaced Anna Scipioni.
- The Portuguese Civil Protection headquarters structure was reorganized in 2006-2007, changing from SNBPC to ANPC.
- The Civil Protection agencies of France (DDSC) and Portugal (ANPC) asked for the integration of two new technical partners: EMA (Ecole des Mines d'Ales) for French partner and the Universidade do Minho for Portuguese partner.

Taking all these elements into account, it was almost difficult to be efficient in sharing information and data, and recovering each partner contributions to produce a suitable deliverable.

Finally, the “Technical Management Board” and the “Project Management Board” on July 2007 in Roma permitted to organise and to decide orientations to write this deliverable (and the others also in late) as soon as possible.

This report aims to give a global description of Civil Protection agencies in order to assess their specific requirements. The final objective is to bridge the gap between

Grid and GMES<sup>1</sup> communities. The aim of this deliverable is to analyse and to summarize the heterogeneous European Civil Protection needs and available resources by the presentation of each Civil Protection agency involved in the Cyclops project. We focused on internal processes and interactions with external entities such as public entities, research centres, and data and knowledge providers.

The document is structured as following:

The first part (section 2) describes the scope of the document in the context of the project. In particular this section presents the main objectives of this deliverable.

The next part (section 3) describes the missions of CP (Civil Protection) agencies in Europe.

The final part (section 4) identifies with more details the characteristics of internal organisation of each CP agency involved in the project (Portugal, Greece, Italy and France). We describe organisations, staffs, training and finally equipment of each agency. For a better understanding, we chose to give a summary and simple diagram of internal organisation for each agency.

## II. SCOPE OF THE DOCUMENT

In objective of bridging the gap between civil protection agencies and Grid community, the initial needs are to highlight main requirements of CP agencies for a potential use of Grid technology (PO\_4). The Annex I – “Description of Work” (Technical annex) clearly details main steps to achieve this objective.

For this, fundamental knowledge of CP agencies becomes a preliminary goal to achieve objectives of the Cyclops project, in order to define the requirements of CP community for Grid platforms.



This deliverable describes the Civil Protection agencies in the four countries involved in the project:

- Portugal
- Greece

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<sup>1</sup> Global Monitoring for Environment and Security: <http://www.gmes.info/>



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- Italy
- France

In particular, this report explains responsibilities for these four countries: (1) the national context, (2) the internal organization, (3) relationships with other national and international agencies.

### III.OVERALL CIVIL PROTECTION MISSIONS

Internal organizations are different from one country in Europe to another. We can summarize the main objectives of CP agencies in Europe:

- To prevent natural or *man made* hazards related to major accidents, disasters or calamities
- To mitigate losses and damages upon population, material resources and environment
- To protect citizen's life, health and property from natural, technological and other major hazards.
- The protection of cultural heritage, historic buildings and monuments, the resources and the infrastructure.

For more details, the next section will describe for each CP agency the internal structure and different policies approach.

## IV. CIVIL PROTECTION AGENCIES PRESENTATION



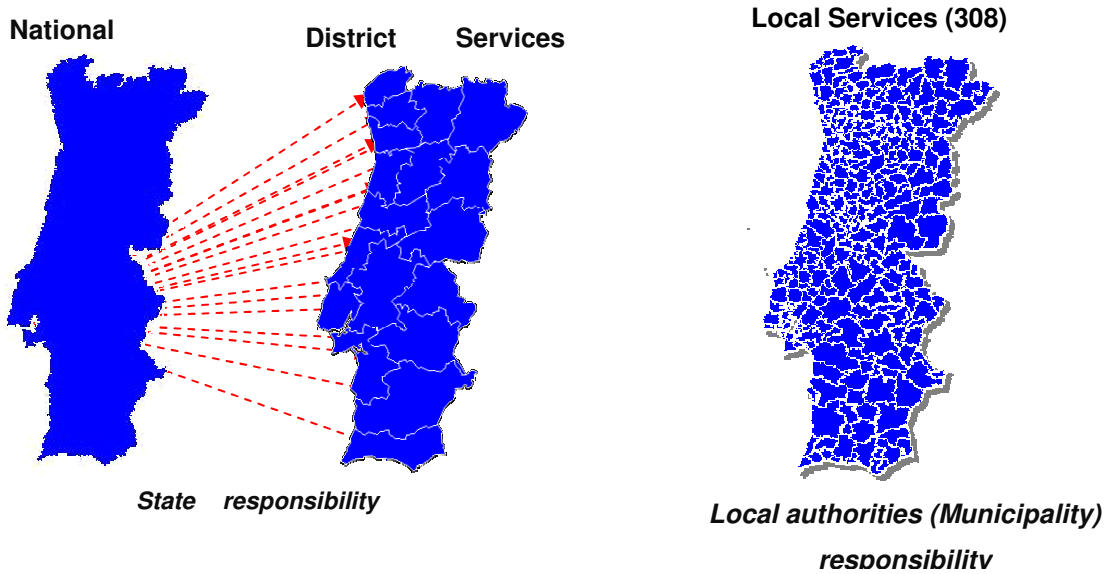
### 1 PORTUGAL

#### 1.1 National System for Civil Protection

In Portugal, Civil Protection is the activity performed by the State, by the Autonomous Regions, by the Local Authorities and by every single citizen, as well as by public and private companies, with the aim of preventing collective hazards, reducing the effects of those hazards and protecting people, environment and properties. The objectives of Civil Protection are prevent the occurrence of collective hazards; mitigate and attenuate the effects resulting from severe accidents and disasters; relief and assist endangered people and support the recovery operations and the re-establishment of the normal conditions.

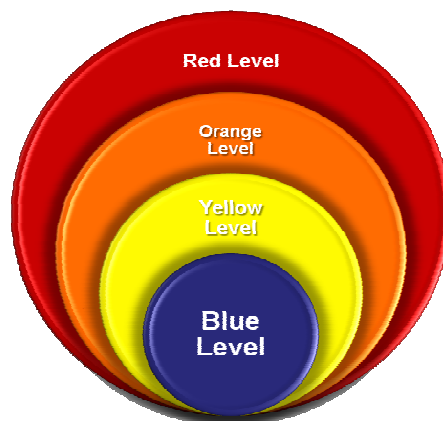
Civil Protection have several domains of activity like forecast, assessment and mitigation of natural and technological risks, vulnerability analysis and developing of risk maps; public information and education of citizens; planning for emergency operations and study and diffusion of self-protective measures.

In Portugal, the objectives and activities related with civil protection are performed at 3 levels (Figure 1), the national, the district and the local. At national and district level, State has the responsibility to implement the policy of civil protection and at local level are the municipalities that have this assignment.





**Figure 1 : Portuguese Civil Protection organisation**

During the Civil Protection activities several warning levels are defined for protection and relief operations. If is necessary to adopt preventive measures and/or special reaction measures, **Alert** is declared by the Mayor, by the Civil Governor or by Minister of Internal Administration, concerning the affected area (municipality, district or national). There are several alert levels (Figure 2) defined concerning severity of emergency: blue, yellow, orange or red.



**Figure 2 : Alert levels**

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When is necessity of adopting preventive measures and/or special reaction measures which can not be under taken at the local level, **Contingency** is Declared by the Civil Governor or or by Minister of Internal Administration. If there is a need of adopting measures of exception to prevent, react or re-establish the normal living conditions in the affected areas, then **Calamity** is declared by the Portuguese Government.

## 1.2 Framework of Civil Protection structure

Civil Protection in Portugal is composed by Directive bodies, Coordinative bodies and Executive bodies. Directive bodies at national level are the parliament, the government, the council of ministers and prime-minister that have the political responsibility to define and implement the civil protection measures. The Ministry of the Interior is responsible for directing the civil protection and emergency preparedness response in case of disaster at national level. Portugal has 18 districts and 2 autonomous regions with a ANPC delegation in each one, responsibility belongs to the Presidents of the Azores and Madeira Autonomous Regions and to the Governors of each of the 18 districts in the mainland. At district level, responsibility belongs to civil governor and at municipal level this task is performed by the mayor.

The National Commission for Civil Protection is a coordinative body that at national guarantees the implementation of the civil protection policy, activate the measures foreseen in the emergency plans and guarantee the development of the civil protection operations and assist the Prime-Minister and the Government in what concerns civil protection. At District level this mission is performed by the District Commission for Civil Protection and at local level by the Municipal Commission for Civil Protection

The National Authority for Civil Protection (ANPC) is the executive body to plan, coordinate and execute the Civil Protection policy and to manage/command the activities of emergency response at national and district level. Activities performed by

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ANPC include prevention and mitigation of risks associated with severe accidents and disasters and attenuation of the effects resulting from this situation and coordination and supervision of all operational activities carried out by the Portuguese fire-fighters.

Operational structure include civil protection agents like fire-fighters, security forces (National Police, National Republican Guard, Local Police), armed forces, maritime and aeronautic authorities, national Medical Emergency Service (INEM<sup>2</sup>), Portuguese Red Cross and public and private Social and Health Care services.

The leagues of volunteer firemen, health services, social security institutions, NGOs and other volunteer organizations, public services responsible for forest and natural reserves, industry and energy, transport, communications, water resources and environment, security and relief services belonging to private and public companies, seaports and airports, have the duty to cooperate with civil protection agents already mentioned. Several scientific and technological institutions and organizations are particularly assigned for cooperation with ANPC and are important contributors into the civil protection system, namely those related to meteorology and geophysics, engineering, industrial technology, geology, forestry, nuclear protection and natural resources.

### **1.3 Early Warning**

The Portuguese Civil Protection has established agreements with several institutions to evaluate and assess situations that can affect population and environment, in order to minimize possible damages related with floods, earthquakes, severe weather and radiological risk.

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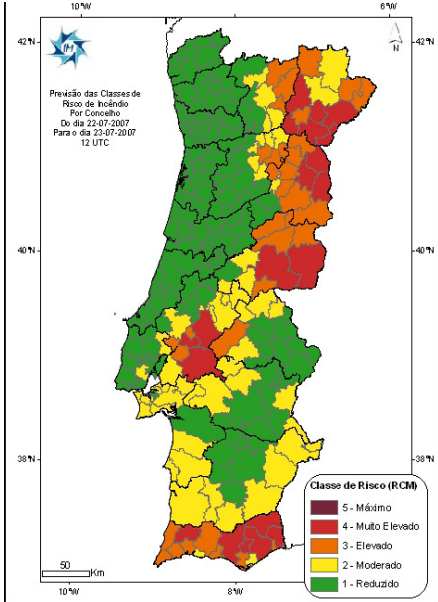
<sup>2</sup> Instituto Nacional de Emergência Médica

Collaboration between ANPC and Portuguese Meteorological Institute (IM), National Water Institute (INAG) and Portuguese Agency for Environment (APA) to related with is described in next paragraphs

*1.3.1. Portuguese Meteorological Institut (IM) and forest fire*

The Portuguese Meteorological Institut (IM) is the national authority for the meteorological, climate and seismological issues. This entity depends on the Ministry of Science and Higher Education. The information provided by the IM through its Analysis and Weather Forecast Centre<sup>3</sup> includes the following general daily provided information (see Figure 3):

- Meteorological observation from the national station network;
- Weather map
- National and regional weather forecast bulletins;
- Satellite imagery;
- Wind field forecast for the next 24 hours with 3 hours intervals.



**Figure 3 : Fire map forecasting**

The IM computes and delivers more specific information such as:

<sup>3</sup> Central of Análise E previsão C tempo

- the forest fire danger index for about 60 meteorological stations. Since 1998, the IM information related with fire danger indexes has been based on the Canadian Forest Fire Weather Index System (FWI), computed between May 15<sup>th</sup> and October 15<sup>th</sup>. Since autumn 2002, the FWI index is being computed along the whole year,
- maps with forest fire risk classes by regions. The classes are computed as a function of the FWI and take into consideration the number of fires and burned areas in each region during past years,
- maps of forecasts and danger index tendencies for forest fires,
- weather bulletins for 48 hour forecasts specific for fire prevention (on a daily routine basis from June to September).

The collaboration between ANPC and IM is done on a daily basis, where information related with meteorological situation is analysed. If necessary, ANPC launch an early warning to civil protection agents and population in case of severe weather.

Specific information about Forest Fire Risk is produced also by IM to support prevention and operation activities from civil protection, like the **Fire Risk Map** (Figure 3) mapped integrated information on risk conjuncture assessed by the forest management Authority (DGRF) with meteorological risk values for mainland Portugal and map of mainland Portugal containing information on the class of fire risk at municipality level, based on the mapped integrated information from DGRF<sup>4</sup> with meteorological risk.

The Portuguese government has defined four priority areas for forest fire defence (Sauvagnargues-Lesage *et al.*, 2006):

- reduce territory vulnerability to forest fires: support global management of forest areas and preventive intervention in strategic sectors;
- reduce fire occurrences: through public awareness campaigns, systematic investigations on fire origin, increase dissuasion capacity and repression;

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<sup>4</sup> *Direcção-Geral Recursos Florestais*

- improve fire fighting and fire management efficiency : this requires an articulation of monitoring and detection systems with first intervention means, a reinforcement of intervention capacities and extended attack, the improvement of planning, prevision and decision, etc ;
- recover and reorganize ecosystems to regain their original condition (DIRECCAO, 2006).

These political orientations are defined in the National Plan for Forest Defence Against Fire (PNDFCI<sup>5</sup>), updated each year by the DGRF (the Plan 2006 was approved by *Resolution of the Ministers Council n °65/2006*).

In Portugal fire prevention activities are under the responsibility of the DGRF (Ministry of Agriculture). The DGRF is organised by agricultural regions which manage public forests (5% of the total), supervise all forest activities in the country and coordinate fire detection devices. The fire detection system is organised around a network of manually operated fire detection towers that are in communication with the ANPC. DGCRF also has terrestrial mobile patrols acting 24 hours per day.

The other entities involved in fire prevention are:

- the National Association of Portuguese Municipalities responsible for promoting fire prevention infrastructures (roads, firebreak, water sources, watch-towers) and supporting the logistics of fire suppression activities in their areas ;
- the Cellulose and Paper Pulp Industries that globally own 10% of the National afforested area;
- the Nature Conservation Institute (ICN<sup>6</sup>).

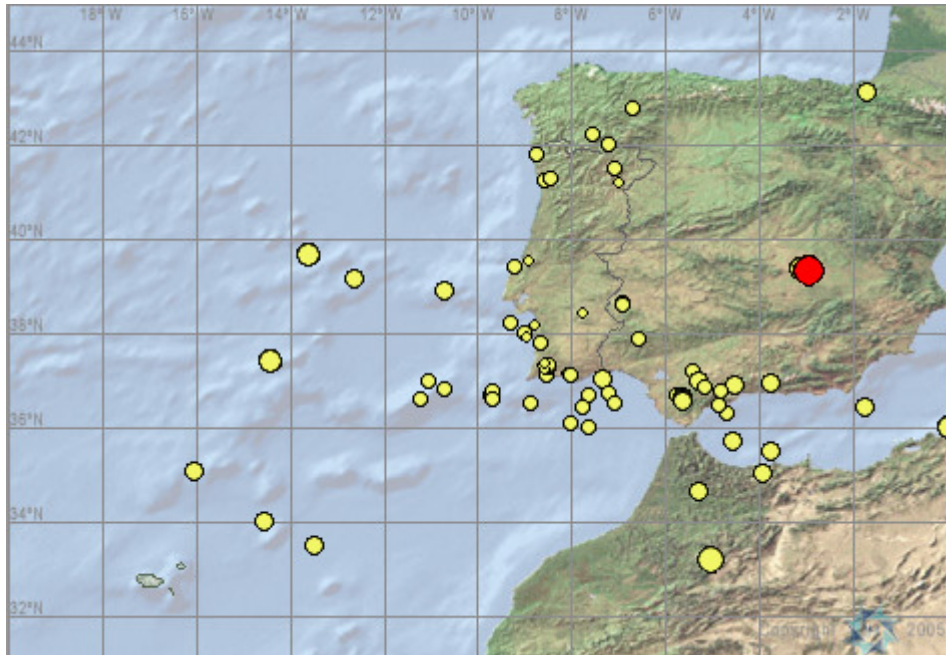
Information about seismic activity (Figure 4) is also exchanged between ANPC and IM.

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<sup>5</sup> *Plano Nacional de Defesa da Floresta Contra Incêndios*

<sup>6</sup> *Instituto da Conservação da Natureza*





**Figure 4 : Seismic activity map**

### 1.3.2. National Water Institute (INAG)

For the permanent analysis of the water resources, the Portuguese Civil Protection uses a Flood Surveillance and Early Warning System (SVARH) (Figure 5), developed by the Portuguese Institute for Water (INAG).

SVARH is used under the scope of a cooperation agreement between INAG and ANPC and permits monitoring in real time the evolution of the hydrological situation in main hydrographical basins. Data from hydrometric stations and dams are available in order to Civil Protection Services access information from hydrographical basins and are updated every 15 minutes for hydrometric stations and every hour for dams.

This system provides information about the situation in some critical points of the rivers that is very useful to early warning.

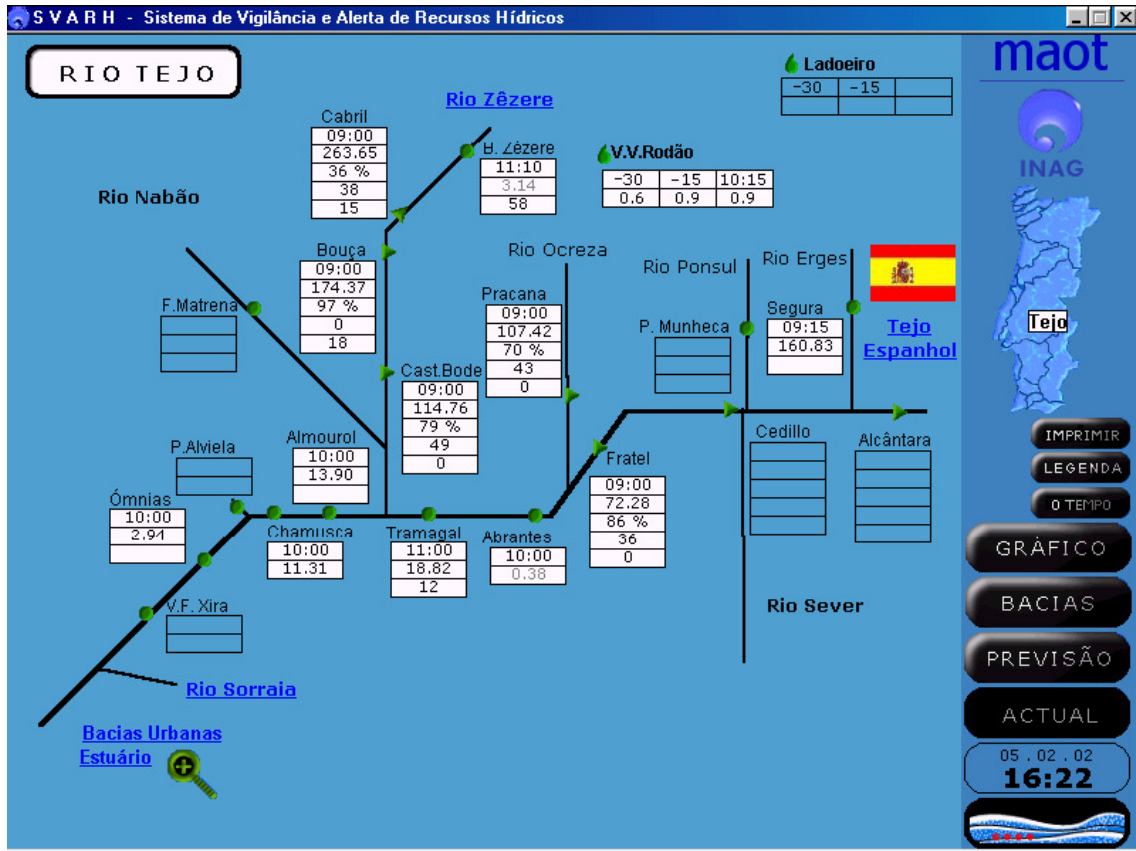


Figure 5 : Flood Surveillance and Early Warning System interface

1.3.3. Portuguese Agency for Environment (APA)

The Portuguese Agency for Environment (APA) is responsible for 13 automatic stations from environmental radiological survey network (RADNET) located in Portugal. Those stations record continuously data on external gamma radiation (with an integration period of 1 minute). If a high level of radiation is observed, ANPC and APA determine what kind of actions have to be implemented.

## 2 GREECE



### 2.1 Global organisation

The Constitution defines the relationships between the different powers at national level. The legislature is represented by the Parliament. Executive power rests with the President of the Republic and the Central Government. However, the role of the President of the Republic is limited. Government is a collective instrument, consisting of the Council of Ministers. Its members are the Prime Minister and the ministers. The Government is coordinated by the Prime Minister, who directs its actions and delegates powers to the Ministers. Power is then delegated hierarchically to deputy ministers, general or special secretaries, senior civil servants and to the government's regional representatives, the general secretaries of the regions and, until 1995, prefects. The judiciary is the third pillar of the powers at the national level. The Greek judicial system comprises administrative, civil and criminal courts.

The country is divided into 13 administrative regions for the purpose of planning, programming and coordinating regional development. Each region is headed by a regional general secretary appointed by the central government. The general secretary chairs the regional council, a collective semi-corporatist advisory organ, comprising representatives of local government and regional socio-economic partners. He is the central government's representative and has responsibility for the implementation of governmental policy, a role which in the past was to some extent reserved for the appointed prefect, but with substantial differences. The general secretary has substantial powers of control over both 1st and 2nd tier local government authorities, whose decisions he has the right to overrule. Each region includes a number of prefectures. There are 54 elected prefecture authorities (2nd tier local government) set up in 1994. A prefect heads the administrative services of its prefecture and has no hierarchical relationship with 1st tier local authorities. The prefect chairs, the prefecture council and a prefecture fund, a legal person of public law through which public investment in the prefecture is channelled.

A prefecture's administrative services include a large number of sectors directorates. Their role in spatial planning is mostly limited to implementation (including building control and permits). They also provide services related to education, welfare and health, passports, commerce, industry and agriculture. Moreover, they implement public development projects, funded either through the regional administration or directly by ministries. In general, both the regional secretariats and the prefectures are structured into directorates which, thematically, are a reflection of the ministries of central government.

The first tier of local government is constituted by 900 Municipalities and 133 Communes, known in Greece as local self-government organisations (OTA). They are in charge of local affairs, which natures are often a matter of legal dispute as neither the Constitution, nor the common law defines this concept. Consequently the definition of "local affairs" becomes a matter of legal dispute, with a tendency in government legislation and in court decisions to lean in favour of the central state or, recently, the regions, in allocating responsibilities. The whole issue of local government powers is further complicated by the unconstitutionality of devolution of planning powers. Their role in planning proper is purely advisory. Local government also includes administrative units which are part of local public administration, but, of course, not part of the State. They are organized as self-governed legal persons of public law (NPDD<sup>7</sup>). The NPDDs operate under public, not private, law, independently of the state administration. These bodies ought to be distinguished from public corporations which are legal persons of private law (NPIDs<sup>8</sup>) and are not part of public administration.

There is a considerable amount of activity (mostly informal) in the field of mitigation and preparedness policies to counteract potential flood events at the local level. However, these are in most part micro-scale, fragmented and disjointed efforts and interventions. They are rarely anchored on hazard / risk assessment data bases and

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<sup>7</sup> Nomika Proswpa Dhmosioy Dikaioy

<sup>8</sup> Nomika Proswpa Idiwtikoy Dikaioy

maps, they are not connected to spatial planning, they do not make advantage of advanced technologies, they are more or less experience-based and they are not incorporated in a holistic counter disaster strategy that is harmonized with the development and spatial planning strategy.

Civil Protection in Greece is organised upon a co-ordinated resource system whereby national, regional, provincial and local authorities work together with local and public institutions and services. Each of these authorities and institutions has developed its own part of the national Civil Protection plan (*Xenokrates*), and makes its own contribution towards achieving the aims of Civil Protection. In addition to *Xenokrates*, a current framework plan aims to extend the level of civil protection. The National Action Plan for Cities and Housing (1996-2000) has two fundamental objectives. First, the creation of cities which provide safe, healthy, equal and sustainable living conditions, and secondly, the guarantee of adequate housing for all. The completion and implementation of this updated regulatory framework will ensure that measures are adopted for the protection of settlements from earthquakes, floods and fires.

The new law-decree 2344/95 and the Act of Ministerial Council no. 288 of 23 December 1996 govern planning of prevention, response and relief efforts in case of natural, technological and other disasters.

The two main competent bodies for the implementation of civil protection measures in Greece are the following:

- The Inter-ministerial coordination body (SDO<sup>9</sup>)
- The General Secretariat for Civil Protection
- Many authorities, organizations and institutions which work together as an integral part of planning and rescue operations. (Ministries, the Fire Brigade, Police, Defence Forces, Health, Aviation and Radiation Authorities are major partners).

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<sup>9</sup> Syntonistiko Diypoyrgiko Organo

- The General Secretariat of the Region
- The Prefecture as well

### 2.1.1. Inter-Ministerial coordination body (SDO)

The Inter-ministerial coordination body (SDO) was established to coordinate governmental action in case of major disasters. The role and the objective of SDO are to reinforce, within a defined Government framework, the coordination activities of the General Secretariat for Civil protection in implementing the national policy during an emergency situation.

### 2.1.2. The General Secretariat for Civil Protection (GSCP)

By Law 3013/2002 GSCP is the competent authority for the planning and set-up of the national policy and actions in matters of prevention, preparation, public information, management and mitigation of natural, technological and other major hazards (including chemical, biological, radiological and nuclear threats). Its members include the Secretary-Generals of the Ministries of the Interior, Public Administration and Decentralisation, Development, Public Works, Forests and Environment, Health and Welfare, Merchandise Marine, Public Order, Transportation and Communications, Media and Public Information, and the Deputy Chief of the National Defence General Staff.

The main areas of activity of GSCP include:

- Readiness of the personnel and means of Civil Protection.
- Elaboration of the available scientific information for the mobilization of resources in case of emergencies.
- Coordination of response and recovery actions in emergencies.
- Coordination of emergency planning actions at national level.
- Provision of scientific support to the programs, plans and actions in the field of Civil Protection.
- Monitoring and control of the Annual National Planning implementation at regional and local level in cooperation with competent authorities.

- Propose the distribution of state funds for Civil Protection to the local authorities.
- Preparation of special reports for every major disaster. Revisions, amendment and improvement of existing proposals are included.
- Functioning a Civil Protection Operation Centre on a 24 hours basis.
- Operation of a unit for the assessment of information on weather forecasting and other precursory phenomena related with natural hazards, for the early notification and warning of the competent authorities and the general public.
- Public information and awareness.
- Organization and promotion of volunteer organizations work in the field of Civil Protection.
- Cooperation with the competent authorities towards preparing regulations, codes and legislation in the field of prevention. Approval of Civil Protection local plans.
- Programming, based on the annual national civil protection planning, of the necessary annual provisions of means and human resources in cooperation with competent authorities.
- Support and promotion (coordination, planning, financing) of the research, education and training in the field of Civil Protection.
- Promotion of the country's relations with International Organizations and Civil Protection authorities, including representation in International Organizations.
- Coordination of the assistance provided to Greece and assistance provided to other countries.

General Secretariat for Civil protection is going to establish an emergency scientific team consisting of seismologists, meteorologists, geologists, structural engineers as well as other scientists and experts responsible to give consultancies in case of disasters and to present new proposals on relative subjects.



The 24/24 hours Operational Centre is located at the same premises as general Secretariat for Civil protection.

In case of emergencies GSCP carries the responsibility to rank a disaster into one of the previous ministries and make decisions to activate the appropriate Civil Protection Authorities and competent services. The GSCP ensures the coordination of all needed state and even private entities for handling all types of disasters; it provides logistic support -material and human- to the Fire Services from local authorities (Regions, Prefectures, and Municipalities). The operations are directed from the Centre of the Operations of Civil Protection and Emergencies of the GSCP that is permanently active, ready to respond to all kinds of major disaster emergencies. However, for unimportant or limited incidents the GSCP operations centre simply keeps being informed of the evolution of the event without further action.

The GSCP issued the General Plan of Civil Protection "*Xenocrates*" which sets in general terms the roles of agencies involved in civil protection in the country. The Plan also defines the composition of Boards for Civil Protection Planning and the Civil Protection Implementation Boards, at state, regional and prefecture level. It should be underlined that according to the Plan, a key role is assigned to the prefecture government, while the role of local authorities (municipalities) is minor.

### 2.1.3. Ministries implication

The general guidelines are provided by the framework of the overall national plan namely "*Xenocrates*" established by the General Secretariat for the Civil Protection. Each of the ministries concerned draws up individual general and emergency plans for various types of disasters are issued by the following Ministries:



- **Ministry of National Defence:** 8 plans concerning forest fires, earthquakes, floods, snowfalls, CBRN<sup>10</sup>, and transport accidents.
- **Ministry of Development:** 9 plans concerning earthquakes, tornados, landslides, CBRN, electric power failure and failure of natural gas transmission lines, storage of hazardous materials, industrial fires, dam failure, mining accidents.
- **Ministry of Environment Physical Planning and Public Works:** 11 plans concerning earthquakes, floods, tornados, snowfalls, landslides, volcanic activity, storage of hazardous materials, industrial fires, environmental pollution, dam failure, road and railway accidents.
- **Ministry of Health and Welfare:** 5 plans concerning: earthquakes, heat waves, CBRN, environmental pollution and epidemic cases.
- **Ministry of Rural Development and Food:** 7 plans concerning forest fires, floods, snowfalls, heat waves, CBRN, environmental pollution and animal and insect related hazards.
- **Ministry of Transport and Telecommunications:** 5 plans concerning tornados, CBRN, telecommunication network failure, road, railway and aircraft air accidents.
- **Ministry of Public Order:** 16 plans concerning forest fires, earthquakes, floods, tornados, snowfalls, landslides, volcanic activity, CBRN, electric power failure and failure of natural gas transmission lines, storage of hazardous materials, industrial fires, environmental pollution, dam failure, mining accidents, road, railway and aircraft air accidents.
- **Ministry of Mercantile Marine:** 7 plans concerning earthquakes, floods, tornados, CBRN, environmental pollution, marine and aircraft air accidents.

