Proposal/Contract: 031874

CYCLOPS

CYber-Infrastructure for CiviL protection Operative ProcedureS

Existing analysis document

(Deliverable D8)

Reference : CYCLOPS-WP03-D8-EMA-DDSC

Due date of deliverable: May 2007
Actual submission date: August 31st 2007

Start date of the project: **JUNE 1st 2006** Duration: **24 months**

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Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)		
Deliverable Dissemination Level		
PU	Public	
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	**X**
CO	Confidential, only for members of the consortium (including the Commission Services)	

DOCUMENT HISTORY

Issue.revision	Date	Description of change	Author	Affiliation
1.0	01/08/2007	Main text	S. Sauvagnargues-Lesage V. Thierion	EMA - DDSC

DISTRIBUTION LIST

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EXECUTIVE SUMMARY

The purpose of this report aims at giving a description of the technical resources of Civil Protection agencies in the perspective of Grid technology adoption. The final objective of this deliverable is to inventory and to describe the equipment such as computing, storage and communication available and used by each Civil Protection agencies involved in this project. This deliverable is useful both to identify the required enhancement to support an EGEE-based Grid platform and to analyse the problem related to the homogenization of resources.

The document is structure as follows:

The first part (section 2) describes the Scope of the Document that is the role of the document in the context of the project. In particular this section presents main objective of this deliverable.

The next part (section 3) describes main resources of CP agencies in Europe.

SCOPE OF THE DOCUMENT

In objective of bridging the gap between civil protection agencies and Grid community, the initial need is to target main requirements of CP agencies to a potential use of Grid technology (PO_4). The Technical Annex I – "Description of Work" clearly details main steps to achieve this objective. In addition, fundamental knowledge of CP agencies becomes a preliminary goal to achieve objectives of Cyclops project in order to define the requirements of CP community for Grid platforms.
This deliverable describes the technical resources of Civil Protection agencies of the four countries involved in the project.

In particular, this report inventories hardware and software resources currently used in the Civil Protection agencies to manage forecasting and emergency phases. It describes for each involved countries the main national systems used by a majority of agencies and recognized as essential tools for the crisis management. It focus on hardware resources that it could be available for a future "Civil Protection" Grid technology implementation. In a second step, main tools and applications of each countries are described with a technical point of view, main functionalities of these and implementation specifications to easily define future enhancements of Grid technology to support these kinds of applications.

The exhaustive description of existing resources seems to be an impossible objective, especially for French case. Indeed, if Italian system is almost centralized in term of management of warning system, the other organisations appear very individualized. For France, each operational departmental service implemented its own systems to manage the crisis. Moreover, as developed in the previous deliverable (D6: Business Process Analysis document), French, Portuguese and Greek structures are almost different than Italian structure for the warning and the forecasting phase.

In Italy, forecasting units are integrated in the Civil Protection organisation as “Centri di Competenza” to provide services, information, data, and elaboration, technical and scientific contributions for specific risks.
In France, all these skills are delegated to external services as Meteo-France and SCHAPI[1] (floods warning and monitoring hydro-meteorological service). In other words, French Civil Protection has a unique role of emergency organisation supported by external services for the warning aspects. It was decided to develop many different strategies for this deliverable. For Italian case, the centralized warning system has been described as the main system of this country. While for French and Portugal cases, the crisis management means description is the main topic. Concerning Greece, the difficulties to contact Greek civil protection members didn’t allow to efficiently perform this objective. For this reason Cyclops partners decided to describe the Hellenic National Meteorological Service (HNMS) more likely to be integrated in a Grid infrastructure.

The general philosophy of this deliverable is to inventory some services of each country. These services are likely to be integrated in a Grid infrastructure in terms of hardware to supply a Grid technology implementation and of software to port them on an eventually European Civil Protection Grid infrastructure.

To perform the D8 objectives, the developed strategy was to produce a form to be filled by technical reference persons of concerned Civil Protection as stipulated in the Annex I. This form is based on a standard questionnaire used in NA4 activity of EGEE project to help users to prepare and understand their applications to port on a Grid infrastructure. For this deliverable, the study has focused on the two first parts of this form; the latter especially concerns the last deliverable “System Requirements Analysis Document” (D11) of the Work Package 3.
This is the Existing Analysis form:

[1] Service Central d’Hydrométéorologie et d’Appui à la Prévision des Inondations

Existing Analysis Form

Introduction

The Cyclops project (http://www.cyclops-project.eu/) aims at bridging the gap between GRID community represented by EGEE project (http://www.eu-egee.org/) and Civil Protection community represented by GMES initiative (http://www.gmes.info/157.0.html). To date, GRID technology is not totally adapted to Civil Protection requirements. So, this project aims at providing the GRID Community with knowledge and requirements that characterise the CP services. These requirements will also be used to assess the possibility for the development of an advanced grid platform enabling Real Time and near-Real Time services and implementing a security infrastructure very close to the defence systems standards. After the first report describing Civil Protection agencies (France, Portugal, Italy and Greece), we produced this form to get in touch with Civil Protection computer team and users team to retrieve technical knowledge and specific requirements of each level of each CP agencies.

You can find two main parts in this form, first one is dedicated to technical resources available and usable to build a Civil Protection Grid Infrastructure in objective of resources and data homogenization. Second one concerns tools and applications already existing which could be more efficient with more computational power and storage capacity. Finally, if necessary you can fill the last part to give potential and specific enhancements that we could have omitted.

1) Available resources to build a Civil Protection Grid

In this part, we expected from you to describe available resources of your organism. This description may help us to know which resources could be used in case of Grid infrastructure implementation among Civil Protection services. You don't have to give a description of each individual computer. We are rather interesting by identifying main available resources, like clusters or computer farms eventually available to build a Civil protection Grid.

a. *Human resources*

- How many persons are included in the computer management in your organism? Can you describe each role? Please specify if some of them have distributed computing skills?

b. *Hardware resources*

- Do you have some main servers, clusters or computer farms?
- Which storage capacity do you have?
- Do you have some database servers? If, yes: Can you describe them (storage capacity, database system, Operating system…)?
- Which amount of RAM and CPU time do you have? Exists it distributed system?
- Network connectivity specifications (Internet, Ethernet, Wireless…)? Network bandwidth?

2) Tools and applications

In this part, you have to identify main tools and applications used in a crisis management context, from the forecasting phase to the rescues monitoring. To summarize, Grid technology could offer much storage capacity and an extra amount of RAM to execute complex job in a reduced waiting time. In an other hand, Grid technology allows to data virtualisation, to share more easily remote data, access sensor data, etc. One of main objective of this technology in a Civil Protection context seems to be the real-time objective.

For example, we decided to describe a flood warning system connected to a sensors system and having some problems of flow rates calculations in real-time. Model results could be interested external services like emergency operational responders and operational command centers, so Grid technology may also improve data sharing facility and interoperable context. Objective isn't to describe all of your applications but only data or CPU intensive need ones. Moreover, this part includes information systems description (GIS, specific database, etc)

a. *Application characteristics*

- Short description of the application
- Is the source code of the application available? In which programming language?
- Is the application running in Linux? Or Windows?
- Is the application CPU intensive, data intensive or both?
- What is the typical size of the application software package?
- Does your application read the input parameters from file?
- Does the application require as an input parameter files? From directories?

b. *Resources requirements*

- CPU time needed for a significant result on a single CPU
- Amount of RAM required at run
- Expected disk space required per run
- Does the application require shared home directories
- Expected number of application users?

c. *Software requirements*

- Operating system and versions?
- Compilers and versions?
- Databases and versions?
- Software libraries and packages required at run and compile time?

3) CP users requirements

One of objectives of Cyclops project is to identify actual needs to enhance crisis management organisation and forecasting and warning systems to follow up and manage with the best accuracy as possible respectively the threatening event and corresponding CP responses. As described in the previous part, grid technology

seems to have some technological solutions in this sense. However, it could be interesting to specify, with CP users, existing and known requirements to improve their system effectiveness. These requirements could be very basic and not directly linked to grid technology advantages.

One important point is the main purpose of Cyclops project which aims at adapting and improving grid technology infrastructure to reach specific requirements of CP systems and not the opposite.

We can quote few general requirements to help you in your investigation:

Requirements	Description
Real-time or near-real-time	
Computational power	
Data sharing facilities	
Interoperability	
Fault tolerance	
Security	
Others	

Based on the previous form, each partner was free to describe one or more services with its computational infrastructure and its applications. Without being exhaustive, this deliverable demonstrates the possible ways of using grid technology in each existing infrastructure. For these reasons, this deliverable doesn't have a harmonious

structure but allows taking in account available existing resources case by case for a potential Grid adoption.

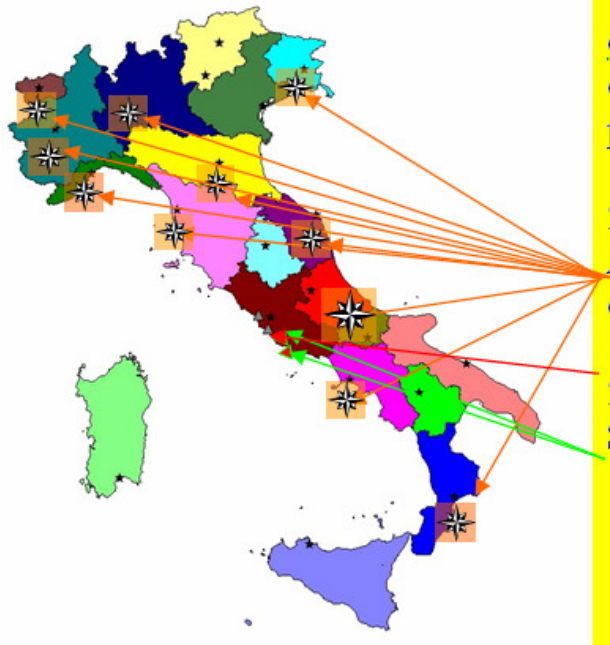
CIVIL PROTECTION RESOURCES DESCRIPTION

1. ITALY

1.1 The "Centri Funzionali" National Network

1.1.1. Overview

As specified in the introduction of this deliverable, Italian partner chose to give some details on the centralized warning system CFC[2] and its regional units. The Department of Civil Protection and the Regions assure the management of the national alert system through the "Centri Funzionali" National Network (Centre for Forecasting and Surveillance of Effects to support the Civil Protection Authority's decisions (CFSE)), as far as the Directive of 27 February 2004 in relation to the hydraulic and hydrologic risk is concerned.



"Centri Funzionali"
National Network:
designed structures for the activities of technical support to the civil protection decision

21 regional centres planned
Almost 13 of those already fully operating
1 Centro Funzionale Centrale (CFC)
2 "Centres for Technological and Scientific services"

[2] Centro Funzionale Centrale

As stated in the mentioned Directive, the Centro Funzionale Centrale (CFC), located in Rome, gradually integrates in the computing network of the CFSE (Figure 1), the operational procedures related to all the various risk typologies that affect the national territory. Quantitative and qualitative data from the different national and regional networks are collected in the main centre, together with all the other information related to the territory. Based on the overall set of data, specific models, routinely refreshed several times per day (h24), produce alert forecasts for risk occurrence as far as the natural disasters are concerned. As already mentioned in other technical documents, monitoring and alerting are the preliminary steps towards risk management and mitigation throughout a distributed mechanism for Civil Protection interventions.

The main purpose of the Centri Funzionali's activities is therefore to support decisions of the competent authorities for the emergency alert and management. Regional CFSE are organised according to common criteria and methods and make use of standards and procedures which have been implemented under the supervision of the DPC (Department of Civil Protection).

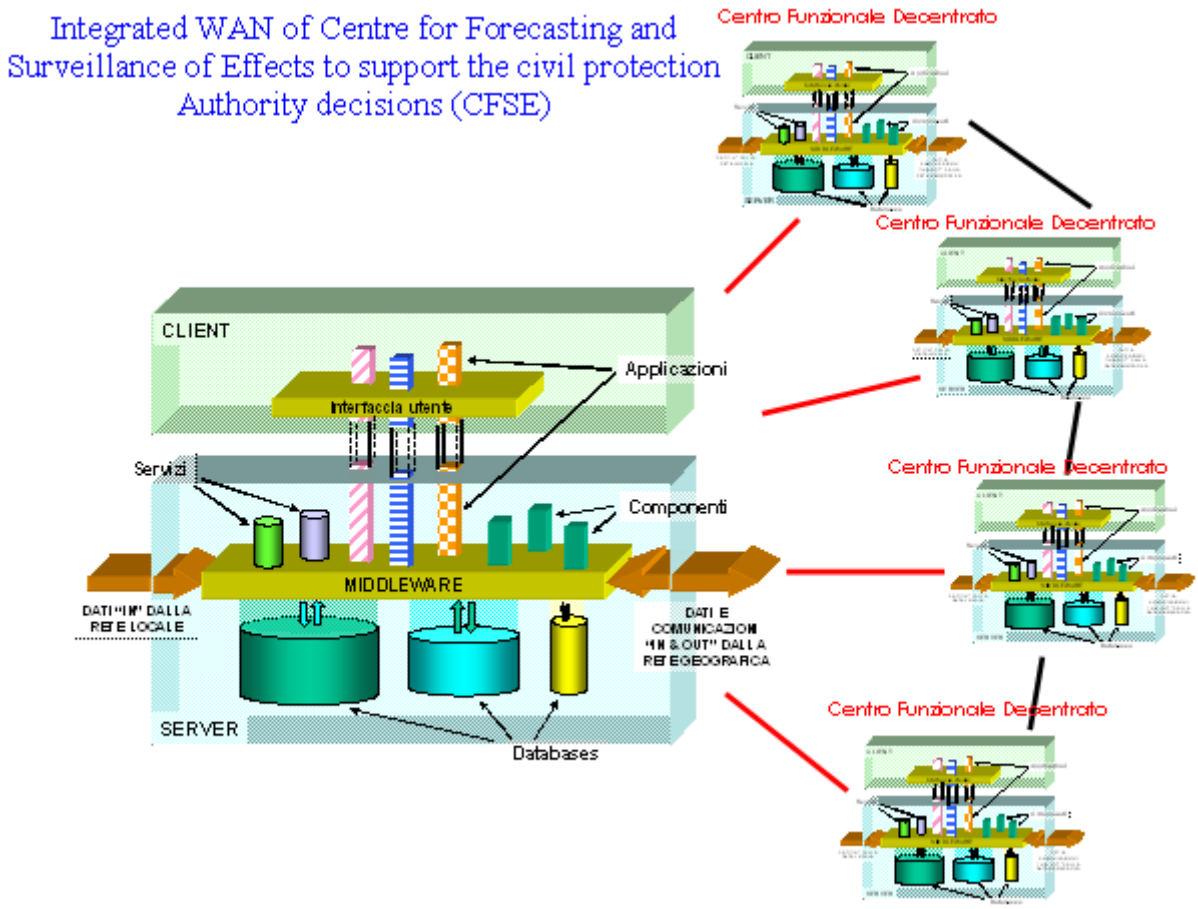


Figure 1 : CFSE architecture

1.1.2. Structure of the CFC

The CFC is a structure of the Department of the Civil Protection, integrated in the CFSE, competent of forecasting activities, real time monitoring and surveillance as far as the various typologies of risks.

Its main tasks and functions are:

- address and general coordination of the CFSE network;
- general surveillance of regional, provincial and communal territories, along with the Regional CF or in their substitution;
- arrangement of the CFSE's information mosaics produced by the existing meteorological radars of the national territory;

- maintenance of the relationships with the dams' Italian Registry, the Meteorological Service of the Air Force, with the National Institute of Geophysics and Volcanology, and with the Agency for the Protection of the Atmosphere and the Technical services;
- support to studies and searches, along with the development of products for the optimal operation of the CFSE, in order to implement the Civil Protection System forecasting and prevention capabilities in real time.

To the Director of the Forecast, Assessment, Prevention and Mitigation of the Natural Risks Office competes the general coordination of the activities, and also assures the good operation of the CFC throughout the Service for the the Centri Funzionali Network.

Every concurrent Office must assure good operation and development of their own field of risk, guaranteeing the necessary staff and proficiency for the activities (H24 in case of alert phase).

1.1.3. Organization works of the CFC

The CFC is generally organized in three great areas for the development of the various functions:
The first area is dedicated to the collection, concentration, elaboration, recording and validation of the data.
The second area is dedicated to the interpretation and the information produced by the forecasting models, related to each single risk, to support decisions of the competent Authorities.
The third area is dedicated to the informative system management that guarantees the operation of the communication systems, cures the data exchange, also in graph form, and of the messages between the CF.

The forecasting is articulated in three functions:

- The first one is relative to the assimilation of the data and/or to the elaboration of the forecast, related to the nature and the intensity of the expected events.
- The second one is relative to the forecast of the effects of such events would have to determine on the national territory.
- The third one is relative to the evaluation of the attended level of criticality.

While the first function can be performed also with the competition of CTS, second and the third function must be acquitted in priority way from the CFC, where the necessary competences and the specific technical activities of support to the decisions reside.

The phase of monitoring and surveillance has the scope, through the transmission, the collection and the concentration in the CFC of the data finds for the various purposes from the various typologies of sensors, let alone through the not instrumental news retrieved locally for through of the territorial sector, to render available information that concur are to formulate and/or to confirm the previewed scenes that to modernize them as a result of the evolution of the event in action.

Such phase is articulated in three functions:

- The first one is relative to the composition and representation of data finds from remote platforms that give instrumental stations and nets to earth;
- The second one is relative to the forecast to short term of the evolution of the event that of the relative effects through the use of models and on the base of the other information collections in real time.
- The third one is relative to the verification of the level of criticality in and being previewed, through the comparison of the measures found with the adopted thresholds and/or eventual news supplied from local observatories.

While the first and second one can be acquitted together with CTS, the third function must be performed exclusively from the CFC, in which reside the necessary competences and specific technical activities necessary to decision support activities.

Offices and the Services that manage the forecast, the monitoring and the surveillance of the significant parameters that characterize the criticality of the various risk typologies, define procedures for the management, along with the CFC, of the activities in ordinary phase and the activation of their own structures for the expected levels of criticality.

1.2 The National Early warning system and the Real Time Management of Hydro-geological risk

1.2.1. The warning system

The general management of the hydro-geological risks follows this global procedure:

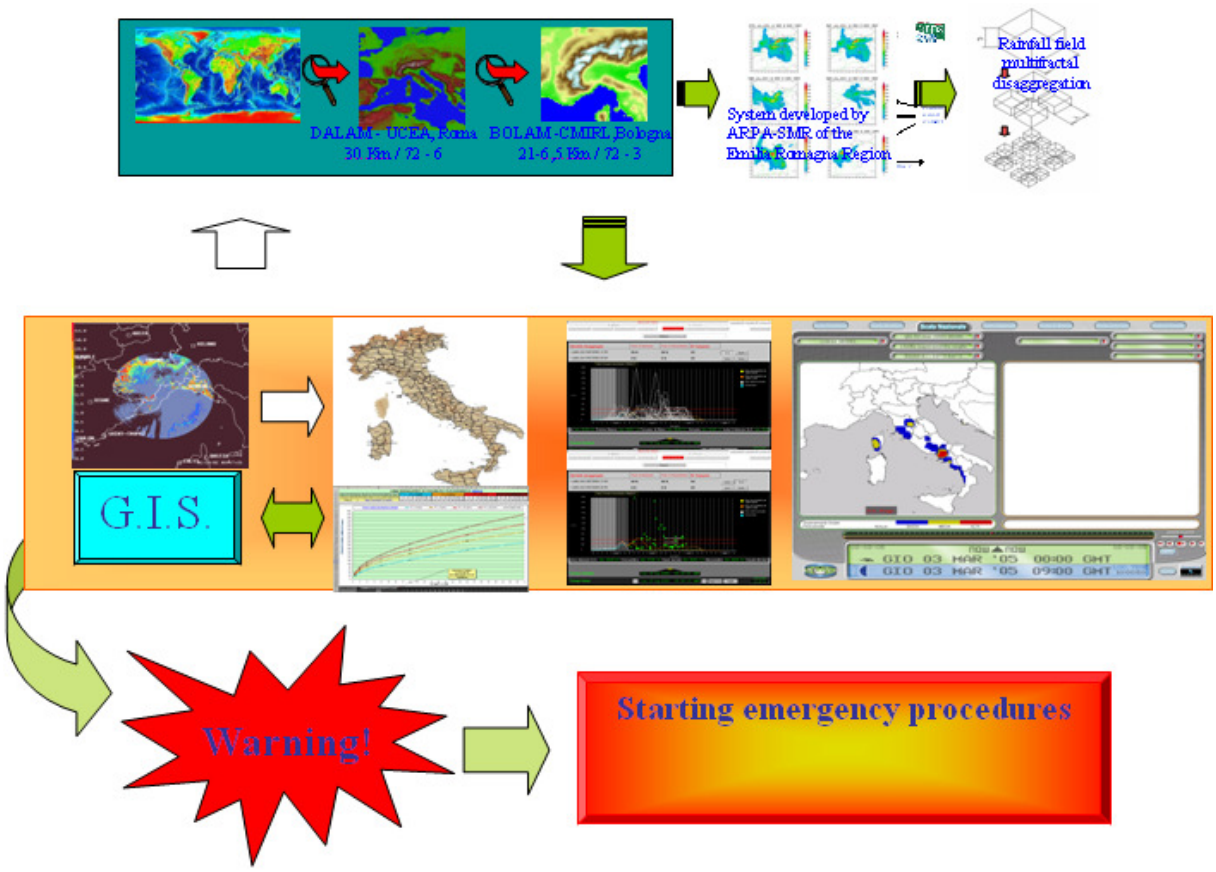


Figure 2 : Italian national early warning system

It uses many different models according to the type of risk to be analysed and managed, the following section details the main hydrological models used in the "Centro Funzionale Centrale" and shared among the regional units involved in the forecasting phase.