#### 2.1.4. The General Secretariat of the region and prefectures

The Regions and Prefectures, in agreement with the GSCP, establish their respective regional emergency plans and are responsible for planning and

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<sup>10</sup> Chemical, Biological, Radiological and Nuclear

coordination of their prefectures or countries, respectively at the regional and local level.

The 54 Prefectures of Greece (see Figure 6) draw up their respective prefecture plans. At the prefecture level the coordinating body (SNO), chaired by the prefect, is the responsible decision-making body to handle emergency situations.



**Figure 6 : the prefectures of Greece**

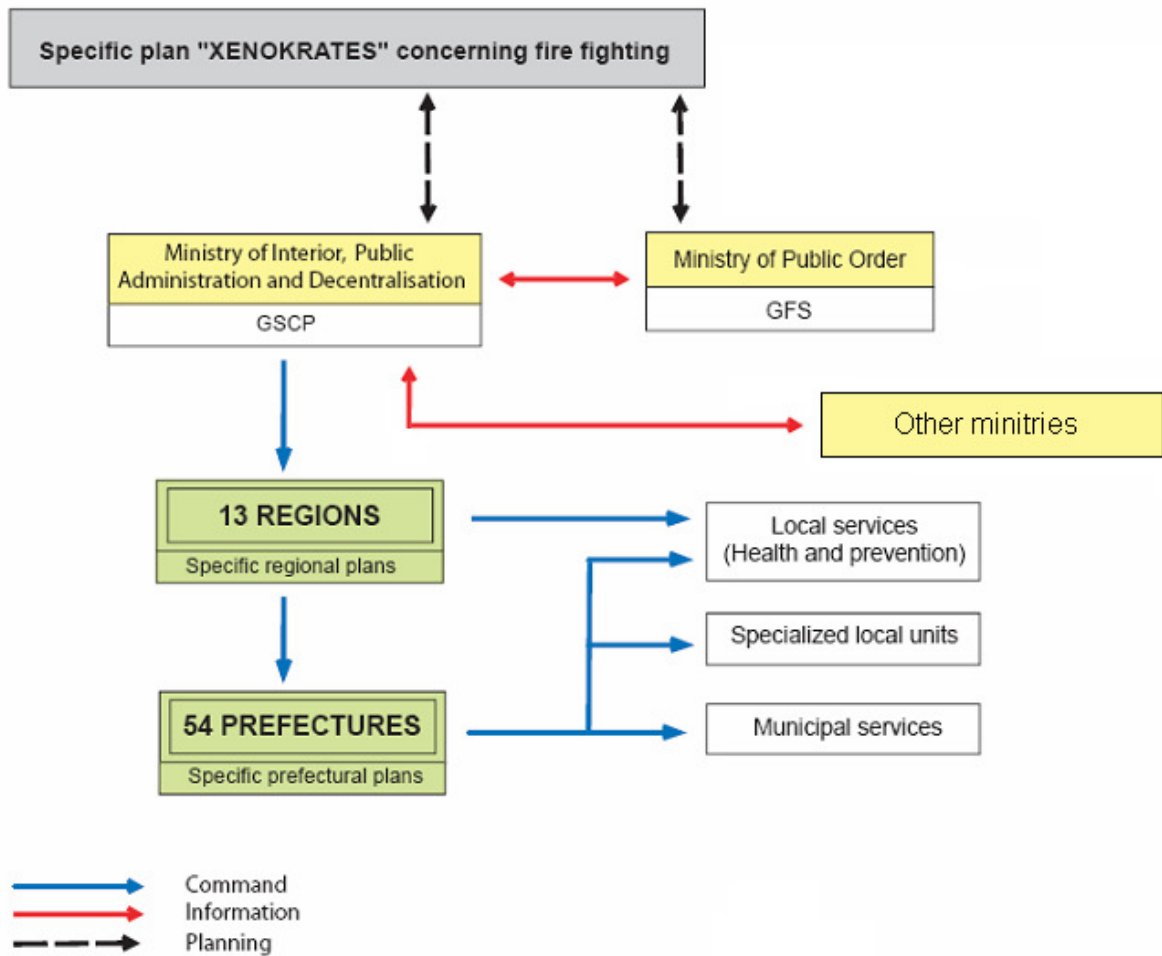
The Law 3013/2002 for “Improvement of Civil Protection and Other Legal Provisions” refers to “local scale disasters” of low and high intensity. Local scale disaster of low intensity is the one that can be tackled effectively by the potentialities and availabilities of the Prefecture.

On the other hand, high intensity local disaster presumes external assistance in terms of apparatus, human forces, and other emergency means and commodities. The above Law defines also the competences of the Prefects and Mayors and requires the establishment of Offices of Civil Protection and Coordination Centres at the Prefecture and Municipal level. The responsibilities of the Prefects and Mayors are the following:

- To coordinate and supervise civil protection work with respect to mitigation, preparedness, emergency and rehabilitation activities in the area coming within their jurisdiction.
- To implement the provisions of the annual National Plan of Civil Protection as far as it concerns the area of their competence
- To make suggestions and recommendations to the General Secretary of the Region about contingent civil protection plans to be implemented in the Prefecture or Municipality of their competence
- To chair the Coordination Centre of the Prefecture / Municipality
- In the case of Prefects alone, to recommend to the General Secretary of Civil Protection about the declaration of an emergency situation, should a local scale disaster strike areas of their competence, or to issue such a declaration, should the local disaster be of low intensity.

The Prefecture and Municipal Coordination Centres are staffed with members of the Prefecture and Municipal Councils respectively, representatives of the Association of the Municipalities (in the case of the Prefecture Centre), officials of the Civil Protection Office of the Region and the Prefecture, commandants of local military camps, chief constables of Police and Fire Service, senior officers of technical service departments, representatives of volunteer organizations for Civil Protection and others.

The Figure 7 shows this Greek organization.



**Figure 7 : Synthesis on the Greek organization**  
(From GDE, 1999)

## 2.2 Staff

In case of emergencies the Civil Protection Authorities and competent services activated under the co-ordination of GSCP include the:

- National Centre for Emergency Care
- Fire Service
- Police
- Coast Guard
- Armed Forces
- National Weather Service
- Earthquake Planning and Protection Organization

- Red Cross
- Research Institutes and Universities
- State Organizations and Local Authorities
- Volunteering Organizations and other non-governmental organizations.

### **2.3 Equipment**

GSCP equipment consists of modern computing and telecommunication facilities and two Mobile Civil Protection Operation Centres. Computing facilities includes LAN & WAN of modern computer systems.

Telecommunication facilities include:

- ISDN telephone lines
- VHF and HF radio systems
- GSM communication
- INMARSAT telephones
- Video-Conference

The two Mobile Civil Protection Operation Centres can be transferred anywhere by C-130 aircraft and have modern facilities including:

- Satellite Communication
- GSM Communication
- Video-Conference
- TV Receiver & Transmitter
- Video
- Collection of Meteo-Data
- Detection of Toxic Gases

### **2.4 Prevention operation**

The law embracing all types of hazards and phases of the disaster management cycle with an emphasis however on emergency management is Law 3013/2002 (102/1-5-2002) for the “Improvement of Civil Protection...”. This law provides that for the purpose of civil protection:

- mitigation plans are elaborated for each type of risk, preparedness measures and actions for relief are taken, reconstruction and rehabilitation are undertaken,
- Human potential might be activated as well as public and private means of any kind at the national, regional and local levels.

The General Plan of Civil Protection bearing the password name “*Xenokratis*” aims at unifying the compartmentalized structure of competences and public actions towards the reduction of risks emanating from multiple hazards and forms of vulnerability. The plan *Xenokratis* has been amended several times. The version currently in force has been institutionalised by a Ministerial Decision (of the Minister of Internal Affairs) in 2003. Among others, the main objectives of the Plan are: the realisation of risk assessment studies, ad hoc studies for the localization of sensitive and vulnerable areas and spaces as well as the elaboration of specialized plans within the framework of the overall *Xenokratis* plan.

The Regions have to elaborate their own plans in conformity with guidelines offered by the General Secretariat of Civil Protection which coordinates the individual regional risk-management plans. However, these are more or less emergency operation plans. Nevertheless, the Ministerial Decision delegates to the Regions the responsibility of mapping contingent zones of high risk within their jurisdictional boundaries.

Unfortunately, for the time being the legal framework is implemented in a minimal number of cases. In any case the *Xenokratis* plan does not refer explicitly to risk and hazard maps as a prerequisite background of mitigation, preparedness and

emergency plans and policies and does not forward them as a mandatory duty to the Regional authorities.

The system of planning policies attempting protection from flood events, for example in Greece, covering mitigation, preparedness, emergency or rehabilitation policies, is largely centralized. Regional, Prefecture and Municipal authority and administration levels are fully dependent, at least according to the law, on guidelines, instructions, policy directions and operational recommendations originating from central decision-making organs. This is especially true in the case of preparedness and emergency planning where -according to legal provisions- the central Coordinating Board of Civil Protection and the General Secretariat of Civil Protection play the leading role and keep full control over the plans formulated, activated and implemented at regional and local levels. In this sense it is impossible to evaluate regional and / or local risk management activities without reference to national level decisions and actions. The centre of gravity of decision- making as regards planning policies targeting risk reduction lies clearly and decidedly on central government agencies. Another critical feature of the system of risk management policies is the detachment of decisions and policies aiming at mitigation from those supporting preparedness, emergency response and rehabilitation. The reason is administrative fragmentation of relevant competencies and the type of hazard / risk concerned. There are also cases where one single stage of the risk management cycle, such as mitigation, is split into several policy domains as responsibilities of distinct public agencies.

#### 2.4.1. Seismic protection policy

Earthquake activity in Greece is a major natural hazard which has caused a great number of human losses over the past 50 years (see Table 1). A total of 646 lives have been lost in major earthquakes since the 1950s:

Earthquake event	Date	Human loses
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Cefalonia	1953	455
Salonica	1978	50
Corinto	1981	20
Kalamata	1987	20
Athens	1999	101

**Table 1: Major Greek earthquakes**

In term of prevention, the GSCP aims to study, plan, organise and co-ordinate national policy in matters such as the prevention of, information about and the response to, catastrophes. It is also accountable for the coordination of operations insuring the necessary preparedness of the nation to respond to catastrophes.

The Earthquake Planning and Protection Organisation (EPPO) established in 1983 runs as an independent body under Ministry of Environment, Physical Planning and Public Works (YPEHODE) and is the competent authority to guide the national earthquake protection policy and to co-ordinate the state and private resources for its implementation. EPPO is responsible for guiding the earthquake protection policy and has an experience in earthquake planning and protection regarding all phases of an earthquake disaster (prevention and mitigation, preparedness and response, reconstruction). EPPO assigns and supports research projects on earthquake protection issues. Collaboration with foreign institutions and authorities, co-operation with the scientific community and a leading role in promoting seismic safety in the country, are among its tasks. A variety of EPPO publications about prevention of earthquake disasters and earthquake protection are available on <http://www.oasp.gr>.

According to the General Plan "*Xenocrates*" the Ministry of Environment, Regional Planning and Public Works issues the Emergency Plan "*Xenocrates-Earthquakes*", i.e. the Plan for preparedness and response after an earthquake disaster. The



Emergency Plan "*Xenocrates-Earthquakes*" was issued by EPPO on June 1999, only a few months before the Athens earthquake. It defines the fields of responsibility of the ministries, the GSCP, the EPPO, the Regional Administration and the Prefecture Governments. It also assigns some role for the municipalities.

Greece has paid a heavy toll in terms of life loss and has suffered a serious damage to property and cultural heritage due to earthquakes. Eventually this experience has led to forming over the years an earthquake protection policy framework. The main lines of the earthquake protection policy are:

- To mitigate seismic risk in the built environment
- To ensure preparedness at central government, prefecture and local authorities level
- To upgrade earthquake awareness and to keep the public informed on seismic safety issues
- To improve emergency response and aid provision.

The following legislative tools consist the basis of the antiseismic policy in Greece:

- ΦΕΚ 534B/20-6-1995, New antiseismic regulation.
- ΦΕΚ 315B/17-4-1997, New reinforce concrete regulation.
- ΦΕΚ 1329/6-11-2000, Greek regulation of reinforce concrete.

The spate of relatively recent earthquake activity in Greece has seen the foundation of two key national institutes specialising in seismic-related research; the Institute of Geological and Mining Research (IGMR) founded in 1976, and the Institute of Engineering, Seismology and Earthquake Engineering (ITSAK) founded in 1979.

IGMR conducts research in projects involving the investigation and study of geotechnical problems which are related to catastrophic phenomena such as earthquakes and landslides. ITSAK also conducts research into seismic activity earthquake monitoring. Recent project work has focused on the development of techniques for studying the seismic response of structures, including:

- evaluation of damage to structures after strong earthquakes; dissemination of technical knowledge to professionals;
- microzonation studies in cities after disastrous events (Thessaloniki 1978, Kalamata 1986, Kozani-Grevena 1995);
- site-specific hazard analysis, dynamic and equivalent static analysis for important large-scale engineering structures in Greece (dams, hospitals, storage silos, chemical storage tanks, high bridges, electric-power facilities, Olympic Athletic Centre of Athens).

#### 2.4.2. Flood prevention operation

In Greece, flood risk management policies focus on emergency planning, rather than on mitigation. It is worth mentioning that even though the Directive of the European Parliament and of the Council 2000/60 (and the corresponding Greek law 3199/03) does not explicitly refer to flood management, however, the fact that it requires the completion of Management Plans (River Basin Management Plans) that will include all the appropriate measures for the achievement of the Directive's objectives, is a good starting point for the creation of Flood Management Plans with definite and concrete measures towards flood protection and management, by taking into consideration local particularities (such as cross-border collaboration etc).

Beyond the relevant provisions of *Xenokratis* plan there have been sporadic initiatives towards the elaboration of flood risk maps.

These are due to the growing consciousness that effective mitigation and emergency plans are not attainable in the absence of maps presenting spatial distribution of potential floods, risk causes and disaster impacts. However it should be emphasized that these initiatives (based on research projects, pilot demonstrations, experimental applications etc) were implemented basically from research institutes operating as consultants of public administration.

#### 2.4.3. Cartographic tools in prevention phase

Greece has already carried out hazard mapping for major hazards (Alexandris, 2005). Hazard mapping is not complete for all hazards, but lot of efforts is still underway to complete and integrate hazard mapping.

In Greece, hazard mapping is available for the following hazards:

- Floods
- Earthquakes
- Landslides
- Forest fires
- Multi-hazard
- Industrial hazards- Seveso establishments
- Nuclear
- Contaminated land
- Volcanoes
- Maritime pollution

#### 2.4.3.1. Floods

- Maps of the areas where floods have been occurred (1/100 000) for the whole territory.
- Maps of the areas in the city of Athens that can be flooded because of overflow of sewage networks. The maps will be based upon a theoretical model. The project is still under development.
- Mapping of rivers and torrents and relevant information for the whole territory at local level are available. This information is prepared by local authorities.
- Maps of the dams across the country. Relevant information and plans are available.
- Other relevant information and maps are collected and prepared in Universities and Institutes.

#### 2.4.3.2. Earthquakes

- Division of the Greek territory in seismic zones of different seismic hazard, based in the maximum expected horizontal peak ground acceleration. A list of

all cities in Greece with the corresponding values of the peak ground acceleration is also available with the above-mentioned map. According to this map the seismic design of structures in Greece is achieved so far. Three different levels are defined corresponding to the ground acceleration. The map is available in electronic format and in the Internet ([www.oasp.gr](http://www.oasp.gr)). The following methods are used a) statistical method (recent seismological data – historical seismological data – damping data b) data from neotectonic maps relevant to possible activation of existent faults.

- Neotectonic maps where all faults are shown (1:100 000). The faults are divided in seismically active, possible to be seismically active and non active. A volume where all the characteristics of each one of the faults are described is also available (type of the fault, kind of the movement, magnitude of expected movement, return period if known, areas prone to liquefaction, etc) The above mentioned neotectonic maps are part of a current project that takes place now in Greece and mainly concerns areas densely populated having a high seismic risk. When the project will be completed will cover the whole region of Greece. The method used is detailed neotectonic mapping with statistical methods of neotectonic analysis, satellite images, catalogues of epicentres and microcosmical observations.
- Seismic micro-zonation maps (1/5 000-1/2 000). The degree of completion varies from 2% to 5 % for the detailed scale concerning mainly urban areas.

#### 2.4.3.3. Landslides

- Hazard maps for the whole territory of Greece (1/100 000). The maps are based on geological, slope gradient, rainfall and seismic hazard data. 3-4 level of hazard will be defined. The project will end mid November 2003.
- Landslides hazard mapping (1/5 000-1/2 000). The degree of completion varies from 2% to 5 % for the detailed scale concerning mainly urban areas.

#### 2.4.3.4. Forest fires

- Mapping of the regions that are considered as extremely dangerous for forest fires. The map is available for the whole territory (1:200 000).
- A Daily Fire Risk Map that specifies the probability of a fire occurring over time and space is issued during the fire period from the General Secretariat for Civil Protection.

#### 2.4.3.5. Multi-hazard

- Landslides across water pipes with local problems of landslides across open channels between two dams that provide water in Attica.
- Maps elaborated for seismic zoning several cities prone to seismic hazard, also examine the probability of occurrence of other potentially damaging phenomena that could be triggered by seismic activity (earth movements, e.g. landslides, subsidence, rock-falls, debris flows).
- Hazard maps have been developed in Greece for intensely contaminated land in urban, rural and agricultural areas. The multi-hazard maps that have been developed, concern contamination of lead (Pb) in surface soil in relation to child blood-lead levels, different sources of pollution and land use activities.

#### 2.4.3.6. Seveso and industrial

- There are detailed lists of all the SEVESO installations across the country.
- Study and development of an operational centre for large scale industrial accidents.
- Mapping of three extended industrial areas in Attica (2 areas) and Thessaloniki (1 area) in the framework of large scale technological accidents planning.
- Maps for limited industrial areas are also available.
- For the determination of the industrial risk in security studies, risk levels and zones for the protection of the population and the suppression teams are used.

- Specifications for the introduction of the solid waste disposal areas into categories have been defined. The conditions and measures for the management of the solid waste disposal areas and also the monitoring of environmental indices are also defined, to attain their normal operation.

#### 2.4.3.7. Nuclear

The critical radiological installations have been identified. Also, the possibility for a major nuclear accident outside the country has been taken into consideration

#### 2.4.3.8. Contaminated land

The process of hazard mapping with respect to contaminated land is in its infancy, because of the amount of data and information required. Hazard maps have been developed only in certain areas where there are serious health related problems due to toxic element contamination. A particular urban and semi-rural case study covers an area of about 7 square kilometres, and the map scale of the hazard maps is 1/5 000. Whereas the rural and agricultural case study covers an area of approximately 170 square kilometres at a scale of 1/25000.

As far it concerns soil contaminated hazard mapping, different levels are defined for the five different types of hazard assessment maps that have been compiled:

- deterministic,
- probabilistic,
- deterministic-probabilistic,
- semi-quantitative
- quantitative.

#### 2.4.3.9. Volcanoes

The last years have been elaborated maps of the recent volcanoes from the south Aegean arc where the main potential volcanic hazard activities occur. The volcanic hazard mapping produced in 1/50.000 scale. The projection is the EGSA 87 (national system). As far as concern recent volcanoes the elaborated maps are static

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#### 2.4.3.10. Maritime pollution

Areas prone to maritime pollution have been identified, based on the number and frequency of occurrence.

Hazard maps are used by Governmental and Intergovernmental Agencies (Civil Protection, Institute of Geology and Mineral Exploration, Earthquake Protection and Planning Organization, the Ministry of Environment and Public Works), Research Institutes, and Universities. The main uses of hazard mapping are:



- Communication to the public
- Infrastructure owners and managers (transport, energy...)
- Targeted information communication amongst decision-makers
- Land use//spatial planning
- Emergency response plans
- Targeted allocation of resources for prevention
- Visualisation of information

In general every organization, authority, body/entity or citizen can access the information, but there are also exceptions where maps can not be copied or are not available if the project is still under development. There are also information, maps and plans that are confidential.

### **2.5 Forecasting operation**

There are early warning systems in Greece, especially in the field of severe weather, forest fires, atmospheric pollution and nuclear accidents. The main institutions involved in early warning are:

- National Meteorological Service (for severe weather forecast)

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- Ministry of Environment and Public Works (air pollution)
- Greek Atomic Energy Commission (GAEC) (Nuclear Accidents)
- Public Power Corporation (dam failure)

### **National Meteorological Service (HNMS):**

Following a strong commitment towards a forecasting system of high standards as it stems from the raising need to the quality of meteorological products for the highly complex bas-relief of Greece, the Hellenic National Meteorological Service follows up-to-date developments for the three local numerical weather prediction models that run in operational mode using local computational resources as well as those of the European Center of Medium Range Forecasts (ECMWF).

The first Local Model is a modified version of the Yugoslavian ETA model (hydrostatic) that was set in operation in 1995 under the project “SKIRON” in collaboration with the University of Athens. It runs twice a day with a prognostic range of 72 hours.

Next, is the Non-Hydrostatic Local Model (LM) that has been developed by the German Meteorological Service (DWD). LM is in operational use since 1998 through the Consortium for Small Scale Modeling (COSMO) that includes the National Meteorological Services of Germany, Greece, Italy, Poland and Switzerland. It runs 4 times a day locally and 2 times a day using computational resources at ECMWF with a prognostic range of 48 hours. Third is the Non-Hydrostatic RAMS model that has been operationally available under the “NHREAS” project in collaboration with the University of Athens. Within this project there is also the operation of a sea-wave model (WAM) that uses the results of RAMS model. RAMS and WAM run once a day with a prognostic range of 36 hours.

For the medium range forecasting, as a founding member of ECMWF, HNMS makes full operational use of all the ECMWF meteorological products both for its operational



mesoscale weather forecasting as well as for data assimilation, objective analysis and initialization of the local models in use.

For the short range forecasting, regarding Local Models, data assimilation for the LM is based on 6-hour cycle Nudging Analysis Scheme developed at DWD. Correspondingly, for RAMS, the Local Analysis and Prediction Section (LAPS) is used. SYNOP, SHIP and TEMP type of messages are currently assimilated.

In the field of flood risk management, the focus has been on the hardware i.e. the construction of flood protection works, rather than on software, i.e. flood forecasting and decision-making for flood mitigation and control. However, the need for optimal management of the existing infrastructure and for non constructional measures is continuous and increasing especially in flood prone regions. Nowadays, there is a shift in techniques and methodologies that focus on the development of flood forecasting systems by the combined use of ground-based measuring networks as well as weather radars.

There is still no operational use of the meteorological radar for the purpose of flood forecasting, and the implementation has remained in the field of research. The last years, many European projects were concerned with storm and flood forecasting techniques by using weather radar, in which scientists from the Laboratory of Hydrology and Water Resources Management have participated. Even though the results were very promising, the experience gained from the experimental implementation of these methodologies hasn't been used for the operational exploitation of a flood forecasting system in real time cases.

Private sector is mainly participating in disaster risk reduction efforts through the participation in co-financed National and European projects. In these projects, private sector is usually in close cooperation with Research Institutes, Universities, as well as NGOs.


Large scale corporations do participating in disaster risk reduction efforts. For instance, the Hydroelectric Projects Development Department of the Public Power Corporation S. A. (PPC) is responsible for the design and the supervision of construction of large dams. In this context, it is responsible for the safe design of dams against the possibility of breach/ overtopping which would have disastrous consequences downstream. In the past, design floods against overtopping have been selected at the 1:10 000 probability level in principal. For each project, a dam break study is conducted and its results are disseminated to competent authorities as well as to the Hydroelectric Power Plants Operation Department of the PPC. The latter is responsible to support competent State Authorities for drawing contingency plans. Large PPC reservoirs at the headwaters of a number of relatively large Greek rivers allow the PPC to offer flood management for the benefit of the cultivated and inhabited areas downstream. By all means, 1:100 floods may be considered almost totally manageable. Much more severe floods can only be attenuated.

Media are participating in disaster risk reduction efforts mainly through preparing and broadcasting, in close cooperation with the competent authorities, basic guidelines and instructions related to public awareness, preparedness and response in a case of an emergency.

NGOs, especially volunteer organizations activating in civil protection under the General Secretariat for Civil Protection, contribute in disaster risk reduction efforts. On a national level a better cooperation between the different key players and coordination should be achieved by the systematically collection and processing of the relevant information concerning all kind of risks.

## **2.6 Description of crisis management operation**

During the crisis phase of a civil emergency it is the local level emergency services (fire and ambulance services) that provide the initial response. The Hellenic Fire Brigade is organised in a national network and comes under the administration of the Ministry of Public Order. Along with the Hellenic Police, they form the emergency services. The Fire Services operate under the command of the Fire Brigade

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Headquarters, headed by a lieutenant general. The headquarters form the core of the service. The other departments are divided into:

- the regional administrations of fire services and their sub-divisions (administrative services);
- the fire stations which are operational units and are classified into categories A, B, C and D (A being the higher risk group) depending on the population density and the risk factor of the area in which they are located. Also included in this group are the fire stations of ports and airports (civil and military);
- the disaster management special unit (EMAK) which is expressly trained to deal with big incidents such as earthquakes, industrial, technological and environmental disasters;
- the special services, which provide mainly training and support (Fire Academy, Fire Workshops, general warehouse, the co-ordinating operational centre «199»).

The first Disaster Management Special Unit (EMAK) started operating in 1986 as a special branch for forest fires combat, and has participated in the rescue operations immediately after the severe earthquake which shook the town and area of Kalamata in 1986. It is an airborne rapid response unit acting all over Greece as well as abroad when requested.

The National Centre for Emergency Medical Care (EKAV) is mobilised to provide emergency health care and participates in the national search and rescue teams.

### 2.6.1. Earthquakes description

To illustrate the crisis management phase, it's interesting to show the specific organisation carrying out for earthquakes crisis. Immediately after the earthquake, a series of functions are initiated. First of all the staff and the material resources of the key response services are mobilised. The National Emergency Operations Centre at the General Secretariat for Civil Protection is activated, as well as the Operational Centres for key response Services, such as the Fire Services, the EPPO, the Hellenic Centre for Emergency Care and the Police.

At the same time, a series of emergency operations were taking place such as:

- inspecting the lifelines and critical facilities,
- assuring that the key facilities of the city are safe to be occupied, first aid and emergency care,
- Restoration of utilities, outdoor sheltering, water and food distribution, installation of portable toilettes, hygiene inspections and control, distribution of a series of items and first need supplies, management of aid.

EPPO is also responsible for coordinating the activities of public and private bodies implementing this policy. This includes the coordination for implementing the national policy. EPPO has established an emergency scientific team consisting of seismologists and structural engineers, responsible to advise SDO in case of an earthquake disaster. At the prefecture level the coordinating body (SNO) chaired by the prefect is the responsible decision-making body to handle emergency situations. At the local (community) level the coordinating body (STO) chaired by the mayor is involved.

On day after the earthquake, the first-degree rapid safety assessment of buildings is started. The aim of the inspections is to warn the occupants about the safety of the building after the earthquake. The standard method for rapid, first-degree safety assessment of buildings issued by EPPO at 1998 is used. Buildings are divided in three categories and posted accordingly:

- Red: Dangerous. No entry.
- Yellow: Not safe. Limited entry at own risk.
- Green: Possibly damaged but not unsafe.

#### 2.6.2. Forest fires and desertification

Fires are responsible for destroying an average of 300km<sup>2</sup> of forest annually even though intensive management efforts reduce their effects substantially. The general Secretariat of Forest and Physical Environment (Central and local departments) is

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responsible for forest fire fighting, prevention, and training. The main concentration of forest fire prevention research is undertaken at the Forest Research Institute (FRI).

The FRI, Section of Forest Protection includes 3 Laboratories, one of which is the Forest Fire Laboratory which is involved in a research program aiming towards an improved model for forest fire behaviour.

Related to forest fires is the process of desertification. Areas in danger of desertification can be found in the southern and central mainland, on the Aegean Islands and in Crete. An area of about 15,000 km<sup>2</sup> is affected. In 1990, about 810,000 people lived in these areas. Natural causes and forest fires have the most serious impact on desertification. The main obstacles to combating desertification and drought are land ownership, grazing rights on public land and land speculation. The International Convention to Combat Desertification in Countries experiencing Drought and/or Desertification was signed in 1994.

### 2.6.3. Coastal pollution

A large portion of the Greek population and human activity is concentrated in the coastal zones. Therefore, the pressure upon the environment and natural resources is particularly high, and the area at risk is extensive - the hellenic coastline extends for 13,676 km.

The National Centre for Marine Research (NCMR) is a governmental research institution belonging to the General Secretary of Research and Technology. It was founded to promote basic research in all fields of the aquatic environment and provides comprehensive and technical support to the public on all aspects of the marine and freshwater environments. The national activities of the NCMR include the implementation of national development programs:

- special studies for scientific purposes,

- consultant services for the public and private institutions,
- organization of special teams trained to deal with national emergencies, such as pollution accidents.