1.2.1.1. The NASH model

This model is composed of three main parts:

- The conceptual model:

It assimilates the real transformation of the rainfalls into discharges to a different physical system that can give a similar response. The hydrologic processes are

represented by “conceptual models” describing a very simple hydraulic system (channels, tanks).

- The concentred model:

There is no space variation of the parameters and inputs in the hydrographic catchment.

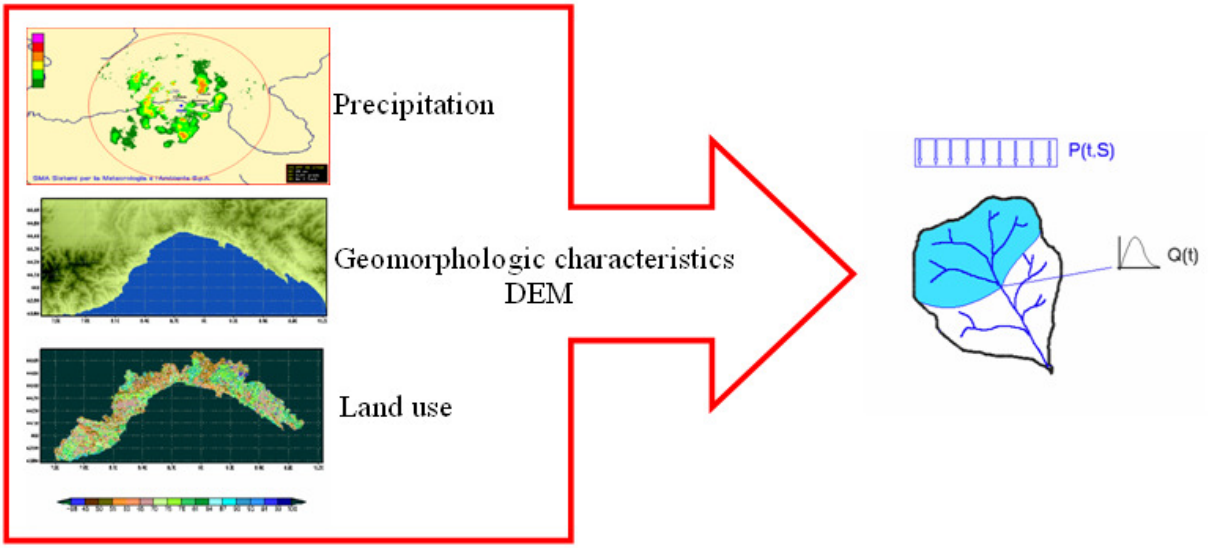
- The parametric linear model:

It simulates the behaviour of hydrographic catchments using a network of linear tanks. The peak wave spreads without deformations in the channels. There is a linear relation between the volume entering the tanks and the discharge flowing out.

1.2.1.2. The DRiFt model (Discharge River Forecast)

This is an event model based on a geomorphologic approach. It is focused on the efficient description of the drainage system in its essential parts: hillslopes and channel networks are addressed with two kinematic scales, which determine the base of the geomorphologic response of the basin.

- Linear and partial model: It does not take into account the sub-superficial runoff
- Five parameters model:
  - Two morphologic parameters: area and local slope
  - Two kinematic parameters: hillslope and channel velocity
  - One physical parameter: soil moisture
- A semi-distributed model: It uses distributed information and a concentrated parameters set to produce the hydrograph in a given section.



1.2.2. Demetra application

DEMETRA is a combined system of software applications implemented on a series of apparatuses hardware in order to support the operators of the Centro Funzionale of the Department of the Civil Protection in the continuous monitoring of the climatic parameters and it is specialized in real time management of weather-hydro geological information.

The system allows for the total integration of the information for both forecast and weather-hydrological observations needed to support accurate issuing, in timely support of warning messages for the populations exposed to the hydrogeologic and hydraulic risk.

DEMETRA is an integrated System used for:

- Hazards assessment
    - Displaying information arising from different sources (NWPs, Satellite, Radar, ground networks, etc…)
    - Performing runoff models
    - Comparing data (e.g. forecasted vs observed or forecasted vs forecasted)

- Risk assessment
  - GIS support
  - Thresholds exceeding

DEMETRA is composed by two base modules:

- VISUAL DEMETRA: a module dedicated to the visualization, the management, the comparison and the control of the information;
- SIDRO DEMETRA: a module used for the management of the cartographic layer and the models the influx/outflux.

1.2.2.1. "VISUAL" module

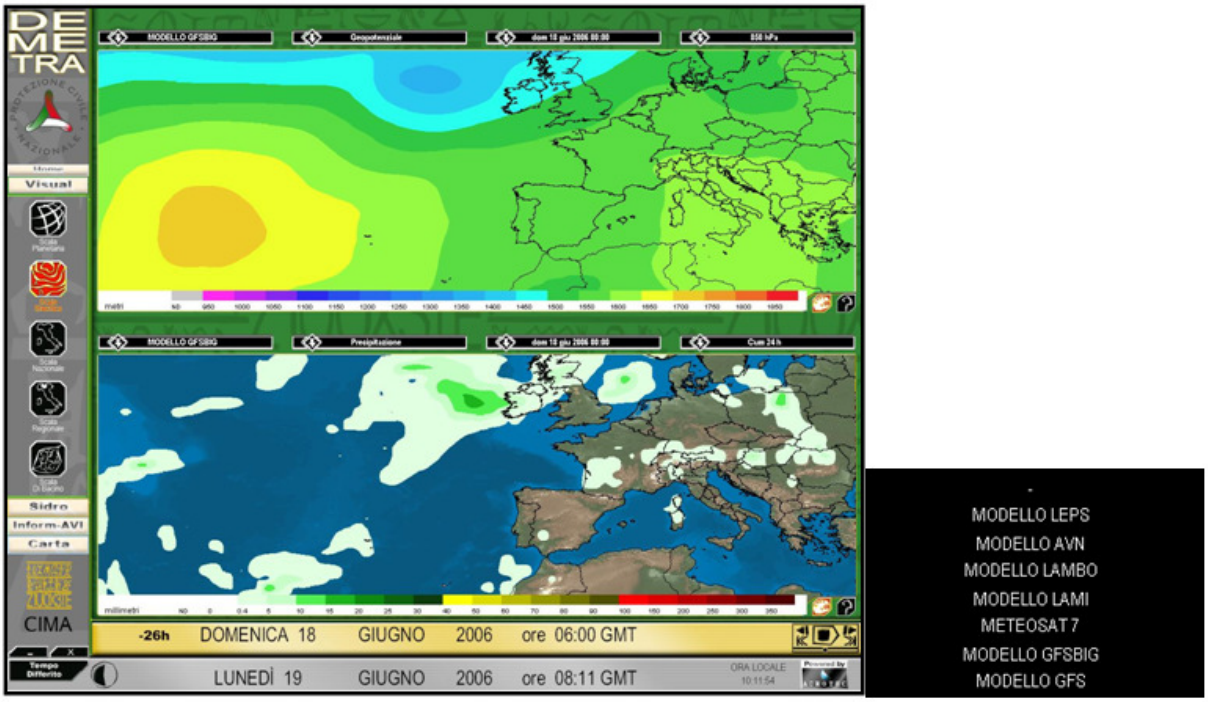


Figure 3 : Synoptic scale screening

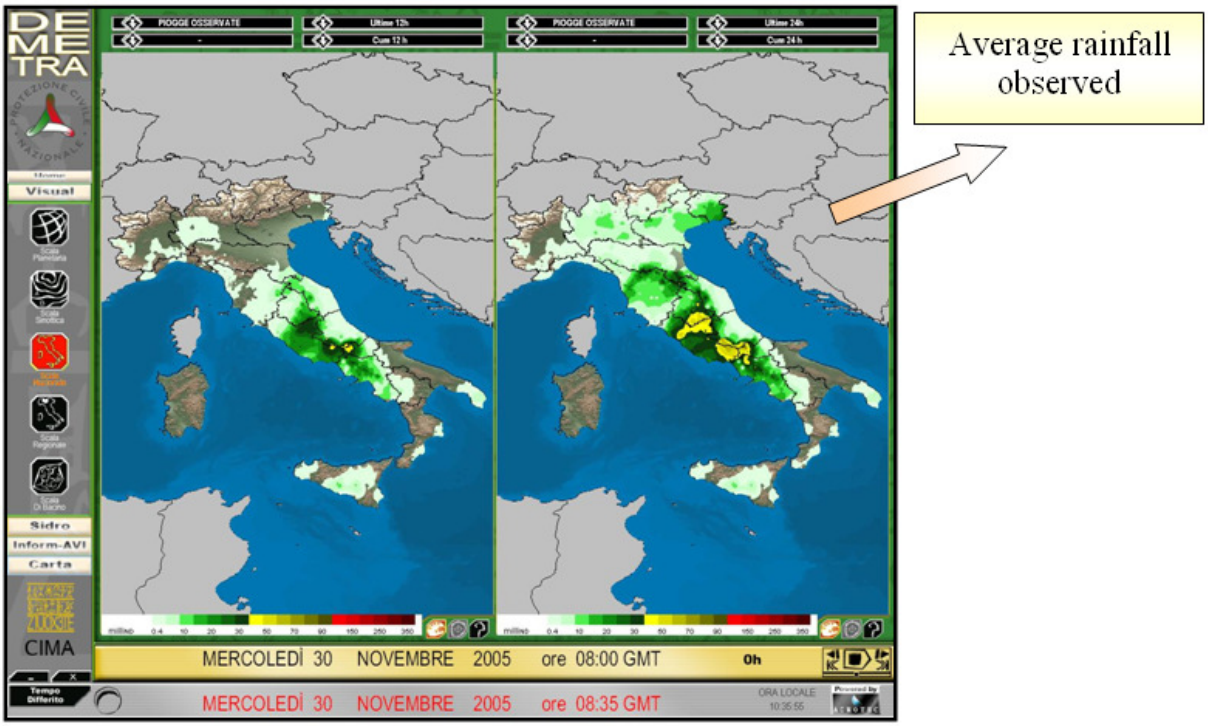


Figure 4 : National scale screening

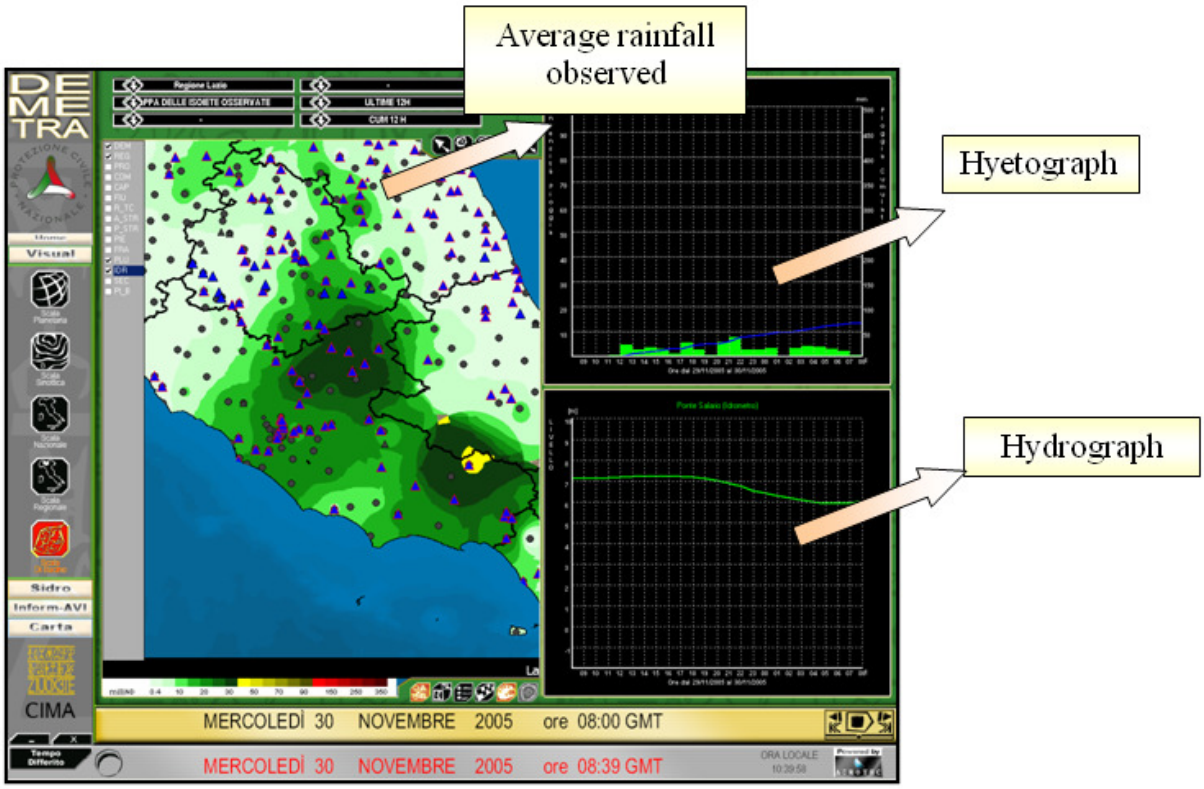


Figure 5 : Catchment scale screening

1.2.2.2. "SIDRO" module

Observed rainfall and hydrologic thresholds exceeding

In the red sections the upper threshold value is exceeded

Figure 6 : Observed rainfall screen

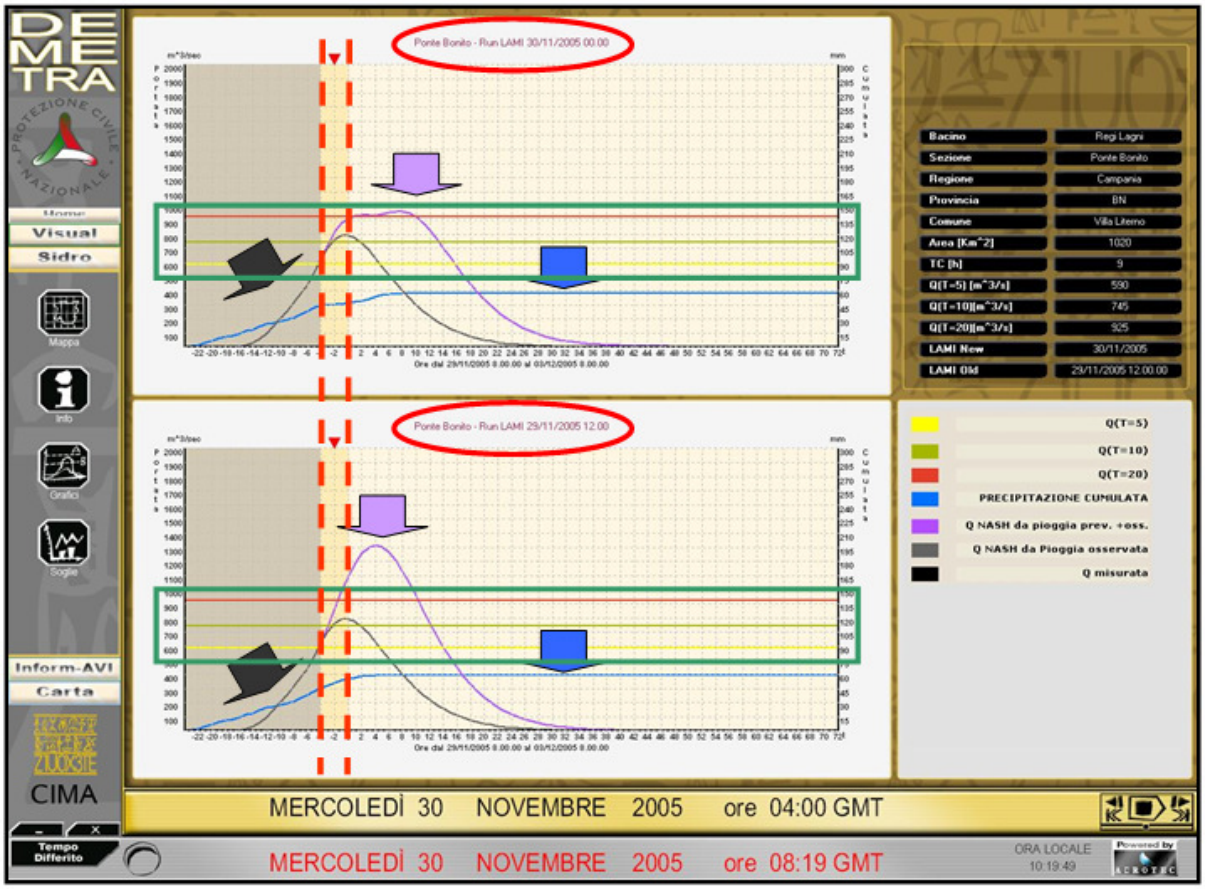


Figure 7 : Cross section database

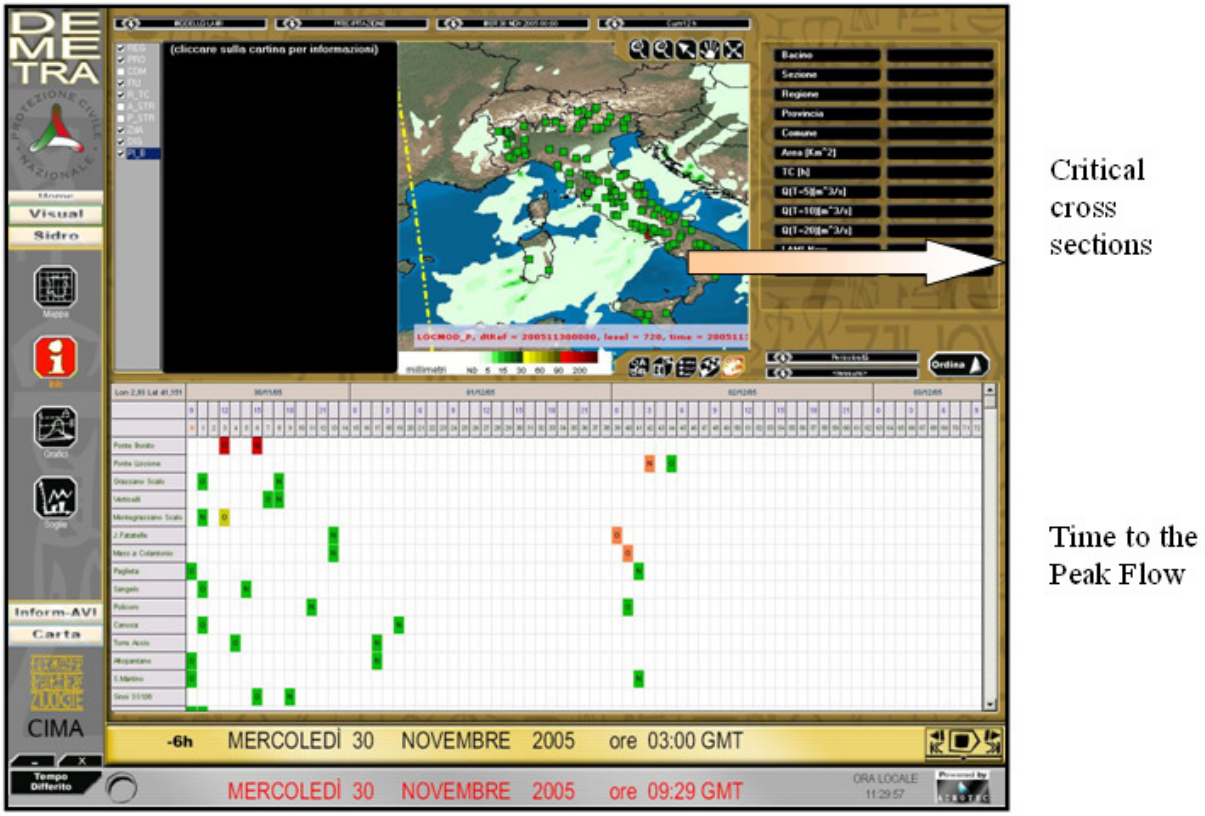


Figure 8 : Event location

For the tasks of forecast and monitoring of extreme the meteoric events, the DPC, has been equipped of a series of complex provisional systems in order to synthesize the continuous real-Time information available near all the connected sources in the net, in order to daily operate at best, to give technical support to the decision in matter of alert emission for hydrologic risk.

DEMETRA is distributed in two operating centres: Rome-Vitorchiano and Savona CIMA (CTS) outlined in Figure 9 and Figure 10.

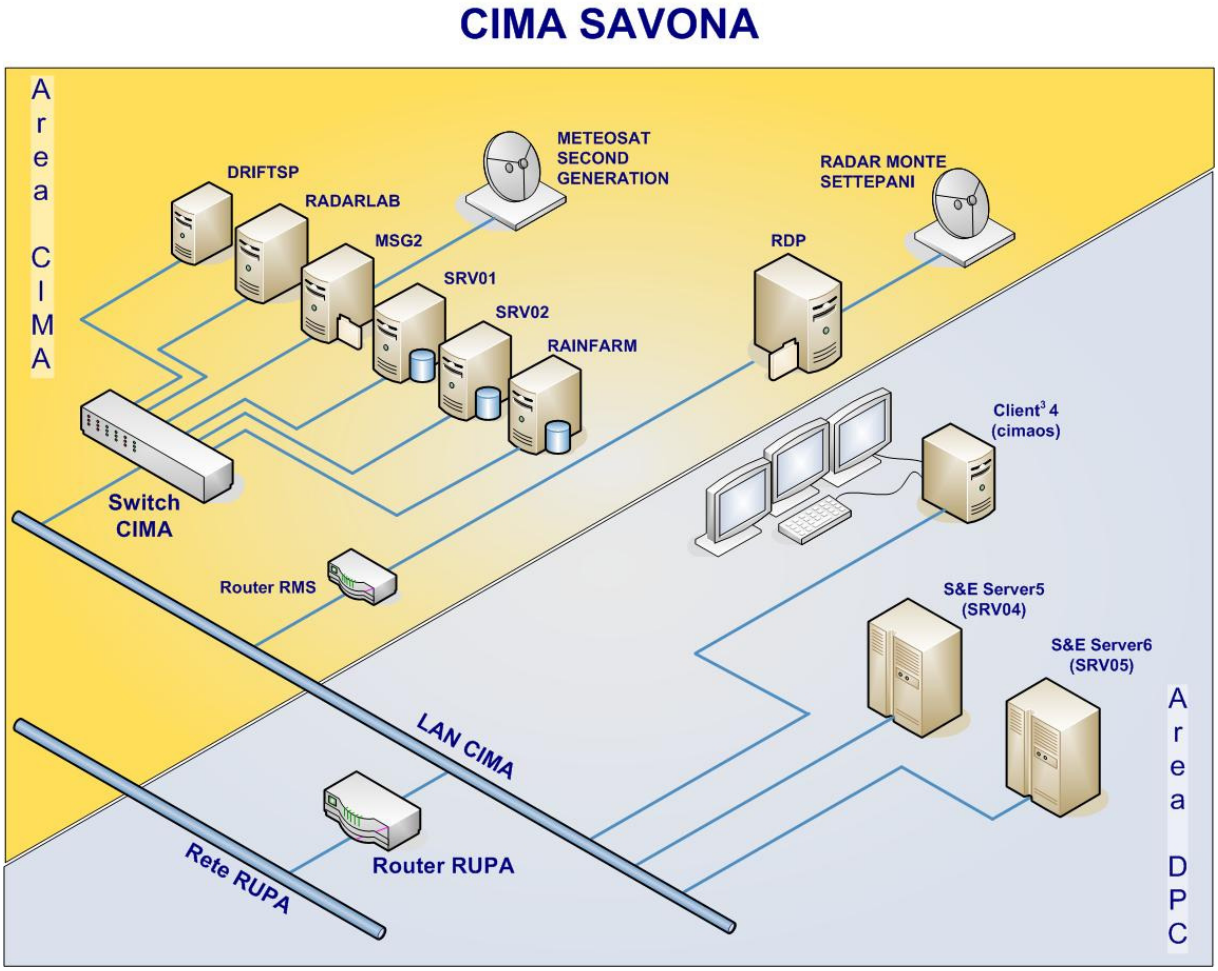


Figure 9 : CIMA SAVONA operating centre

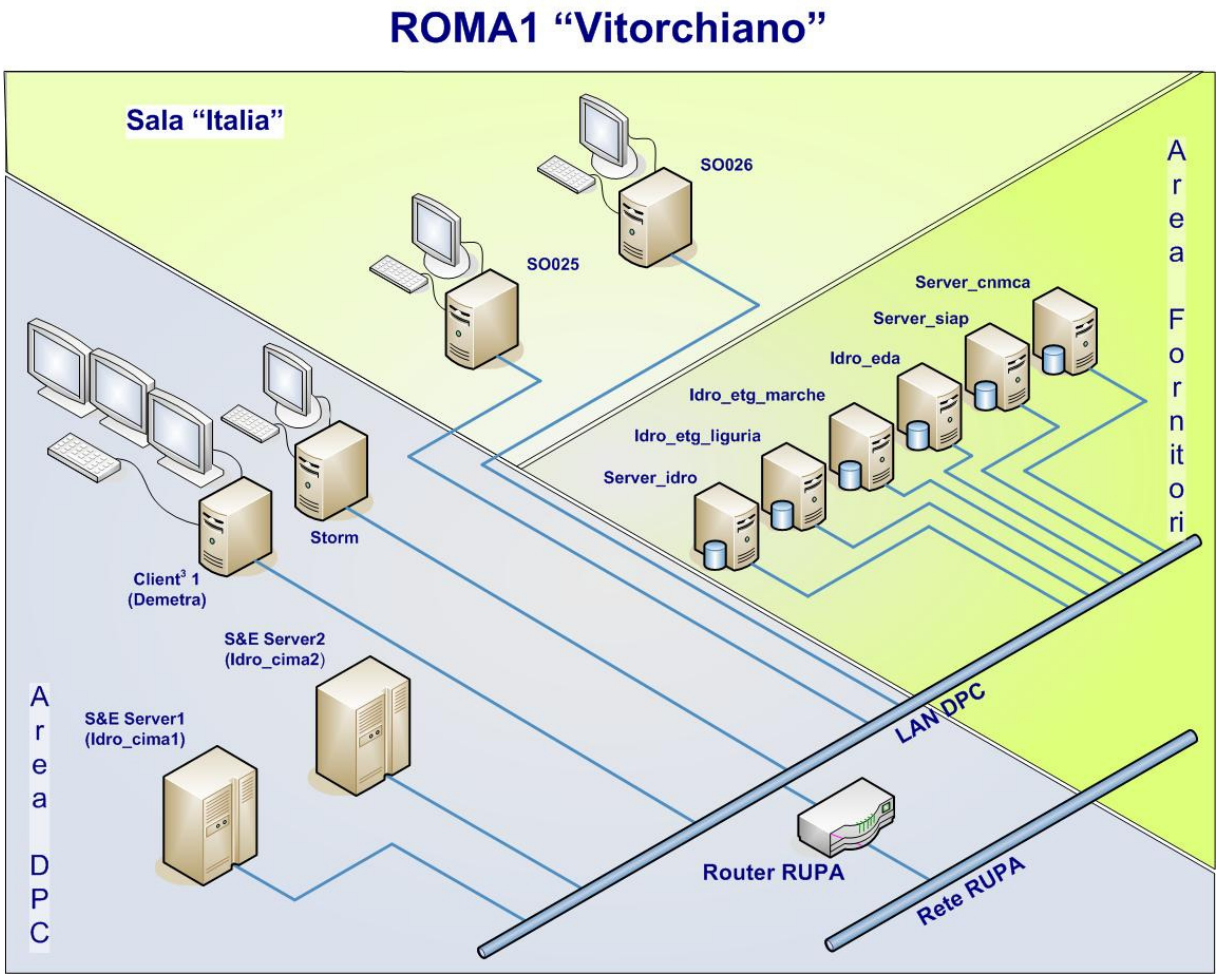


Figure 10 : Rome-Vitorchiano operating centre

1.2.3. "RAINFARM" : The downscaling module

"Rainfarm" is the MEDUSA process module that implements the same-named technical-scientific algorithms, realized by CIMA, for the probabilistic downscaling of numerical meteorological forecasts.

In its operating configuration, starting from the historical deterministic precipitation derived from the most recent run of the LAMI (Local Area Model of Italy) meteorological forecast model, the module generates a meaningful sample of probable precipitation fields for the entire national territory, represented by three-dimensional matrices (space-time).

As far as the computer science is concerned its implementation is a collection of runtime programs written in “C” language, along with specific elements realized in MATLAB.

Model input, available twice a day in the DEMETRA’s DBASE in real time in its original format, is represented by a three-dimensional matrix of the valid forecasted precipitation over the entire national territory, up to 72 hours from the run of the meteorological model.

The output of the module is represented by “n” three-dimensional matrices of forecasted precipitation, also valid over the entire national territory.
In the operating implementation for the Department of the Civil Protection, the entire process is resident in the CIMA-SV’s calculator mass memory storage named “RAINFARM”, specifically dedicated to their periodic half-day execution.
Due to the limitations of the calculating power, currently disaggregating operations are executed sequentially one after the other.

The calculator currently in use is a bi-processor “Opteron” with 4 GB of memory RAM installed with a LINUX DEBIAN operating system, that regularly executes the entire process in approximately 200 minutes.

1.2.4. MODULE MAD (MODELLAZIONE AFFLUSSI-DEFLUSSI)

For every implemented drainage basin, the MAD module supervises the transformation of all “n” field of the forecasted precipitation, produced from the previous downscaling module (meteoric inflow), in as many as necessary histories of surface runoffs needed to characterize the expected event depending on its hazard.
Its implementation is in a runtime program realized in language “C”.

The calculator currently in use is a bi-processor “Dual XEON” with 2 GB of memory RAM and Windows 2003 Server operating system, capable of executing the entire process in approximately 240 minutes.

1.2.5. The RISICO system (RISchio Incendi e COordinamento)

The software RISICO, developed by CIMA (Centro di Ricerca Interuniversitario in Monitoraggio Ambientale) is capable of using EO data, if available, and the ground-based meteorological information in order to correct the initial state of the variables. It uses a GIS like database and software integration for the management of algorithms and the visualization of the output (Figure 11). It has a defined algorithmic structure that allows the system to produce new simulations in case the system recognizes the presence of new information (given meteorological measured from the stations, satellite data, etc.).

This demands the management of one remarkable size of real-Time information. In this context the use of GRID architectures could allow an efficient management of the flow of the incoming information and a good management of the outgoing information from the model to central and peripheral centres.

Structure of the software

RISICO is a software written in C++ and planned to use the Object-Oriented paradigm. Some key characteristics have determined the choice of the language of programming and the structure to objects, in particular:

performances: the software must have short times (in the order of the execution minutes);

Concerning the modularity, the software must be subdivided in modules works distinguished them, so as to guarantee a good manutenibilità and an easy re-use of the code, from which the choice of Object-Oriented paradigm;

Concerning the portability, RISICO is written totally in C++ standard, using the classes of the Standard Template Library and has been compiled with happening on platforms Windows and Unix/Linux.

The software backgroung of Risico is modular and has been studied to ensure the possibility to replace easily the several models of which it is composed.

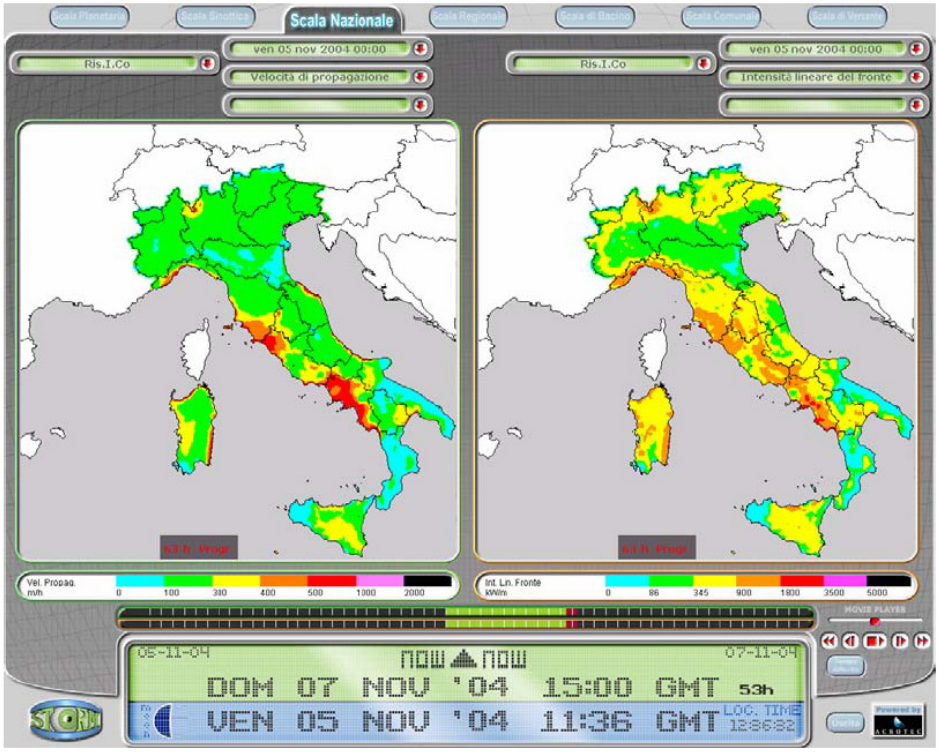


Figure 11 : Risico main screen

1.3 Main characteristics of the Italian warning system infrastructure

1.3.1. Overview

The national early warning system is based on an informative system including:

- Data acquisition
- Data elaboration
- Issue of hydrological hazard alerts

The integrated system use both the real-time rainfall observations and the weather forecasts that come from numerical models of atmospheric circulation, as well as all

other observations, such as satellite and meteorological radar. This enables us to reduce the amount of uncertainty.

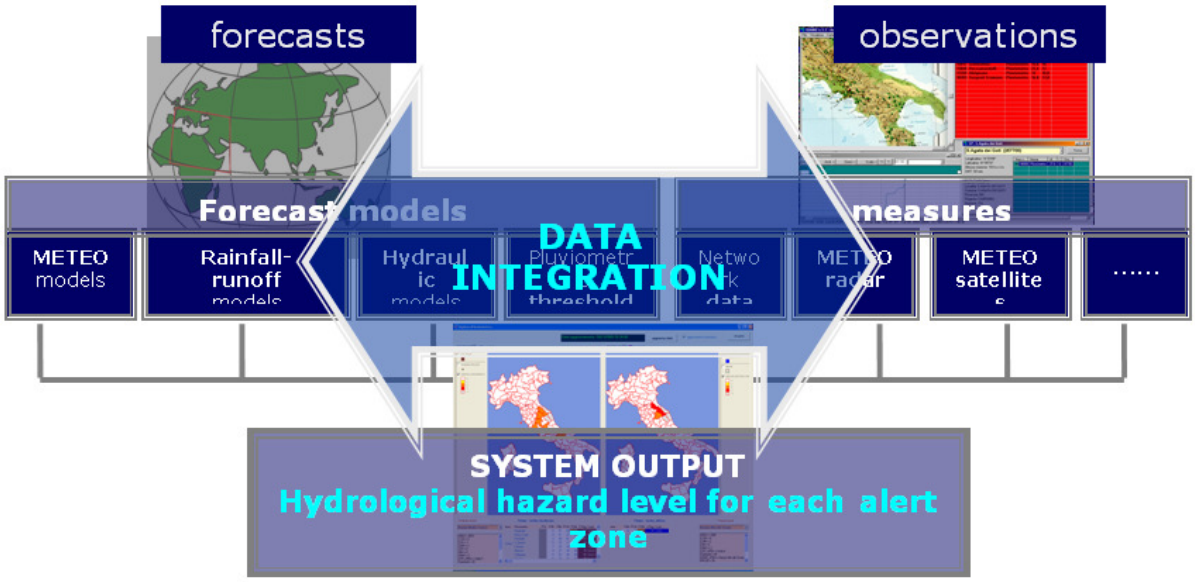


Figure 12 : National early warning system operations

The Informative system is composed by operative tools for hydrologic monitoring. To perform warning objective, the centre has developed an informative structure (Figure 13) that consists of a set of software programs, routines and databases.

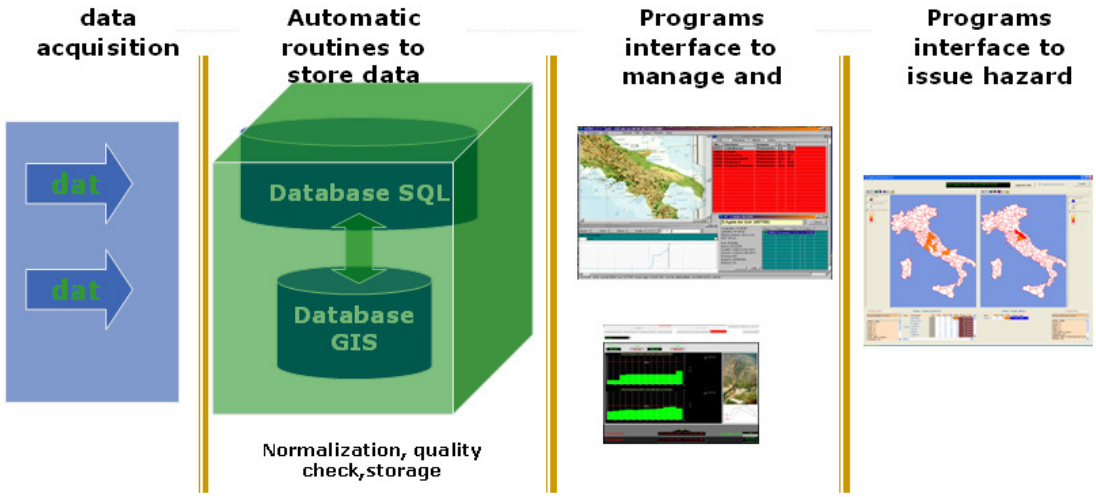


Figure 13 : Informative system structure

The warning system is built with a set of national and local organization-information procedures. The system's efficiency is based on the internal and external coded procedures, regarding the relevant administrative offices. Furthermore, operative standards are defined in order to get a quality certification UNI EN ISO 9001.

An internal operative manual has been made. It contains all procedures that the personnel must put in action depending on different hazard situations, in order to provide proper management of the center. It defines the different roles that the Centre's personnel must play. It contains all documentation for different emergency situation.

1.3.2. Ground stations

The real-time network is composed by many different sensors and meteorological stations (Figure 14) as follows:

- Albedometer AB20/K
- Anemometer DV200 e VV200
- Barometer BA20
- Evaporation gauge E200
- Ultrasonic hydrometer ULM20
- Ultrasonic nivometer ULM20/N
- Water depth gauge PLM20
- Rain gauge PMB2
- Solarimeter HE20/K
- Thermohygrometer TU20AS

The data filing and processing is performed with high velocity and efficiency, and up to 500 stations may be received in less than 15 minutes and 2040 telemeter stations (Rain gauges (1500) and Hydrometers (900)) more.

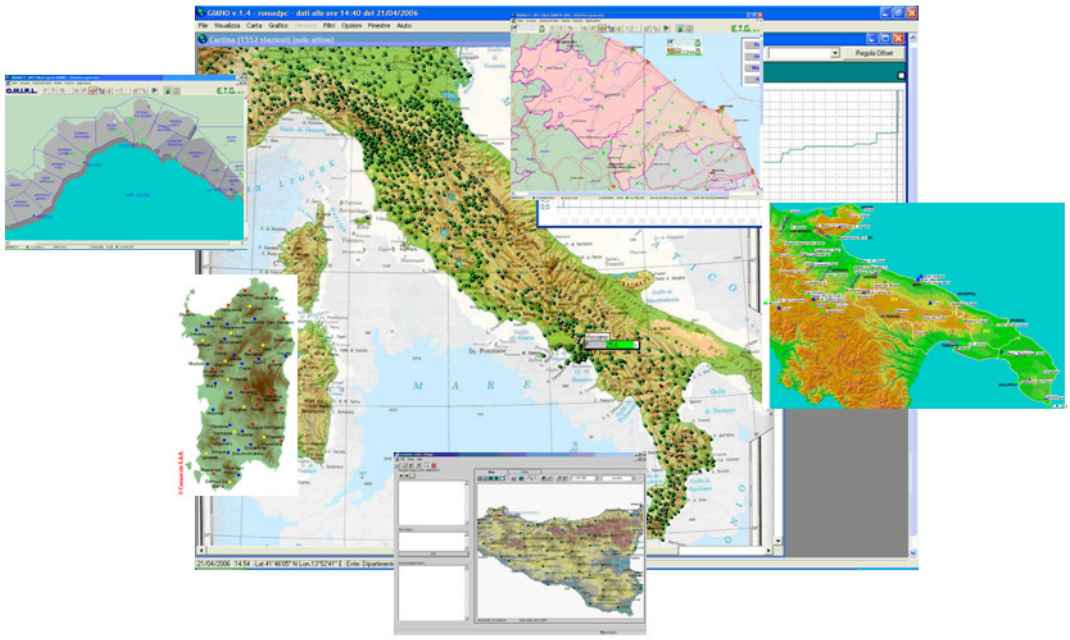


Figure 14 : Sensors and meteorological stations map

1.3.3. Data quality checking

Concerning the data quality checking (Figure 15) of this informative system, it exists many different errors:

- No data (=-999,9)
- Values without physical sense
- Instrumentation error
- Formating error
- Measuring error

There are two distinct aspects which are important for data monitoring assurance:

- data quantity monitoring
- data quality monitoring

Data quantity monitoring is concerned with the timely collection and receipt of observations and products while data quality monitoring is concerned with the accuracy of the observations. The aim is to provide a sufficient quantity of high

quality for to utilize valid and reliable data in the Department of Civil Protection's alert systems.