In terms of national coastal emergencies, the NCMR participates in the open sea Marine Pollution Program (Aegean, Cretan and Ionian Seas) launched in 1983. This is developed under the guidelines of the MEDPOL/UNEP program. It concentrates on the monitoring of chemical, biological and physical parameters of the open waters around Greece. Chemical parameters include the measurement of nutrients and pH, heavy metals in water, in sediment and in biological organisms, petroleum hydrocarbons in water and sediment. Physical parameters include T,S,O meteorological data and currents. NCMR also participates in the European-wide EUROMAR program.

## **2.7 Post-crisis operation and training**

The Earthquake Rehabilitation Service (YAS) under YPEHODE has as main task the implementation of the policy on earthquake reconstruction of buildings at national, prefecture and local level. YAS supervises the rehabilitation and reconstruction procedure and the Service keeps records of the state funds expenditure for the reconstruction and repair of earthquake damaged buildings.

There is a systematic socio-economic and environmental impact and loss analysis after each major disaster. After a major disaster a socio-economic and environmental impact and loss analysis are performed and the results are in general available to every organization, authority, body/entity or citizen. For instance, after strong earthquakes socio-economic analysis is carried out for the disaster area and studies of macroseismic observations in the affected areas are usually carried out, describing damages on structures and secondary geological phenomena, such as surface ruptures, subsidence, landslides, rock falls etc. Also, seismic zonation studies, in urban areas suffered strong earthquakes.

From the training point of view, some seminars concerning disaster risk reduction are provided by governmental services and institutions to special target group (decision makers, workers, etc).

These seminars are in general raise the awareness and familiarize target groups with the concepts of disaster risk reduction. This information is mainly useful at local level planning, where disaster risk reduction concepts are gradually integrated to planning activities.

### 3 ITALY



#### 3.1 Civil Protection global Organisation

The Civil Protection National Service (SNPC<sup>11</sup>) consists of central and peripheral State administrations, Regions, Provinces, municipalities, national and territorial public agencies, and any other public and private institution and organisation present on the national territory. The President of the Council of Ministers provides for the co-ordination of the National Service and the promotion of civil protection activities through the Civil Protection Department (DPC<sup>12</sup>). DPC constitutes the junction of the Civil Protection National Service. Its main tasks include:

- promoting and co-ordinating the whole system;
- intervening directly in case of national disasters;
- defining intervention and action procedures common to the whole system;
- giving guidelines for legislation relative to risk prevention;
- supporting peripheral structures, particularly the ones with fewer resources;
- directing the setting up and management of information networks necessary for risk prevention.

The SNPC system is based on the principle of subsidiary. In each Municipality, the first person responsible for civil protection is the Mayor, who organises municipal resources according to pre-established plans made to cope with specific risks in his territory. When a disastrous event occurs, the SNPC is able, in a very short time, to define the event's significance and assess whether local resources are sufficient to face up to them.

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<sup>11</sup> Servizio Nazionale Protezione Civile

<sup>12</sup> Dipartimento della Protezione Civile



In case of necessity the support of Provinces, of Regions and the assistance of peripheral State administrations, will be guaranteed and co-ordinated by the Prefects. In the most serious situations, a national integration will take place: forces available on the spot will unite with any other staff and equipment necessary to meet the needs effectively. For the system to function it is important that the local, regional or national authorities take charge of operations according to the gravity of the event and within their competence. In cases of national emergency this role rests with the Civil Protection Department, whereas the President of the Council of Ministers assumes the political responsibility. The civilian society also takes an active part in the SNPC, mainly through voluntary organisations. These voluntary organisations are nowadays structured at the regional level and there has been an increase in the number of available volunteers - the members of civil protection organisations are about 1.200.000, as well as in operative capacity, training, competence, experience, technical equipment and operative instruments.

The organisation model of our civil protection proves to be particularly adequate to a territorial context such as the Italian one, which presents a wide range of possible risks of disasters and catastrophes. Almost every area of the country is exposed to many risks, such as:

- Volcanic risk
- Seismic risk
- Forest Fires risk
- Floods, Landslides, Coastal erosion
- Snow avalanche risk
- Industrial risk
- Anthropogenic risk

It is therefore important to carry out prevision activities, that are developed by means of an increasingly close linking system between DPC and the world of scientific

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research, with new technological systems for collecting and processing data on different types of risk, and with data processing centres (Competence Centres) that are able to forewarn as early as possible of the probabilities of natural disasters. This series of technical-scientific activities ranges from the collecting of information in the area to their processing, to the interpretation of data according to models and simulations of disastrous events. It enables the Civil Protection, at all levels, to assess situations of possible risk, alert the intervention system ahead of time but, above all, to provide the competent authorities with the necessary elements, so as to make judicious and opportune decisions. Civil Protection's forecasting and monitoring units are being transformed into a network of "Centri Funzionali" organised at a national and regional level. It is therefore necessary to have a civil protection system that is able to ensure in each area the presence of human resources, equipment, operative and decision-making capabilities ready to intervene in a very short time in case of disasters, but also to operate with continuity in order to prevent and, as far as possible, predict disasters.

### *3.1.1. Staff*



The national organisations involved in SNPC are:

- National Fire Brigade;
- Armed Forces;
- Police;
- State Forestry Corps (CFS<sup>13</sup>);
- The National Alpine Aid Corps (CNSA<sup>14</sup>)
- Italian Red Cross;
- Voluntary Organisations
- National Technical Services;
- National Scientific Research Groups including the National Institute of Geophysics and Volcanology (INGV<sup>15</sup>), CNR and Universities;

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<sup>13</sup> Corpo Forestale dello Stato

<sup>14</sup> Corpo Nazionale Soccorso Alpino

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- National Health Service Departments;
- Private Agencies/Companies and Public Administrations.

### 3.1.2. The Civil Protection Department

The Civil Protection Department of the Presidency of the Council of Ministers (DPC) is the operative arm of the President of the Council, when it comes to coping with the protection of the country's people and goods, undergoing particular threats and dangers deriving from conditions of natural, environmental or anthropic risk. The DPC constitutes the junction of the Civil Protection National Service; its tasks include: promoting and co-ordinating the whole system; intervening directly in case of national disasters; defining intervention and action procedures common to the whole system; giving guidelines for legislation relative to risk prevention; supporting peripheral structures, particularly the ones with fewer resources; promoting and supporting the activities for the formation and growth of civil protection organisations; informing public opinion and promoting civil protection culture, particularly among young people; directing the setting up and management of information networks necessary for risk prevention; producing and managing exceptional regulations – the official orders - needed to enforce emergency interventions and deal with calamities, in order to reduce to the utmost the damage to people and things. The Department's staff is highly specialised in emergency management, both from the administrative and technical-operative viewpoint.

This has led the Government to request its intervention in all situations, even atypical ones, in which organisational and managerial capability in complex operations and the efficient and authoritative co-ordination of numerous administrations and institutions are necessary, as in the case of “great events”. Or, more recently, in dealing with new risks that can also involve our country with the changed

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<sup>15</sup> Istituto Nazionale di Geofisica e Vulcanologia

international situations, or in case of the spreading of dangerous and unknown epidemics. The Figure 8 shows the synthesis on the Italian organization.

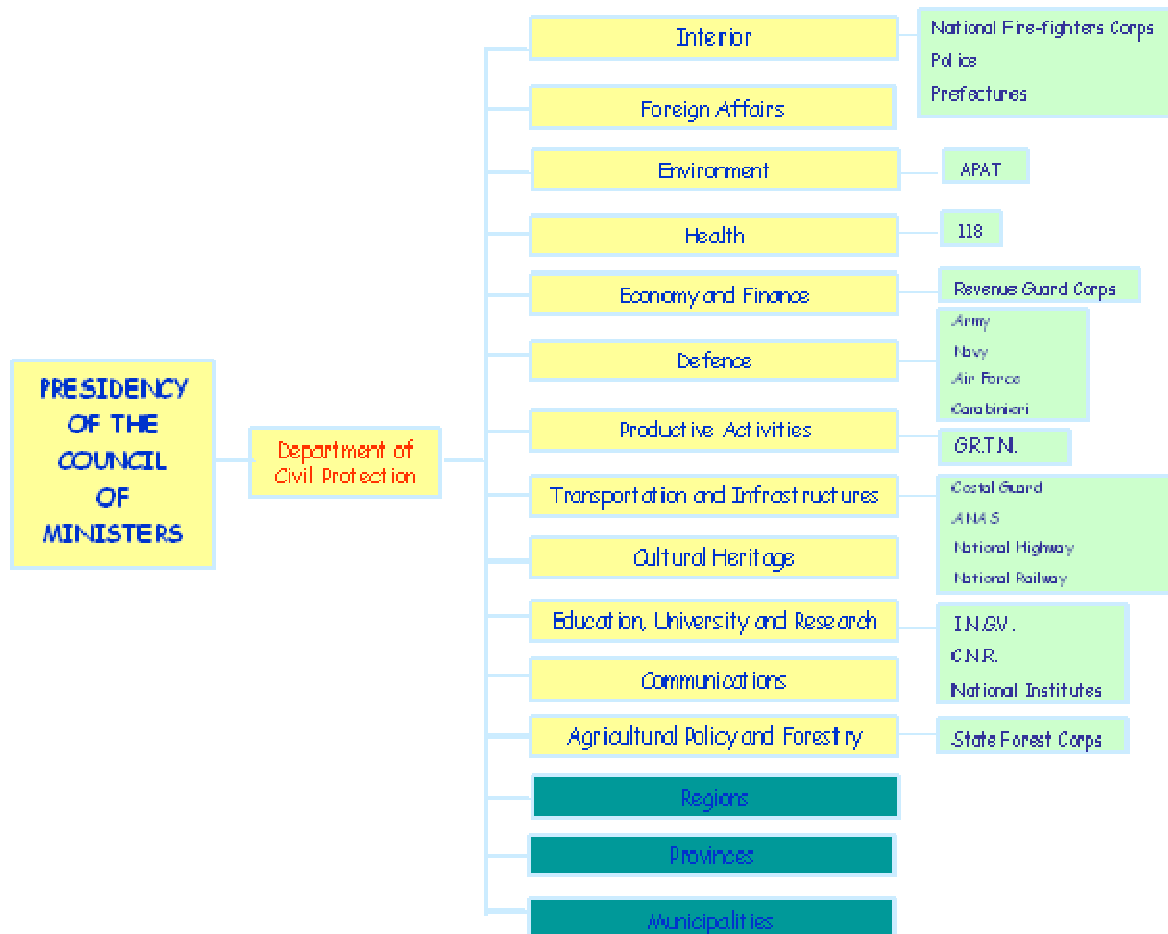




Figure 8 : Synthesis on the Italian organization

### 3.2 Description of prevention operation

The knowledge of the territory and of the various risks' danger thresholds is the basis not only for prevision activities necessary to make the rescue organisation efficient, but also to identify the directions and guidelines of the different kinds of possible prevention interventions. It is the civil protection's task to inform the competent authorities of useful interventions to reduce within acceptable thresholds the probabilities of disasters or at least to limit possible damage. The recent revision of

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the national seismic map is set in this context. As everybody knows, science is not able at present to forecast the occurrence of an earthquake. However, we have at our disposal rigorous, scientifically verified information on the different exposure to seismic risk of the Country's areas, which allows us to identify in which municipalities it is necessary to use adequate building techniques to increase the constructions' resistance in case of an earthquake. Apart from seismic risk, the civil protection system keeps under control in a more and more accurate way the various types of hydrogeological risks, the map of the areas more prone to forest fires, the areas where risks connected to a high level of industrialisation are more likely.

### 3.2.1. Risks affecting the Italian territory

#### 3.2.1.1. Earthquakes

The Italian territory stretches over several tectonic plates, whose reciprocal movement periodically produces earthquakes. For this reason, Italy has a high seismic risk: it is estimated that about 20 million Italians are potentially exposed to earthquakes. This is a not foreseeable phenomenon, generally of very short duration, but with devastating consequences, as can be seen from recent history. In fact, it should be considered that earthquakes often hit buildings that belong to Italy's artistic heritage and which, for the most part, particularly in the historic centres of our numerous municipalities, date back to ancient times, when anti-seismic building techniques were still unknown.

Moreover, building speculation of the last decades has worsened this situation, which needs to be remedied by means of huge interventions and investments.

#### 3.2.1.2. Volcanoes

Southern Italy has the highest concentration of active volcanoes in Europe: Vesuvius, Mount Etna, the islands of Stromboli and Vulcano, the Campi Flegrei. Volcanoes have been in the past the protagonists of disastrous eruptions, which destroyed

entire cities and caused thousands of victims: suffice it to remember the Vesuvius' eruption that destroyed Pompei in 79 A. D. Today, thanks to the study and the continuous monitoring of certain forewarning phenomena, it is possible in many cases to predict an eruption ahead of time and consequently take important preventive measures.

#### 3.2.1.3. Floods, landslides, landslips and coastal erosion

Hydrogeological risk represents for Italy a danger which is second only to the seismic one, in terms of loss of human lives and of damages caused to structures. The causes of such risk can be of natural origin, as in the case of exceptionally heavy rainfall and stormy seas. However, man's negative influence, which can be seen in unauthorised housebuilding, neglect of watercourses' maintenance, indiscriminate deforestation is, in most cases, a determining factor in the gravity of the effects. In addition to the consequences closely linked to the violent force of water, there are also phenomena of a typically geological nature, such as landslides and landslips (see Figure 9), which in turn widen, throughout time and space (see Figure 10), the risk situations in which civil protection must intervene.

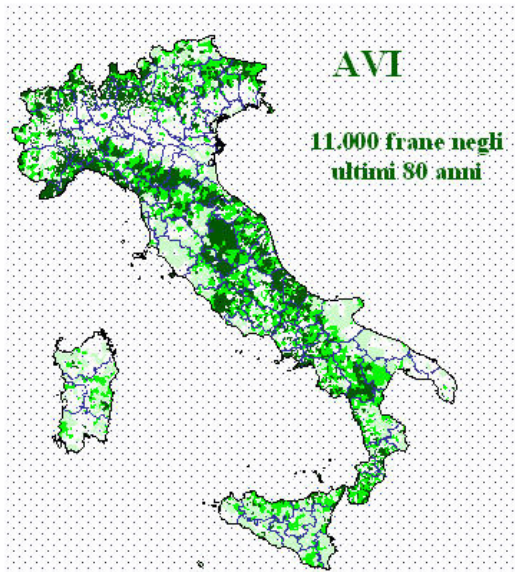


Figure 9 : Landslide risk in Italy

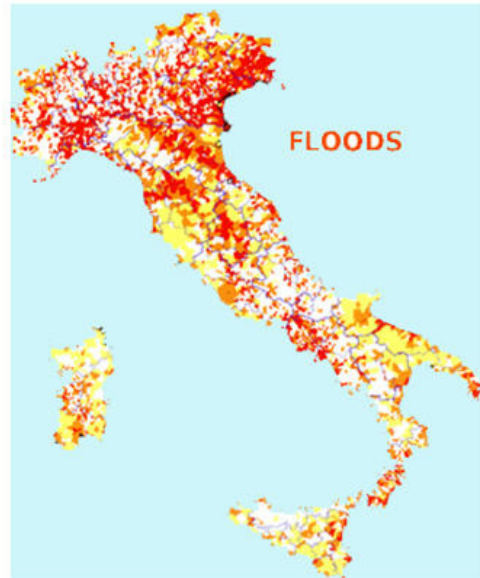


Figure 10 : Flood risk in Italy

#### 3.2.1.4. Forest fires

The Italian forest heritage, among the most important in Europe by extension and variety of species, represents an enormous wealth for the environment and economy, for the territory's equilibrium, for the conservation of biodiversity and landscape (see Figure 11). However, every year thousands of hectares of forests are burnt by fires very often due to arson, connected to building speculation or human negligence and carelessness. The consequences on environmental equilibrium are extremely serious and the recovery time of the ecosystem is very long. Today, thanks to a strong sensitisation campaign and a more careful legislation, risks - albeit still very high - can be reduced, and fire-fighting interventions have undoubtedly become more efficient.



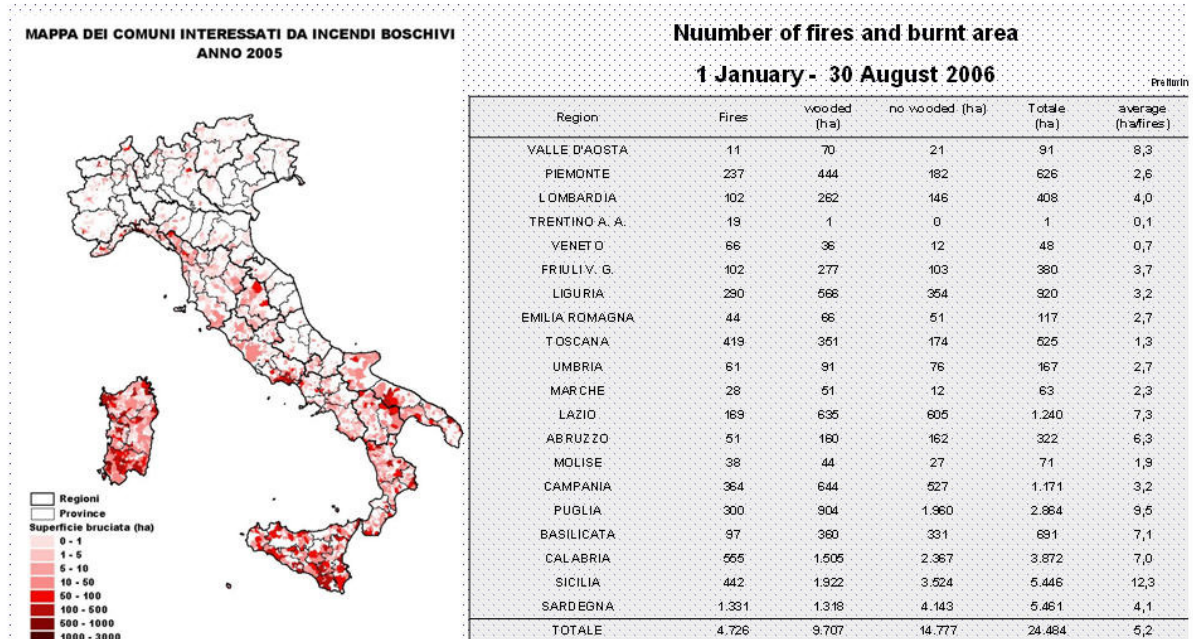


Figure 11 : Map of the areas affected by forest fires

### 3.2.1.5. Industrial activities

In the last fifty years Italy has developed so much that, from being an essentially agricultural country, it has become one of the most industrialised countries in the world, not without paying the price of an increase in possible dangers. Industrial activities, in fact, can determine two main risk typologies. On one hand, the severe climatic changes and the damages to public health and to the environmental and artistic heritage caused by small, but constant detrimental actions: from the emission of toxic gases, to the discharge of polluting substances in the water or ground, from deforestation to excavations. On the other hand, some enormous potential risks determined by anomalous events of relevant proportions, such as the disaster in Seveso, the explosion of the nuclear power station in Chernobyl or the recent shipwreck of the oil tanker Prestige. The effects of this type of events are devastating and cause serious consequences, especially on public health, which can last for decades and reach areas that are far away from the disaster area.



### 3.3 Description of forecasting operation

The history of great catastrophes in our Country has taught us that, in order to protect efficaciously human lives and the community's heritage, one should not rely solely on timely rescues, but dedicate energies and resources most of all to the prevision and prevention of calamities. Prevision activity is developed by means of an increasingly close linking system between civil protection and the world of scientific research, with new technological systems for collecting and processing data on different types of risk, and with data processing centres that are able to forewarn as early as possible of the probabilities of natural disasters. This series of technical-scientific activities ranges from the collecting of information in the area to their processing, to the interpretation of data according to models and simulations of disastrous events. It enables the civil protection, at all levels, to assess situations of possible risk, alert the intervention system ahead of time but, above all, to provide the competent authorities with the necessary elements, so as to make judicious and opportune decisions. This is the continuous, almost invisible, but fundamental work of the civil protection's prevision units, which are being transformed into a network of "Centri Funzionali" organised at a national and regional level. The use of technologically advanced networks (such as radar networks for weather forecast, the national seismography network, the sophisticated systems for monitoring volcanic activity), and of the best scientific and professional experience should make Italy's civil protection able to intervene immediately and, whenever possible, with preventive measures such as the evacuation of risk areas.

#### 3.3.1. Data and knowledge providers – "Centri di Competenza"

Competence Centres are Institutions which provide services, information, data, and elaboration, technical and scientific contributions for specific topics.

According to the Directives some National Competence Centres, concerning hydro-geological and hydraulic, volcanic, and seismic risk and satellite data have already been defined.

There are various data providers adequately selected in order to give appropriate information related to the different types of risk:

- National Hydrogeological Disaster Defence Group (GNDCI<sup>16</sup>) and National Meteorological Service for meteorological and hydrological data in support of flood and landslide monitoring and forecasting;
- National Meteorological Networks (synoptic observations, weather radars, satellites, lightning);
- Regional Observing Networks (rain gauges, hydrometers);
- State Forestry Corps for forest fire risk;
- National Institute of Geophysics and Volcanology (INGV), National Research Centres and Universities;
- Public Administrations and Private Companies/Agencies (GIS and EO data).

All these continuous flux of data are received in real-time or near real-time and inferred into DPC computing facilities for data elaboration and models. “Competence Centres” also provide outputs of their scientific findings and technical results. All the above mentioned information are used by the “Centro Funzionale Centrale” (CFC) in Rome, which has the main task of monitoring H24 the entire territory against potential natural disasters, and alert the Civil Protection System by the emission of early warnings to local and national Authorities.

Data storage is an additional delicate task of the central operational structure of DPC, because this allows to compare in real-time any part of the territory before and after a disastrous event. Emergency Management and Recovery are also heavy and important tasks performed in case of critical situations.

### 3.3.2. Centro Funzionale Centrale (CFC)

DPC and the Regions ensure the National Warning System’s management through the network of the “Centri Funzionali” and “Presidi Territoriali”, and also through the regional structures and “Centri di Competenza” (CdC). The “Centro Funzionale

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<sup>16</sup> Gruppo Nazionale per la Difesa dalle Catastrofi Idrogeologiche

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Centrale” (CFC), for all the various risks affecting the Italian territory, has the task to bring together and integrate in the network of the CdCs all the territorial qualitative and quantitative data acquired from the monitoring networks, models useful for prevention, risk evaluation and surveillance.

CFC also provides:

- Support and general coordination to the “Centri Funzionali’s” network;
- Surveillance of single regional, provincial and local territories;
- Communications with National Dam’s Registry, the Military Air Force’s Meteorological Service, National Institute of Geophysics and Volcanology (INGV), and furthermore with the Agency for the Environment Protection (ARPA);
- Support to researches and studies.

CFC system is organised into 3 major areas to which the General Offices and Units’ activities are strictly connected. The first area is dedicated to data collection, storage, development and validation; the second area is dedicated to the interpretation and use of all the data and information collected from the provisional models, for every single risk, and provide decision support to all the other Civil Protection Authorities; the third area is dedicated to the information’s exchange management and has the task to connect the “Centri Funzionali’s” network to the CdCs.

The activities carried out by the Network of the “Centri Funzionali” include the forecasting phase together with the monitoring and surveillance.

The *forecasting phase* is composed of 3 functions:

- Forecast of the expected events’ nature and strength;
- Forecast of the effects that an event could bring to the national territory;
- Evaluation of the expected criticality level.

The first function can be carried out by the CdCs, while the second and the third have to be accomplished by the CFC.

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The *monitoring and surveillance* phase aims at giving all the information necessary to process or confirm and update the expected scenarios, following the event, throughout the acquired data from the several sensors' typologies. This phase also can be divided into 3 functions:

- Building and representation of the acquired data from remote sensors and stations;
- Short-term forecasting of the event and effects throughout models and other information collected in real-time;
- Test of the present and forecasted criticality level, comparing the measures acquired with the adopted thresholds or by communicating with local observers.


The first function can be carried out by the CdCs, while the second and the third have to be accomplished by the CFC.

### 3.3.3. Centro Funzionale Centrale for Volcanic Risk

The Centro Funzionale Centrale-Rischio Vulcanico (CFCRV) represents the technical branch and the scientific decision-support section of the Italian Civil Protection Department (DPC).

The main task of CFRV is to collect, share and synthesize data related to volcanic hazard provided by the Competence Centres (INGV sections, University of Florence). Surveillance Bulletins of Italian volcanoes for the assessment of impending risk are worked out daily or weekly to support Civil Protection actions and procedures. Surveillance bulletins are also quickly carried out as a sudden and exceptional activity is recorded on any Italian volcano. CFRV works in H12 or H24 depending on the level of activities of the monitored volcanoes.

During the volcanic emergency phases the CFRV is supported by a scientific Synthesis Group made up of expert volcanologists of the High Risks Committee, researchers of Competence Centres involved in the monitoring activities and a Civil Protection Manager/Officer expert in risk evaluation.

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The main activities of the CFCRV are:

- acquisition and analysis of the data collected;
- development and usage of models to simulate the scenario in terms of realistic or potential effect;
- criticalities evaluation and support to the decision making process;
- dissemination of warning and criticality bulletins.

Currently in the CFCRV are shown the following data:

#### 3.3.3.1. Stromboli

- real-time seismic signal of Roccette station (750m);
- real-time acoustic infrasonic signal;
- volcanic tremor's weekly and monthly trends;
- real-time localization of infrasonic signal source;
- real-time evaluation of intensity and source of the explosions and degassing;
- models estimating the fall-out of the ejected material during the explosions;
- real-time thermal camera at 750m and infrared camera at 400m ;
- interferometric radar (SAR) monitoring of the Sciara del Fuoco flank ;
- CO2 flux at Pizzo sopra La Fossa;
- real-time weather station and Aeronautica Militare Italiana meteorological station;
- models simulating the effects of tsunamis triggered by landslides;
- models simulating the tephra fall-out in case of strong or paroxysmic explosions;

#### 3.3.3.2. Etna

- 2 stations for CO2 fluxes;
- seismic signals from two separate stations located at different altitudes;
- real-time thermal and visible cameras;

- model simulating the tephra dispersion and the areas affected by ash fall-out;
- real-time volcanic tremor's trend;
- near real-time images acquired by AVHRR;

#### 3.3.3.3. Vulcano

- fumaroles' temperature in critical areas;
- real-time visible camera;

#### 3.3.3.4. Vulcani Campani (Vesuvio, Campi Flegrei e Ischia)

- real-time seismic-signal for each area;
- real-time localization of seismic events in the area.



#### 3.3.4. Warning and Surveillance Systems: the hydrogeological case

The Italian territory is characterized by a great number of medium-scale (< 1000 km<sup>2</sup>) water basins and complex orography. The knowledge of the atmospheric parameters, such as precipitation intensity, its' phase (rain, snow, hail) and of the event's space-time dynamics, allows to evaluate approximately the effects on the territory and consequences on the population involved. The prevision of a bad weather condition is carried out throughout a deep macroscale analysis of the background and throughout many computer based products related on one hand to ground observations (rain gauges, wavemeters) and on the other hand to numeric simulations. Furthermore along with the information's provided by ground-based monitoring systems there are the remote sensed products (i.e. satellite images, weather radar).

As far as the numeric modelling is concerned the most used supports are the medium-range forecast models (ECMWF) and limited area models (LAMI – Limited Area Model of Italy), very useful for short-term forecasts (up to 72 hours).

### 3.4 Description of crisis management operation

#### 3.4.1. Crisis Management Overview

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It is of fundamental importance for civil protection to be a well-organised “emergency intervention machine”, able to reduce to the utmost the time that elapses between a disastrous event and the first rescue operations and interventions. The work of defining “emergency plans”, elaborated at a national and local level; the continuous updating of emergency procedures; the regular exchange of information between all levels of the system; the training activities for the staff and practice of all the components that take part in civil protection, and the development of technical means available are all actions dedicated to this purpose.

Thanks to this systematic work and the increased correspondence of the structures present at the regional level, some satisfying results have been achieved in the last few years both in the reaction times and in the methods of rescue operations. The definition of necessary actions, as well as the capability to operate in order to reduce damages and start in due times the activities to restore normal living conditions in disaster areas have definitely improved.

#### 3.4.2. Civil Protection Organisation and Emergency Cycle Management - Stromboli 2007

After a few weeks of intense volcanic activity, characterized by a very high rate of the meaningful parameters, on the 27<sup>th</sup> of February the National Monitoring Centres (*National Institute of Geophysics and Volcanology* and *University of Florence*) communicate to the *Centro Funzionale Centrale – Rischio Vulcanico* (CFRV - the scientific decision-support unit of the National Civil Protection) significant variations of the state of volcanic activity especially regarding blocks rolling along the Sciara del Fuoco flank. CFRV, in attention phase since January 2007 noticed, throughout the surveillance cameras, at 12.30 GMT p.m., an explosive phase followed by the opening of an effusive vent at the NE crater’s base that triggered several landslides along the Sciara del Fuoco. Immediately all the warning procedures began to work and the *Advanced Operational Centre* (COA<sup>17</sup>) of Stromboli was instructed to launch

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<sup>17</sup> Centro Operativo Avanzato

acoustic signals in order to warn people to move out from the coastline, according to the tsunami's risk emergency procedures.

CFRV contacted the Responsible of the National Monitoring Centres and the experts of the High Risk Committee for a preliminary evaluation of the phenomena, and then started to operate no stop surveillance.