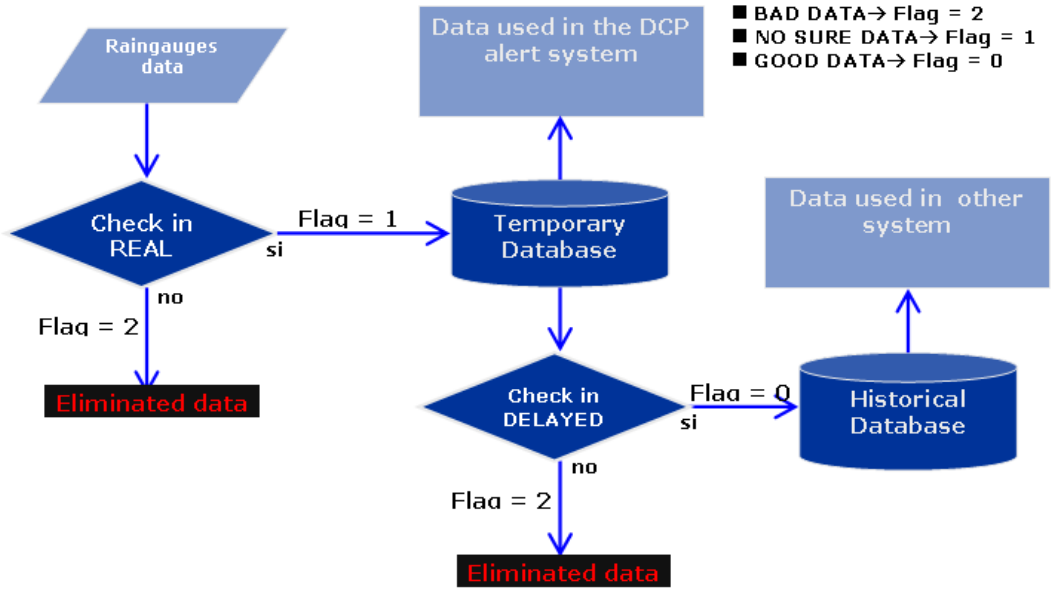


Figure 15 : Error checking procedure

1.3.4. Hydro-geologic warning system Information issue

Every day the centre issues a meteo-hydrologic bulletin and a warning map (Figure 16) that is sent to the relevant offices

Figure 16 : hydro-meteorological warning map

1.3.5. Actual and Future innovations

1.3.5.1. Overview

The system optimizes the speed and the efficiency of the eventual safety operation. The future prospects concern the data fusion. Indeed, critical information on storm spatial pattern can be augmented by weather radar and satellite estimates

How radars support the daily activities in the CFC?

The scope of radar network is to complement, mainly in Central, South Italy and islands, the already existing system of meteorological radars managed by the

Regional Governments as well as by the Meteorological Department of the Air Force (AM), for early warning, flash floods and diffuse land sliding.

The operative use of the Radar System (Figure 17 and Figure 18) presently permits:

- To monitor in real time rainfall intensity, wind speed, hail ;
- To forecast short term or/and very short term (nowcasting) of stormy phenomena associated to intense precipitations, hail, etc;
- To improve rainfall estimates, using in combined way radar and rain gauges network, as input in hydrological models.

Figure 17 : National Radar Network Coverage Plan

Figure 18 : Radar map legend

1.3.5.2. Architecture of the DPC Radar Network system

The architecture of the DPC Radar Network system (Figure 19) is composed by a set of 14 remote radar site connected by satellite link with two National Radar Primary Center (one of which for backup purpose). Co-located with the National Radar Primary Center, there will be a Radar Archive Center (RAC) for centralized archive.

Data flow from radar site are collected by both NRPC, with only one allowed to send control data. In case of controlling NRPC failure, the second one (NRPC backup) will take control of the whole system. The two NRPC are connected via leased line for activity synchronization.

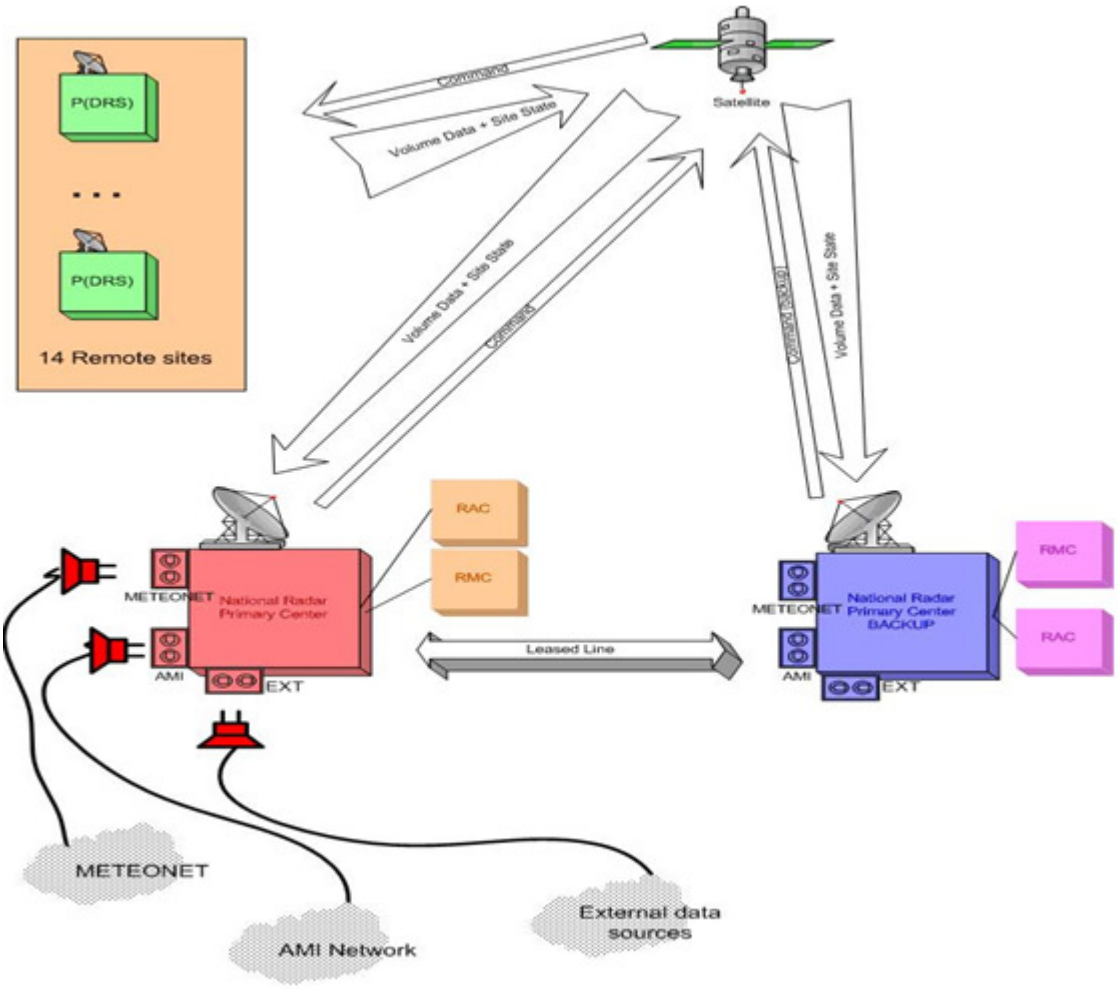
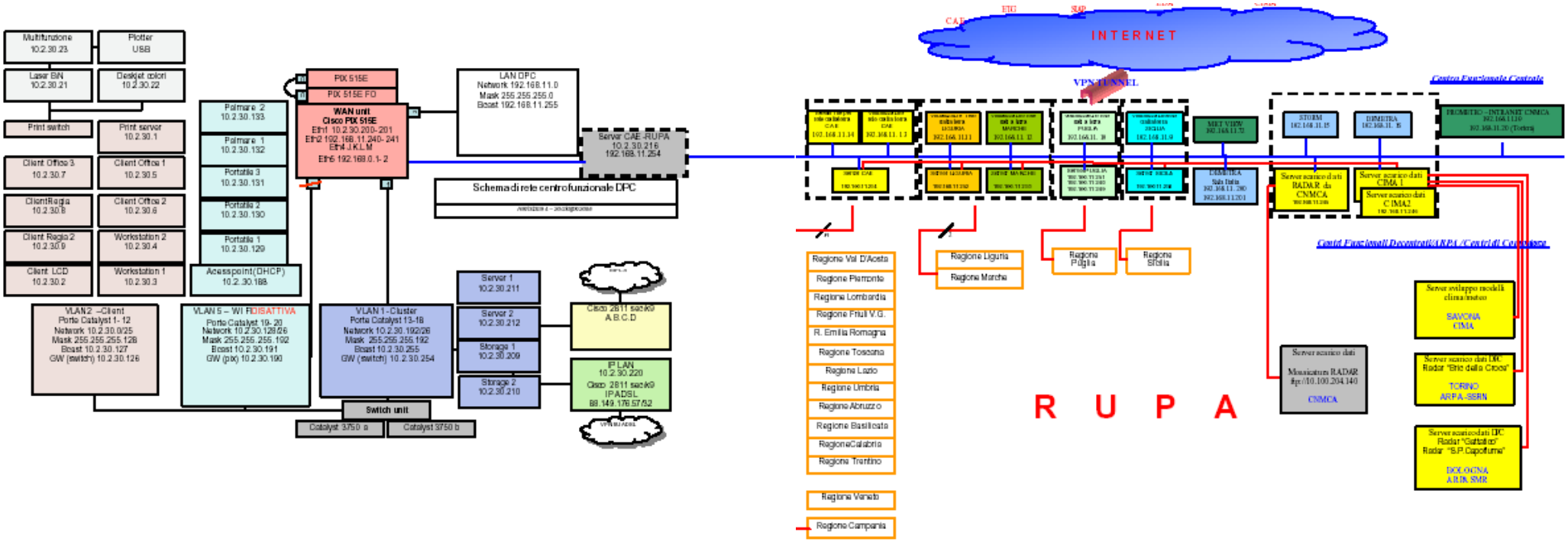


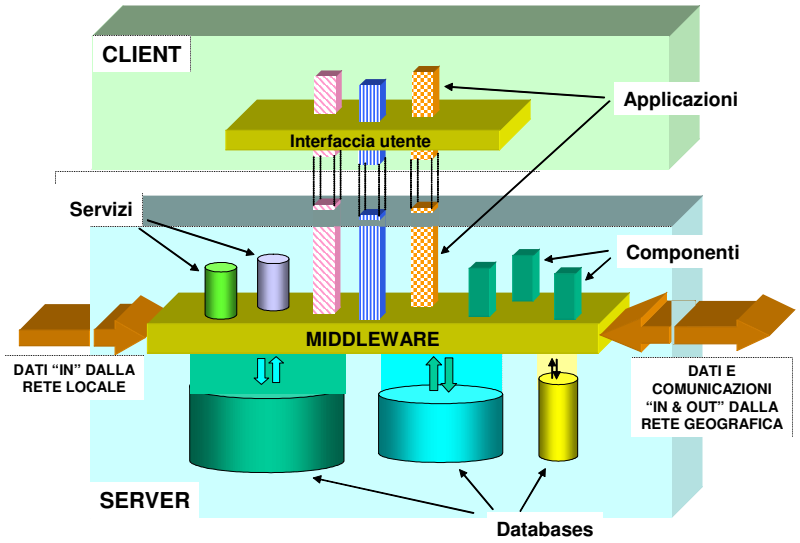
Figure 19 : DPC Radar Network system

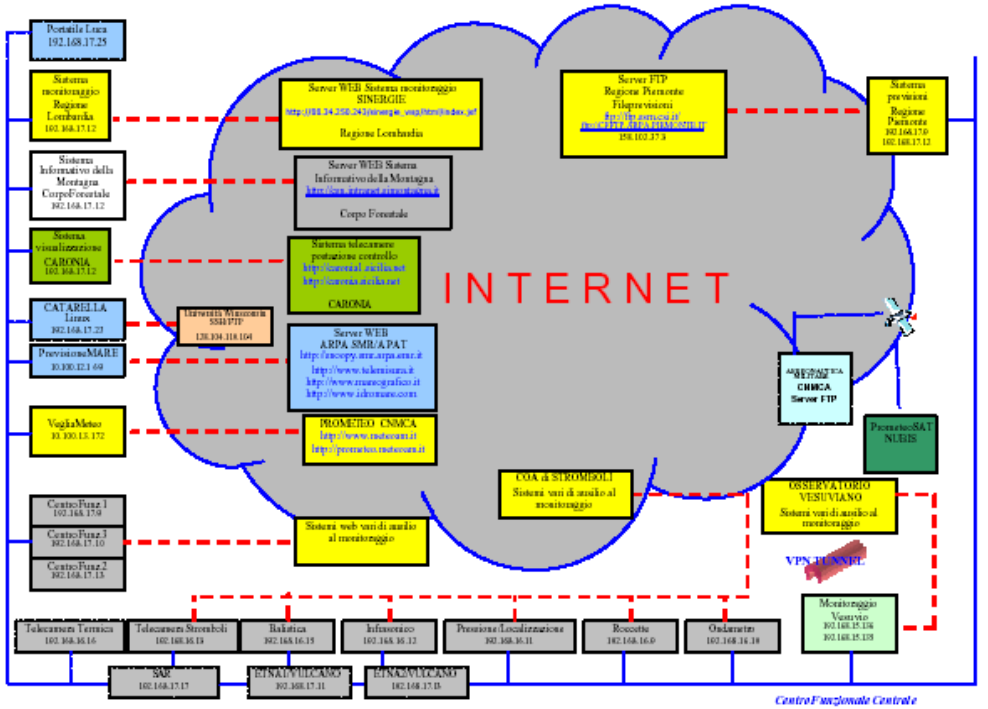
The Network mosaic is made by:

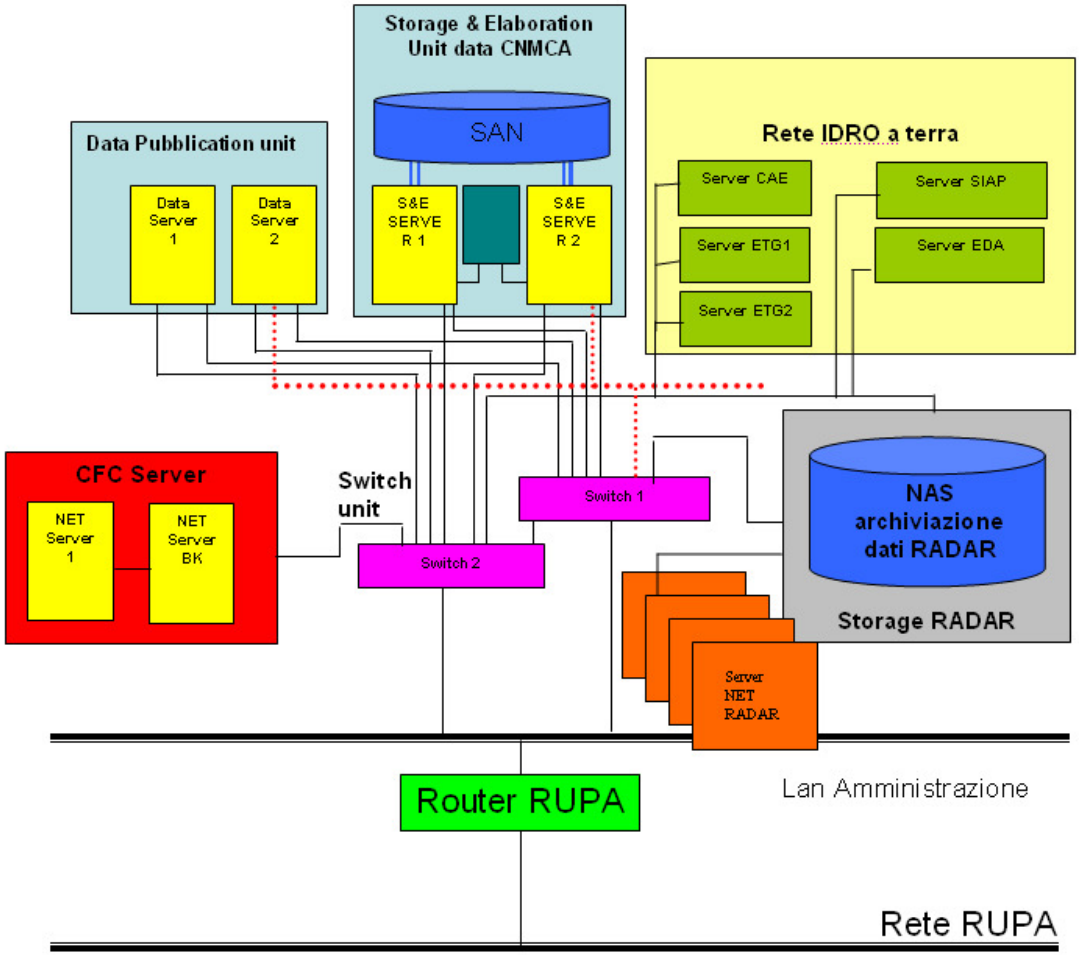
- SRI (Surface Rainfall Intensity)
- Frequency 30‘
- Data are available in BUFR format;
- Air Force Met Service produces the national mosaic and makes available product in BUFR format and in jpg format with a delay of 15min.

1.3.6. Synthesis of the existing hardware resources


Multifunzione 10.2.30.23
Plotter USB
Laser BN 10.2.30.21
Deskjet colori 10.2.30.22
Print switch
Print server 10.2.30.1
Client Office 3 10.2.30.7
Client Office 1 10.2.30.5
ClientRegia 10.2.30.8
Client Office 2 10.2.30.6
Client Regia 2 10.2.30.9
Workstation 2 10.2.30.4
Client LCD 10.2.30.2
Workstation 1 10.2.30.3
VLAN 2 –Client
Porte Catalyst 1- 12
Network 10.2.30.0/25
Mask 255.255.255.128
Boast 10.2.30.127
GW (switch) 10.2.30.126
Palmare 2 10.2.30.133
Palmare 1 10.2.30.132
Portatile 3 10.2.30.131
Portatile 2 10.2.30.130
Portatile 1 10.2.30.129
Acesspoint(DHCP) 10.2.30.188
VLAN 5 – WI FIDISATTIVA
Porte Catalyst 19- 20
Network 10.2.30.128/26
Mask 255.255.255.192
Boast 10.2.30.191
GW (pix) 10.2.30.190
PIX 515E
PIX 515E FO
WAN unit
Cisco PIX 515E
Eth1 10.2.30.200- 201
Eth2 192.168.11.240- 241
Eth4 J K L M
Eth5 192.168.0.1- 2
LAN DPC
Network 192.168.11.0
Mask 255.255.255.0
Boast 192.168.11.255
Server CAE-RUPA
10.2.30.216
192.168.11.254
Schema di rete centro funzionale DPC
VLAN 1-Cluster
Porte Catalyst 13-18
Network 10.2.30.192/26
Mask 255.255.255.192
Boast 10.2.30.255
GW (switch) 10.2.30.254
Server 1 10.2.30.211
Server 2 10.2.30.212
Storage 1 10.2.30.209
Storage 2 10.2.30.210
Switch unit
Catalyst 3750 a
Catalyst 3750 b
Cisco 2811 sec/k9
A B C D
IP LAN
10.2.30.220
Cisco 2811 sec/k9
IP ADSL
88.149.176.57/32
INTERNET
VPN TUNNEL
MET VIEW
STORM
DIMITRA
PROMETEO - INTRANET CNMCA
Server scarico dati RADAR da CNMCA
Server scarico dati CIMA 1
Server scarico dati CIMA 2
Centro Funzionale Centrale
Centri Funzionali Decentrati/ARPA /Centri di Competenza
Regione Val D'Aosta
Regione Piemonte
Regione Lombardia
Regione Friuli V.G.
R. Emilia Romagna
Regione Toscana
Regione Lazio
Regione Umbria
Regione Abruzzo
Regione Basilicata
RegioneCalabria
Regione Trentino
Regione Veneto
Regione Campania
Regione Liguria
Regione Marche
Regione Puglia
Regione Sicilia
R U P A
Server sviluppo modelli clima/meteo
SAVONA CIMA
Server scarico dati
Misuratore RADAR ftp://10.100.204.140
CNMCA
Server scarico dati DPC Radar "Bric della Croce"
TORINO ARPA-SSRN
Server scarico dati DPC Radar "Gattatico" Radar "S.P.Capofiume"
BOLOGNA ARPA-SMR

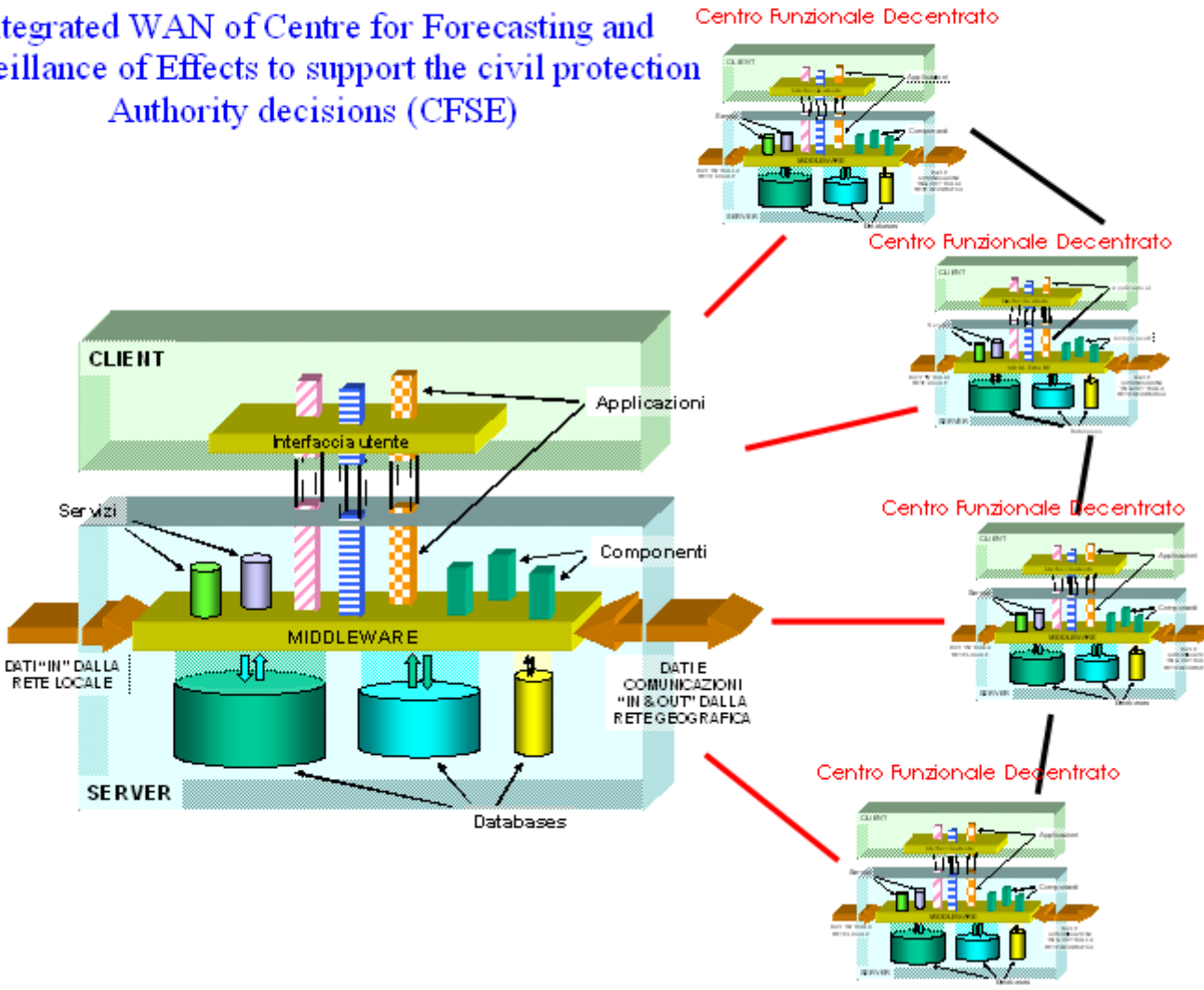

CLIENT
Interfaccia utente
Applicazioni
Servizi
Componenti
MIDDLEWARE
DATI "IN" DALLA RETE LOCALE
DATI E COMUNICAZIONI "IN & OUT" DALLA RETE GEOGRAFICA
SERVER
Databases


INTERNET
Centro Funzionale Centrale


Storage & Elaboration Unit data CNMCA
SAN
S&E SERVE R 1
S&E SERVE R 2
Data Pubblication unit
Data Server 1
Data Server 2
Rete IDRO a terra
Server CAE
Server SIAP
Server ETG1
Server EDA
Server ETG2
CFC Server
NET Server 1
NET Server BK
Switch unit
Switch 1
Switch 2
NAS archiviazione dati RADAR
Storage RADAR
Server NET RADAR
Router RUPA
Lan Amministrazione
Rete RUPA

EXPERIENCE APPLICATION MANAGER

Integrated WAN of Centre for Forecasting and Surveillance of Effects to support the civil protection Authority decisions (CFSE)



Descrizione	Qu.
HARDWARE	
Server IBM Xseries 336	
x336, Xeon 3.4GHz/800MHz,2MB L2, 2x512MB, O/Bay HS U320, 585W, Rack	1
3.4GHz 800MHz 2MB L2 Cache Xeon Processor	1
2 GB (2x1 GB Kit) PC2-3200 CL3 ECC DDR2 SDRAM RDIMM	2
IBM Total Storage DS4000 FC2-133 Host Bus Adapter	2
IBM xSeries 585W Hot-Swap Power Supply WW	1
1m Fiber Optic Cable LC-LC	4
Server IBM Xseries 346	
x346 Xeon 3.6GHz/800MHz, 2MB L2, 2x512MB, U320 HS O/Bay, CD/DVD R/W 24x, 625W p/s	2
3.6GHz 800MHz 2MB L2 Cache Xeon Processor	2
2 GB (2x1 GB Kit) PC2-3200 CL3 ECC DDR2 SDRAM RDIMM	4
IBM serveRAID 7k SCSI Controller	2
IBM Total Storage DS4000 FC2-133 Host Bus Adapter	4
IBM xSeries 625W Hot-Swap Power Supply WW	2
Server IBM Xseries x3850	
x3850, Xeon 3.66GHz/667MHz, 1MB L2, 2x1GB, O/Bay HS SAS, CD-RW/DVD Combo, 1300W p/s, Rack	2
Intel Xeon Processor Upgrade 3.66 GHz 667 MHz 1 MB L2 Cache	6
Active Memory 4 Slot Expansion Card	6
4 GB (2x2 GB Kit) PC2-3200 CL3 ECC DDR2 SDRAM RDIMM	8
73GB 2.5" 10K RPM SAS Hot-Swap HDD	6
ServeRAID 8i SAS Controller	2
IBM Total Storage DS4000 FC2-133 Host Bus Adapter	4
xSeries 1300W Power Supply Option Kit	2
SAN Storage	
DS4700 Express Model 70 (2 GBCache)	2
(39M4594) 2 Gbps FC, 300 GB/10K	34
(19K1248) Fiber Cable 5m Multimode (LC-LC)	4
(22R4251) DS4700 Windows Host Kit	2
DS4700 Mod 70 4-Storage Partitions Activation	2
Field Integrate DS4700	2
(14F0069) Power Cord 250V/10A,	2

IBM TotalStorage SAN16B-2	2
4 Gbps SW SFP Transceivers - 4 Pack	8
Fibre Cable LC/LC 1m multimode	16
Fibre Cable LC/LC 5m multimode	16
B16 4-Port Activation	4
Unità STORAGE & ELABORATION **STORAGE & ELAB. SERVER 1 ; Server IBM Xseries x225** Server; nr. 2 Processori Intel Xeon 3,2 GHz; Chipset Tipo Serverworks; Memoria RAM 2 Gbyte DDR SDRAM; Memoria Di Massa Unità RAID 5 2TB; Memoria Di Massa Sistema Operativo Unità RAID 1 75GB; Controller SCSI Ultra 320 SCSI RAID bi-canale; 2 Lan Controller Ethernet Gigabit; 2 Alimentatori HotPlug; DVD Rom 16X; Sistema Operativo/SW Windows 2003 Server;	
STORAGE & ELAB. SERVER 2 Server IBM Xseries x225 Server; 2 Processori Intel Xeon 3,2 GHz; Chipset Tipo Serverworks; Memoria RAM 2 Gbyte DDR SDRAM; Memoria Di Massa Unità RAID 5 2TB; Memoria Di Massa Sistema Operativo *Unità RAID 1 75GB;* Controller SCSI Ultra 320 SCSI RAID bi-canale; nr. 2 Lan Controller Ethernet Gigabit; nr. 2 Alimentatori HotPlug; DVD Rom 16X; Sistema Operativo/SW Windows 2003 Server	
Unità ELABORATION data Real time network **Server IBM Xseries x345** Server; nr. 2 Processori Intel Xeon 3,2 GHz; Chipset Tipo Serverworks; Memoria RAM 2 Gbyte DDR SDRAM; Memoria Di Massa Unità RAID 5 1TB; Memoria Di Massa Sistema Operativo Unità RAID 1 75GB; Controller SCSI Ultra 320 SCSI RAID bi-canale; 2 Lan Controller Ethernet Gigabit; 2 Alimentatori HotPlug; DVD Rom 16X; Sistema Operativo/SW Windows 2003 Server;	6
Unità CLIENT Workstation; Processore Pentium 4 2.8 GHz 512 K 533 MHz; Chipset 875 P; Memoria RAM 1 Gbyte DDR SDRAM; Memoria Di Massa 120 GB Serial-ATA; Controller IDE Integrato; Lan Gigabit Ethernet; DVD ROM 16x IDE COMBO; Sistema Operativo/SW Windows XP Pro; Scheda Video tripla uscita 128 Mb RAM; Nr. 3 Monitor 18" LCD (1280*1024); Tastiera Italiana 105 tasti; Mouse Optical wheel mouse	2
Workstation; Processore Pentium 4 2.8 GHz 512 K 533 MHz; Chipset 875 P; Memoria RAM 1 Gbyte DDR SDRAM; Memoria Di Massa 120 GB Serial-ATA; Controller IDE Integrato; Lan Gigabit Ethernet; DVD ROM 16x IDE COMBO; Sistema Operativo/SW Windows XP Pro; Scheda Video tripla uscita 128 Mb RAM; Nr. 2 Monitor 17" LCD (1280*1024); Tastiera Italiana 105 tasti; Mouse Optical wheel mouse	25
Workstation; Processore Pentium 4 3,6 GHz 512 K 533 MHz; Chipset 875 P; Memoria RAM 1 Gbyte DDR SDRAM; Memoria Di Massa 120 GB Serial-ATA; Controller IDE Integrato; Lan Gigabit Ethernet; DVD ROM 16x IDE COMBO; Sistema Operativo/SW Windows XP Pro; Scheda Video tripla uscita 128 Mb RAM; Nr. 1 Monitor 18" LCD (1280*1024); Tastiera Italiana 105 tasti; Mouse Optical wheel mouse	4
Workstation Sun Ultra 20 M2: 2 processore AMD Opteron modello 1218 (dual-core), acceleratore grafico NVIDIA Quadro FX 1500, memoria DDR2-667 con registrazione ECC senza buffer da 2 GB (2 moduli DIMM da 1 GB), 2	2

unità SATA da 250 GB 7200 RPM a 3 Gbps, 1 unità DVD-Dual Monitor 19", sistema operativo Linux Fedora 4	

CFC HARDWARE	*Q.TÀ*
Server Cluster (Server 1, Server 2, SAN) Server; nr. 2 Processori Intel Xeon 3,8 GHz; 800 Mhz, Chipset Tipo Serverworks; Memoria RAM 1 Gbyte ECC DDR2 SDRAM RDIMM; Memoria Di Massa Unità RAID 5 1TB; Memoria Di Massa Sistema Operativo Unità RAID 1 75GB; Controller SCSI Ultra 320 SCSI RAID bi-canale; 2 Lan Controller Ethernet Gigabit; 2 Alimentatori HotPlug; DVD Rom 16X; Sistema Operativo/SW Windows 2003 Server;	*1*
Client LCD *Processore Pentium 4 2.8 GHz 512 K 533 MHz; Chipset 875 P; Memoria RAM 1 Gbyte DDR SDRAM; Memoria Di Massa 120 GB Serial-ATA; Controller IDE Integrato; Lan Gigabit Ethernet; DVD ROM 16x IDE COMBO; Sistema Operativo/SW Windows XP Pro; Scheda Video 4 uscita 128 Mb RAM; Nr. 1 Monitor 17" LCD (1280*1024); Tastiera Italiana 105 tasti; Mouse Optical wheel mouse*	*1*
LCD 40"	*3*
Client *Processore Pentium 4 3,6 GHz 512 K 533 MHz; Chipset 875 P; Memoria RAM 1 Gbyte DDR SDRAM; Memoria Di Massa 120 GB Serial-ATA; Controller IDE Integrato; Lan Gigabit Ethernet; DVD ROM 16x IDE COMBO; Sistema Operativo/SW Windows XP Pro; Scheda Video tripla uscita 128 Mb RAM; Nr. 2 Monitor 17" LCD (1280*1024); Tastiera Italiana 105 tasti; Mouse Optical wheel mouse*	*8*
Client Mobile (PC laptop, PDA GSM, Access Point wireless)	*3*
Client print Service (Print Server, Switch, Plotter, Stampante colori, Stampante b/n)	*1*

2. FRANCE

2.1 Communication and management systems

The use of new technologies in French Civil Protection mainly concerns the communication systems. As detailed in the Scope part, forecasting and warning phase is handled by external services as Meteo-France and other national organisms. Tools and resources which are described in this part are allocated to the communication topic and the information feedback during the crisis management among the different organisational level of the Civil Protection. The main objective of last improvements in the field of crisis management organisation is the standardisation of tools, applications and emergency operations. These recent studies aim at reaching an interoperable organisation to make data and information exchanges easier for all involved services in the emergency phase. The first one, Antares only concerns firemen and command centres communications. The two other (SIZIF and SYNERGI) were developed in the objective to have the whole of the emergency knowledge in a unique database available and helpful for anyone involved in the concerned crisis management.

2.1.1. Antares[3]

Antares is a national radio system for fire Services and public safety that allows communication among each Civil Protection level and all services involved in the public safety.

The work undertaken in the years 1997 - 2003, allowed the DDSC to define the broad outline of the reform of the transmissions necessary to the firemen. The main objectives of the program called “ANTARES” (national adaptation of the transmissions to the risks and the emergency) are:

- To reduce the technological fracture between the firemen services and the other public services of rescues (the gendarmerie passed to

[3] Adaptation Nationale des Transmissions Aux Risques Et aux Secours

numerical with RUBY, the police force has finished its migration in 2006)

- To reinforce the operational capacity by a stronger interoperability among firemen services
- To increase the safety of the firemen during interventions: emergency call, localization of the engaged units

These reflections resulted to adopt a terrestrial numerical solution, secure, coherent with the systems equipping the other CP services but which also allows specific applications for the firemen. ANTARES thus fits in the continuity of the networks RUBIS (Gendarmerie network) and ACROPOL (national police force network).

Moreover, the infrastructure of network ACROPOL ensure cover of 65% of the territory, making possible for the firemen services to place the 2/3 of the sites of emission necessary to the satisfaction of the needs for the firemen. The mutualisation of the infrastructures is thus the principle which guides the deployment of ANTARES and makes possible to carry out the objective of the unified wide-area network wanted by the law of modernization.

On the functional level, network ANTARES takes again the basic services of ACROPOL and defines essential functions in addition specialized within the framework of the missions of the firemen (status, geolocalisation, emergency call, tactical networks… etc) with radio resources dimensioned for the needs for the firemen services (SDIS).

The basic architecture of ANTARES is based on basic infrastructure ACROPOL and breaks up into:

- the base of cover ACROPOL of 1095 sites, 65% of the territory, ensuring a territorial infrastructure for the operational cover,
- a commutation - supervision centralized at the departmental level,
- a national inter-connection of the networks.

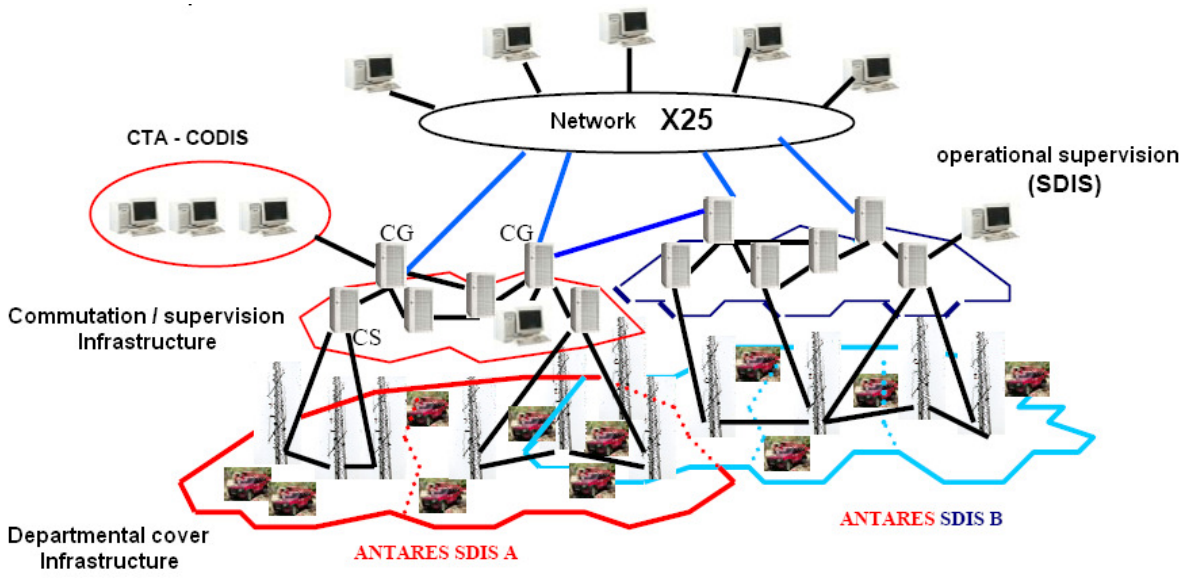


Figure 20 : Antares infrastructure

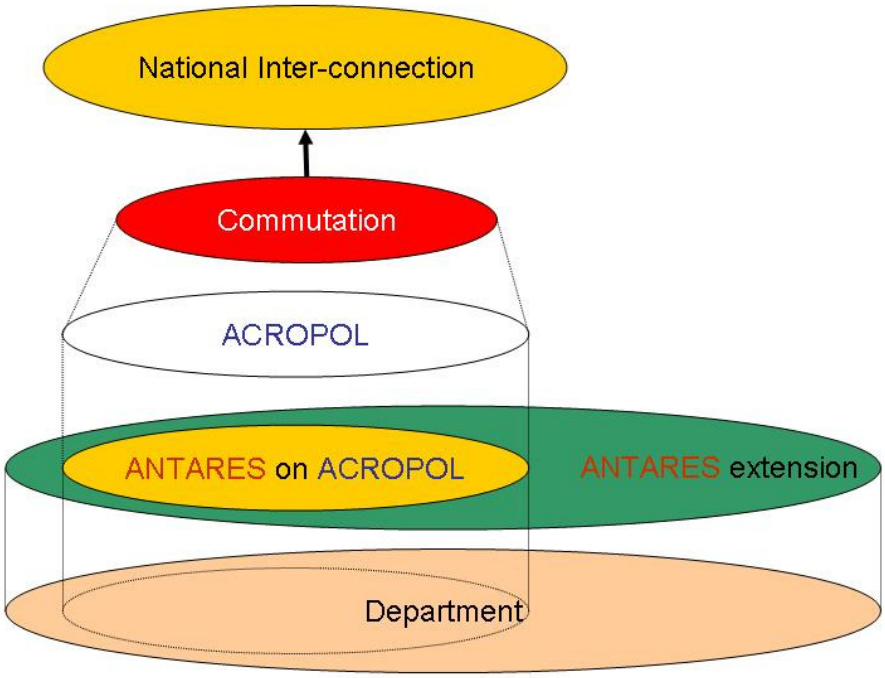


Figure 21 : ACROPOL cover with ANTARES extension

The departmental networks of the SDIS are homogeneous and interoperable.
National network ANTARES is the inter-connection of the departmental networks defined by the SDIS according to their own requirements (cover of the department, capacities of communication, implemented of the services and the homogeneous applications at the national level) within a framework of total interoperability (with the external reinforcements that they come from other SDIS , national or even Europeans).

This national homogeneity makes possible to exploit services of communications usable on the whole of the territory: individual calls (mobility), groups of communication, tactical conferences and connections, standardized terminals integrating the status, localization, emergency call, data transmission, access to the databases, definition of route, standardized interfaces for an integration in the operational centres,…

ANTARES aims to reinforce interoperability at the national level and the inter-departmental level by giving to the SDIS common applications supported by portable technical solutions on all the territory.
Thus, it fulfils the operational requirements on four levels:

- At the departmental level, ANTARES reinforces the means of command and coordination: generalization of the “status”, knowledge of the tactical situation by the positioning of the means feedbacks to the Codis (contour of fire for example), effectiveness of the sending of rescues to the involved persons by the feedback in absolute priority of the emergency call, possibilities of direct communications between the operational center and command, …
- At the tactical level, ANTARES aims at increasing the performance on the ground by individual and direct communications, by the possibility of integration into the command processing system and the specialized means (PCO, PMA…)

- In the vehicles, ANTARES allows thanks to a modular configuration of radio operator type radio / data-processing equipment / geolocalisation, to provide boarded services (operational cartography, assistance with the route, specific applications) and services “communicating” like the buttons “status”, the key of emergency call, the sending of computerized assessments, the use the transport or the basic consultation of data.
- Lastly, portable terminals ANTARES are adapted to the missions of the firemen (final with intrinsic safety, integration with the individual protection equipments…).