At the same time a Crisis Unit was gathered to coordinate the emergency activities. It sent two operative teams by helicopter that in a few hours reached Stromboli and Lipari Islands to enlarge Stromboli COA's activities and verify the readiness of local Operative Centres regarding the Aeolian archipelago emergency procedures. Volcanic surveillance activities are normally carried out by remote monitoring centres; in emergency condition, Stromboli COA becomes the unique surveillance centre hosting all monitoring sectors' researchers. In the same way, Police Officers, Mountain Rescue Unit of *Guardia di Finanza* Officers, an Air Force air-traffic controller, Coast Guard seamen and the Official Volcanic Guides also take part in COA's activities. So at the Stromboli COA all emergency operative functions are activated (direct surveillance, monitoring data collection, events synthesis and evaluation, emergency management activities, population support, radio links control, logistic supports and mass-media communications).

At the COA all monitoring and assessment activities reported to a Synthesis Group, composed by volcanic experts of the High Risk Committee and monitoring managers, that constantly evaluated the hazard status of the volcano providing the basis for all emergency procedures.

During the first emergency phase, according to the fast evolution of volcanic dynamics and the consequent variation of the hazard status, the population was precautionary moved out several times from the dangerous areas of the coastline. Moreover the safety altitude limits were also modified for hikers, accompanied by volcanic official guide. Stromboli COA continuously reported the situation to the





Neighbourhood Committee and several meetings with Stromboli's and Ginostra's village or Panarea Island population were organized to ensure correct information. A multi-language brochure was arranged to inform visitors and hikers about behaving and self-safety rules.

The following figure (Figure 12) shows the management scheme of the Italian Civil Protection organization.

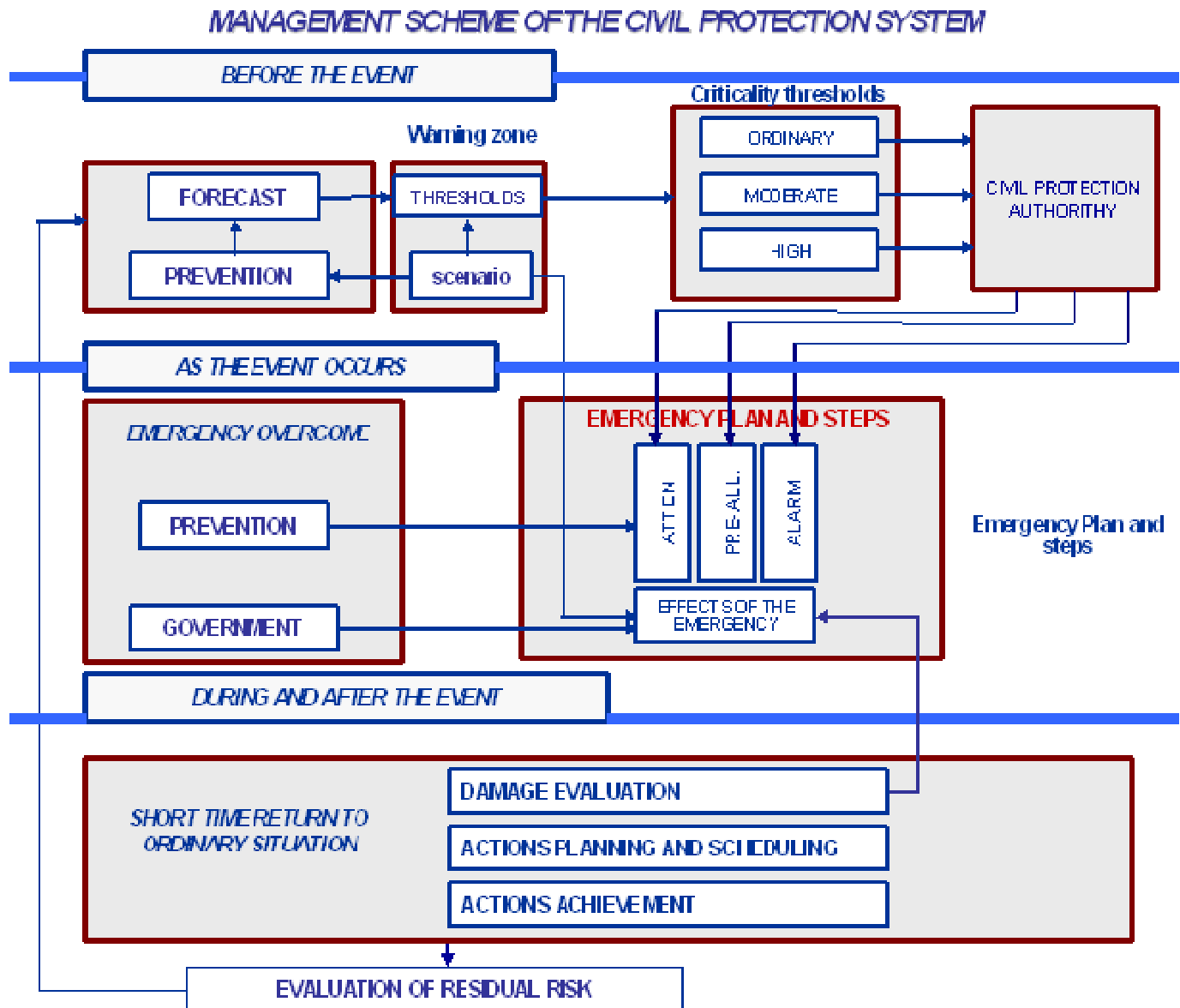




Figure 12 : Management scheme of the Italian Civil Protection System

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## 3.5 Training

### 3.5.1. Civil Protection National Exercise – Valtellina 2007

#### 3.5.1.1. Overview

All the planned initiatives represent an opportunity to relate an important part of Civil Protection history. Civil Protection has become stronger, after the Valtellina experience occurred 20 years ago in July which involved an extended area including up to five provinces of the Regione Lombardia: Bergamo, Brescia, Como, Lecco and Sondrio. The institutions and the volunteers are called to perform an essential role in the framework of forecasting and prevention activities, which are vital elements for an updated Civil Protection mentality. The “Valtellina 2007” national exercise simulates a meteorological situation similar to the one occurred in 1987, involving the provinces of Brescia, Bergamo, Como, Lecco and Sondrio, including a total of 27 municipalities. The operational response facing the simulated event’s effects, will demand the employment of resources and extraordinary powers as in emergencies classified as C type events), according to article 2 letter c) Law 225/1992. The main objective is to become aware of the role played by each component of the civil protection system during the real event, to test a carefully researched response model and to use a language and procedures shared on a national level. The entire regional civil protection system will be engaged for this purpose, also through the testing of the twinning process among the above mentioned Provinces of the Regione Lombardia with other Lombard Provinces not directly interested by the scenario. Other Regions will be called to participate with the Lombard system to carry out specific activities related to technical scientific functions.

#### 3.5.1.2. Objectives of the National Exercise

The general objectives of the exercise are to test how quick and effective is the response provided by the emergency management system at a local level integrated with the regional and national levels. Within this context we can define the following specific objectives:

1. With regard to the population:

- To offer the opportunity to learn about local, regional and national civil protection;
- To spread information through the main communication media on the risks present on the territory and the specific behaviour codes to adopt;
- To test intervention models and procedures related to the management of the residents of the areas at risk, besides the population's evacuation and assistance.

## 2. With regard to the institutional bodies

- To actively involve the institutions and the competent operational structures in the exercise's preparatory and planning phases ;
- To update and test emergency plans at a municipal inter-municipal and provincial level,
- To test the early warning procedures for hydro-geological risk through the Operational Centres involved in monitoring natural risks
- To test the timing and activation procedures of the operational centres and verify the information flow between the national, regional, provincial and municipal operational centres (cf. Control and command system);
- To test of the telecommunications system particularly in the critical areas;
- To verify the Health Care System's coordination procedures;
- To test the modalities and procedures for the survey of damage and effects caused by the emergency;
- To share a standard communication project for the population, the Local Institutions and the Mass- Media



## 4 FRANCE

### 4.1 Civil protection global organisation

The French civil protection is described for three scales; national, zonal and local scales.

#### 4.1.1. National level

Many administrations and services are involved in civil protection. Responsibilities are shared between Ministries, Zones, Departments and Communes. Civil Protection is based both on actions undertaken by State structures as well as on facilities set up for relief throughout the country. In addition they are supported by decentralized authorities.

The Ministry of the Interior pilots French Civil Protection operations and controls the main part of national rescue means. The Management of Defence and Civil Safety (DDSC<sup>18</sup>) is the central structure and is in charge of prevention and operations - through several operation centres. The Director of Civil Protection and Security is a high-rank official (Prefect), appointed by the Ministry of Interior.

The Ministry of the Interior disposes of the essential portion of national relief resources. It may apply to other ministries for help that it solicits or monitors as the lead organism in civil safety:

- The Ministry for Defence intervenes in forest fires;
- The Ministry for Ecology and Sustainable Development coordinates the governmental policy on major natural and technological disasters. It also controls "classified installations for the protection of the environment".
- The Ministry for the Economy, Finance and Industry intervenes directly in the prevention of technological hazards: nuclear hazards or hazards related to hydrocarbons, etc.

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<sup>18</sup> Direction de la défense et de la sécurité civiles

- The Ministry Delegate for the Budget and Administrative Reform coordinates activities for the prevention of domestic accidents and the safety of goods proposed to consumers.
- The Ministry for Health and Solidarity supervises urgent health services (SAMU<sup>19</sup>), and emergency and re animation services (SMUR<sup>20</sup>).
- The Ministry for Transportation, Capital Works, Tourism and Maritime Affairs conceives the regulations concerning safety against fires in inhabited buildings.
- The Ministry for Employment, Social Cohesion and Housing is directly concerned by the prevention of accidents and damages in enterprises and professional premises.
- The Ministry for Agriculture and Fisheries is responsible for the prevention of forest fires, the management of and safety in forests (clearing, forest paths to prevent fires, forest fire-fighter units, etc.).

At the national level, an Inter-ministerial Operational Crisis Management Centre (C.O.G.I.C.<sup>21</sup>) collects all information regarding a serious event that may harm the population, material goods or the environment. This is a tool that is permanently on the watch to assist the Government in its decisions. It informs the Cabinet of the Ministry of the Interior of all situations justifying emergency measures. It must also respond to requests for technical information formulated by prefectural authorities and, if necessary, place at the disposal of these authorities all necessary supplementary means for action. In addition, it directs and coordinates the use of means of action engaged at national or international levels.

#### 4.1.2. Zonal level

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<sup>19</sup> Service d'aide médicale d'urgence

<sup>20</sup> Service mobile d'urgence et de réanimation

<sup>21</sup> Centre opérationnel de gestion interministérielle des crises



At the intermediary level, civil protection is organised with 7 Civil Safety Zone Staff (EMZ<sup>22</sup>) (see Figure 13 - Paris, Bordeaux, Lyon, Metz, Rennes, Lille and Valabre, and two in the overseas territories (Martinique et La Réunion)) which analyses all the risks the zone is likely to encounter and elaborates the guidelines for the training of firemen. It also establishes a general plan for the organization of relief (ORSEC) in the zone. Each zone is directed by a prefect of region who becomes the chief of rescue operations when a zonal disaster occurs.

Under the authority of the chief of the EMZ, the operational zone centres (C.O.Z<sup>23</sup>) coordinates relief operations regarding several departments or that need national reinforcement.

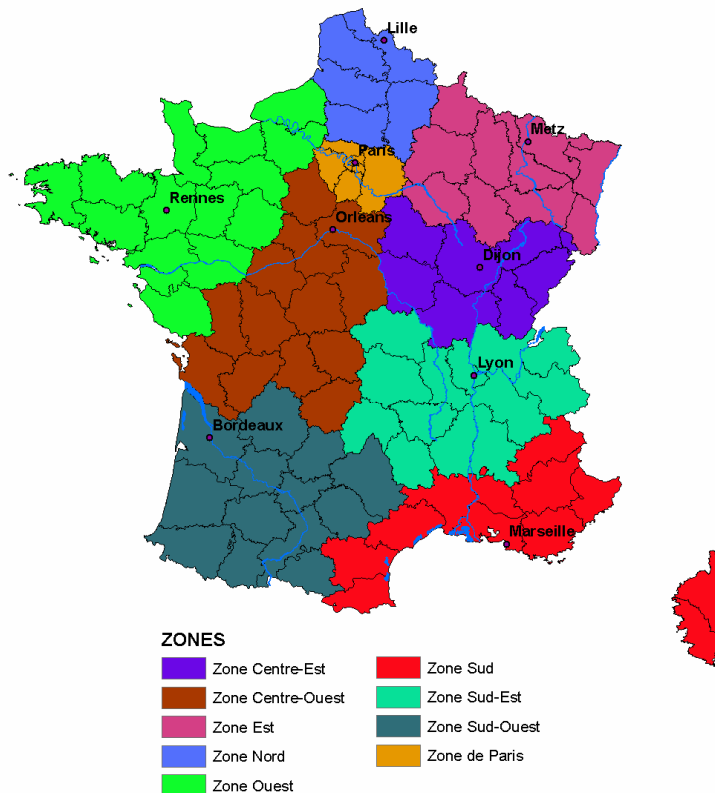


Figure 13 : The Zones of Civil Protection

#### 4.1.3. Local level

<sup>22</sup> Etat major de Zone

<sup>23</sup> Centre opérationnel zonal

#### 4.1.3.1. Command and operational entities

At the local level, the authorities in charge of hazard prevention and relief organization are: the mayor within the limits of his powers of keeping order, and the prefect of the department who has the main role on the decisions making for a local disaster. They share responsibilities to prevent accidents and direct relief operations to assist victims.

- The prefect prepares and triggers the ORSEC plan and other emergency plans during major disasters. He is also in charge of elaborating plans to prevent foreseeable natural hazards (floods etc.). When there are disasters that cannot be handled by one single commune, the prefect is the authority with the legal right to direct operations in which fire-brigade units take part. He can also call upon necessary private relief resources. He has, at his disposal, the inter-ministerial service for defence and civil defence (SIDPC<sup>24</sup>).
- Mayors responsible for the safety of citizens on their territory of their communes rely mainly on the fire-brigade (CS<sup>25</sup>). In each department belong to the departmental fire and emergency service (SDIS<sup>26</sup>), a departmental public establishment with an administrative commission presided by a local elected member. The Director General of the SDIS, under the authority of the prefect and the interested mayors, is responsible for the operational use of resources and the fire-brigade serving in the department. Finally, the CODIS<sup>27</sup> under the authority of director of SDIS manage all tactical means, and corresponds to the departmental operational of fire and rescues centre.

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<sup>24</sup> Service Interministériel de Défense et de Protection civile

<sup>25</sup> Centre de Secours

<sup>26</sup> Service départemental d'incendie et de secours

<sup>27</sup> Centre Opérationnel Départemental d'Incendie et de Secours

However, when it is obvious that intervention is beyond the possibilities of the commune or the department, the day before, one single ministry intervenes and coordinates relief – the Ministry of the Interior, through the COGIC.

#### 4.1.3.2. A strategic entity: SIDPC

SIDPC role is to permanently assist the prefect in the prevention and the risk management. It works as an inter-ministerial unit in partnership with the State decentralized services and local authorities. This unit has a major role in the Civil Protection organisation; indeed it intervenes at each phase of the crisis management to support Civil Protection decisions and actions:

#### Prevention Work

It has missions for the organization, the planning and the coordination of the resources and the rescues.

Upstream from the risk, prefect responsibilities, assisted, within the prefecture, by SIDPC, are as follows:

- the study of the risks: prevention of the natural risks, technological or related to the everyday life (transport, accidents), study of the crisis situations. The awareness and the information of the populations and the elected representatives upstream of the risk are essential;
- development, the update, the follow-up of the rescues plans and the general plans of protection like Orsec plans...
- the organization and the control of the departmental exercises;
- work of the safety commissions, in particular those which relate to the establishments or installations receiving public;
- design and the management of the ways of alert of the populations (floods, pollution, measurements of containment...);
- the follow-up of the training of the first-aid workers and the structuring of the network of the associative partners of civil protection.



The prevention phase prepares the operational phase. So, the animation role of SIDPC is essential. Its activity is led in connection with the State decentralized services and the whole of the first-aid organizations in which SDIS has an essential role. The effective response to an event supposes the preliminary constitution of networks that it is necessary to structure, animate and test on the occasion of exercises. The more these networks will be structured and diversified, the more their capacity of response will be fast and efficient when they will activate in operational phase.

### **Operation phase**

According to the intensity of the event to be treated, the territorial levels which will be implied will be either one or more departments, or the zonal level and a whole of departments.

- within the crisis cell, SIDPC assists the chief of crisis cell, in theory the director, guarantor of the coordination of the services implied in the rescues organisation and the safeguard of all the necessary wheels to the regular operation of the authorities. SIDPC ensures the activation and the animation of the operational room of the prefecture; it is located at the interface between the prefect and all the services (State, communities local, companies or service provider) engaged in a rescues plan;
- it brings a decision-making aid of the prefect by his work of synthesis, takes part in the evaluations in real time of the efficiency of the involved resources; it gathers information of any nature allowing prefect to manage the communication with medias.

The priority missions in the operational phase are:

- the protection of the populations (alert, information, help),
- the continuity of the governmental action (safety of the public buildings, significant points, transmissions, communications),
- the maintenance of national safety and maintain law and order,

- the guarantee and the protection of the essential functions of the national life (supply, transport, production of energy, telecommunications...),
- the communication at public and at medias. The reliability of information is a major stake of crisis management. It is necessary to obtain the materials resources and to organize the networks which make it possible to collect it. The prefect must have sure and checked information.

### **After-crisis**

The prefect coordinates the follow-up of the after-crisis.

After the rescues operations, the assistance at the populations changes of nature but remains essential to satisfy material needs (rehousing, restoration of the framework of life...), to bring a medical care, to restart the activity, to ensure the payment of the services providers involved in the rescues phase, to face up the litigations, to continue to inform and to help victims...

For this period, SIDPC continues to carry on its activity in connection with the State decentralized services. According to the nature of the tasks to be carried out, it will be necessary to maintain, within one or more decentralized services, cells of "after-crisis" charged to come to assistance of disaster victims (financial cell for compensations, lodging cell, employment cell, medical aid cell...).

The following figure (Figure 14) illustrates the French risk organization.

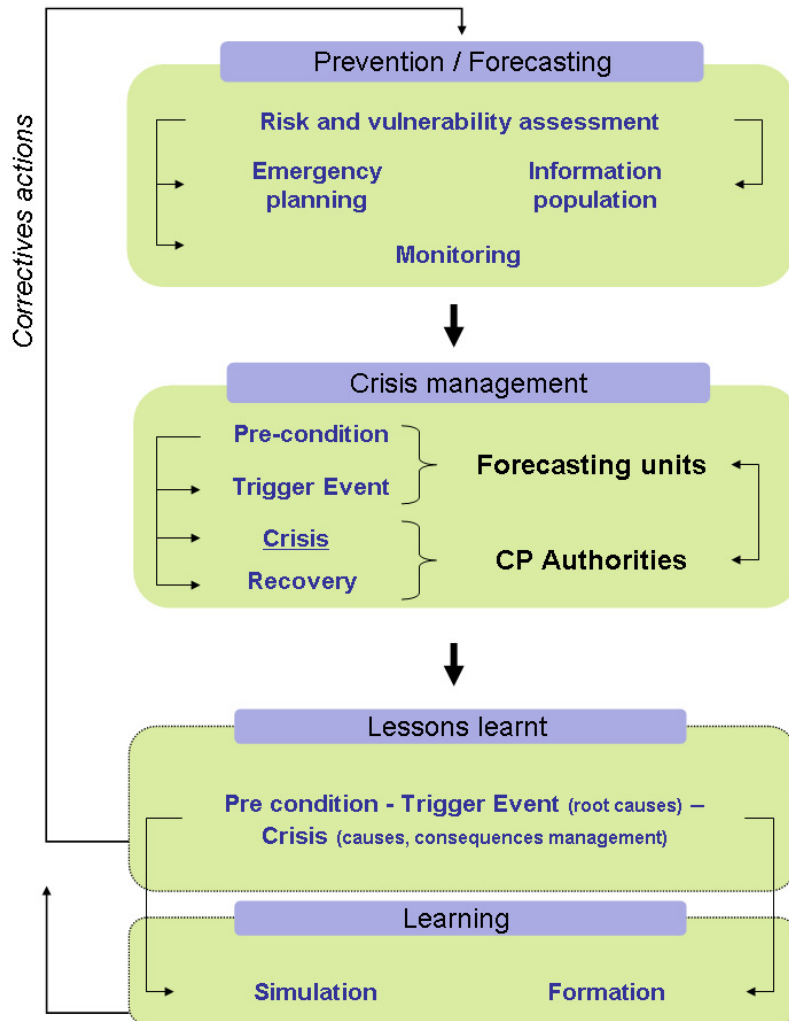


Figure 14 : French global risk loop

## 4.2 Description of prevention operation

### 4.2.1. Prevention overview

All these laws may enhance risks knowledge and conscience, ways of life face up risks; reduce existing vulnerability by lived places protection, by civil engineering structure carried out by the State or the local communities.

To supplement the knowledge of the threats on the population, rescues plans are created to define in advance crisis management organization ways in potential threatened places, we can quote.

The regulation in term of major risk prevention is dated July 22<sup>nd</sup> 1987 with n°87-565 law. Since this date, many different laws are completed the original text to perform risk prevention, the last one, the n°2003-699 law on July 30<sup>th</sup> 2003 imposed :

- The CLIC creation (local committee of information and consultation) by prefect to identify risks on industrial fields
- Historical floods benchmarks creation
- Risks information Renewal by Mayors every two years on each city having a PPR (Risk prevention plan) plan on its territory

France forecasting organisation mainly depends on external services and not directly included in civil protection system.

#### *4.2.2. Departmental level*

##### **4.2.2.1. PPR**

A PPR concerns all department territory; its development is led by the State services. It is carried out under the authority of the Prefect of department, which approves it after consultation of the communes and public investigation (MATE,1997). PPR nevertheless is carried out in narrow dialog with the concerned cities. In details, PPR aims at gathering the knowledge of the risks on a given territory, deducing delimitation of the exposed zones and to define regulations as regards town planning, buildings and management in the threatened zones, as well as prevention measurements, protection and safeguard of existing constructions in this zone (see Figure 15).

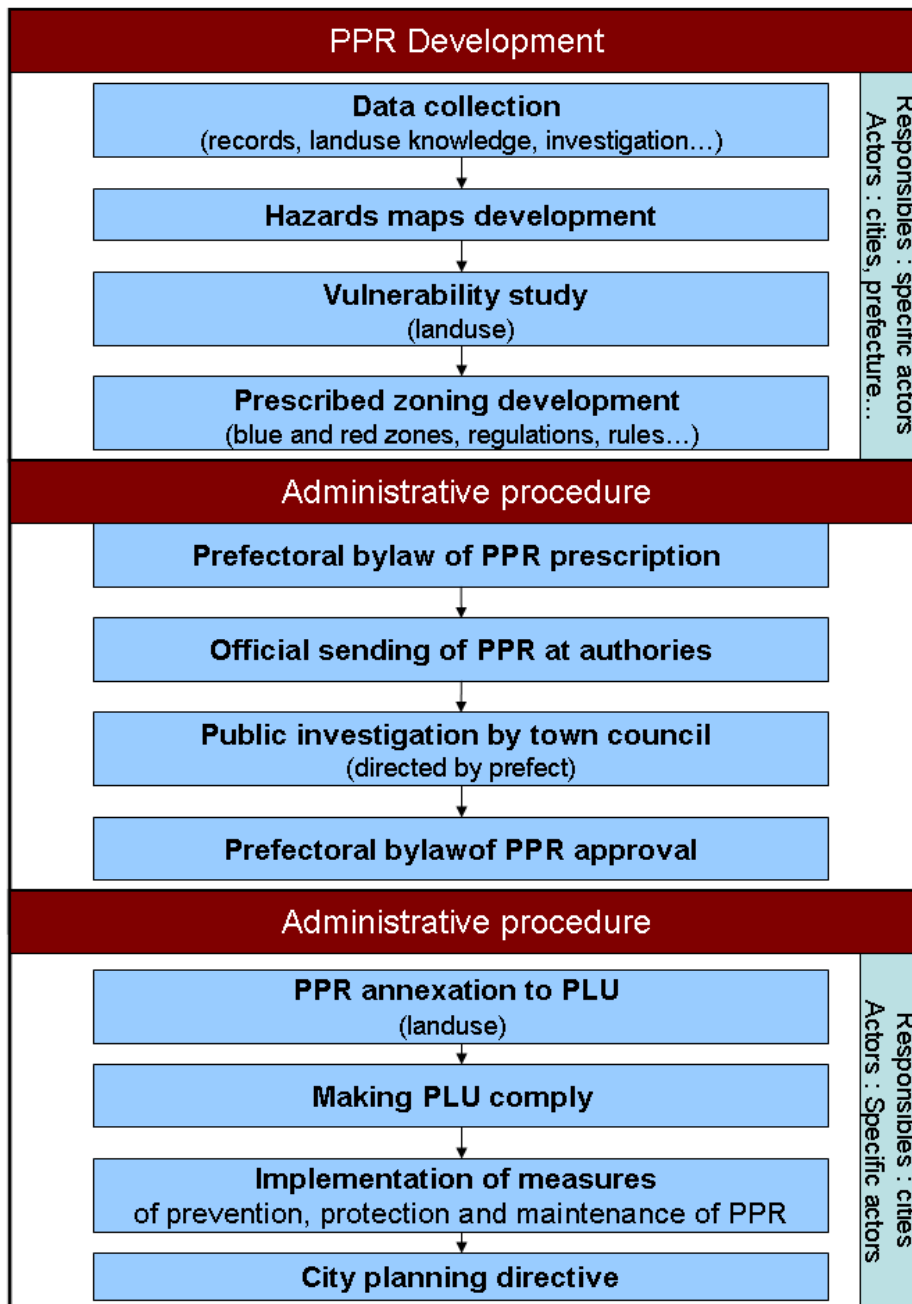


Figure 15 : Phases of PPR development

It makes it possible to direct the development towards risk-free zones. The PPR is a prescribed prevention plan which permits to inform population about risks zones and ways of vulnerability reducing.

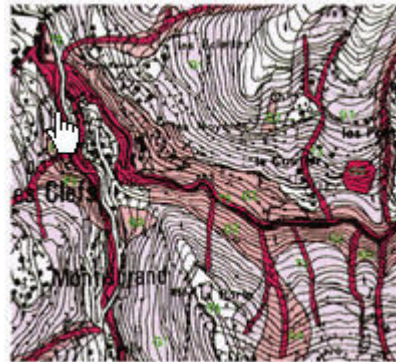
To guarantee PPR effectiveness and using, the document is included in the country planning. Also, it regulates the land use (PLU) (plane buildings of town planning - P.L.U., diagram of territorial coherence...), must take into account the natural risks (article L 121-10 of the code of town planning). Thus, PPR must be annexed to PLU of the commune.

But PPR makes it possible to go further. It aims to the taking into account of the natural risks in installation, construction and management of territories. It makes it possible to direct the choices of installation in least exposed territories to reduce population and goods damages.

The development of PPR begins in general with the historical analysis of the main natural phenomena having touched the studied territory. After this analysis, a hazards map (see Figure 16) is created, which makes it possible to evaluate the importance of the foreseeable phenomena. This map, after a dialog with the various local partners (and after an analysis of the local stakes in terms of safety and installation – see Figure 17), becomes the base of the thinking which will lead to PPR.

The final document of PPR is made up:

- of a report which contains the analysis of the phenomena taken into account, as well as the study of their impact on the people and the goods, existing and future. This report indicates also the principles of development of PPR,
- of a prescribed map on a scale ranging between the 1/10 000 and the 1/5 000 in general, which delimits the regulated zones by PPR (see Figure 18)
- of regulation which specifies the rules applying to each zone.



**Figure 16: Hazards Map**



**Figure 17: Vulnerabilities map**



**Figure 18: PPR Zones map**

PPR strongly regulates new constructions in the very exposed zones. In the other sectors, it takes care that new constructions do not worsen the phenomena (factors of risks) and are not vulnerable in the event of natural disaster.

Thus, the rules of PPR are essential either on future constructions, or with existing constructions, but also according to the cases with the various possible land uses: tourist activities, of leisure industry, farms... These rules can treat town planning, building or space management. PPR is obvious to everyone: private individuals, companies, communities, like in the State, in particular during the delivery of the permit building.

#### 4.2.2.2. SADCR / DDRM

The SADCR<sup>28</sup> is, in France, the document determining the establishment of the fire station as well as their equipment in employees and stocks. It must make it possible to propose optimizations of the civil protection actions already carried out.

Under article 21 of the law n°87 of July 22nd, 1987, each citizen is entitled to information on the risks which occurs on his places of life, holidays and on the maintenance measures to protect itself.

The law of May 3rd, 1996 relating to the organization of the rescues and fire agencies specifies firemen missions in its article 2:

- Prevention
- Protection
- Fighting against fires

By the circular of February 25, 1993, the Department of the Environment required of the prefects to draw up list of cities concerned by risks, to define an emergency order so that all the concerned citizens are informed less than five years: the major risks departmental file (DDRM<sup>29</sup>).

To carry out this preventive information, a risk and preventive information analysis cell (CARIP<sup>30</sup>) was made up in each department; this CARIP is placed under the

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<sup>28</sup> Schéma départemental d'analyse et de couverture des risques

<sup>29</sup> Dossier départemental des risques majeurs

<sup>30</sup> Cellule d'analyse des risques et d'information préventive



authority of the prefect and gathers the main departmental actors concerned by the major risks.