ANTARES falls under the continuity of the recent evolutions as regards telecommunications and allows within the departmental, national or European framework, to reinforce the solidarity of the emergency services. ANTARES thus makes it possible to have an operational solution of telecommunication adapted to the existing risks.
This major evolution outlined by the law of orientation and programming for the interior safety of 2002 is based on a federator wide-area network of the whole of the forces of safety and rescues.

By continuing the technological migration engaged by RUBIS then ACROPOL, ANTARES answers the objective assigned by the law of modernization of the civil Safety of 2004, realization in the very next years of a national numerical solution, adapted to the firemen and beyond to the whole of the services which contribute to Civil Protection.

Figure 22 : Global Antares devices

2.1.2. SIZIF[4]

The application SIZIF, shared between the BASC[5] (protection civil Air base) and the COZ of Valabre, makes possible to manage in real-time and together the reserves of national means and their engagement.

This tool was developed by PôNT and meets several needs in the following fields:

- **Decision-making and information systems**: For the COGIC, the COZ of Valabre, the other COZ, possibly the CODIS, for the Headquarters…)
- **Specific databases** (Within the framework of the Defence of Forests against Fires : collect, formatting, structuring, exchanges, updates.
- **Statistics** (Prométhée database, COZ requests, daily reports, statistical BASC and Weather France…)

[4] Système d'Information Zonal contre les Incendies de Forêts

[5] Base aérienne de la sécurité civile

- **Lessons learnt**: Quantitative and qualitative operational data acquisition, library of cases, modelling, probable scenarios …
- **Training** (meeting animation, simulation, modelling…)
- **Plans**: Development (modelling, landuse) and cartography.

Being located at the crossroads of these needs S.I.Z.I.F. answers the following objectives:

- **To identify the common basic tools for the whole of needs**: Geographical information systems, databases administrative systems, networks, messaging…). When these tools are different it permits to harmonize them.
- **To be equipped with the means** (software and material platforms…) and with skills (training, information) necessary to the control of these tools and of their development.
- **To lead the users to the management or the knowledge** of the basic tools (training, watching…)
- **To be located at the interface** among the users, the developers, the suppliers…
- **To set up networks** allowing to cross skills (geomatic, data-processing, legal…), to support the expression of the needs and to cross these needs carried out by working groups
- **To develop** products or parts of products. To allow an optimal development by subcontractors (conditions of contracts, functional specifications, permanent dialogue…)

The constituent "SIAD[6]" of this application is set up on the COZ of Valabre and the BASC infrastructures. It allows these two services to work together and to manage efficiently all the main emergency situations in real-time. From a technical point of

[6] Système informatisé d'aide à la décision

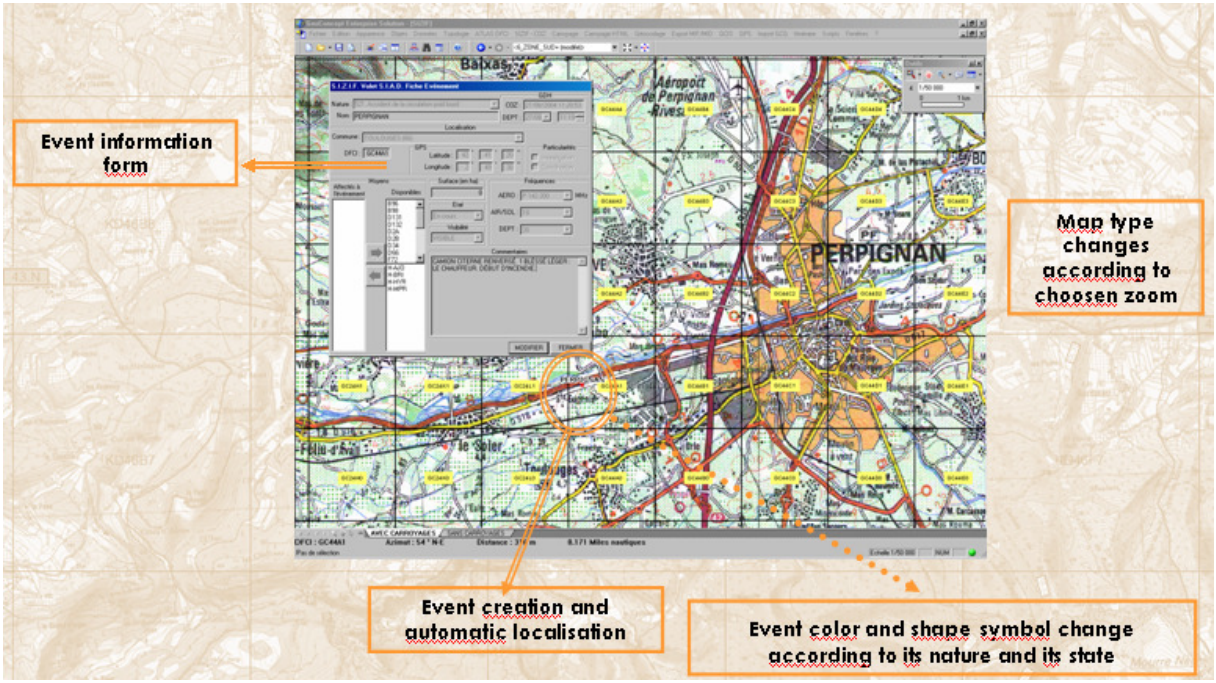
view, SIZIF is a client-server application with a global database. The tool makes it possible to the users to insert relevant information only once through various entrances points, to automatically feed cards and tables.
SIZIF constituent "SIAD" integrates a three-dimensional engine, a relational database (SGBDR Oracle©), a geographical information system (SIG Géoconcept©), and a messaging software (Lotus© or Exchange©), with which was coupled a handrail and statistical tools.
SIZIF endeavours to provide information to the level of the operational environment of the Zone Sud. This operational management tool combining cartography, relational database management system, and communication makes it possible not only to transmit the messaging data but also to interface and exchange data with other information systems (such as SYNERGI).

Finally, this whole of data and functions make possible to answer the three existing levels in the crisis management:

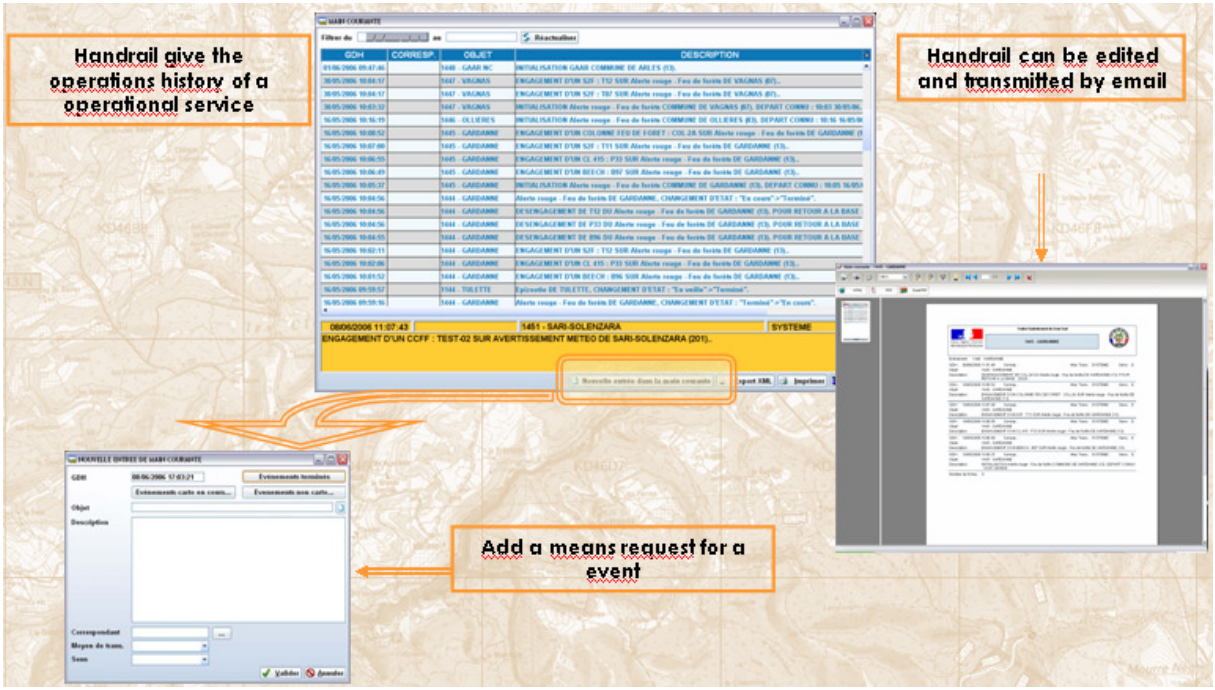
- modelling, thanks to databases (IGN data, flooded zones, catchments, roads, perimeters…)
- management in real-time, by spatializing the events and the means,
- anticipation, by analyzing and gathering the various information provided by the system.

Hence, SIZIF, thanks to SGI (Instantaneous Graphic Synthesis) and its operations in a visual way, permits to:

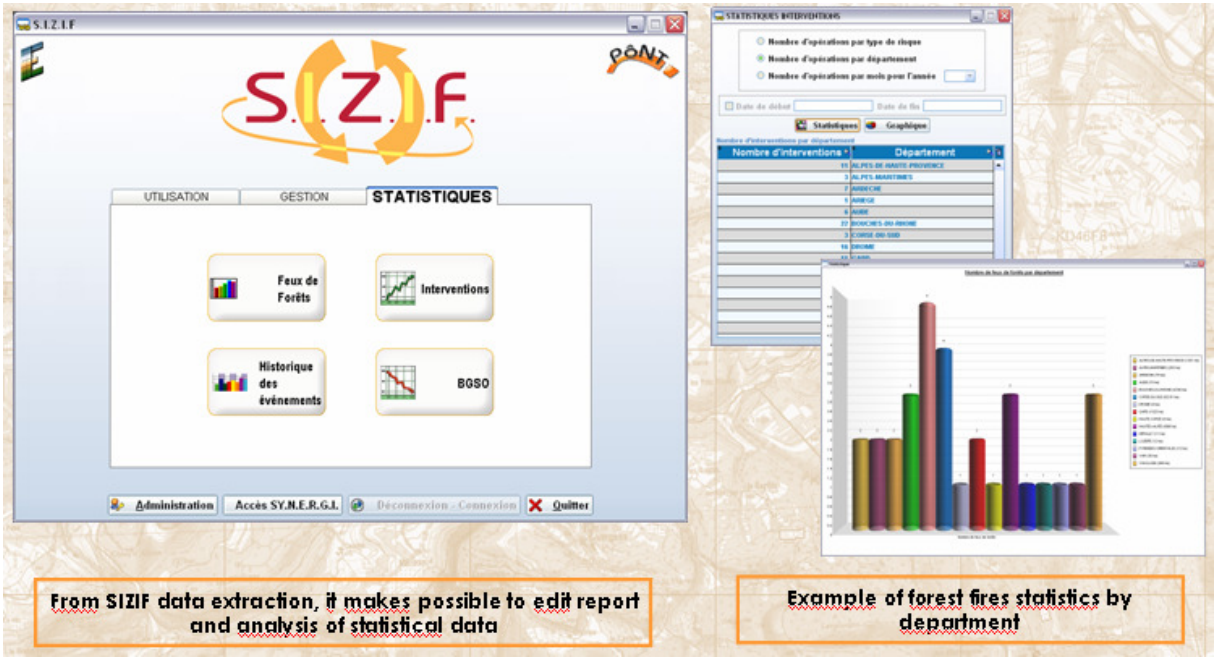
- The creation of ground events



- The assignment and the management of means on these events
- Semi-automatic operational handrail



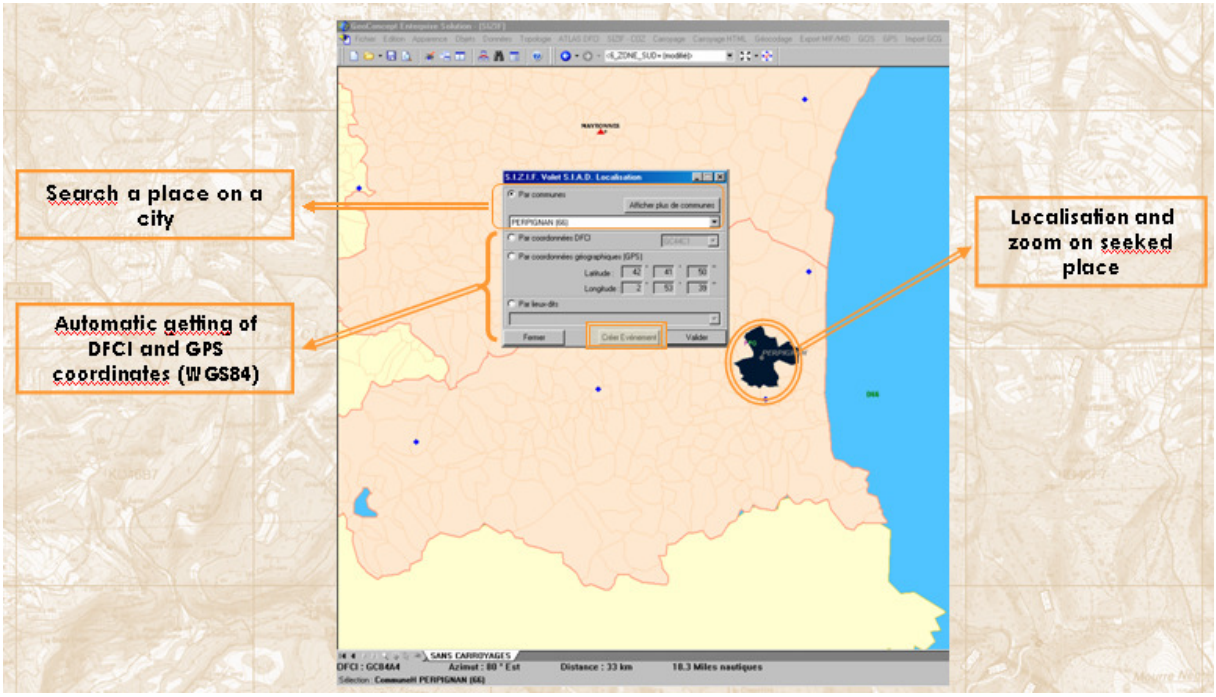
- The instantaneous visualization of the synthesis graphic (general map of the events in real time)



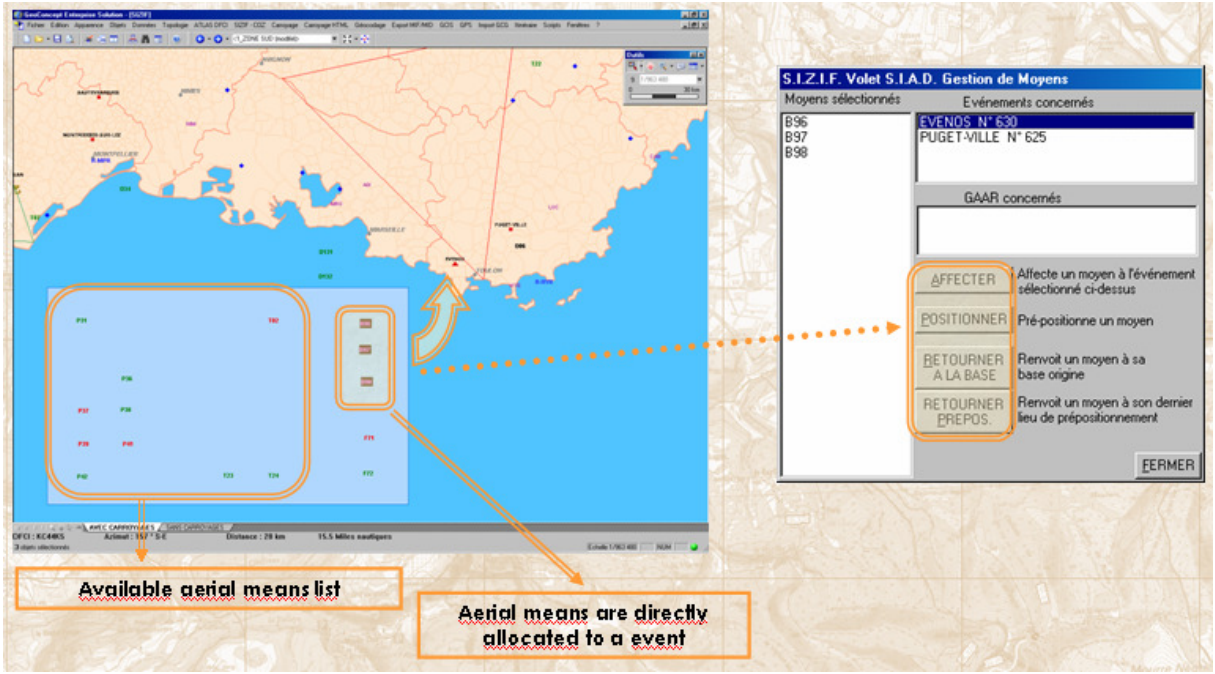
- The constitution and the edition of the synthesis files
- Statistical analysis and assessments printing

The following functionalities are available:

- To locate a place
- To search a place



- To create an event
- To create a means



- To list the available means
- To list the events by commune

To date, this application is used in the COZ of Valabre and in the BASC of Marignane. Initially, develop to the zonal level. This application has been adapted to organisational departmental level (CODIS) and prefecture. One implementation has been developed for the SIRACED-PC[7] (cf. SIDPC) of Herault Prefecture. The central role of this administrative service in the crisis management, especially for floods monitoring, gathering decentralized national services (DDE, DDASS, EDF…), asked more detailed functionalities for SIZIF. Hence, following functions have been added to the first version:

- To locate it on…, which makes it possible to quickly find an object in the map among various lists which correspond to the integrated data in the map: catchments, schools, significant points, hospitals?
- To block a road…, which make it possible to the user to create a new object on the map, of type ' blocked Road', with a particular appearance, and a card of associated data.
- Points to be protected close from here…, which makes it possible to create on the map a ' Marker' and to list among catchments, schools, significant points, hospitals, those which are in the wanted perimeter, compared to this marker

This project SIZIF consists of two types of cartographic data:

- A first, known as ' of base': a numerical cartography of the department which comprises source data of the IGN (scan25, scan100, administrative units of the BDCARTO), supplemented by thematic data realized by the various services of the State (DDASS, DDE, National Education) and of the General Council. On this map, the events and the means are represented.

[7] Service interministériel Régional des Affaires Civiles et Economiques de Défense et de Protection Civile

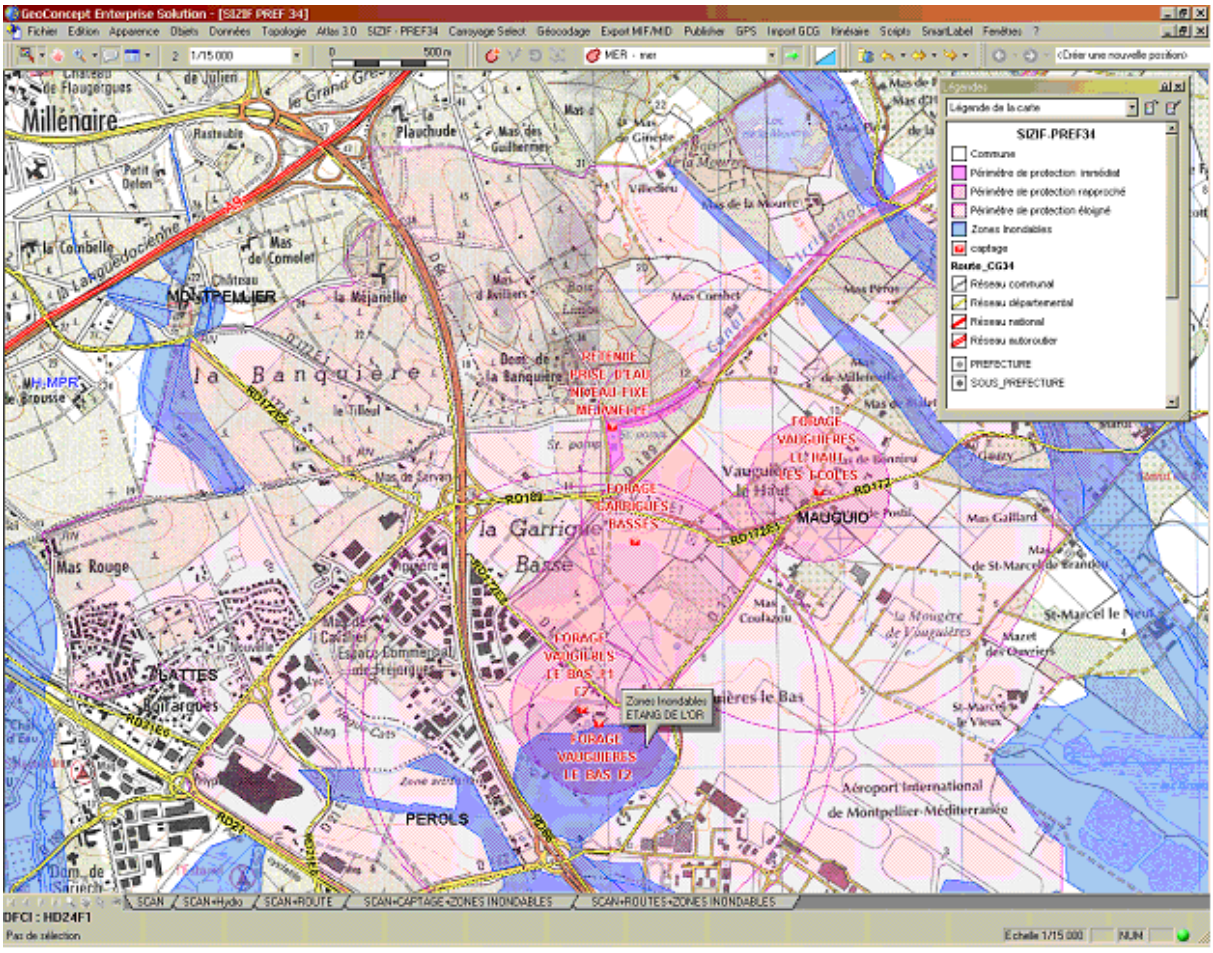
- one second, known as ' detailed': the basic cartography is enriched by other spatialized data such the PPR and other databases, DCS (synthetic communal document), networks of energy, military zonings …

The following table summarizes the whole of data included in the Herault SIZIF application:

Organism	Data
DDASS	Catchments
	Catchments perimeters
	Hospitals
DDE	PPR-flooded zones
	Roads
	drainage network
General council	Roads
DIREN	Watersheds and drainage network
MB Management	DCS
Ministry of Education	Schools
Prefecture	ERP[8]
	Sensible points
	Means

The map presently used at the SIRACED-PC looks like the following figure:

[8] Etablissement recevant du public



2.1.3. Synergi

Synergi (Numerical System for information sharing, reporting and managing) is an interface intented for the crisis management on all the levels.

It allows all the concerned and involved services with the same operation to work on the same tool, with the same procedures, in real time.

Broad collection of information, each one finds there the entirety of the information provided by each actor. It does not have the role to be the exclusive tool of a service and must be useful to all and is not intended to serve the intentions of the zonal level.

SYNERGI allows the piloting of the operations and the crisis management for "civil defense" (disorders with the law and order: demonstrations, strikes…) or for "civil safety" (technological risks, weather risks) and various accidents.

SYNERGI aims to allow the management of the operations, in real time, by all the

actors concerned what imposes a single file by event that it is opened by the CODIS or the prefecture. Each correspondent (DDE, DDASS, DDAF…) brings his elements in accordance with what was locally defined by the prefect or the DDSIS for the CODIS.

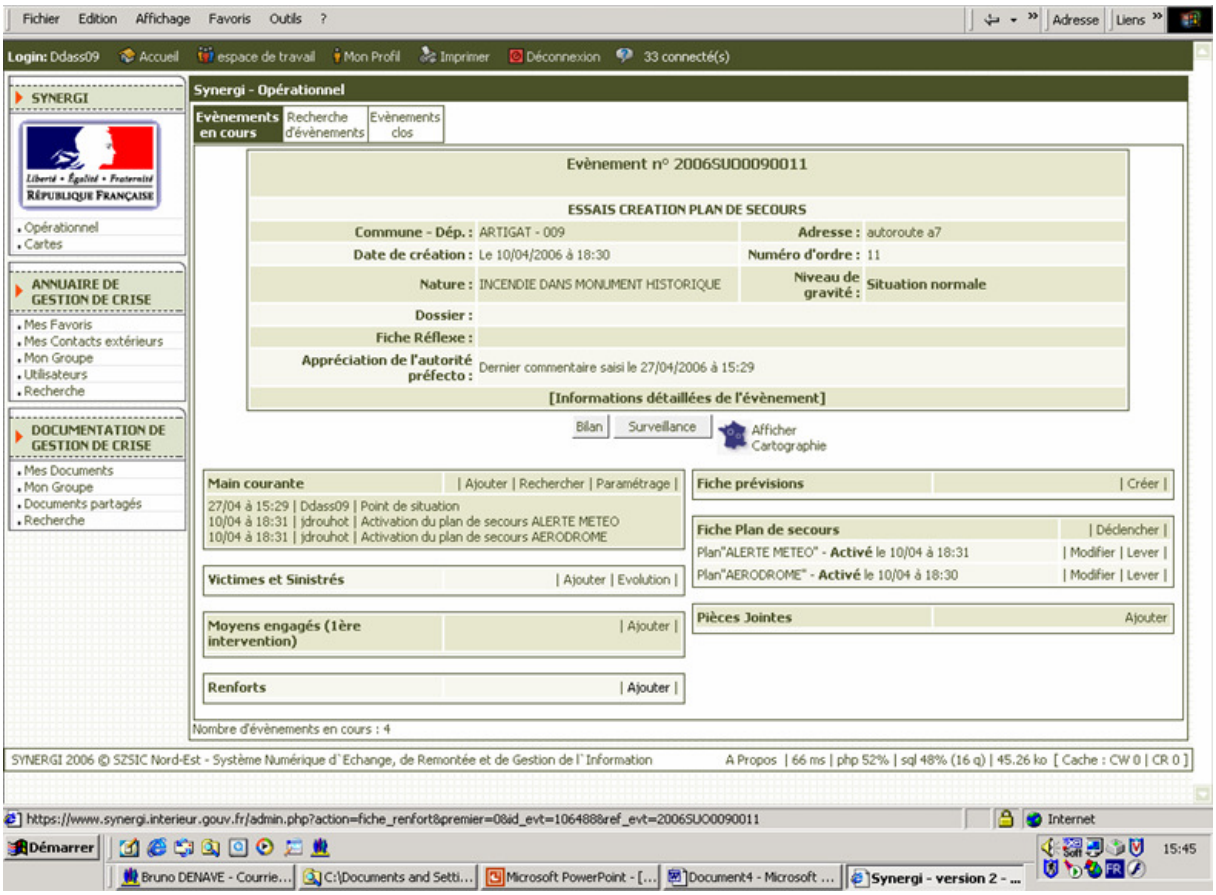
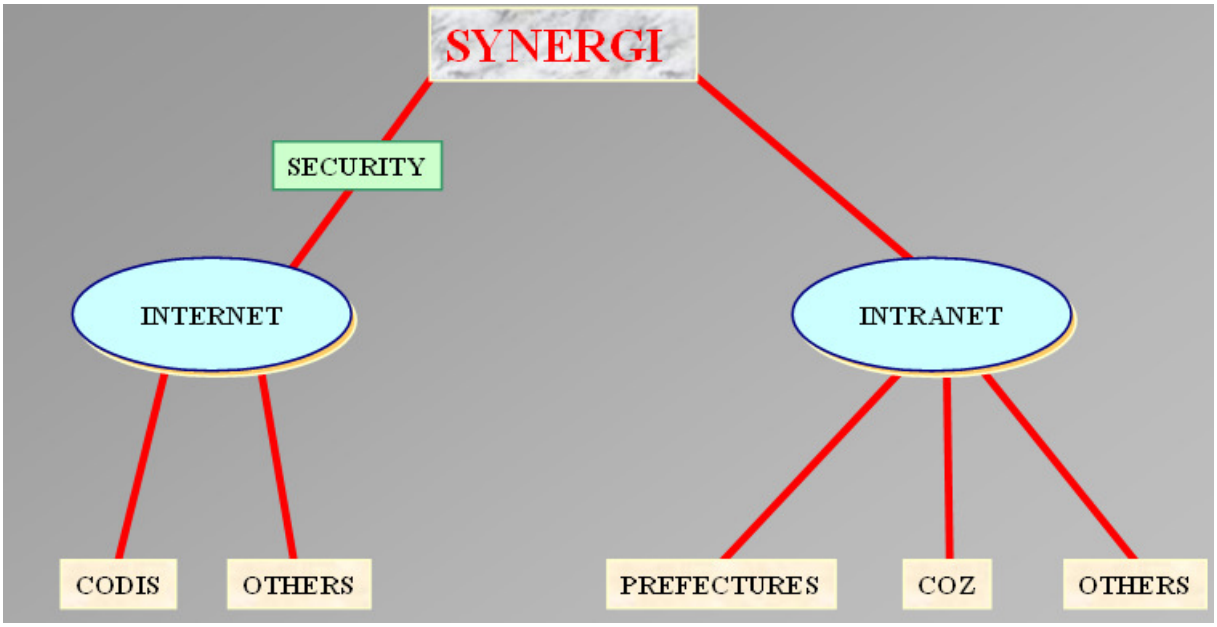


Figure 23 : Synergi events management

Synergi is developed with WEB type application. The program is written in ASP, the database is developed with SQL WAITER version 7.The users connection on the server is done through standardized navigator like Internet Explorer.
The application was written by the agents of the SZSIC of METZ, which have the sources code (what allows a fast adaptation at the users requests).

This application is directed towards the management of crisis management feedback.

It allows the COZ, SIDPC, COD, CODIS, to inform, and to inform themselves on the evolutions of the crisis.



Three modules make it up:

- An administration module
- A documentation module
- An operational module

The documentation module makes it possible to all the actors of a crisis to find constantly the up to date official documents necessary to manage the crisis, to find a telephone number or an address, to create “reflexes cards” etc…

The operational module allows the management of the crisis by automatically providing:

The creation of a complete file including:

- A handrail,
- points of situation which must be able, in a synthetic way to reflect the reality of the moment
- Consequences cards which aim to allow a feedback towards the zonal level by the intermediary of a common document. These cards make it possible

moreover to have in real time and at one considered moment a clear and precise vision of the phenomenon and of its human or material consequences. These cards are carried out by the operational center of zone (COZ) according to criteria defined by the DDSC and of the nature of the crisis.

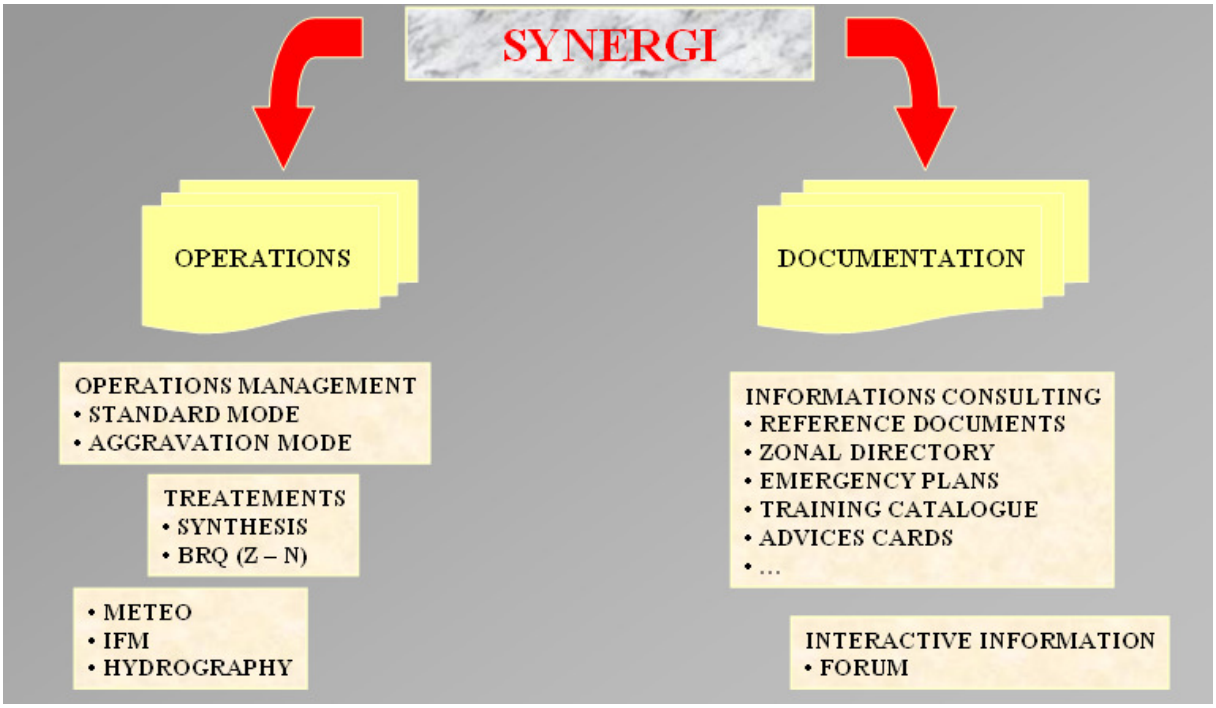
They appear in the files since the COZ creates the associated event (strike of the lorry driver of… - alarm weather of…).

It is a question for the users of SYNERGI of informing, each one for what concerns, in the term fixed by the EMZ these documents. Thus, in order to allow good information of the COZ and by extension of the COGIC, it is advisable to establish a report for 11h00 and for 17h00 by means of these cards consequences.

- forecasts,
- the possibility of joining any type of document,
- reports,
- maps

Moreover automatically this application provide: The BRQ[9], assessment, synthesis.

[9] Bulletin de renseignements quotidiens



2.1.4. SIZIF and SYNERGI fusion

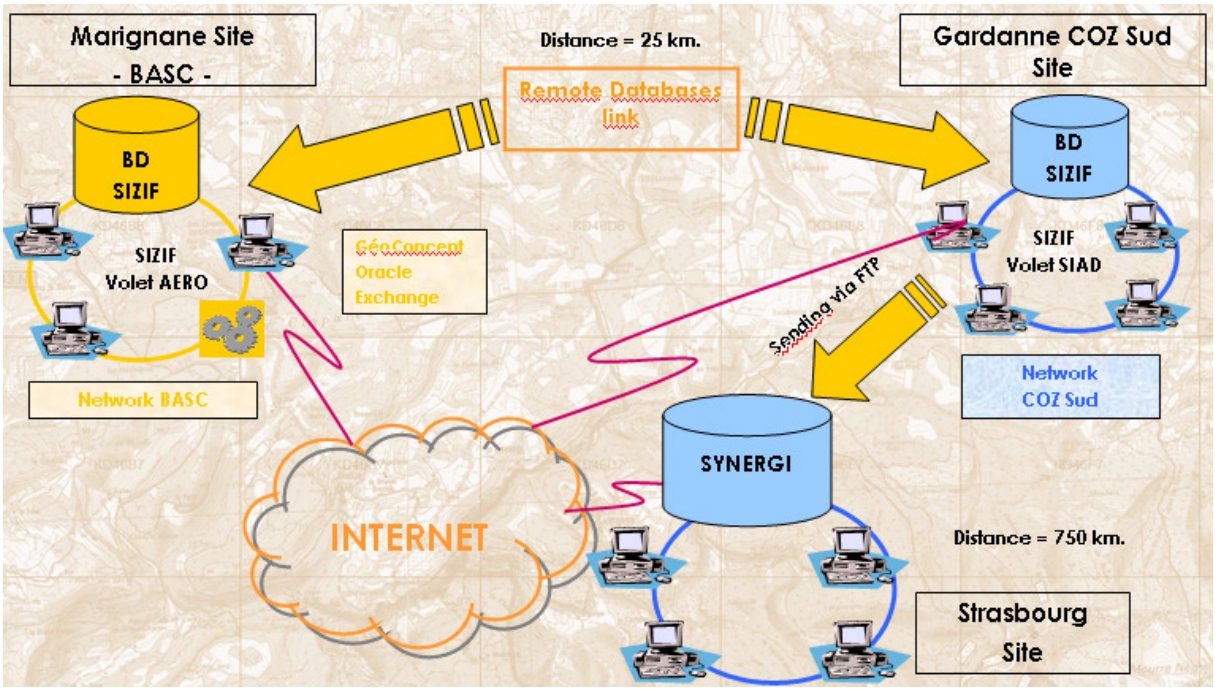
The functional complementarity of applications SIZIF (operational cartographic application) and SYNERGI (operational feedback application for crisis management) led French Civil Protection to gather these two tools to have a global system of crisis management and operational data and information feedback to optimize interoperability among the various services of Civil Protection

The principles of fusion are as follows:

- SYNERGI network, being based on technology Internet, makes it possible to share information between the various actors in real time (messaging, directories, operational information, and reference documents).
- SIZIF allows in a given operational centre to manage the operations (cartography, handrail, statistics…). The information enters on SIZIF and which interest the whole of the partners is recovered, on the one hand via a automated treatment and transparent for the users, and on the other hand

transmitted to SYNERGI, which integrates them after checking and validation in the objective of a global sharing.

- all operational information, event by event, are recovered in SYNERGI in real time,
- periodically (every 10 minutes) a map of events is captured and transmitted via SIZIF towards SYNERGI,
- actors, of departmental and zonal level, can identify a common event and share information.



This exchange consists in transmitting in real-time information coming from SIZIF to feed SYNERGI automatically. Hence, any user identified by SYNERGI (CODIS, Gendarmerie, Prefectures, and national deconcentred services) can consult the elements of SIZIF freely and act on all the other elements.

These data exchanges between SYNERGI and SIZIF are done with format XML via a protocol HTTP. All the processes are established through Web servers.

2.2 South zone case

2.2.1. The south zone (Valabre) infrastructure and operation

The Internet communications among the central service DDSC and the 7 zonal centres are provided thanks to the RGT[10]: the privative network of Interior Minister. It is a privative and secure network which constitutes presently the basic infrastructure of transmissions among all services of Interior minister including DDSC. French partners (DDSC and EMA) chose to describe general operation of this operational zone given its important implication in French Civil Protection innovations. Moreover, this zone assisted Gard operational departmental service (SDIS 30) during major flash floods (D9 use-cases) events (2002 and 2005) and more generally for all important crisis situations. Finally, this organism has been chosen by RISK-EOS project in 2005 as main corresponding end-user organizations. As précised in RISK-EOS deliverable, these organizations correspond in practice to the user organizations operationally involved in the prevention and management of flood and fire risks, at local, regional, and national levels in some European countries.

2.2.1.1. Available hardware resources

2.2.1.1.1. Human resources

The information technology of Zone of Valabre is managed by a unique senior engineer who doesn't have any skills on distributed computing. She works on the general administration problems and manages the database infrastructure of SIZIF.

[10] Réseau général de transport

2.2.1.1.2. Hardware resources

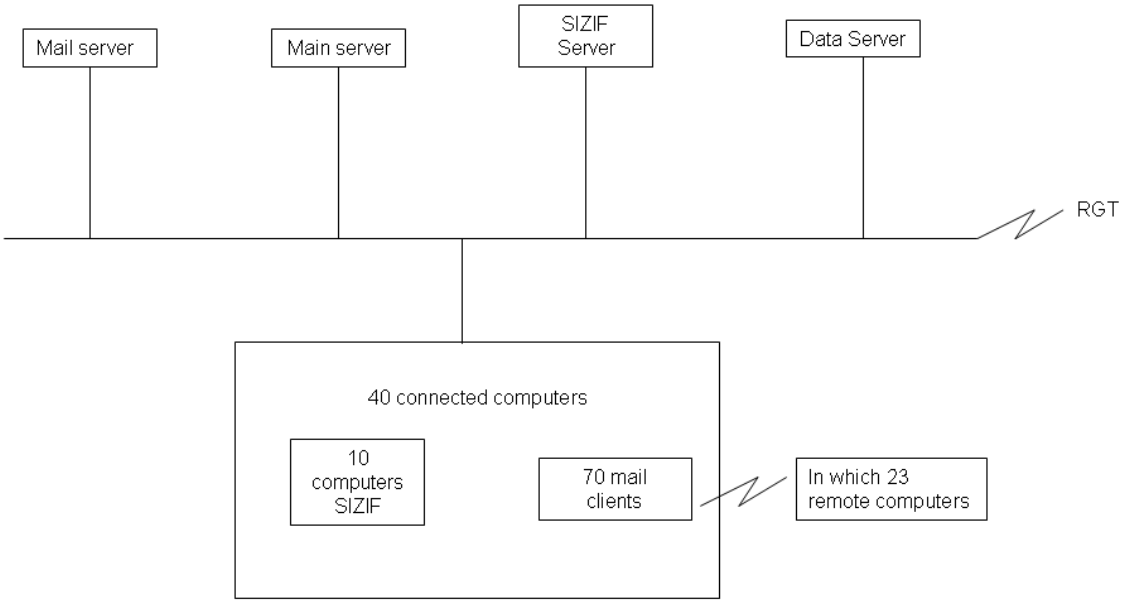


Figure 24 : South zone infrastructure

As shown in the previous figure (Figure 24), the Valabre infrastructure is simple and based on four main servers. It is Intel Xeon 2.8 GHz servers with 4Go of RAM. The network is based on the RGT network.

2.2.1.2. Tools and Applications

2.2.1.2.1. Application characteristics

The main application used in the crisis management operation is SIZIF already described in 2.1.2 section. This application has been developed by the PÔNT[11] organism, specialized in the new technologies using and helping in the Civil Protection organisms. The main module of this application is based on the GIS software GeoConcept© version 5.6. The additional module is implemented in C++ (2 Mo), the HCI (Human-Computer Interaction) (about 20 Mo) with WINDEV© and the database in set up on Oracle 9i (9.2) ©. The basic geographical data package corresponding to the necessary for an operational functioning has a size of 100 Mo.