The Prefect validates the inventory of the major risks including:

- threatened basins, zones and sites
- dangers identification
- impacts maps

Concerning the DDRM, the R125-11 article specifies that the given information to the public on the major risks is consigned in this document, on a department scale, and established by the prefect.

The DDRM includes:

- the enumeration and the description of the major risks to which it is exposed
- the statement of their foreseeable consequences for the people, the goods and the environment,
- the chronology of the events and known and significant accidents of the existence of these risks,
- the inventory of the general envisaged measures of prevention, protection and safeguard by the public authorities in the department to limit the effects of them.

Prefect must transmit to the mayors of interested towns the DDRM which will be available to the prefecture and the town council. The DDRM is updated within a time which cannot exceed five years.

The list of the communes mentioned with article R. 125-10 is updated each year and is published in the administrative acts compendium<sup>31</sup>. It is accessible on prefecture

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<sup>31</sup> Recueil des actes administratifs

Internet sites, when they exist and on Internet site of the Ministry for Ecology and the Durable Development (MEDD<sup>32</sup>).

#### 4.2.2.3. PPI

In term of technological risk prevention, French civil protection has developed two mains plans to efficiently manage these types of risks. At the departmental level, a PPI is developed while at the technological unit, each organism has to create POI to inventory risks and security measures to avoid increasing of crisis.

The PPI, specific intervention plan, which completes the previous plan and concerns awaited civil protection actions in case of technological accident, are subject of PPI setup:

- Sites comprising at least a basic nuclear installation of nuclear engine type of a thermal power higher than ten megawatts;
- SEVESO Classified installations in the nomenclature of the installations classified for the environmental protection;
- Underground storages of pollutant gases or compressed or liquefied gases mentioned with the decrees n° 62-1296 of November 6th, 1962 and n° 65-72 of January 13th, 1965

Each PPI comprises risks indication for which it is established.

It operates for each one of these risks or groups risks, measures inventory to be taken and ways to be implemented. It enumerates in particular the procedures of mobilization and requisition which will be used and the terms of the available resources involvement.

It defines the State services missions, of its public establishments, the local authorities and their public establishments and it lays down the methods of private

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<sup>32</sup> Ministère de l'écologie et du développement durable

organizations participation invited to intervene. It specifies the methods of command organization on operations place.

It mentions the methods of alert transmission to the various participants, as well as the connections to be established among the private units, services, organizations, rescues command and the concerned authorities.

Its development results from a multi-institutional consultation including departmental fire and emergency service (SDIS), Environment, research and industry regional direction (DRIRE<sup>33</sup>), *Meteo-France*, and specialized actors.

PPI comprises following regulations:

- The general description of the installation, building or the places for which it is established,
- The list of the communes on the territory of which the measures plan apply,
- The information measures and provided protection for population, if necessary, diagrams of possible evacuation of those, including the lodging places indication,
- Measures falling with the owner for the immediate diffusion of alert near the concerned authorities and information on the situation and its evolution, if necessary, putting an arranged command post at State authorities disposal on the site or near it.
- Measures falling with the owner for the close populations and in particular, in case of immediate danger, the emergency measures that it has to take before the police intervention force and for the account of this one, in particular:
  - Diffusion of alert near the close populations;
  - The interruption of circulation on the transport links and move the people living near the site away from accident site;
  - The interruption of the public networks and drains in the vicinity of the site.

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<sup>33</sup> Directions Régionales de l'Industrie de la Recherche et de l'Environnement

In connection with the owner who ensures the financing of PPI, the prefect establishes booklets comprising the instructions intended for the populations remaining in the plan application zone. These booklets, placed in the public places where the plan can be consulted, are given to the people who request it.

#### 4.2.3. Local level

##### 4.2.3.1. DICRIM

The DICRIM<sup>34</sup> is a document carried out by the mayor with an aim of informing population of his commune on the natural and technological risks which relates to them, on the prevention, protection and maintenance measures implemented as well as on the means of alert in case of one event occurs. It also aims at indicating the individual security instructions to respect, instructions which are the subject of a posting campaign, organized by the mayor and with which the owners with certain buildings are associated (dwelling house gathering more than fifteen residences for example). The whole of the regulations concerning the DICRIM is codified with the Code of Environment (EC), R125-9 articles in R125-14. They are supplemented by the decree n°2005-233 of 14 March 2005 relating to the establishment of the floods benchmarks and by the decree n°2005-1156 of 13th September, 2005 relating to the PCS.

##### 4.2.3.2. PCS

The PCS<sup>35</sup> has been created in the Article 13 of the law n° 2004-811 of August 13th, 2004 of modernization of civil protection. The device is specified by the decree n° 2005-1156 of September 13th, 2005. Useful tool for the mayor in his role of major actor of the safety management, this new plan is integrated in the general organization of the rescues. It forms with plans ORSEC a new complete and coherent chain of management of the events threatening populations, goods and environment. Organizing the response of proximity by taking of account the

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<sup>34</sup> Document d'Information Communal sur les Risques Majeurs

<sup>35</sup> Plan Communal Sauvegarde

accompaniment and the support for the populations as well as the support with the first-aid organizations, the PCS is the local link of the civil protection organization. This document completes the DICRIM role with its informative and organisational value. It helps local civil security services to manage rescues, thus it completes knowledge on risks and rescues ways given by the ORSEC plan.

The PCS development is carried out in several constituents corresponding to each existing risk on the concerned city. The main parts of this document are:

- Risks inventory
- Information and alert of population
- Resources inventory
- Communal organisation creation
- Operational tools implementation
- Long-term operational maintaining

This document has many advantages; however the most important is its multi-temporal approach:

- Before crisis, it permits to have risks knowledge and to inform local population about them
- During crisis, it permits to coordinate and to standardize actors responses
- After crisis, it helps civil protection services and local authorities to come back to a safe situation and to setup effective lessons learnt.

In concrete operation, the PCS development not aims to carry out “a document” but to prepare and organize the commune to face up an emergency (see Figure 19).

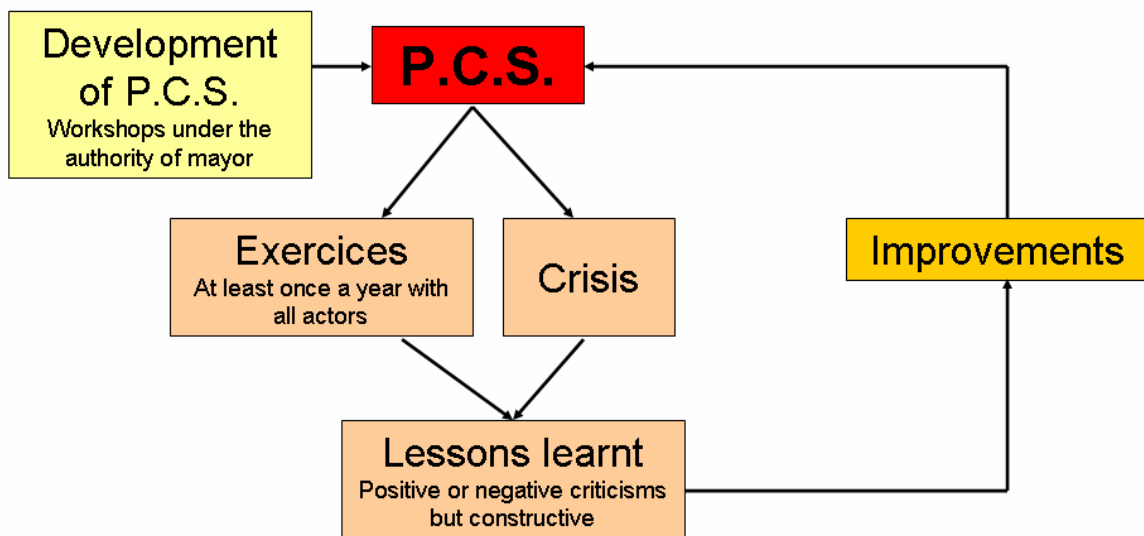
The PCS must be adapted to the size of the commune. The decree 2005-1156 fixes minimum realistic elements for all the communes of France:

- to organize the intern commune measures in order to be able to alert the population in case of event

- to inform the populations on nature of the risks and the security instructions (by implementing the DICRIM)
- the diagnosis of the risks and local vulnerabilities

To conclude this communal approach, it is desirable that the commune sets up a true local project in order to:

- to make the maximum of people take part in its development to support its operational character and its appropriation by the actors,
- to carry out a basic thinking on pragmatic questions,
- to lead to simple but effective tools rather than a bulky and impressive paper tool but not controlled by the actors,
- to determine best strategies taking into consideration particular met situation in each commune.



**Figure 19 : PCS improvements operation**  
(Adapted from Villeval, 2004)

#### 4.2.3.3. POI

The POI, Internal operation plan, defines organization rules, intervention methods and necessary resources that the owner must implement to protect the

personnel, the populations and the environment. This plan is specific to the buildings presenting the most important risks for the people and the environment.

The POI is established by the owner under his responsibility. Its purpose is to organize the fight against the disaster and must, in particular, detail the resources and equipment implemented.

The POI cannot be only established on the basis of study of danger including an analysis of the various scenarios of possible accidents and their consequences.

The POI must reproduce the emergency measures which lie with the owner under the control of the police force authority, in particular as regards public alert, the services, the dealers and the concerned municipalities.

The realization of exercises of POI application must be effective, in order to check reliability and to fill the possible gaps.

It is desirable that such exercises take place at least once per year. The various concerned services must be informed of these exercises and to be associated.

The modified decree on 21st September 1977 forces the owner to update and to test its POI with intervals not exceeding 3 years.

### **4.3 Description of forecasting operation**

#### ***4.3.1. Forecasting overview***

French Civil protection is linked to external services to forecast all natural events, in term of prevention, local state services collaborate with civil protection services to design prevention and operational plans to efficiently manage emergency situations.

Term of forecasting is generally used for natural hazards anticipation, in this report we will focus on natural hazards to describe forecasting phase. Concerning technological risks, this report will describe major plans to prevent and help emergency teams to manage disasters.

France territory knows following hazards:

- Avalanches
- Flash floods
- Plain floods
- Landslides
- Earthquakes
- Storms
- Forest fires

#### 4.3.2. Meteo-France

##### 4.3.2.1. Global organisation

For the majority of these hazards, the main competent organism is Meteo-France which assists and alerts State and Civil Protection services in case of occurring threatening event.

Meteo-France is a public administrative organism included in transportation ministry. Meteorological forecasting results to a complex process which combines land observation, data processing and expertise. To perform precise forecasting, Meteo-France uses a important observation network, made of 554 terrestrial stations, 18 rainfall radars, 196 climatological units and 7 radiosonde investigation stations. Moreover, it uses observations of meteorological worldwide watch managed by worldwide meteorological organisation (10602 terrestrial stations, 839 radiosonde investigation stations, 14 meteorological satellites).

The numerical forecasting models used today by Meteo-France are ARPEGE and ALADIN. ARPEGE has its own system of data assimilation (use meteorological observations to improve the initial conditions) and provides forecasts twice per days at 96 hours of expiry the morning, and at 72 hours of expiry the evening. Its resolution is variable with a grid of approximately 16 km on France (200 km at antipodes). ALADIN draws his initial conditions in limits of ARPEGE and provides forecasts on finer scale with a grid of approximately 8,5 km, with short expiry (48



hours the morning and 36 hours the evening). It covers western and central Europe. Meteo-France currently carries out forecasts over one 7 days period with a good precision on storms appearance and their trajectory. Reliability increases with the proximity of the expiry. The need to know in real time the estimates of the rainy intensities has led meteorologists and hydrologists to develop the weather radar.

This device makes it possible to have directly a global image of the zones of precipitation and to better apprehend the space distribution and the intensity of rainfall, in particular maximum intensities. With the Aramis network, Meteo-France lays out at the end of 2006 of 23 radars distributed on the national territory. The project "PANTHER" takes the continuation of the Aramis network with for objectives, in addition to reinforcing the number of radars, renewing oldest and to put in place new technologies. System PI (immediate forecast) aims to improve the forecast with very short term (a few hours at 15 minutes), by combining information from Meteosat satellite second generation, radars and networks of rain-gauges in situ. It is operational since 2006. In 2008, the model AROMA will come to significantly improve the forecast in the short term, one finer space scale. This model will allow, thanks to a representation more detailed of surface conditions, a better simulation of the local phenomena (breezes marine, of relief, urban, convection and storms, fogs, etc). Finally, results are interpreted by forecaster in taking in account special climatic features of each area. To this point, they are able to predict future weather and eventually dangerous event.

One of important point of its organisation is the Meteo-France weather forecast which is managed at each administrative level (Sauvagnargues-Lesage *et al.*, 2007):

- National level : SCEM<sup>36</sup>
- Regional level : CMIR<sup>37</sup>
- Local level : CDM<sup>38</sup>

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<sup>36</sup> Service Central d'exploitation de la Meteorologie

<sup>37</sup> Centres Meteorologiques Inter-Régionaux

<sup>38</sup> Centres Départemental dela Meteorologie








At national level, SCEM forecasters fix the guidelines for models interpretation, while at regional level, CMIR forecasters provide detailed weather forecast on concerned zone.

Only, these two levels are always (24h/24) activated, so their role is to always watch weather conditions and to eventually alert CP agencies.

Finally, the CDM develop a precise weather forecast depending on users needs, when a threatening event occurs, they are activated and become data providers for every services using weather data, in particular flood warning services, departmental operational centres and State services as mayor or prefect offices.

**4.3.2.2. Meteo-France and specific hazards**

Meteo-France is expert for some hazards as avalanches, floods, storms, forest fires and extreme climatic conditions (see Figure 20).

Pictogram	Phenomenon
	Wind
	Avalanche
	Important rainfall
	Storm
	Snow / icy roads
	Cold conditions
	Heatwave

**Figure 20 : List of extreme climatic conditions and their pictograms**

The link between Meteo-France and Civil Protection is illustrated by the concept of vigilance, which, for each quoted extreme climatic conditions, allows communicating important information on the event specifications.

Meteorological vigilance corresponds to information on potential meteorological dangers. This signal must encourage prefect offices, departmental operational centres, mayor offices, Medias... to consult meteorological information. It only represents a warning signal on a potential dangerous event without being sure of the effective occurring. This phase is embodied in a vigilance map developed by Meteo-France. Since October 2001 1<sup>st</sup>, the vigilance map is performed twice a day by Meteo-France in collaboration with CMIR and simultaneity broadcasted at audiovisual the medias, safety services and population on official web site of Meteo-France ([www.meteo.fr](http://www.meteo.fr)). This one corresponds to a France map defining the meteorological danger in the considered zone for the 24 hours to come with a departmental precision. In case of exceptional expected phenomenon, a procedure of follow-up is activated.

Weather alert is organized by the civil protection services which can, take precaution measures. According to weather obtained information and local expertise, the operational services are placed in pre-alert by the prefects and take part in the emergency means increasing. If the convergence of the whole of information confirms the need for an authority's action, the alert of the whole of the operational and State services is then started. This device makes it possible to avoid too frequent and not justified alerts which would be likely to induce a demotivation of the elected representatives and a consequent fall of vigilance and protection of the populations.

It exists various types of situation depending on intensity and extension of the natural event. The level of vigilance necessary face up to the future weather conditions is represented by a scale of 4 colours:

- The "green" level of vigilance is without consequence.
- The levels of "yellow" vigilance, according to the criteria retained by Meteo-France, refer to occasionally dangerous but usual phenomena for the season or area (mistral, icy roads, not organized storms of summer, etc).

- The levels of “orange” vigilance justify a meteorological watch implementation. The vigilance map is then accompanied by a precise comment on the phenomenon (realized by Meteo France) and actions to be taken by the population. The fact of classifying a department in orange or red level means that, in the 24 H, a dangerous weather phenomenon of strong intensity is likely to occur on whole or part of this department.
- The “red” level of vigilance indicates a situation probably catastrophic (storms of 1999 or precipitations in Gard in 2002) requiring the immediate installation within the services in charge of the civil protection of a crisis management device. It is nevertheless the follow-up which will make it possible to judge in real time of the evolution of the situation observed or envisaged.

If the red level is likely to justify the immediate and massive mobilization of the whole of the actors and the means, the orange level must result in engaging a emergency means increasing. The selected dangerous phenomena are specified on the map in the shape of pictograms, associated with each zone concerned with a setting in vigilance of level 3 or 4. The winds violent one, strong precipitations, the storms, snow, the glaze and the avalanches, strong heats are distinguished there. The colours refer to a predetermined vigilance level and follow-up reports allow establishing weather forecasting, the possible consequences of the dangerous phenomena expected and the advices or behaviour to be followed. A concerned zone with several exceptional phenomena of variable intensity will take the colour and the pictogram of the phenomenon corresponding at the highest level of vigilance. In case of two distinct phenomena, of the same colour of vigilance, the pictogram will be that of the phenomenon considered to be most intense whereas the follow-up report can describe the two phenomena.

Finally, the pictogram "storm" refers as much to a strong electric activity as to the intense precipitations possibility or associated violent winds.

The vigilance setting does not involve in a systematic way a weather alert. Thus, the level of orange vigilance, contrary to the red, will not justify crisis management measures.

The vigilance map (see Figure 21) has for main vocation to attract attention to the meteorological hazards, and not on the direct consequences of these risks. This is particularly true for rainfall: the map makes it possible to alert on abnormally violent or abnormally consequent precipitations in terms of rainfall accumulation, but not directly on the flood risk. However, in certain cases (wind, snow, icy), the consequences and the risks remain closely dependants. From a point of view of stormy alerts, the zones with isolated storms are placed directly in yellow vigilance by the forecasters, in taking in account that any storm is potentially dangerous. The favourable zones with the storms covering several departments are placed in orange vigilance, without for all this that can mean that violent storms will occur on all the departments in orange vigilance, nor even on the whole of the territory of a given department. To date, only these vigilance maps on departmental scale make it possible to define the probable arrival of a weather phenomenon.

In case of orange or red vigilance, Meteo-France (the CMIR for the regional reports and the Meteo-France forecast direction for the national reports) is held to set up a procedure of follow-up and is at disposal of the professionals. As soon as a envisaged weather situation is such as a threshold of precipitations can be exceeded, the interregional direction emits an alert. The message is transmitted to civil protection services which then inform the concerned prefectures and retransmit towards the flood warning services. This measure is in line with a will “to centre the device on the really intense and qualified weather phenomena”. Map and reports which result from this are then supplied with a comment defining the phenomenon and advices of adapted behaviours.

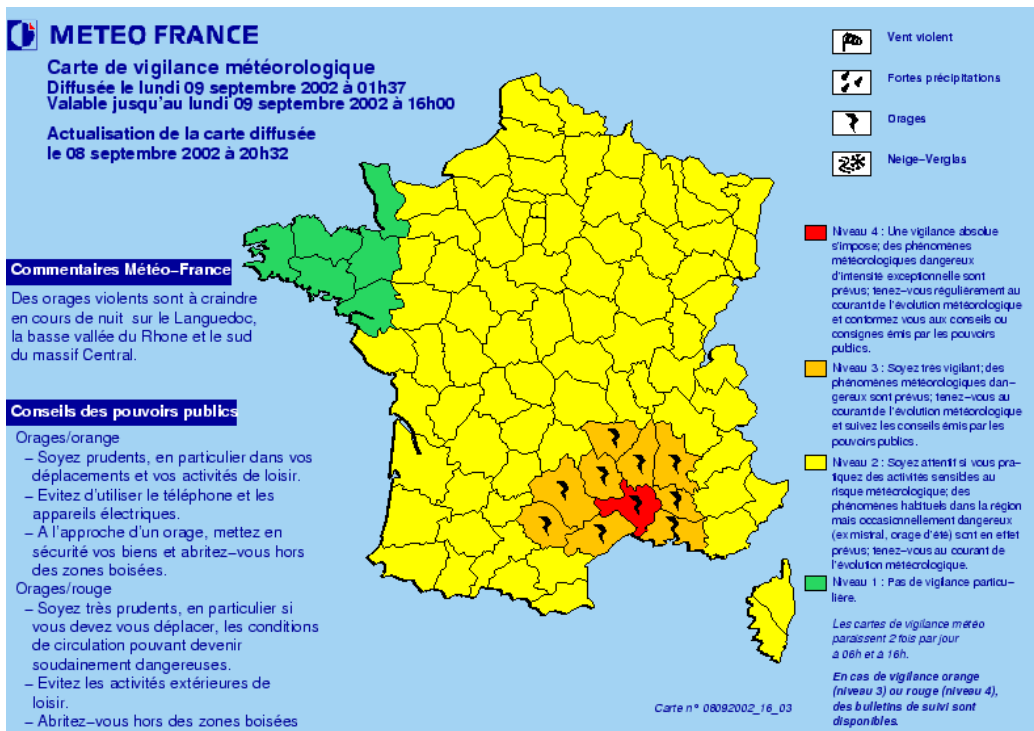


Figure 21 : Vigilance map during the flash floods in Gard, 2002

#### 4.3.2.3. Avalanches

Managed by Meteo-France, weather forecast depends on a network of observations snow and meteorological conditions carried out in majority by the ski resorts workers, and set up in all the Alps, the Pyrenees and Corsica. These observations make it possible to know the weather conditions and the characteristics of the snow cover, to estimate the level of risk of avalanche thanks to a scale of risk on five levels (Low, limited, moderate, high and very high). Forecasters also have the network "Nivôse", network of automatic stations of high mountain (15 in the Alps, 5 in The Pyrenees, 2 in Corsica) which allows to have information in real time of heights of snow, temperatures, and wind. For several years the researchers of CEN have developed models which allow efficient forecast from the in situ data. The SAFFRON model provides all the weather variables on a space scale of the studied zone and its principal slopes.

The CROCUS model simulates and forecasts the temporal evolution of the snow cover principal variables and phenomena of metamorphosis of the flakes. The

MEPRA expert model supplements these results by an estimate of main mechanical parameters of each snow layer to evaluate the cover stability. The integrated data are placed at the disposal of all the mountain weather centres which use them thanks to a DOLMEN tool. The established forecasts report of the risk of avalanche is daily diffused during the winter by the Meteo-France departmental weather stations, of the departments the Alps, the Pyrenees and Corsica.

#### 4.3.2.4. Flood forecasting

The floods forecasting is based on the weather data but also on the specific knowledge of the hydrological conditions of the watersheds. Thus, the floods forecasting is based on skills of local services (SPC) managing coherent hydrological units, allowing them a better expertise on the flood risk.

Primarily based on a collecting system of hydrometric and weather data, the floods forecasting and warning require knowledge of watersheds, and an experiment of real-time data analysis. The whole of received information and the analyzes which result from this must allow a follow-up of the progression of the hydrological units likely to generate harmful answers at the territorial level.

The State manages the organisational system of hydrological forecasting. The mission of floods forecasting is managed at the national level by the Ministry for Ecology and the Durable Development (MEDD) and is delegated at the departmental level with decentralized services of State (DDE<sup>39</sup>, DDAF<sup>40</sup>, DIREN<sup>41</sup>, maritime Services or of navigation).

Since 2006, the organization relates to 22 Services of floods forecasting (SPC<sup>42</sup>) covering the whole of the national territory (see Figure 22) and the installation of a national engineering department of support of the Ministry for

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<sup>39</sup> Direction départementale de l'équipement

<sup>40</sup> Direction départementale de l'agriculture et de la forêt

<sup>41</sup> Direction régionale de l'environnement

<sup>42</sup> Service de prévision des crues





Ecology and the Durable Development (MEDD), floods warning and monitoring hydro-meteorological national service (SCHAPI<sup>43</sup>).



Figure 22 : SCP and floods forecasting administrative organisation

The floods monitoring and forecasting constitutes an essential mission in the floods prevention device. This system works not only on alert, but also on rivers monitoring and on floods forecasting.

Two organizations constitute the pivots of this device: central service of hydrometeorology and support to the floods forecasting (SCHAPI), the national level and floods forecasting services (SPC), at the local level.

For this reason, the SCHAPI works on a mission of animation, assistance, council and training near the services and establishments intervening in the field of the floods forecasting and, more generally, hydrology. The service also ensures at the national level scientific and technical coordination in this field in connection with the scientific

<sup>43</sup> Service Central d'Hydrométéorologie et d'Appui à la Prévision des Inondations



and technical State organizations. It is also charged to establish, in connection with the SPC and the regional directions of the environment, a “flood” vigilance map.

The SPC have the role of working out floods forecasting and of disseminating information on this subject. These services are the interlocutors of the authorities who wish to be invested in the field of the floods alert and forecasting.

The objective is to equip the territory with reliable floods forecasting services in all circumstances, and giving to the concerned experts the means to link the necessary knowledge of the good knowledge of the forecasting model and the watersheds characteristics.

The SPC is responsible for the floods vigilance production on its territory. The operational production of SPC as regards floods vigilance is based on the tools placed at the disposal by the SCHAPI. The SPC forecaster bases his hydrological expertise on the information provided by the systems of supervision and modelling, the weather forecasting diffused by Meteo-France and the hydro-meteorological analyzes of the SCHAPI. In normal mode of development of information (publication on morning at 10h and evening at 16h), the SPC forecaster determines the colours of vigilance of the followed-up sections. Since the SPC leaves green vigilance, it writes the associated report with its detailed components for each section at least in yellow.

It broadcasts the whole of information at the SCHAPI before 9h on morning and 15h on afternoon. In case of updated information requiring a change of colour on at least a section of the SPC territory during abnormal hours of production (10h and 16h), the SPC forecaster must contact the SCHAPI forecaster with a maximum anticipation. These actualizations must remain exceptional.

In this transmission chain of information as regards floods intervene lastly, the police force authorities which, according to the announced events, transmit alert to the populations and carry out the evacuation measures, if necessary.

The floods vigilance map is founded on the same principles as the weather vigilance set up by Meteo-France since 2001. Its objective is to inform the public and the actors of the crisis management in case of risk of floods occurring on the main rivers on which State deals with the lawful mission of monitoring, forecast and transmission of information on the floods.

The floods vigilance is intended to inform all interested public, private individual, or professional ones, in a simple and clear form. It is also intended for the authorities in charge of civil protection (prefects and mayors), which start alert when it is necessary and mobilize emergency means. Three principal points were thus developed:

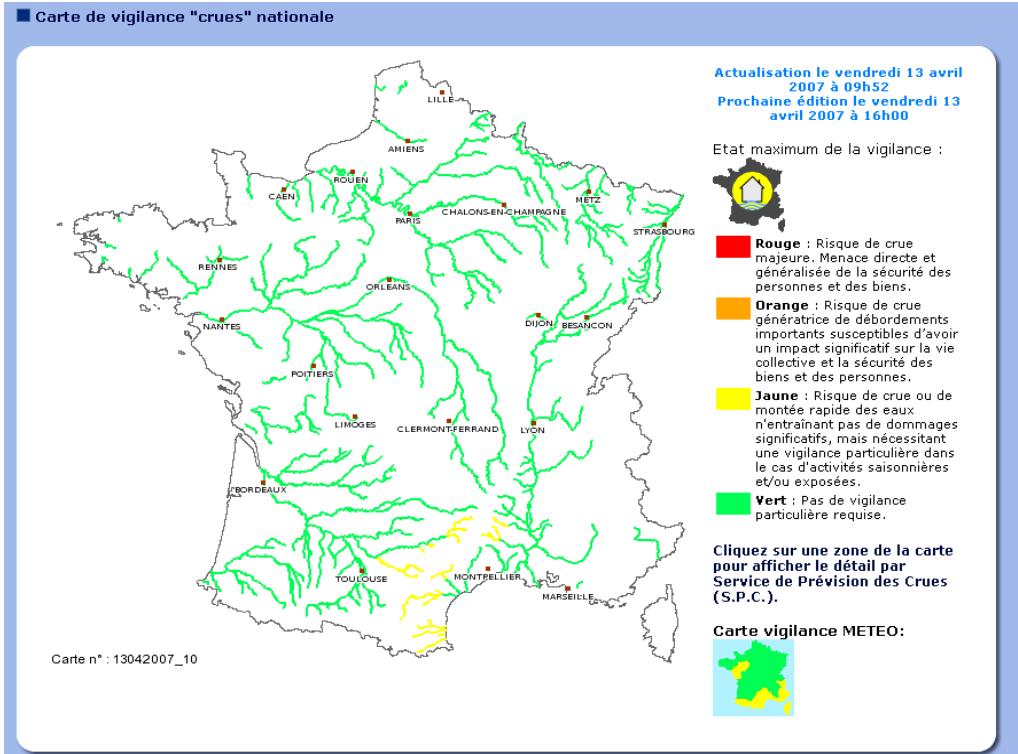
- an objective of anticipation of alert to the public authorities for each level;
- an improvement of the information of forecast and a delivered follow-up to the decision makers and concerned State services;
- a simultaneous information to the media and the population (Internet server in service since July 2006) with associated messages adapted to the situation in progress and supplementing information relating to weather vigilance.

Each river included in the floods vigilance, visible on the vigilance map, is divided into sections. For each section is affected a colour, green, yellow, orange or red, according to the level of vigilance necessary to face the danger likely to occur in the hours or the days to come.

The map is presented in its national form or in its local forms accessible by a click on the concerned zone. The map is completed by a national news report and local news reports. These bulletins specify the chronology and the evolution of the floods describe the intensity and provide (if possible) quantified forecasts for some reference stations. They also contain information of the possible consequences, and advices of behaviour defined by the authorities, when necessary.

The vigilance map (see Figure 23), the reports and the data in real time are available permanently. The map is updated twice a day at 10h and 16h. In period of floods, when that is justified by the speed of evolution of the situation, the reports are more frequently updated. In addition, if a notable change intervenes, map and reports can be updated constantly.


The period of validity of the colour of a section is variable according to the sections and the hydrological situation. This period of validity does not appear on the map, but figure in the report.



**Figure 23 : Flood vigilance map**

The follow-up of the weather situation, materialized by the BMS<sup>44</sup> emitted by Meteo-France is an essential complement with vigilances maps. It represents a support of decision-making aid for the installation of a crisis management device (Alert,

<sup>44</sup> Bulletins de Suivi Météorologique

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preventive measures, emergency organization, etc) and makes it possible to adapt the methods of them. Emitted by the CMIR, it describes for a type of event:

- 1 - Localization and the period (date of emission, concerned departments, date of start and end of event)
- 2 - A description (current situation and envisaged evolution of the event)
- 3 - The qualification of the event
- 4 - Possible effects on the human activities
- 5 - Advices of behaviour expected by the authorities
- 6 - The hour of the next report

The public authorities must broadcast at the concerned populations the security instructions to be observed.

The prefects of defence zones are held to start the zonal and departmental diagram of alert of the whole of the concerned operational services. This diagram is in line with a whole of documents such as the national diagram of alert of civil protection services or the diagram of the connections with the concerned towns.

The prefect in collaboration with the departmental centre of Meteo-France or the CMIR carries out a local expertise on the situation which will influence the measures taken within the framework of the departmental device of crisis management associating the CODIS and the COZ.

The prefect must quickly identify the means of necessary reinforcement and the emergency plans likely to be started.

The Prefects are based on the local means of communication to transmit the alert and the security instructions (these instructions can be predetermined and must adapt to local specificities) to the concerned populations.

The new procedure insists on the need for a close co-operation with mayors and departmental councils. Thus, if it is optional in the event with orange vigilance, the alert of the mayors by the Prefect of the zone of defence must be communicated in case of red vigilance. This measure allows the development of a “diagram of connection with the mayors”. As well as alert is orange or red, the Prefect of zone must ensure himself of the installation of a device allowing to the mayors a direct access to information in Prefecture.

The Prefect must establish the connection with the CDM and/or the CMIR and thus determine necessary measures to adapted crisis management (in particular for the opening and the maintenance of a CDM)

The main objectives of this alert system differ according to the concerned type of actor. The first objective is to generate vigilance behaviour and to broadcast it to the greatest number:

- to the public authorities at the national, zonal, departmental and communal levels, in their giving the means to anticipate, to prepare and to manage the crisis by a transmission of earlier information, thanks to forecasting and follow-up tools.
- To the population, by providing instructions of adapted behaviours in addition to the follow-up of weather alert
- to the medias, ensuring the transmission of information and the instructions of adapted behaviours by all the possible vectors of information (telecommunications, Internet, television and radiophone media)
- to Civil Protection, allowing the set up adapted measures corresponding to the existing vigilance level .

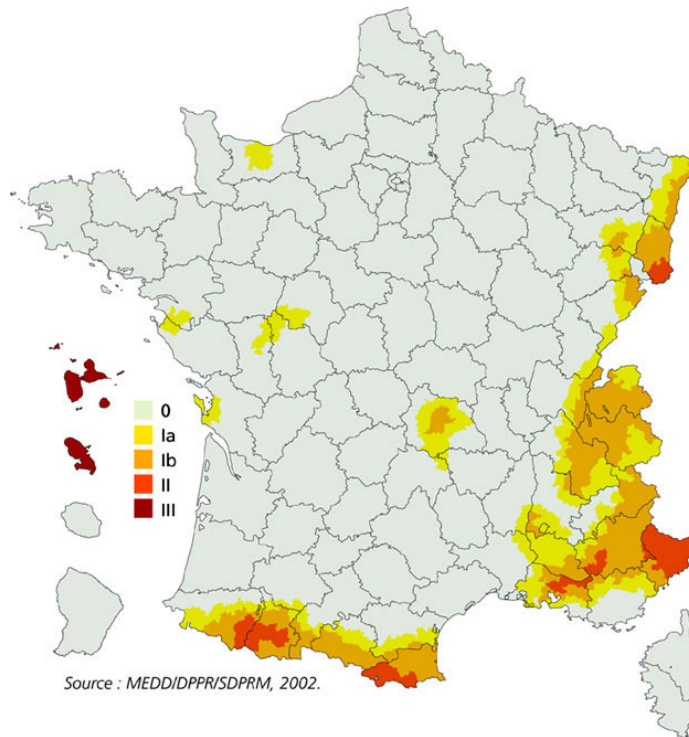
#### 4.3.3. Some particular cases

In this part, some other hazards forecasting are described to show other ways to forecast operation. Even if Meteo-France has a main role in forecasting phase, some

hazards prevention are completed by other organism such earthquake and forest fires. For the first one, the forecasting operation seems very difficult and Meteo-France organisms don't have specific skills to perform these objectives, thus this work is delegated to other national institutes like LDG and RéNaSS. For forest fires, Meteo-France delivers essential weather data to allow civil protection to perform their own forecast, thus this forecast phase is the result of collaboration between Meteo-France and Civil Protection organisms.

#### 4.3.3.1. Earthquakes

At The long-term forecast, the analysis of the historical seismicity (recurrence of the seisms), of the instrumental seismicity and the identification of the active faults, make it possible to define the seismic risk of an area, i.e. the probability that a seism occurs. It is the only existing tool of forecast. A seismic zoning of France according to five zones was thus elaborate starting from the study of 7.600 seisms (decree of May 14th, 1991). This classification is carried out on a canton scale (see Figure 24).



**Figure 24 : Seismic zoning of France**

- zone 0: insignificant seismicity
- zone Ia: very low seismicity
- zone Ib: low seismicity
- zone II: medium seismicity
- zone III: high seismicity.

*The short-term forecast:* unfortunately, to date there is not any reliable means to envisage where, when and with which power a seism will occur. Indeed, the precursory signs of a seism are not always identifiable. World research is however undertaken in order to better understand the seisms and to forecast them.

For the French case, the real time monitoring of the seismic activity of the territory is assured 24h/24 by the national network of Geophysics detection laboratory (LDG<sup>45</sup>) of the atomic energy authority (CEA<sup>46</sup>) located in the Paris and by the seismic

<sup>45</sup> Laboratoire de Détection Géophysique

<sup>46</sup> Commissariat à l'Énergie Atomique

watching national network (RéNaSS<sup>47</sup>) installed in Strasbourg.

These two networks are complementary to ensure a good monitoring of the territory and the best possible localization of the epicentres. They provide to the French central seismologic service (BCSF<sup>48</sup>) within a time lower than one hour, the principal parameters of the important seisms occurring in France or in the borders areas: start hour, geographical coordinates, magnitude. This information is transmitted to civil protection, the delegation with the major risks, the various French and foreign laboratories of seismology and if necessary, at the medias.

Currently, the experimental data come from seismological stations grouped essentially in two networks:

- The national network of the LDG/ECA consists of 30 stations, of which the data are permanently transmitted in real time by telemetry to a processing centre to *Bruyères-le-Châtel* in Paris region.
- The national network of seismic monitoring (ReNaSS) includes one hundred federated stations. It consists of regional networks, some isolated stations and seismological observatories broad-band.

The data are transmitted to ReNaSS installed to the earth science observatory and school of Strasbourg (EOST<sup>49</sup>).

The BCSF proceeds, with the assistance of the departmental services of Civil Protection to an investigation in situ for any event magnitude higher than 3,5 in order to collect testimonies concerning the possible effects of the seism on the population and the buildings. That enables it thereafter to determine the intensity of the seism in the zone.

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<sup>47</sup> Réseau National de Surveillance Sismique

<sup>48</sup> Bureau central sismologique français

<sup>49</sup> Ecole et Observatoire des Sciences de la Terre



#### 4.3.3.2. Example of forest fire forecasting

The agreement on May 1994 between Meteo-France and Civil Protection direction define the main role of weather forecasting organism in forest fires forecasting. Thus, Meteo-France put elements concerning forest fires meteorological dangers at civil protection's disposal. To precisely describe the fire forest forecasting organisation, the South-East zone has been taken as example.

The operational weather assistance for the forest fires in Mediterranean zone covers the 13 departments of the Southern defence zone, to which Ardèche and Drôme are added.

For Meteo-France, this field relates to two interregional directions:

- The south east inter-regional direction (DIRSE<sup>50</sup>) Aix-en-Provence, which includes:
  - The CMIR South-East
  - 13 CDM
- The centre east inter-regional direction (DIRCE<sup>51</sup>) Lyon, which includes:
  - The CMIR Centre-east
  - 2 CDM

The forest fires observation network is essential to the forecast of the fire hazard. It is used as a basis for calculations of dryness indices, which are one of the links of the forecast of danger:

- 174 "complete" stations (5 sensors minimum: direction and speed of the wind, temperature, moisture and rainfall)
- 109 stations with 2 sensors (rainfall and temperature)
- Normal and permanent means of Meteo-France

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<sup>50</sup> Direction interrégionale Sud Est

<sup>51</sup> Direction interrégionale Centre Est

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To forecast the fires danger, Civil protection and Meteo-France use climatic zoning, called “forest fires zoning”, which is used as a basis for the analysis of the weather danger of fires includes 116 zones.

Meteo-France sets up a weather branches supplied by DIRSE forecasters at the EMZ of Southern zone, in Valabre, and works out and broadcast forecasts twice a day appraised of weather danger of forest fires. The elements worked out by the DIRSE concerning the fire hazard are placed at the disposal of the services institutional processing forest fire on an web site of Meteo-France, dedicated to the question of forest fires in Mediterranean zone (named site FDFSE) and accessible only with an access code and a password. This site is not intended for the public

Information is also transmitted directly to the EMZ Southern and included in the communication systems of civil protection.

The forecasts of weather fires danger broadcasted by Meteo-France, for the forest fires partners are given on a scale of six levels. This scale is not intended for the public. The scale has been developed and validated by the Southern and South-western EMZ, it is common to the South-western area and the Mediterranean zone.

Level	Calling	Color	Definition
1	low	Blue	Zone is few sensible, fire first appearance is unlikely
2	light	Green	Even if fire first appearance, its propagation will be slow
3	moderate	Yellow	Sensibility of the zone increases, dryness state is from low to moderate. its propagation will be moderate
4	high	Orange	Zone is sensible and dryness is from moderate to high. Two cases : - Fire first appearance is few likely, however propagation will be important - meteorological danger for first appearance is important, fire first appearance is likely and propagation will be important
5	very high	Red	Zone is very sensible, fire first appearance is important. Any heat or fire sources can cause a fire with a rapid propagation
6	exceptional	Black	Zone is extremely sensible. Dryness is extreme and fire first appearance risk is very high. Fire with very high intensity and a very rapid propagation

**Table 2 : Danger scale**

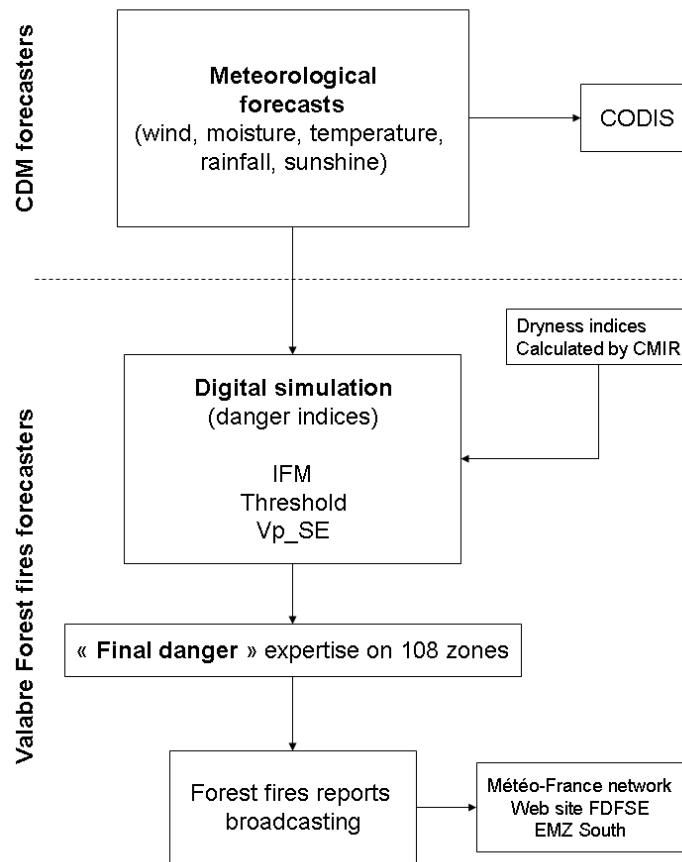
The expertise on the danger is carried out by the forest fires forecaster of the branch of Meteo-France of Valabre (see Figure 25). It is the final phase of the analysis of the fire hazard. It tries as well as possible to reflect the variations of the weather danger of forest fires in space and time.

It is based on:

- analysis of the 3 indices of danger IFM, THRESHOLD and VP-SE calculated from weather forecasting and from the dryness indices, and from the known operational limits of each index of danger
- rainfall modes and their consequence on the dryness indices, the space distribution of rainfall within each zone, the representativeness

of information and the indices of the reference stations, the effect of the recent and expected rainfall ,

- Temporal evolution envisaged of the weather parameters during the day
- Possible shifts of the indices of danger with reality



**Figure 25 : Fires danger forecasting operation**

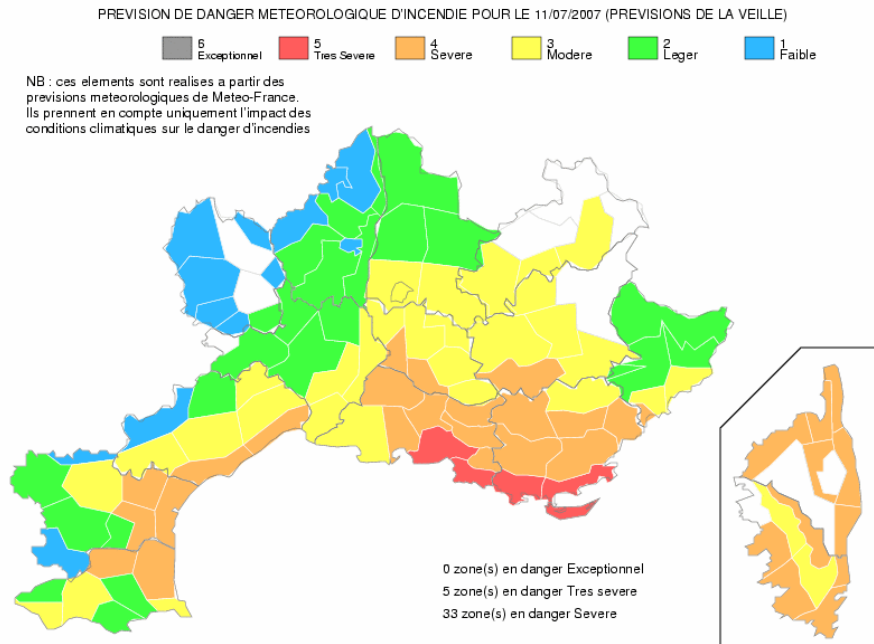
The Météo-France branch of Valabre works out, twice a day (the morning between 9h and 10h and the afternoon towards 17h), of the reports “forest fires” in which weather danger of fires forecasts of are.

Those include, for each zone fires of forest (see Figure 26):

- Daily analyzed dryness indices
- A forecast of weather parameters appraised for D and D+1

- A weather forecast of danger of fires appraised for D and D+1 on the scale on six levels


The forest fires reports comprise moreover a comment on the danger forecast for D and D+1, and in the afternoon a general tendency for the six following days.



**Figure 26 : Forest fires danger map**

An important existing network in the fire fighting topic is the *Prométhée* database which inventories the forests fires of the Mediterranean area. Conceived and launched in 1973, this operation covers 15 departments of South-east. *Prométhée* gathers the data from sources of various services, because the problem of fires of forests is managed in France, contrary to many of other countries, by various and varied entities:

- firemen and civil protection services
- foresters
- policemen
- weather services
- State services (city, department, region, ministries)

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Thus, *Prométhée* aims to federate and harmonize the data coming from various sources and to broadcast the results with all those which are concerned with the problem of the fires of forests (<http://www.promethee.com/>).

#### 4.4 Description of crisis management operation

##### 4.4.1. Crisis management overview

##### 4.4.1.1. Emergency organisation

From a point of view of rescues organisation, there are three main command posts which interact to manage the crisis in real-time:

- The P.C.F<sup>52</sup> (Fix command post) is installed to the prefecture and directed by prefect. Its role is to take strategic decisions in using all existing documents which can help them in this sense (risks inventories, operational maps...)
- The P.C.O<sup>53</sup> (Operational command post) is installed in a safe place near the catastrophe (defined in the ORSEC plan) directed by a prefect's colleague or a ranked fireman. This post is in charge of tactical manoeuvres and land actions.
- The P.C.C<sup>54</sup> (Communal command post) is installed in the hall centres of concerned cities and exists before the ORSEC plan start to manage first rescues. Its organisation is defined by the PCS (communal protection plan).

These posts are organised in cells:

- Information
- Logistic
- Operation

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<sup>52</sup> Poste de commandement fixe

<sup>53</sup> Poste de commandement opérationnel

<sup>54</sup> Poste de commandement communal

For example, in case of important event a site PC (see Figure 27) is created to manage the crisis near the threatened zone, whereas the first PC corresponding to a typical event have only information and resources functions. The site PC is organised with two committees and five main functions:

### **Operations**

- Information
  - o study
    - Relief and planimetry
    - Transport link
  - o List
    - sensible points
    - kind of threatened population
    - usable resources
    - weather conditions evolution
    - radio link between COS and CODIS
- resources and logistical support
  - location of PC and Site PC : enough place, no threatened place, helicopter take-off
  - Meeting points validated by CODIS
  - Already used or in transit resources
- Action and transmission

### **Anticipation**

- Information / anticipation
- Information / resources

### **Two others functions**

- Transit point
  - Available newcomers
  - Logistical needs
- Ground information

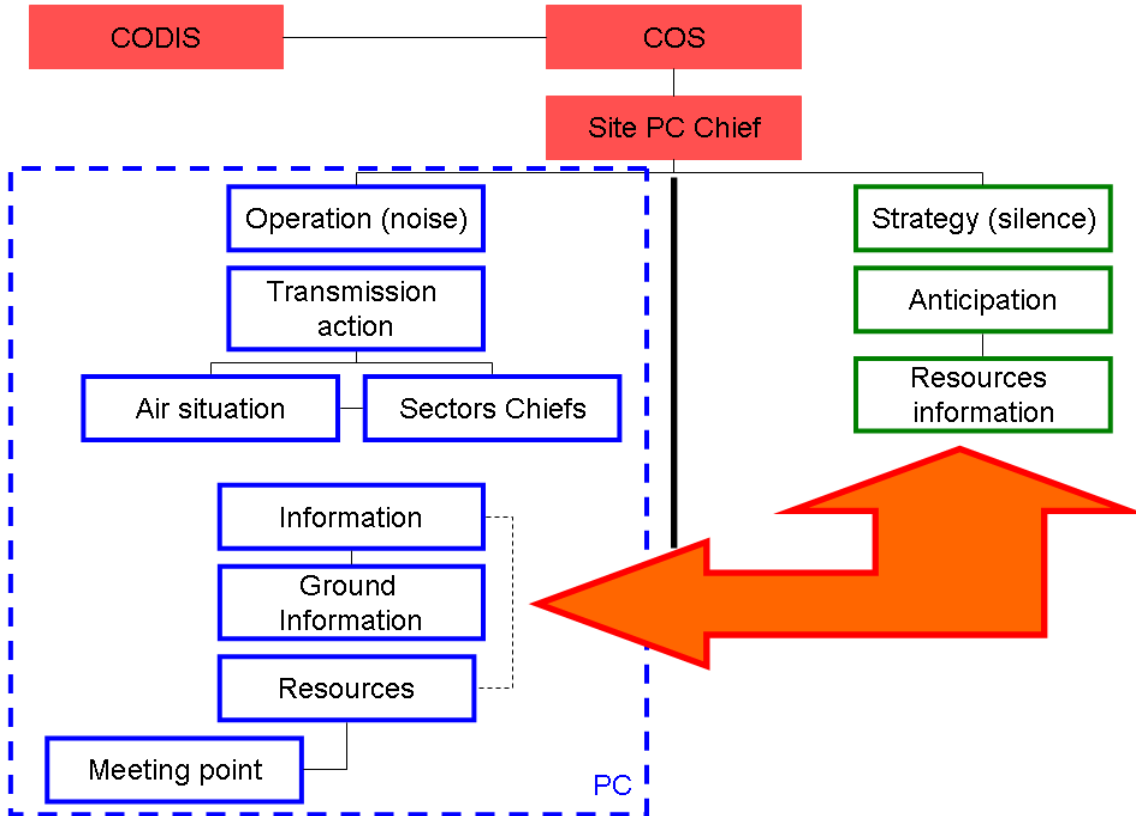
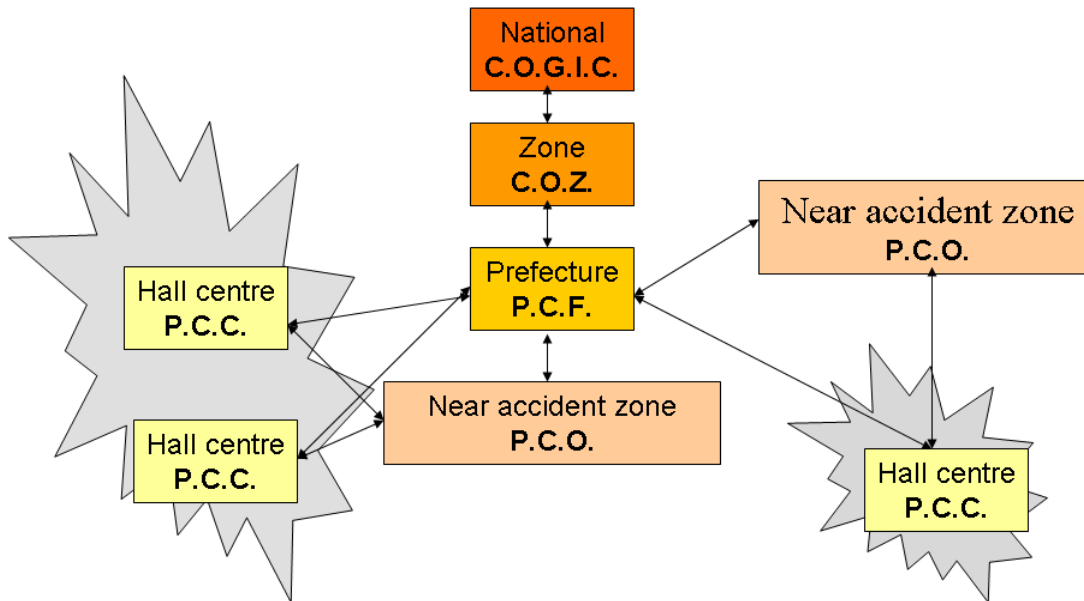


Figure 27 : Site PC global organisation

The analysis of ORSEC plan permits to understand details of crisis management organisation, in term of interactions and communication among all concerned services, from the accident zone to the national operational service (COGIC).





**Figure 28 : Crisis management organisation**  
(Adapted from Villeval, 2004)

To command an efficient crisis management, all these command posts are in constant communication and helped by internal and external services. The organisation isn't fixing but totally dynamic, in the best way, all services representatives are present in each command post, and however, it isn't always the case (Figure 28).

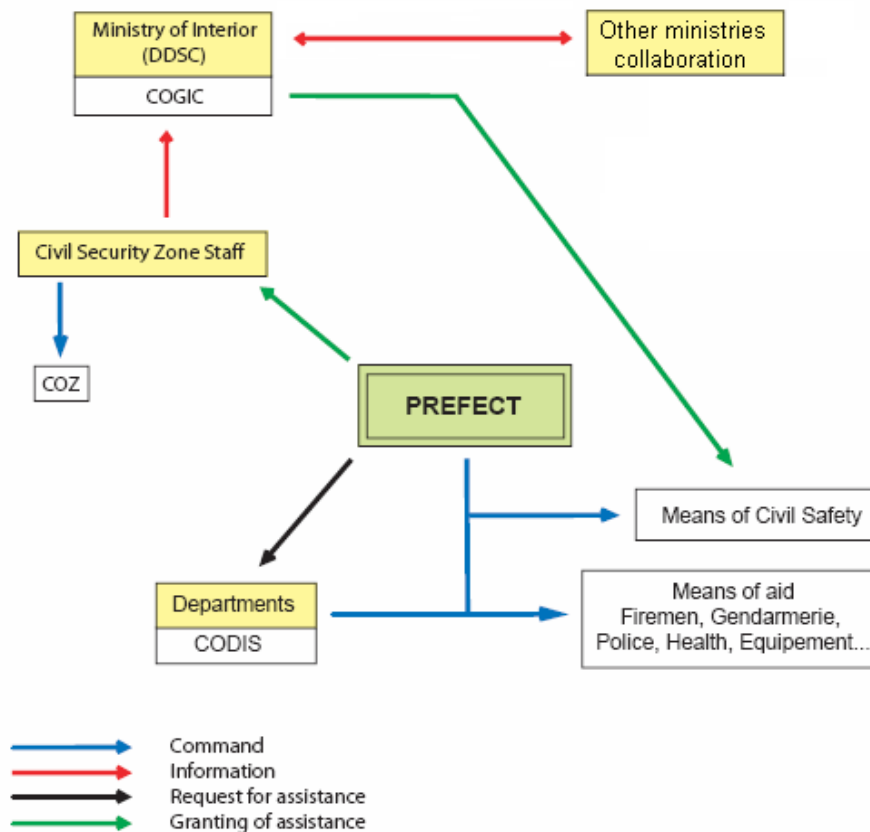
We can cite many different competent services to help Civil protection in the crisis management:

- The firemen under the authority of DDSIS<sup>55</sup> (Director of Departmental Service of Fire and rescues)
- Medical aid services under the authority of DDASS<sup>56</sup> (Director of Departmental of social and sanitary affairs) to manage urgently medical aids, psychological aids and mutual aids



<sup>55</sup> Directeur départemental des services d'incendie et de secours

<sup>56</sup> Direction départementale des Affaires sanitaires et sociales

- Police and information services under the authority of departmental director of national police to protect goods and population, inventory victims and rescues operations (reinforcements)
- Transmissions and links service under the authority of departmental director of interior transmissions which allows to liaise between different services and actors of the crisis
- Transportation services under the authority of responsible of departmental direction of equipment (DDE) to manage communication links security, to help of evacuations and means.
- Public relations and information service under the authority of prefect which keep all crisis actors, population and medias up to date about occurring events to deliver precise information



**Figure 29 : Synthesis on the French organisation**  
(From GDE, 1999)

 <p>CYCLOPS</p>	 <p>Information Society and Media</p>	<p>REF:CYCLOPS-WP03-D6-EMA-DDSC Issue : 01      Rev : 01 Date : 31/08/2007</p>
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#### 4.4.1.2. Civil protection actors

##### **Police officers and gendarmes**

To deal with any situation requiring of measures of civil defence, 130 000 police men and 97 000 gendarmes can intervene in any kind of situations.

##### **Military units**

The Units of Instruction and Intervention of Civil Protection (U.I.I.S.C.) generally intervene in reinforcement of local means in case of major accident with a team of 1 500 soldiers. These units are put the ministry of interior at disposal in case of need of reinforcements.

##### **Pilots of helicopters and water bombers**

22 helicopters bases (44 helicopters) and 1 planes base (25 planes) which allow to Civil Protection to fight forest fires, rescue in perilous zones (mountain) and manage medical emergency evacuation

##### **Mine clearance experts**

150 Mine clearance experts are Civil Protection at disposal. Main roles of these experts are:

- To neutralize the suspect objects,
- To ensure the safety of the important person and the significant places,
- To collect and destroy the old ammunitions always present in the North-East of France.

##### **First-aid workers**

Several hundreds of thousands of first-aid workers help and supply Civil Protection in prevention, formation and intervention for disasters victims. For example, there are “Croix Rouge française” (<http://www.croix-rouge.fr/>), the secours catholique (<http://www.secours-catholique.asso.fr/>) and the national federation of civil protection (<http://protection-civile.org/>).

##### **Public services**

We can quote the most famous organism which helps Civil Protection in rescues phase, the SAMU. The SAMU is an important organism for the management of pre-hospital urgencies. The principle is to centralize on the level of a medical Regulation the emergency calls and to adapt the answer according to their types and their degree of gravity. Each call is dealt with by Doctor-Regulator which adapts the decision of the means sent according to cases. There it carries out a true “medical act” of telemedicine, with the vital distresses dealt with by the SMUR (Mobile Services Urgently and of Reanimation), the other urgencies without distress profiting from doctor sending in residence, of transfer towards a structure of care per ambulance . This organization is specific to several countries of the French-speaking zone.

### **Firemen**

The main actors of Civil Protection actions are the firemen. To date, 240 000 firemen are allocated to local fire and rescues centres setting up at each town or group of villages. The article 2 of the law of May 3rd, 1996 defines the following missions of the firemen:

- Prevention, protection and fire control,
- Protection and fight against the other accidents, disasters and catastrophes,
- Evaluation and prevention of the technological and natural risks,
- Emergency Help,
- Preparation of the safeguard measures and organization of the emergency means, Protection of the people, the goods and the environment.

### **Private means**

Certain private companies have their own means of safety which constitute reinforcements for the public rescues services.

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#### 4.4.1.3. Staff/Equipment

- Civilian staff of the DDSC (2005): 1 109;
- Military staff (covered by the D.D.S.C. budget): 1 504;
- 9 928 military firemen (Paris, Marseilles);
- 36 461 civilian professional firemen;
- 197 556 civilian voluntary firemen.

#### 4.4.2. Emergency plans

##### 4.4.2.1. ORSEC<sup>57</sup> plan

Since the law of 13 august 2004 of civil security modernization, crisis situation organisation follows the plan ORSEC to organize rescue phase. This plan has been created by the July 22<sup>nd</sup>, 1987.

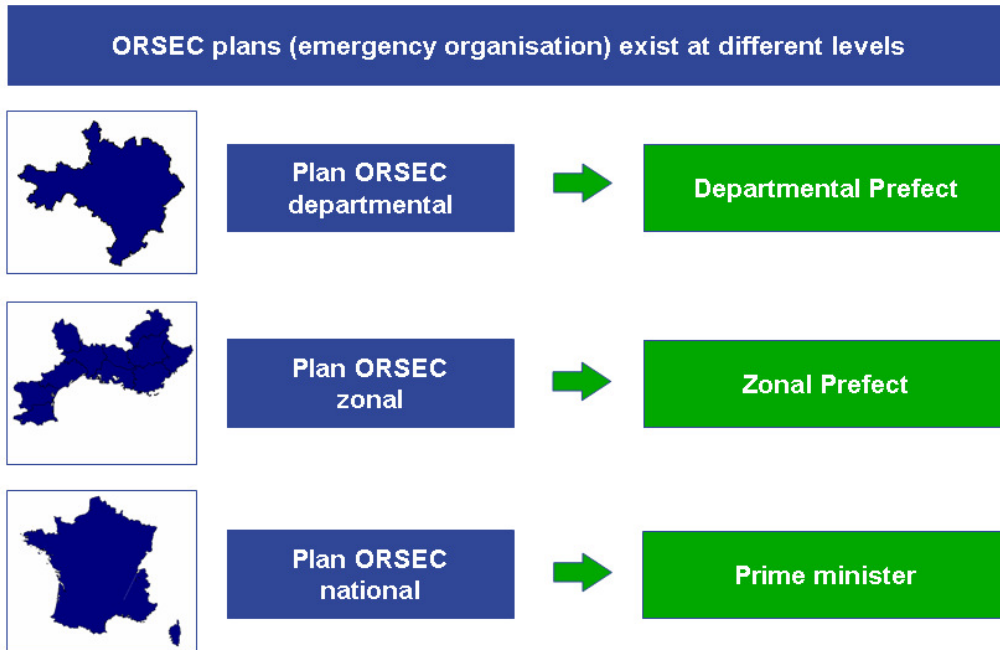
The ORSEC plan is the essential element of inter-services organisation allowing to manage major events. ORSEC tool is the unique and multifunctional organisation to manage major events occurring important damages on local population, as well as natural hazards, technologic or terrorist attack. Plans ORSEC are organizational rescues plans applying to any kind of catastrophe but don't give answers to any kind of situation but rather a whole of means to develop in case of emergency. It permits to handle an effective and competent structure to manage rescues with a unique command centre to obtain a rapid and efficient result (MIAT, 2006).

This plan is composed of four main territorial levels:

- Departments
- Defence zones
- National level
- Maritime zones

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<sup>57</sup> ORganisation des SECours



**Figure 30 : ORSEC plans**

This plan is organised around four main principles:

- Inventory and analysis of risks and consequences of threats where the main objective is to perform a repertory of identified risks by all the services allowing to share common behaviour and data in case of major event.
- Inventory of effective public and private means to face up catastrophic events.
- Operational operation which defines a common organisation of crisis management to protect population specific at each level but following a common approach. It consists at an operation allowing to adapt to any kind of emergency situations. This organisation is modular, progressive and adaptable
- Preparation, exercises and training phases to facilitate the operational phase by a mutual knowledge of each partner. It consists to train all partners to work together in difficult circumstances.

Use and application of ORSEC plan depends of intensity of event. Several cases imply the ORSEC plan use:

- number of victims
- geographical extension of event
- Specific accidents

For particular catastrophes, particular plans ORSEC were established in the form of appendices:

- Plan SATER: search for aircraft on the ground,
- Plan SATMER: search for aircraft at sea,
- ORSEC RAD: in case of nuclear accident,
- POLMAR: in case of marine pollution,
- Cyclonic plan in the DOM-TOM,
- Piratox, Biotox...

Concerning the plan command organisation, it exists three level of ORSEC plan depending on intensity of the occurring event. The next table permits to understand the main role of the directors of rescues for each organisational level.

	Departmental ORSEC Plan	Zonal ORSEC Plan	National ORSEC Plan
<b>Departmental prefect</b>	<b>Start the ORSEC PLAN</b> is the <b>D.O.S.</b> of his department	is the <b>D.O.S.</b> in his department	is the <b>D.O.S.</b> in his department
<b>Zonal prefect</b>	Is informed by departmental prefect and inform the prime minister	<b>Start the ORSEC PLAN</b> Delegate the D.O.S. to departmental prefects and inform the prime minister	Delegate the D.O.S. to departmental prefects and inform the prime minister
<b>Prime Minister</b>	Is informed	Is informed, Can choose a person to the D.O.S	<b>Start the ORSEC PLAN</b> Can choose a person to the D.O.S

**Table 3 : ORSEC plan command organisation**  
(Adapted from Villeval, 2004)

This operation document is the best overview and sequence of rescue phase organisation. We give four main kind of accident or crisis management, classified by intensity and type of event in the next part (cf. 1.4.4.3).

#### 4.4.2.2. Plan Rouge

The plan rouge is an urgency plan intended to treat a significant number of victims in the same place, and to organize the emergency means according to the concentration of the victims. It is started when the usual emergency means are insufficient, and that it is necessary to coordinate the action of various State services. It can be an accident with many victims (in general more than ten) or a situation in which number of victims can increase.

The plan rouge is based on four concepts:

- the rational organization of the means: it is necessary to prevent that the means are not obstructed mutually, preserving reserves of means for other emergencies, organizing the various actors and their actions by a hierarchical structure of the measures to be taken and victims to be treated;
- a double chain, one focused on the total management of the disaster, the other on the management of the victims;
- the installation of a countryside hospital, the advanced medical station, near the disaster;
- a double command: one on the site which takes in charge the management of the emergency operations, the other distant one which takes in charge the reinforcements and logistics.

This plan is started by the prefect of the department. In an operation requiring the execution of “plan rouge”, it is necessary in same time:

- to fight against the initial disaster, its direct and indirect effects
- to remove the victims of the hostile environment
- to take in charge the victims



Taking into account the difficulty in carrying out these missions simultaneously, two chains of command are set up under the authority of the emergency operations commander (COS): the chain fire-rescue on one side, and the medical chain on the other side (Figure 31):

- the chain fire-rescue is primarily in charge of the fight against the initial disaster; for this reason, and because the first actors will be completely devoted there, it contributes to the mission of research, localization, and release of possible victims
- the medical chain comprises three functions:
  - the collecting, which ensure raising and the transfer of the victims of the place of the event towards the advanced medical station (PMA<sup>58</sup>)
  - categorization and the conditioning of the victims
  - evacuation of the victims towards the structures of care adapted.

The prefect of the department ensures the emergency operations direction (DOS). It is him which starts the plan rouge.

The commander of the concerned SDIS concerned or his substitute ensures the emergency operations command (COS). It lays out, to manage its mission, of a rescues and fire emergency director (DSIS), and of a medical emergency director (DSM<sup>59</sup>)

The means of the plan can come from other than firemen and SAMU, like associations (the Croix Rouge or Civil Protection for example), or private ambulance; the latter will intervene primarily like not medicalized vectors of evacuation, for the taking in charge of emergency relating to the PMA, or for the psychological taking in charge of implied victims (CUMP<sup>60</sup>).

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<sup>58</sup> Poste médical avancé

<sup>59</sup> Directeur des secours médicaux

<sup>60</sup> cellules d'urgence médico-psychologique

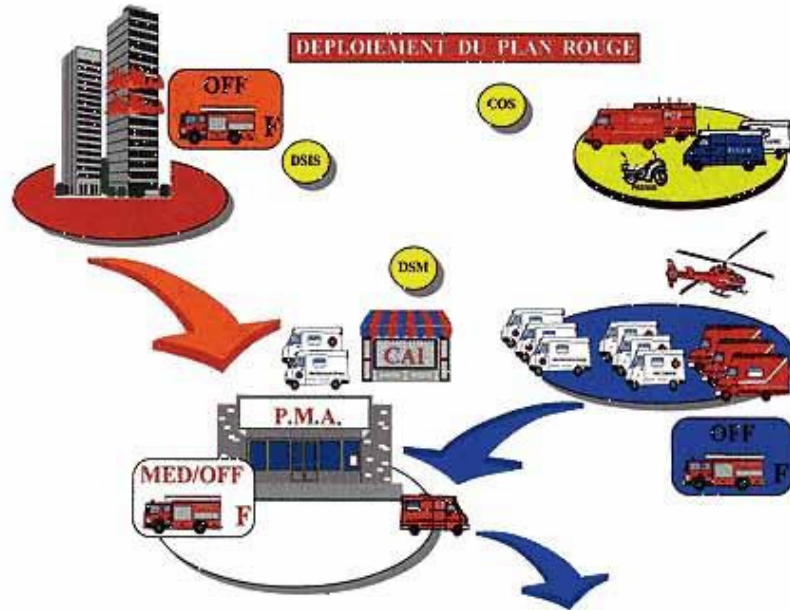


Figure 31 : Plan Rouge global organisation

4.4.3. From one simple road accident to a major event

At the departmental level (CODIS), firemen use generally predefined and typical organisations according to the type and the intensity of the event. It is “departs-types” procedure (Figure 32).

GRILLE DE DEPART SIMPLIFIEE		
DOUBLER LE VPI SYSTEMATIQUEMENT SAUF CAS IDENTIFIES DANS LES CONSIGNES		
NATURES	ENGAGEMENT IMMEDIAT	COMPLEMENT DE DEPART OU CONSIGNES
<b>INCENDIE</b>		
<b>HABITATION INDIVIDUELLE</b>		
FEU (CUISINE / CHAMBRE / SALON...)	FPT OU VPI / ECHELLE / CDG	PORTEUR D'EAU / YSAV SI MOTION VICT.
EXPLOSION	FPT OU VPI / ECHELLE / YSAV / VRM / CDG	CDC / SD / CYNO
FEU DE CHEMINEE	FPT OU VPI	NE PAS DOUBLER LE VPI
FEU D'ABRI DE JARDIN	FPT OU VPI	DOUBLER LE VPI PAR UN PORTEUR D'EAU
<b>HABITATION COLLECTIVE</b>		
FEU (APPARTEMENT / CAGE D'ESCALIER / CAYE / PARKING)	FPT OU VPI / ECHELLE / YSAV / CDG / CAMERA THERMIQUE SI CAYE ET PARKING	FPT / VAR / VENTIL
FEU LOCAL TECHNIQUE (POUBELLE / ASCENSEUR / CHAUFFERIE)	FPT OU VPI / ECHELLE	CDG / YSAV
EXPLOSION	T OU VPI / ECHELLE / YSAV / FPT / VRM / CDG / Gpc CDT / SD / CYNO / CAMERA THERMIQUE	
FEU DE JOINT DE DILATATION	FPT OU VPI / ECHELLE / CDG / CAMERA THERMIQUE	
<b>DANS E.R.P.</b>		
ETABLISSEMENT AVEC LOCAUX A SOMMEIL (HOTEL, INTERNAT...)	FPT OU VPI / ECHELLE / YSAV / FPT / CDG / VRM	CDC / VAR / VENTIL
<b>DANS UN ETABLISSEMENT SANITAIRE</b>	FPT OU VPI / ECHELLE / YSAV / FPT / YSAV / CDG / VRM / Gpc CDT	Gpc SAP / VAR / VENTIL
<b>DANS UN ETABLISSEMENT DE SPECTACLE</b>	FPT OU VPI / ECHELLE / YSAV / FPT / CDG / VRM / Gpc CDT	Gpc SAP / VAR / VENTIL
<b>CENTRE COMMERCIAL</b>	FPT OU VPI / ECHELLE / YSAV / FPT / CDG / Gpc CDT / VRM	ISSR ALUT / Gpc SAP / VAR / VENTIL
<b>MAGASIN / BAR OU RESTAURANT</b>	FPT OU VPI / ECHELLE / YSAV / CDG	FPT / VRM / CDC / ISSR ALUT
<b>DANS UN ETABLISSEMENT D'ENSEIGNEMENT</b>	FPT OU VPI / ECHELLE / YSAV / CDG / VRM	FPT / CDC / VAR / VENTIL
BUREAUX	FPT OU VPI / ECHELLE / CDG	YSAV SI IMMEUBLE A USAGE DE BUREAUX
CAMPING	FPT OU VPI	NE PAS DOUBLER LE VPI
EXPLOSION	T OU VPI / ECHELLE / YSAV / FPT / SD / CYNO / CAMERA THERMIQUE / CDG / Gpc CDT / VPI	Gpc SAP SI PLUSIEURS VICTIMES
<b>DANS ETABLISSEMENT INDUSTRIEL</b>		
D'ENTREPOT	FPT OU VPI / ECHELLE / FPT / Gpc ALIM / CDG / CDC / SOUTIEN SANITAIRE NIV 2	Gpc CDT / ISSR ALUT / ECHELLE
ATELIER	FPT OU VPI / ECHELLE / FPT / CDG / SOUTIEN SANITAIRE NIV 1	CDC / ISSR ALUT / VAR / VENTIL
STATION SERVICE	FPT OU VPI / ECHELLE / FPT / EMULSEUR / CDG / SOUTIEN SANITAIRE NIV 1	CDC / PCH3 / Gpc ALIM / CMIC / DEPOL

Figure 32 : "Départs-type" table

#### 4.4.3.1. Road accident

This situation is a very simple and typical case of firemen actions. In general, we find three vehicles for this kind of accident, first one for rescues organisation (VLCG<sup>61</sup>), second one for the first approach (VSAB<sup>62</sup>) and last one for rescue (VSR<sup>63</sup>). Main objectives of firemen are:

- Signposting
- Protection
- Boarding
- Cutting the victims free
- Picking of victims
- Evacuation

In certain cases, corresponding to a need of reinforcements beside local firemen because of an important number of victims, *plan Rouge* or plan ORSEC should be activate to a better organisation of rescues and reinforcements. At this point, the prefect becomes director of rescues.

#### 4.4.3.2. TMD<sup>64</sup>

This kind of accident corresponds to the transport dangerous goods (see Figure 33). This risk is linked to an accident occurring during goods transportation by train, car, boat, drains or sometimes by plane. It exists three kinds of effects:

- explosion
- fire
- toxic cloud dispersion

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<sup>61</sup> Véhicule de Liaison Chef de Groupe

<sup>62</sup> Véhicule de Secours aux Asphyxiés et Blessés

<sup>63</sup> Véhicule de secours routier

<sup>64</sup> Transport de matières dangereuses

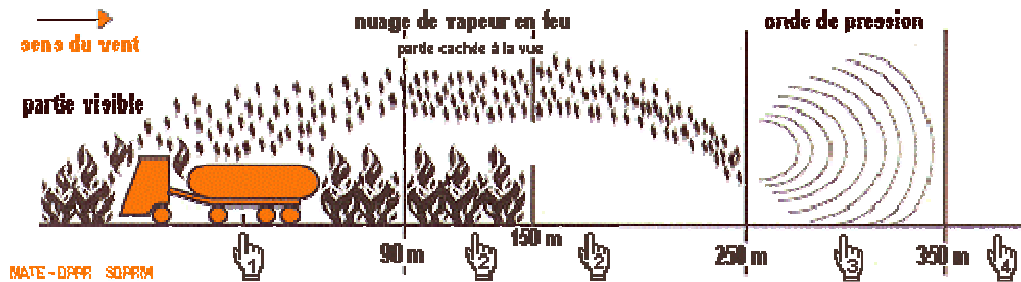


Figure 33 : Typical TMD accident

TMD events are not often included in major events because of many precaution measures in the prevention phase and during the transport of these kinds of goods. So, face to short-term situation, local firemen can easily carry out rescues phase as well as road accident. However, one fault in the security regulations can cause important damages (Erika, 1999). From a certain level of seriousness and complexity, rescues organisation is taken in charge by state units. At this point, prefect of department or zone, depending on intensity of hazard, coordinate involvement of rescues plans organisation (ORSEC plan) or emergency plans (PPI, plan rouge, PSS) to imply reinforcements at local operational forces.

Finally, for TMD train accident, the French national train company (SNCF<sup>65</sup>) has one plan to manage potential accident: the PMD<sup>66</sup> which concerns dangerous goods plan.

#### 4.4.3.3. Forest Fire

As others types of events, level of operation depends on intensity of fire, especially on fire spatial extension. In this case, we take in account fire implying departmental fire forces (GARD use-case). The main actor in this kind of event is the prefect assisted by departmental operational of fire and rescues centre (CODIS).

This service manages in real-time local firemen and reinforcements teams eventually asked to operational zonal centre. Main objectives of operational local centre are:

<sup>65</sup> Société Nationale des Chemins de Fer

<sup>66</sup> Plan marchandises dangereuses

- population and firemen security
- new fire departure management

Firemen implication depends on fire intensity and success of management, however, from an irregular situation corresponding to a lack of involved units because of an extended fire (>10 Ha), departmental direction may ask to higher level (Zone) reinforcements like others units, eventually groups of units or air equipment. From this point, operational zonal centre follows and help departmental prefect and CODIS, in the rescues management.

In term of fire fighting, the C.O.S (Rescues Operations Command) has the main control of terrestrial forces, and the main operational tool is a G.I.F.F. corresponding to forest fire intervention group made up of five vehicles, one of them for the command actions and others for fighting actions (SDIS 30, 2007).



Let's take one example of fire fighting:

**Fire starting:**

One group chief and two fire fighting vehicles (CCF) create the first PC to manage rescues phase.

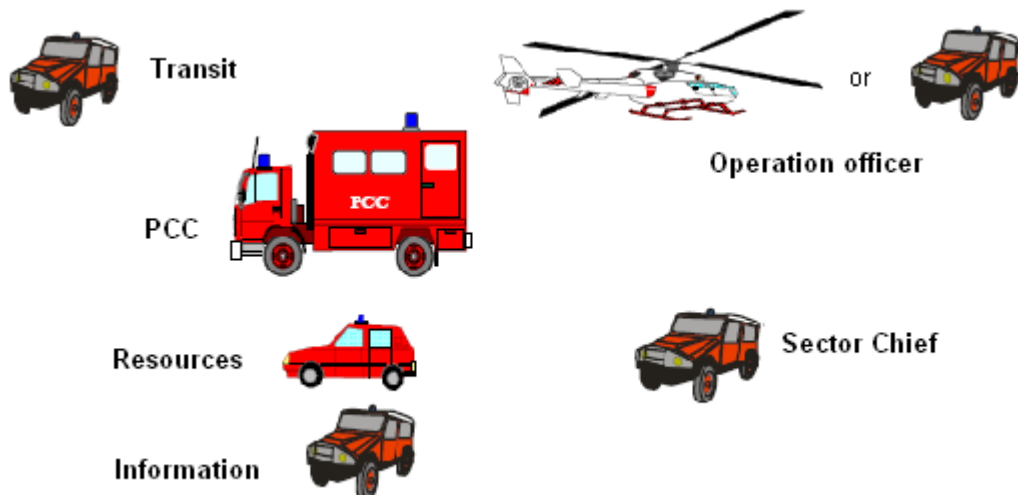


**Increase of level of risk:**

Depending on intensity of fire, one or more G.I.F.F is committed.



When two or more G.I.F.F are necessary, a chief of rescues party is committed in the rescues, especially in the existing PC and becomes the main contact with CODIS. At this point, a command structure is setup near fire site and become the intermediary command post (PC), this command secondment permits reinforcements reception, division and activation, and it is composed of:



### **From 3 G.I.F.F to 7 G.I.F.F**

Some reinforcements are given beside command structure:

- an vehicle with integrated geographical information system
- a sanitary vehicle
- a fire tactics responsible

### **From 7 G.I.F.F**

From seven or more G.I.F.F are necessary, site chief and his site command post are committed and some extra units added to the existing operation, in particular a

sanitary and command reinforcement to anticipate and control all units included in the operation.

One of important element in this adaptable organisation is the change of responsible as event increases. Indeed, when he arrives, the most ranked person become event responsible and is informed of rescues organisation by the previous highest responsible. Success of rescues depends on this transfer of power and the effectiveness of communication to describe existing situations (I'm, I see, I do, I ask, I forecast). So, communications follows some essential rules, as authorised or unauthorised interlocutors. To summarize the fire rescues phase for an important fire, the command post (PC) is included in the Site PC, and represents the operation part of Site PC. Generally, when meteorological situation is favourable for an important fire, a Site PC is directly committed in an anticipation principle.

#### 4.4.3.4. Major event

The case of major event concerns crisis situation, “the main characteristic of a crisis lies in the impact on an organization which presents some difficulties to manage them. Indeed, the decision-makers must face to negatives effects as the stress, the lack of information, several uncertainties and a great complexity in the roots causes, in the consequences and in the dynamic of the extreme situation”.(Dautun, 2007)

In France, some typical examples represented a crisis situation in the last decade, we can quote:

- Flood in 2002 in Gard department (see Figure 34)



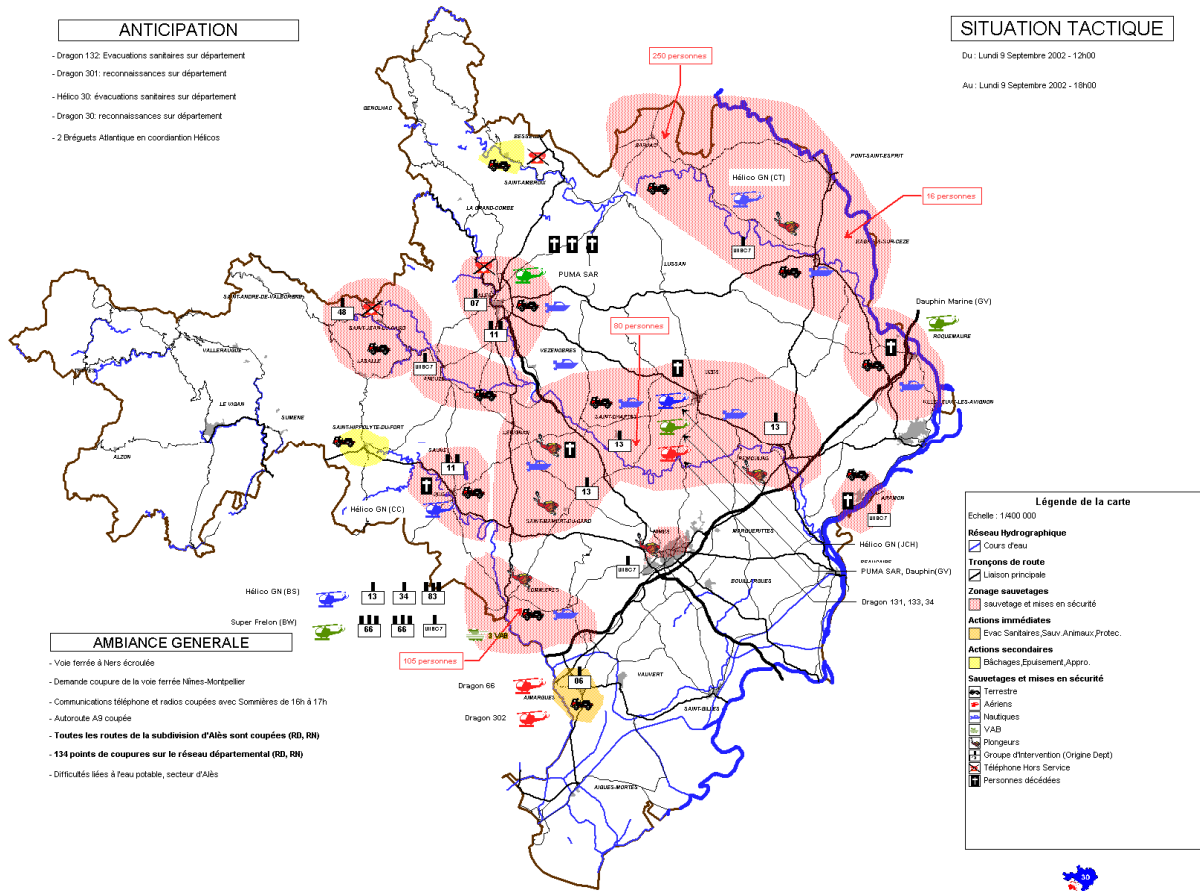


Figure 34 : Emergency organisation during floods Gard 2002 (Sauvagnargues-Lesage et Ayrat, 2007)

- Storm in Winter 1999
- AZF in 2001

These cases represent different kinds of emergency organisation and are typical of a crisis situation. It's difficult to summarize global organisation in term of involvement of emergency teams. The main idea is that, it doesn't exist typical and predefined organisation to face up these kinds of events, but they are based on a complementarity of existing "departs-types".

### 4.5 Description of post-crisis operation



#### 4.5.1. Lessons learnt by organisational level

##### 4.5.1.1. Overview

The lessons learnt procedure, which must be based on a rigorous and systematic method defined by the collection and the sorting, the setting in memory and storage, the transmission and the use of the lesson resulting from the crisis (Huet, 2005). It firstly relates to the crisis likely to be repeated, and likely to involve modifications in the procedures implemented by the service in charge of the crisis management.

The lessons which can be released after the crisis relates to the devices of prevention, forecast and planning, on the organisational and/or operational difficulties, the description of positive innovations and finally the possibility of transfer of the lessons.

The lessons learnt (REX<sup>67</sup>) is destined for many different organisms, using it for different purpose, always in the main objective of improving crisis management next occurrence:

- For the medias, it is a question of informing the reader in real-time
- For the victims, it is a question of including/understanding the drama and sometimes to find civil or criminal responsables
- For the judge, it is a question of establishing the behaviour of each actor and if he were not in conformity with the laws, to sanction him civilly and/or criminally
- For the scientists, it is a question of making progress knowledge in all the physical and socio-economic fields
- For the state and for the State authorities in their field of competence, it is truly the search for improvement of the public policies, their applications and the constitution of a durable trace for the collective memory and its diffusion.

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<sup>67</sup> Retour d'EXpérience

In France, one of the first actors of the lessons learnt for major events is the general inspection of the environment (IGE<sup>68</sup>) included in the Ministry for Ecology and the Durable Development (MEDD) which for the major events which have occurred these last years is the principal pilot. It is frequent that the general inspection is sent after a catastrophe, like Gard floods in 2002, or industrial accidents like AZF, fires of forests or oil slicks.

- The lessons learnt missions of the IGE is based on three types of work:
- The research programs to provide methodologies (MEDD, CNRS...), the use-cases studies and the expert scientists who support lessons learnt missions
- The gained experience

The principal missions of a lessons learnt procedure are:

- The evaluation of the prevention policy, of its implementation and of its effectiveness, this part is managed and analysed by the MEDD.
- The evaluation of the crisis management managed and analysed by the Civil Protection (DDSC) and the Ministry of the interior
- The proposal for actions and means for rebuilding managed and analysed by the MEDD.

One of specificities of the French organization is proposed here, indeed, the risk management is managed by two major organizations, on the one hand the MEDD manages the questions of prevention and installation whereas the Management of Defence and Civil Safety (DDSC) coordinate and organize the crisis management. If it splits the public action, this separation makes it possible to contribute to an effective lessons learnt procedure.

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<sup>68</sup> Inspection générale de l'environnement

Many lessons learned come from individual organism initiative; indeed for example, for the floods of Gard 2002, it makes it possible to inventory many REX:

- Ministry of Equipment
- General inspection of social affairs (IGAS<sup>69</sup>) and sanitary stakes
- Ministry of Defence
- Meteo-France
- EDF
- ...

Presently, the major objective of lessons learnt management is the coordination and the centralisation of all these different REX.

The interest and the need to formalize these lessons learnt procedures are illustrated by its integration in the emergency and rescues plans of Civil Protection. Indeed, either in plan ORSEC or in the communal plan of safeguard (PCS), it is explicitly expressed that the public authorities and their responsible must implement a precise lessons learnt procedure in order to improve the emergency organization and the knowledge of the hazards.

Thus, the document intended for the mayors to facilitate the creation of a PCS specifies the following missions of crisis manager and the interest of a lessons learnt document:

- to analyze the causes of the crisis
- to analyze the consequences of the crisis,
- to analyze the crisis management organisation and to modify it if required,
- to constitute a synthetic file.

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<sup>69</sup> Inspection Générale des Affaires Sociales

#### 4.5.1.2. Gard 2002 use-case focus

The floods of September 2002 mobilized the scientific and technical community as well as the State services and the local authorities. A great number of studies were initiated, thus aiming at documenting as possible this event in an objective of lessons learnt. Among all these studies, only some relate to the field of the crisis management. They can be subdivided in 3 categories: reports of events written as of the end of the emergency operations, the missions of lessons learnt worked out in the months which follow, and the longer-term organizations.

#### **Reports of events**

- The general report of the ORSEC Plan (SDIS 30, 2002), which presents the event from a chronological point of view until the end of the operations. It is a question of recounting the actions carried out by the firemen of the department of Gard supported by the extra-departmental reinforcements. A chapter is devoted to the lessons learnt. It aims to present the positive and negative lesson: encountered difficulties, favourable elements, perspectives of evolution.
- The Perriez report of the General Inspection of the Environment (Perriez, 2002), which relates primarily to the description of the event and the estimate of the damage caused on the public goods, the private individuals and the companies.

#### **Missions of lessons learnt**

- The mission of the General Inspection of the Environment (IGE)  
The interministerial report "Retour d'expérience des crues de septembre 2002 dans les départements du Gard, de l'Hérault, du Vaucluse, des Bouches du Rhône, de l'Ardèche et de la Drôme" coordinated by Philippe Huet (Huet *et al.*, 2003), was ordered by the Ministry for Ecology and the Durable Development (MEDD) to the General Inspection of the Environment (IGE).

More than twenty of studies were indexed to form this lessons learnt document (studies hydrometeorological of the event, evaluation and cartography of the damage, cartography of *Plus Hautes Eaux* (PHE), hydraulic studies, and socio-psychological studies...). The principal objective is to analyze the operation of the public policies concerned, in order to improve the effectiveness of it.

From the analysis of the event, improvements of the prevention in the various fields above were made. The conclusions appear according to 4 large axes:

- To redesign the general provisions of information and alert
- To engage a strict policy of reduction of the vulnerability in flooded zone
- To launch a plan of reconquest of the hydraulic infrastructures
- To engage a general policy of prevention

This report indirectly treats aspects relating to the crisis management, by the elements relating to the alert, for which are recommended the taking into account of the local “devices of alert” in the global thinking, the conservation of the role of centralization of the prefect concerning the setting off alert, the improvement of the accessibility of the weather and hydrological data to the elected representatives, and generally, to think about a simplification of the rules of advertisement.

- The mission of the Departmental Service of Fire and rescues (SDIS) of Gard

The Departmental Service of Fire and rescues of Gard does not have systematic method, contrary to other departments (Pomaret and Sauvagnargues-Lesage, 2004). However, in the case of the floods of September 2002, a step of lessons learnt was launched in order to index the strong points and the weaknesses related to the interventions carried out by the firemen on the ground as well as command units.

Thus, it has been created working groups having for goal to think on the lessons learnt of these floods in connection with a given topic. 9 topics of thinking and consequently the 9 working groups were made up: command, alarm of the event,

engagement and use of the material, formation, communication, security of the sites, medicalized help and health service, requisitions, individual protection equipments. Conclusions of the various working groups made the objects of operational modifications right now, in particular on the level of the individual protection equipments.

### **Organizations**

- The interdepartmental Pole of "floods competences, dam break and vigilance Meteo" of the EMZ Southern for Civil Protection

Even if the floods of September 2002 are not directly at the origin of its creation, the vocation of the Pole of Competence must make it possible to associate the whole of the actors concerned with an operation in network (responsible, correspondents of zones and services operational), to enrich the thinking and to facilitate the crossing of the cultures as regards crisis management.

The interministerial Pole of competence "floods", set up in 2003 has a total mission of study and proposal which is articulated around the following points:

- mission of analysis: link between the representatives of the concerned organizations, to gather information, hierarchical system of the risks at the zonal level, lessons learnt
- mission of planning: realization of reflexes cards , animation of networks of experts, harmonization of the departmental plans
- mission of crisis management: technical council at the zonal level
- mission of study and research: lessons learnt, technological warning, bibliographical collection

The topic of the lessons learnt is omnipresent in this work which feeds from the lived experiments by the various participating structures, and reaffirms a fact: the lessons learnt procedure became today one of the priorities of the Ministry for the Interior.

#### 4.5.2. Insurances and CatNat

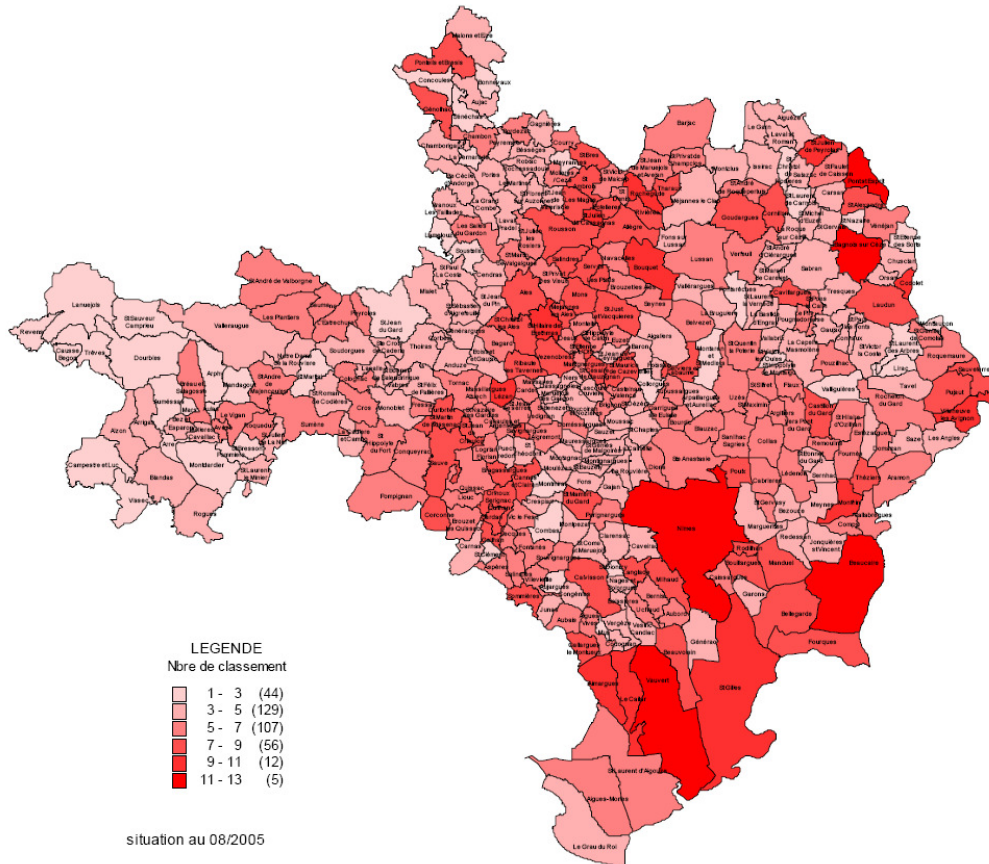
##### 4.5.2.1. Overview

The final phase of crisis management relates to the stages of lessons learnt procedure, rebuilding and compensation for the damages for the victims. The objective of the post-crisis is to avoid or minimize the consequences of a new occurrence of crisis, by taking in account the organisational or informational problems listed after the crisis, by repairing the destroyed zones or by carrying out changes in the land use to reduce the vulnerability of the populations or finally by improving the fight against hazard events by a better prevention. Interdepartmental commission, prefectures, town halls, insurances, disaster victims: the actors in the responsibility and management post-crisis of the natural disasters are multiple.

In France, the compensation for the victims of a major catastrophe returns to the principal responsible defined by investigation and by a decision of a judge. If no person in charge could be defined, it is the State which has an obligation of compensation.

The case of the process of compensation for the natural disasters is described in this report, it acts of the mode CATNAT which is planned for the management of the compensations within the framework for a major natural event classified as “natural disaster” by the State services.

The natural disasters touch more or less wide areas of the national territory. For example, it’s interesting to look at the CATNAT procedure implementation in Gard department (Figure 35).



**Figure 35 : Catnat classified cities departmental map**

The natural events considered as natural disasters are events coming from the ground and affecting it: water overflows (floods, tidal wave), draining and dilations of ground, earthquakes, eruptions volcanic, and landslides. On the other hand, storms and effects of the wind (hurricanes, cyclones, weight of snow...) are not regarded as natural disasters and any contract of fire insurance must also cover them since a law of 1990. Indeed, the law obliges the insurer who covers the fire to also cover the goods against the storms and other effects of wind (> 110 km/h), however the conditions appear more restrictive than in the case of natural disasters mode. Thus, the normal way with the compensation for the damages is the insurance.

However, contrary to all other product of insurance, the setting concerned of the guarantee natural disasters is not decided by the insurers but by the State, these exceptional events must have been the subject of an inter-ministerial decree. This prerequisite is essential so that the victims can constitute a file for the insurances for



compensation for the undergone damages. These decrees are taken by the government on request of the mayors, after consultation of the prefects and of an interdepartmental commission at Paris. As soon as that the decree is published in the Official Journal, the insurers know that they will have to compensate within the framework for the special procedure for the natural disasters. It is thus the State which is a Master of the decision.

Generally, the insurance companies do not cover the damage related to the natural disasters. The State must thus intervene via the reinsurance supplied with public funds. Thus, the taking in care of the damage following a major natural event is based on national solidarity

However, the damage caused by a natural disaster is difficult to evaluate and their cost can be considerable. This is why the State brings its guarantee via a public company, the central Case of reinsurance (CCR), at which the insurance companies can be partly reinsured.

The law of July 13th, 1982, included in the code of the insurances by the articles L 125-1 and following, fixes the framework of the compensation for the victims, the prevention of the natural risks and the role of the State in the compensation for the victims of natural disasters.

The main axes of the law are as follows: the victim of a natural disaster is entitled to compensation since it subscribed a contract of insurance to the goods. Indeed, the insurers are obliged to insert in the contracts a clause of guarantee of the damage resulting from natural disaster. Moreover, national solidarity is implemented by the enabling of the central case of reinsurance (CCR<sup>70</sup>) to reinsure the risks with the guarantee of the State. The rates of premium are single.

The guarantee of the natural disasters is granted fewer than three conditions:

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<sup>70</sup> Caisse Centrale de Réassurance

- On the one hand, the natural event must be the cause of the disaster. The phenomenon must present an abnormal character.
- In addition, the state of natural disaster must be recognized by inter-ministerial decree. The guarantee begins after publication of the decree. The decree determines the zones and the periods of the natural disaster as well as the nature of the damage resulting from this one and covered by the legal guarantee.
- Lastly, it is necessary that the damaged goods are covered by a contract of insurance, contract of damage to the goods. The no-insurance or the exclusion of a good to the contract consequently involves the failure of the guarantee of natural disaster for the good in question.

Thus, this compensations mode gives right to the guarantee of the natural disasters only to the persons or entities subscribing the voluntary insurance of damage to the goods. The diagram of mode CATNAT can thus be summarized by:

- On the one hand, there is the State represented by the CCR, which manages the implementation and the follow-up of the prevention of the risks, which fixes the rates of premium of insurance for the compensation for the victims of the natural disasters and finally which recognizes a zone disaster victim (city, department,...) as site touched by a natural disaster.
- In addition, there are the insurance companies which receive the order of the State to refund the insured party by the simple recognition of natural disaster of a disaster zone. Beyond a financial threshold of refunding, a system of reinsurance of the insurance companies is dealt with by the State and more particularly by the CCR.

#### 4.5.2.2. The relation between compensation and prevention

To support the implementation of measures of reduction of the vulnerability prescribed by PPR, the legislator created the funds of prevention of the major natural

risks, known as funds Barnier, born from the law “Barnier” of February 2nd, 1995 supplemented by the law Bachelot of July 30th, 2003. Thus, the victims can profit, under certain conditions and in certain cases, of a subsidy of the Barnier funds to implement measures of reduction of the vulnerability of goods. The insurance companies feed these funds by paying part of the contribution perceived under the natural disasters.

For the only ensured goods, it contributes to the financing of:

- studies and the work of prevention prescribed by PPR;
- expenses related to the recognition operations, treatment and filling of the underground cavities and marl-pits;
- allowance allocated in case of friendly acquisition of the building by the commune, a grouping of communes or the State.

It also contributes to the financing:

- allowance allocated in the case of expropriation because of important danger;
- expenses of prevention related on the temporary evacuations and the rehousing of the exposed people.

Lastly, to ensure the adequacy of the resources and uses of the funds, it is expected that the rate of deduction on the natural disasters premiums feeding the Barnier funds, fixed at 2% before, from now fixed by decree in the limit of 4%. System CATNAT largely supports and facilitates the compensation for the victims of natural disasters in a short-term procedure. Moreover, the funds “Barnier” facilitates the setting in safety of the population in preventative phase. Thus, these two complementary systems ensure on the whole a taking in account of responsibility of the consequences of the major natural events.

French mode CATNAT is a unique case in the world, it is based on national solidarity and is opposed to foreign systems as England system which is completely managed by private insurance companies.

#### 4.5.3. Restoration actions

After the period of the emergency intervention, the reconstruction period starts. In France, if the emergency operations are organized, however to date there is not a real planning of the rebuilding operations. During this phase, it is necessary to always repair what can be and to rebuild the destroyed zones, with a preoccupation of a reduction of the vulnerability compared to the catastrophic phenomenon.

The legislation does not indicate an obligation of repair on behalf of the firemen, however, when this reconstruction relates to the setting in safety and persons rescues, they are the first actors. In the case of major crisis, the army and ONG take an active part in this phase.

The authorities (Mayors and prefecture) accompanied by the specialized publicly-owned establishments (EDF, DDE...) had to control and carry out the rebuilding to facilitate a return to the normal as soon as possible. For example in the official recommendations of assistance and advices for the creation of a communal plan of safeguard (PCS) the post-crisis missions allocated to the mayor of the concerned commune are:

- to organize and coordinate the recourse to the voluntary ones,
- to coordinate and obtain the means necessary to the realization of the most urgent work,
- to make ensure medical controls.

## **4.6 Training**

### **4.6.1. ENSOSP**

The Higher National School for Fire-Brigade Officers (ENSOSP<sup>71</sup>) is today a national publicly-owned establishment in administrative matter created by the decree of June 7th, 2004. It is placed under the supervision of the minister in charge of civil protection and is equipped with a board of directors. It has the roles:

- The implementation of the initial and continuous officers formation of professional and voluntary firemen.
- The organization, for fire and rescues, of formations intended to the elected representative, to the civil servants, for the managers of the companies and the French or foreign experts.
- The animation of the network of the schools of firemen, and in particular coordination, in connection with the prefects of zone, of the formations, researches and the co-operation projects ensured by these schools.
- Research, studies, the evaluation, futurology, technological warning and the diffusion of related information in the concerned fields with the field of competence of the departmental services of fire and help.
- The development of international cooperation projects, in particular formation and research, in its fields of competence.

The ENSOSP is a collective company, characterized by the richness and the plurality of the actors who make the board of directors: eight State representatives, eight local authorities representatives and their publicly-owned establishments, eight representatives of the users and personnel of the school.

#### 4.6.2. ECASC

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<sup>71</sup> Ecole Nationale Supérieure des Officiers de Sapeurs-Pompiers

The School of Application of Civil Protection (ECASC<sup>72</sup>) is an institute of formation for the firemen wishing to specialize in topics more specific than the basic trainings delivered by the departmental fire and emergency service (SDIS).

The vocation of this school is to carry out training activities for the protection of the people, the goods and the environment and, more particularly the safeguarding of the Mediterranean forest.

Today, within the framework of the national diagram of formations controlled by the Management of Defence and Civil Safety (DDSC), the ECASC is the National Center of Formation approved by the Ministry for the Interior as regards forests firefighting and subaqueous diving.

Face to the new needs expressed by the various actors of Civil Protection, the School of Application of Civil Protection, resolutely prospective laboratory of ideas, developed other fields of competences for which it is also approved by the Ministry for the Interior such as the first aid, the chemical and radiological risks, cross-country driving, the clearing rescue, the help in perilous zones, the rescues in mountain, physical and sporting education, preparation for the competitive examination of major, lieutenant and fireman captain, etc...

The teaching staffs which intervene within the ECASC come mainly from the departmental bodies firemen of France.

Many teaching and technical means are placed at the disposal of the trainees, such as for example: training area, didactic rooms and software of forests fires simulation.

It is on the basis of these permanent investments, together with a innovative and quality way in phase with the realities field, that the School of Application of Civil Protection delivers capable knowledge to answer legitimate waiting of the institutions and the population and became with the Higher National School for Fire-

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<sup>72</sup> Ecole d'Application de Sécurité Civile

Brigade Officers (ENSOSP), established in Aix-Les Milles, and the new publicly-owned establishment defined by the law of modernization of Civil Protection, a true School of Application of Civil Protection.

#### 4.6.3. Initial training

The basic trainings to become voluntary or professional fireman are carried out by the departmental fire and emergency service (SDIS). The initial formation, the Initial Formation of Application (FIA<sup>73</sup>) includes the administrative culture, the public relations, the various interventions, operational management and command, fire, people rescues and operational techniques. The firemen have then the possibility of specializing in various fields in the respective departmental centres. Beyond of a certain technical level or a rank (officer), the firemen have to integrate one of the two schools quoted previously (ENSOSP or ECASC).

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<sup>73</sup> Formation Initiale d'Application

## 5 INTERNATIONAL AND TRANS-NATIONAL ORGANISATION

### 5.1 Existing European projects

To date, it doesn't exist a real European cooperation in security civil domain between members of Union European. This collaboration between members will become more realistic in next years. At the operational point of view, in the fire fighting domain, some non-official partnerships exist between several countries. South European countries cooperate for external assistance in case of cross-border fires or insufficient national capacity to share competences and equipment. For this, European commission has set up Monitoring Information Centres (MIC) accessible and ready to intervene 24h/24, and the Common Emergency Communication and Information System (CECIS). Finally, the EU supports simulation programs for catastrophes, organized to evaluate the operational assistance and command chain and to test in full-scale the co-operative work between the European teams.

For project's countries, it exists an old cross-border cooperation (1963) between Italy and France.

For data and knowledge broadcasting, new programs developed since few years in a European context. We can quote the European initiative GMES, or the INSPIRE (<http://inspire.jrc.it/>) program which aims at sharing spatial data between members.

We can find too these ones:

- PREVIEW : <http://www.preview-risk.com/>
- RISK-AWARE : <http://www.smr.arpa.emr.it/riskaware/>
- RISK-EOS : <http://www.risk-eos.com/actus/pge/index.php?arbo=0>
- EUFIRELAB : [www.eufirelab.org](http://www.eufirelab.org)

We thought that the set-up of a European Grid Platform must take in account all these existing co-operations in the field of data sharing, data mining and skills exchanges.

### 5.2 Existing European initiative



### 5.2.1. European Forest Fire Information System

The European Commission DG Joint Research Centre set up since 1999 a research group to work specifically on the development and implementation of advanced methods for the evaluation of forest fire risk and mapping of burnt areas at the European scale. These activities led to the development of the European Forest Fire Information System (EFFIS). Since the year 2003 EFFIS is part of the Regulation (EC) No 2152/2003 (Forest Focus) of the European Council and Parliament on monitoring of forests and environmental interactions. All the EFFIS activities are coordinated with DG Environment to reach the final users, Civil Protection and Forest Services, in the Member States.

EFFIS is aimed to provide relevant information for the protection of forests against fire in Europe addressing both pre-fire and post-fire conditions.

On the pre-fire phase, EFFIS is focused both on the development of systems to provide forest fire risk forecast based on existing fire risk indices, and on the development of new integrated forest fire risk indicators. These indices permit the harmonized assessment of forest fire risk at the European scale. They may be used as tools for the assessment of risk situations in cases in which international cooperation in the field of civil protection is needed. Currently, the dynamic forest fire risk forecast indices are available on the EFFIS web site and sent to the Member States Services daily from the 1st of May until the 31st of October.

On the post-fire phase, EFFIS is focused on the estimation of annual damage caused by forest fires in southern EU. All burned areas larger than 50 ha, which account for around 75 % of the total area burnt in southern Europe are mapped every year using satellite imagery. The first cartography of forest fire damages in southern EU was produced on year 2000 and continued for the subsequent years.

Additionally, as from 2003 a new activity for rapid assessment of forest fire damage has been developed in order to map all the fires larger than 100 ha twice during the fire season: at the beginning of August and at the beginning of October.

An EU Fire Database is also included in EFFIS (previously referred to as Common Core database). The database contains the forest fire information compiled by some of the EU Member States.

The outcome of research topics on forest fires currently investigated at the JRC will be implemented in EFFIS in the forthcoming years. These topics are all related to the post-fire phase and refer to forest fire atmospheric emissions, vegetation regeneration, and post-fire risk analysis. (<http://effis.jrc.it/wmi/viewer.html>).

#### 5.2.2. *MeteoAlarm information system*

Our climate is changing and extreme weather is likely to occur more frequently, increasing danger to life and damage to property. Time after time storms, floods, or avalanches somewhere in Europe have lead to a disaster and heat waves over recent years have cost many thousands of lives. Meteoalarm.eu provides a single source of comprehensive weather conditions anywhere in Europe.

Meteoalarm is a new website, designed to warn the public for severe weather across Europe. More than 20 European countries have combined to develop ([www.meteoalarm.eu](http://www.meteoalarm.eu)) a unique initiative from Eumetnet, the public European weather services network within the World Meteorological Organization.

A universally understood system using symbols and colour-coded maps provides the latest warnings of expected severe weather for the next 48 hours over most of Europe. Wherever you are in Europe, clear, concise information will help you plan your travel, or any activity affected by severe weather.

Where, for example, might heavy rain cause flooding; what is the risk of avalanche; might fog delay my flight; and will hot, dry weather increase the risk of forest fires? Each country is color-coded on the map to represent four levels of warning: red to indicate exceptional risk from dangerous weather conditions, down through orange and yellow to green, indicating that severe weather is not expected. The site offers also a greyscale map for color blind people.

The alert levels are published in a unified system with a clear relationship between the meteorological feature towards possible damage and proposed functioning, this to avoid damages. The thresholds for these levels differ from region to region because for instance intense snowfall in the Alpine region causes less disruption and damage than in Lisbon. Meteoalarm is also a portal to the national warning systems: click on the logo of individual weather services to visit websites of the respective national meteorological services for regional information.

The service concerns Europe but is meant for everyone in the world and available in 17 languages. Not only will business and holiday travellers benefit, so will official organizations such as marine and mountain rescue services. People can use it to plan more effectively, businesses can prepare for how severe weather could affect their operations and emergency services will have up-to-date information close to hand. TV weather presenters in Europe may use the colored map to enhance extreme weather.

## **V. CONCLUSION : TOWARDS A COMMON REFLECTION**

Cyclops overall objective is to define requirements of CP agencies to adapt existing Grid technology. To define these specific requirements, we presented in this deliverable general structure of each CP agency. Several main analogies were

founded so as differences among these four countries CP agencies, in objective of Grid implementation:

### 1.1 Common elements of operations

Although there is much diversity and complexity in civil protection activities and organizations around the Europe, some common elements can be detected (Quarantelli, 2000). These common functioning are very general and simple, however it allows to understand and to detect parts of operations of Civil Protection agencies which could be commonly enhanced by Grid technology adoption.

- There are shared responsibilities among three nested and prioritized levels depending on disaster intensity. To control rescues phase, each level has an attached operational centre. For a local event, rescues monitoring are controlled by a local operational centre. Regional and national centres are only informed of state of rescues. For an important crisis, controls of rescues are taken in hand by higher levels services.
- From a local to a national implication in rescue phase, we found many interactions and cooperation among the 3 levels (local, regional and national). However, there is often poor integration between the higher and lower levels (Quarantelli, 2000).
- In case of an important disaster, the direction of rescue is taken by Minister of interior. Depending on type of disaster (natural, industrial, terrorist attack...), other ministers collaborate in decision making.
- All the functioning of CP agencies is characterized by a dynamical structure adapted to the disaster conditions in near or real-time.

Finally, in term of administrative organisation, these four countries have same structures where there is a major government responsibility.

Some other interesting points, not explicitly developed in this deliverable, but evoked by Quarantelli (Quarantelli, 2000) concern:

- An accelerating focus in the civil protection area on using a generic or an all hazards approach
- A growing emphasis on disaster mitigation to reduce the impact of disasters.
- The preparedness planning seems better than the response patterns.

This last analogy confirms the first assumptions explained concerning the fact that monitoring and warning systems could be good candidate for use-cases study. Some additional elements will confirm this strategic choice in the following lines.

All these analogies allow us to think it is possible to have a common reflection for the next deliverables. Moreover, this can help us to consider future using of Grid technology in CP agencies with a same reflection. Finally, current researches on a European organisation of CP agencies and a data sharing policies (cf. § 5.) should be another motivation to design a standard infrastructure such Grid Technology.

One main difficulty which will be develop further concerns the heterogeneous systems of civil protection agencies, organizationally complex and poorly integrated, both internally and externally. For example, in France, each operational departmental centre developed its own operational systems and applications. However, last policies at national and European levels show a new trend to homogenise and to centralise systems, applications and operations. Cyclops project follows this general trend.

## **1.2 Some specific differences**

On the other hand, European Civil Protection agencies don't have same operations to manage a crisis, corresponding to the four main phases of crisis:

- Mitigation

- Preparedness
- Response
- Recovery

In the case of France one should stress that civil protection is a shared responsibility both across ministries and along administrative levels. For instance DDSC is not responsible of risk prevention plans while in Italy the DPC has also responsibilities in prevention.

While DDSC (as well as ANPC and GSCP) have a kind of service agreement with e.g. Meteo-France (respectively Portuguese Meteorological Institute and Greek National Meteorological Service), DPC has built a more integrated system with its partners and called "Centri di Competenza" for each specific threatening events. Thus, Italian Civil Protection has to be seen as a more integrated organism corresponding to a unique structure managing all crisis phases. While others countries have to be considered as multi-institutional structure, increasing security and sharing problems well known in Grid science. In term, of grid technology adoption, these two different approaches in crisis management probably require two different analysis and studies to a future enhancement and use of Grid technology to perform specific Civil Protection operation.

Finally, these differences have given the future orientation of deliverables developments, concerning the "Existing Analysis Document", these differences don't affect description and analysis of existing infrastructure and applications. On the other hand, the "Use-cases Document" should show and emphasize organisational and functional differences among countries. For this reason, one Italian use-case will be compared to a French use-case on the preparedness topic. This comparative analysis will permit to have the more detailed Civil Protection requirements as possible to develop the "System Requirements Document" and to finalize the aim of Work package 3 "Civil Protection systems analysis".



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Hydrological events prevention and forecasting project

**Atlas des zones inondables du Gard:**

[http://www.gard.equipement.gouv.fr/eau\\_environment/AtlasZI/AccueilDDE30.htm](http://www.gard.equipement.gouv.fr/eau_environment/AtlasZI/AccueilDDE30.htm)

Flooding zone in Gard Region

**Central of Análise E previsão C tempo:**

[http://web.meteo.pt/pt/previsao/riscoincendio/risc\\_class\\_conc.jsp](http://web.meteo.pt/pt/previsao/riscoincendio/risc_class_conc.jsp)

Portuguese Meteo Website

**Civil Protection of Chania Prefecture:** <http://www.nax.gr/>

**DDSC:** [http://www.interieur.gouv.fr/sections/a\\_l\\_interieur/defense\\_et\\_securite\\_civiles](http://www.interieur.gouv.fr/sections/a_l_interieur/defense_et_securite_civiles)

**Dipartimento della Protezione Civile:** <http://www.protezionecivile.it/>

Italian civil protection

**Earthquake Planning and Protection Organisation (EPPO):** <http://www.oasp.gr/> -

A variety of EPPO publications about prevention of earthquake disasters and earthquake protection in Greece.

**ECASC:** <http://www.valabre.com/>

The School of Application of Civil Protection

**ENSOSP:** <http://www.ensosp.fr/v4/>

The Higher National School for Fire-Brigade Officers

**ESA:** [http://earth.esa.int/applications/dm/archdm/disman/db/synthesis\\_reports/](http://earth.esa.int/applications/dm/archdm/disman/db/synthesis_reports/)

Synthesis reports on European Civil Protection agencies

**EuroFireLab:** [www.eufirelab.org](http://www.eufirelab.org)

A wall-less Laboratory for Wildland Fire Sciences and Technologies in the Euro-Mediterranean Region

**European Forest Fire Information System:** <http://effis.jrc.it/Home/>

**Global Monitoring for Environment and Security:** <http://www.gmes.info/>

GMES is a European initiative which will provide us with the tools to improve our environment and will help us keeping our planet safe and healthy.

**Inspire:** <http://inspire.jrc.it/>

A initiative intends to trigger the creation of a European spatial information infrastructure that delivers to the users integrated spatial information services

**Memento du Maire:** <http://www.mementodumaire.net/>

Risks management reminder for Mayors and Prefects

**MeteoAlarm:** <http://www.meteoalarm.eu/>

Alerting Europe for extreme weather

**PÔNT:** <http://pont-entente.org/>

Pôle Nouvelles Technologies

**Portuguese Authority for Civil Protection:**



<http://www.proteccaocivil.pt/Pages/default.aspx>

**Preview project:** <http://www.preview-risk.com/>

Geo-information services for risk management on a European level

**Prim.net :** <http://www.prim.net/>

Major risks prevention portal

 <p>CYCLOPS</p>	 <p>Information Society and Media</p>	<p>REF:CYCLOPS-WP03-D6-EMA-DDSC Issue : 01    Rev : 01 Date : 31/08/2007</p>
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**Promethee:** <http://www.promethee.com/>

French database of forest fires

**Risk-aware project:** <http://www.smr.arpa.emr.it/riskaware/?page=index>

Risk-advanced weather forecast system to advice on risk events and management

**Risk-EOS:** <http://www.risk-eos.com/>

The Risk-EOS service portfolio, is dedicated to support the management of Flash Floods, Plain Floods and Forest fires throughout all phases of the risk management process.

**SDIS 30:** <http://www.sdis30.fr/>

Gard operational departmental service

**Secourisme.info:** <http://www.secourisme.info/>

Rescues portal

**SPC Grand Delta:** <http://orig.cg-gard.fr/ori/tab/infoprev>

“Grand Delta” Flood warning service web site

**Vigicrues:** <http://www.vigicrues.ecologie.gouv.fr/>

French floods vigilance map