[11] **Pô**le **N**ouvelles **T**echnologie

However, for an efficient functioning it's necessary to use a large amount of geographical data as for example BD ORTHO (IGN) and other raster data corresponding to a size up to several Giga-octets. Finally, this collaborative application use a centralized database to manage a crisis situation, it doesn't use data input parameters.

This application exclusively runs on a Windows operating system, indeed the using of Oracle database, the system requires Windows 2000 or 2003 Server and for clients units Windows 2000 or XP.
The computational and sharing requirements for SIZIF using depend of number of connected users. It could be interesting to increase storage capacity and geoprocessing capabilities.

2.2.1.2.2. Resources and software requirements

To run SIZIF on a client post, expect a fast intranet connection, it requires:

- a CPU time up to 1.5 GHz
- a amount of RAM equal to 1 Go
- a storage capacity of 80 Go

In a crisis management situation, it is important to have at least three client applications which simultaneity run.

As seen previously, to use this application, many requirements have to be validated:

- An operating system capable of hosting GeoConcept© software
- Presently, SIZIF only runs on Windows 2000 or 2003 Server
- For C++ library, Visual Studio 6© or equivalent
- For forms, WINDEV 11©
- For Database hosting, Oracle 9i (9.2)©

To summarize, presently the SIZIF application is a Client/Server application adapted to French Civil Protection needs, in particular to South zone infrastructure. Its source code is totally available, however all the implementation has been designed on a Windows platform. Except the problem of portability, it could be interesting to share data coming from multiple institutes included in the crisis management as well as Civil Protection services than external organisms (Meteo-France, SCHAPI, ONF…). Moreover, this sharing could be completed by an interoperability context where each command centres could be visualize and management the emergency situation.

2.2.2. The Gard departmental service (SDIS 30)

2.2.2.1. Available hardware resources

2.2.2.1.1. Human resources

Presently, this organism can't provide human resources to manage and develop a grid infrastructure.

2.2.2.1.2. Hardware and software resources

The operational departmental service of Gard region (CODIS) has a simple LAN infrastructure to an administrative use. For operational functioning, the infrastructure is composed of about ten individual computers connected to Synergi application (cf. 2.1.3) to inform zone operational centre (COZ) and CODIS of current rescues, only for important operations.

The administrative part of Civil Protection departmental unit (SDIS 30) has an important data-processing infrastructure. Every rescues centres of Gard region are connected to SDIS 30 to access all administrative documents and applications. The objective of this infrastructure is to centralise the administrative management, e.g. financial management, medical management, vacations… This important infrastructure can provide hardware resources (Figure 25) to Grid technology adoption in Civil Protection services:

- One servers farm METAFRAME (4 servers Bi Xeon, 2.8 GHz, 2 Go of RAM)

- Eight servers WINDOWS 2003 SP1 (6 of them with Bi Xeon, more than 1.8 GHz and 2 Go of RAM)
- Six servers on Linux with a storage bay of 1.5 To
- Two specialized lines with a transmission rate of 2Mb/s
- The database system is ORACLE SQL SERVER (not usable in case of grid technology adoption)
- A mailing system (LOTUS)

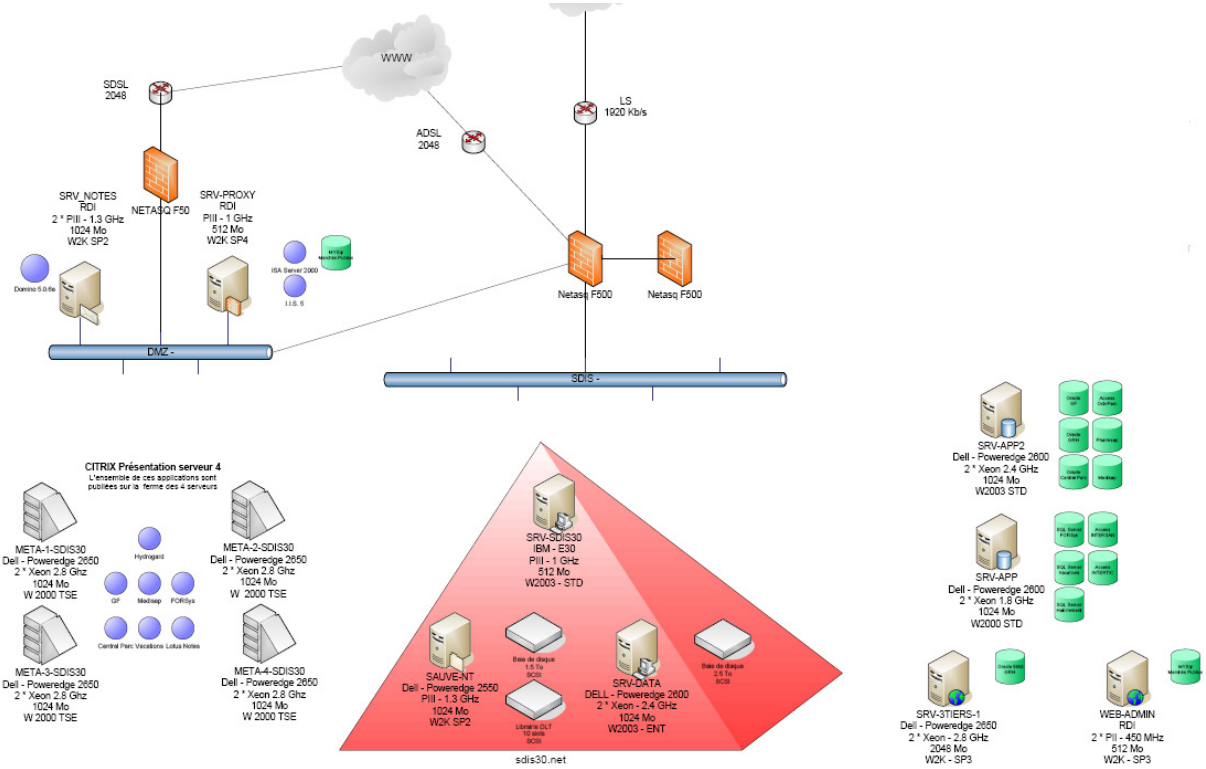


Figure 25 : SDIS 30 infrastructure

The general infrastructure of Civil Protection Gard Region is based on this previous infrastructure. To complete this structure, three territorial groups are connected to it:

- Cevennes – Aigoual territorial group
- Rhône Valley territorial group
- Garrigue – Camargue territorial group

The global infrastructure is represented in the following figure (Figure 26).

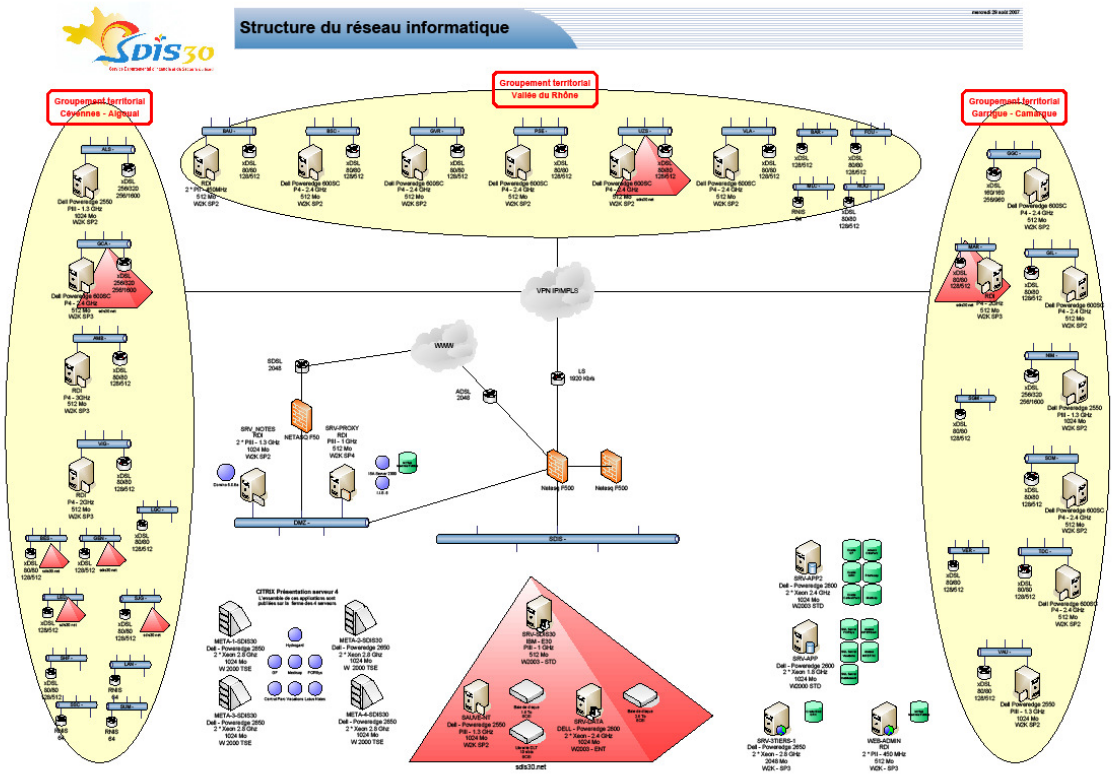


Figure 26 : Global SDIS 30 infrastructure

2.2.2.2. Tools and applications

The operational departmental centre of Gard doesn't use specific tools to manage a crisis situation. All the data-processing structure, previously presented, is used to administrative and financial management among the 29 emergency centres and the SDIS but not to an emergency situation. In few months, a calling system with geolocalisation (CTAU) will be integrated in CODIS infrastructure to easily localize emergency calls (18 and 112 telephone numbers).

The level of hardware resources, detailed in the 2.2.2.1.2, permits to define the SDIS 30 organism as a potential provider of resources. During a meeting at SDIS 30, its data-processing administrators have given their consent to provide resources in objective of Grid technology adoption. Henceforth, a future system could be designed between flood hazard management actors, where SDIS 30 could provide some

computational and storage resources (500Go) and SPCGD could provide flash floods models, their modelling results and raw hydro-pluviometric data (cf. Deliverable 09 and 11).

3. PORTUGAL

For the Portugal case, ANPC partner chose to describe and to inventory resources of the central service of the Portuguese Civil Protection: The ANPC. Main information presented in following come from answers of the presented form.

3.1 Available hardware resources

3.1.1. Human resources

ANPC has a small TI area:

- 1 senior engineer (specialist system and database administration);
- 5 technicians – help desk, hardware maintenance and some administration tasks (mail, proxy, file and print server administration);
- Expecting 1 senior engineer to do GIS area (end of this year);
- No skills concerning distributed environments.

From a human point of view, to date ANPC skills don't permit to implement a Grid infrastructure or to port some applications on an existing grid infrastructure without helping of Grid experts.

3.1.2. Hardware resources

ANPC Headquarters (general description):

- 1 Domain server (Windows 2003);
- 1 Mail Server (Exchange);
- 1 Proxy Server (ISA);
- 2 Application Servers and 2 Database Servers (Oracle/Linux and W2003/SQL 2005);

- 4 Servers for Sharepoint 2007/MOSS + SQL2005 – site, intranet – authoring(2) and DMZ(2).
- Other servers (files, antivirus, etc.)

To complete, the central ANPC infrastructure, the 18 ANPC delegations have just a file and application server with the following specifications “Proliant 380 – 2GB RAM, 200GB of storage”.
It doesn’t exist distributed systems. All servers are from the “HP Proliant” family (380 / 580) with typically 2 to 8 GB RAM and 150-300 GB disk storage (with RAID 1 or RAID5 and in some cases processor redundancy). To summarize, to date the total disk space for all the Portuguese Civil Protection structure availability is less than 1 TB.

For connection specifications, headquarters and the 18 regional delegations are linked trough a VPN (xDSL and circuit). There are Ethernet networks inside each building.

Moreover, it is expected by the end of the year an integration among all the entities belonging to the Ministry of Internal Administration to share a unique VPN (bandwidth >= 2Gb everywhere). The datacenter that will manage this private network will also guarantee some additional space and processor capabilities.

3.2 Tools and Applications

3.2.1. Application characteristics

Focusing only on applications from the operational area, ANPC has started a new project called “Digital Civil Protection” 2 years ago. That has some software modules sharing an ORACLE database and GIS information (Google, ArcGIS).
These modules are used to register all the activities concerning operational activities and to produce some maps and statistics.

ANPC is now starting to produce management reports (dashboard with indicators related to the forest fires fighting).

To date, there are no available applications concerning “modeling” and “simulation” inside the ANPC infrastructure.

3.2.2. Resources and software requirements

Some new applications are just starting and growing, but there is no significant need of space and processor capacity for this kind of applications. These needs are foreseen when simulation and modeling applications will be implemented.
For the exiting systems described previously, the general requirements are:

- Some web-based applications are developed in “.net” technology and JAVA. But, presently, the ANPC is not source code owner.
- Servers based on MS W2003 OS.
- Server with Linux to use the ORACLE central Database (v 10g).
- SQL 2005 Databases (MOSS, BI).

To summarize, this existing analysis for the Portuguese partner permit to show the low level of information technology development. Some basic applications are used in ANPC headquarters and delegations to manage emergency operations but presently not adapted to be ported on a grid infrastructure. In term of hardware resources, the equipment seems to don’t permit to implement a national or trans-national Grid infrastructure.

4. GREECE

As specified in “scope of the document” part, some difficulties have not permit to collect the expected information on the Greek Civil Protection. For this reason, Cyclops partners decided to present the Hellenic National Meteorological Service (HNMS) infrastructure and operations to answer to the Cyclops D8 objectives. This national organism already involves in Grid technology adoption. Indeed, they are

including in the EGEE II project as non-contracting partner, and they will monitor the applications activities (NA4) from the user perspective.
However, this deliverable only focuses on the existing resources of involved organism in the Civil Protection activities. The HNMS is presently totally involved in crisis management given they transmit all weather forecasting useful to Greek Civil Protection to manage the emergency organisation. This organisation is somewhat similar to French functioning where forecasting mission is provided by external services.
Finally, the present state of Greek Civil Protection, from a data-processing point of view, seems to don't permit a real and efficient study on the Grid adoption in its services (communication of Filippos Vallianatos, Second Technical Management Board, Rome – July 2007).

The following description is based on annual report of World Meteorological Organization (WMO, 2005, WWW technical progress report on the global data-processing and forecasting system (GDPFS) and the annual numerical weather prediction (NWP) progress report for the year 2005, 9p).

4.1 Summary of highlights

Migration of the local weather and wave prediction model runs to two high performance computing systems (HP based on Itanium-type and IBM based on Power4-type processors). A high level visualization tool (Visual Weather) as well as data storage systems and software (MARS and Web-MARS) are in the process of being operationally integrated. Based on the experience from the Athens Olympic Games, WEB-based technology for the meteorological support of events of relevant significance has been developed.

4.2 Equipment in use at the center

- **Message Switching System (MSS)**

Servers 2 x RX2600 2 x Itanium 1,3 Ghz

Gb RAM 2 x 36 Gb HD, 1Gb 2 x FC Connection

Cluster configuration Service Guard

O.S. Linux Red Hat A.S. 3.0

- **Preprocessing**

  Servers 2 x RX 2600 2 x Itanium 1,3 Ghz

  4 Gb RAM 2 x 36 Gb HD, 1Gb 2 x FC Connection

  Cluster configuration Service Guard

  O.S. Linux Red Hat A.S. 3.0

- **Web Mars Intranet**

  Servers 2 x RX 2600 2 x Itanium 1,3 Ghz

  4 Gb RAM 2 x 36 Gb HD, 1Gb 2 x FC Connection

  Cluster configuration Service Guard

  O.S. Linux Red Hat A.S. 3.0

- **MARS**

  Servers 2 x RX 5670 4 x Itanium 1,3 Ghz

  16 Gb RAM 2 x 36 Gb HD, 1Gb 2 x FC Connection

  Cluster configuration Service Guard

  O.S. HPUX 11.22

- **Graphical Servers**

  Servers 2 x RX 5670 4 x Itanium 1,3 Ghz

  16 Gb RAM 2 x 36 Gb HD, 1Gb 2 x FC Connection

  Cluster configuration Service Guard

  O.S. HPUX 11.22

- **MSG Processing**

  5 x Intel Based Servers

DELL.NAS 1Tb

O.S. Linux Red Hat 9.0

- **Radar Processing**

  2 x Intel Based Servers

  O.S. Linux Red Hat 9.0

  SuSe Linux

- **Web Server Farm**

  24 Servers Intel Based Xeon

  1 Gb RAM 1 x 36 Gb HD

  O.S. Linux Red Hat 9.0

  2 x SUN480

  4 Gb RAM 2x36 Gb HD

  NAS Storage

  80 Gb HD

  Sun Cluster 3.0

  4 X SUN V120

- **High Performance Facilites**
  - Current System HP Cluster
    - Computer Nodes

      28 x RX2600 2 CPUs Itanium 1.3 Ghz

      4 Gb RAM

      2 x 36 Gb Internal Disks (Mirroring)

      1 Myrinet Card

      O.S. HPUX
    - I/O Nodes

      2 x RX2600 2 CPUs Itanium 1.3 Ghz

      4 Gb RAM

      2 x 36 Gb Internal Disks (Mirroring)

1 Myrinet Card
2 x Gb Copper Ports
2 x Fiber Channel Cards
O.S. HPUX

- Parallel Environment
  MPI
  HP Cluster Pack

- Interconnection Switch
  Myrinet 32 Ports

- Control Nodes
  1 x RX2600 2 CPUs Itanium 1.3 Ghz
  4 Gb RAM
  3 x 36 Gb Internal Disks
  1 Myrinet Card
  2 x Gb Copper Ports
  2 x Fiber Channel Cards
  O.S. HPUX

- New System IBM Cluster 1600

  - 28 Compute Nodes 7039-651 pSeries 655
    8-way 1.7 Gh power 4+
    16 Gb Memory
    2 Link Switch Interface

  - 2 I/O – Front - End Compute Nodes 7039-651 pSeries 655
    8-way 1.7 Gh power 4+
    16 Gb Memory

2 Link Switch Interface

Shared 7040-61D I/O drawer with 1 Gb Ethernet/Server and

2 FC/Server

- Disk SubSystem

  1 FASt600 Server

  14 146.8 Gb Disks

  2 links FC Switches

- 6 Hight Performance Swithes (HPS) 7045-SW4

  Federation Switches

- Total 240 Power 4+ Processors
- Parallel Environment

  MPI

  GPFS V2.1.0

  Loadleveler V3.1

- Operating System

  AIX 5L V5.2

4.3 Data and Products from GTS in use along with their average number of messages by day

SYNOP 14541

TEMP 294

SHIP 1207

GRID from DWD 942

GRIB aero from EXETER 9408

GRIB from ECMWF 10160

Aeronautical Charts from Exeter (T4 code) 208

4.4 Data input system.

The system is fully automated.

4.5 Quality control system

There is no quality control system in use regarding outgoing data to the GTS, except for formal structure. The format of all coded reports is checked and if is necessary and possible corrected. Surface and upper air reports are checked for internal consistency before storing them into a database.

4.6 Monitoring of the observing system.

Surface observations and upper air observations are monitored quantitatively only on the national level.

4.7 Forecasting System

4.7.1. System run schedule

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 (HNMS) 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.

4.7.2. Medium range forecasting system

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.

4.7.3. Short range forecasting

4.7.3.1. Data assimilation, objective analysis and initialization

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.

4.7.3.2. Numerical weather prediction products

Numerical Weather Prediction Model ETA (Hydrostatic)	
Time prediction range and step	Initialization from ECMWF analysis of 00 UTC and 12 UTC with prediction range of 72hours from analysis hour. Data production every 3 prediction hours.
Computer system	HP cluster based on Itanium Processor

Surface data parameters	Mean Sea Level Pressure Wind 10m Temperature 2m Specific Humidity Precipitation
Upper-level data parameters	Geopotential height Temperature Wind Specific Humidity
Vertical Resolution (hPa)	100, 150, 200, 250, 300, 400, 500, 700, 850, 1000 and Surface
Horizontal Resolution	0.1◦X0.1◦ in rotated grid with geographical center (22.0, 39.5), and width 16 degrees in longitude and 12 degrees in latitude.
Covered area	Part of Italy, Adriatic Sea, Balkan peninsula and west part of Asia Minor
Results form	Binary which are converted to ASCII and GRIB

Numerical Weather Prediction Model LM (Non-Hydrostatic)	
Time prediction range and step	*Locally (4 runs a day)*: Initialization from the Global Model (GME) of DWD based on analysis of 00 UTC and 12 UTC. Data assimilation is included every six hours by using the Nudging Analysis scheme developed at DWD. The prognostic

	range is 48 hours and data production is available every prediction hour. *ECMWF (2 runs a day)*: Initialization from the Global Model of ECMWF based on analysis of 12 UTC and from the Global Model (GME) of DWD based on analysis of 00 UTC. The prognostic range is 48 hours and data production is available every 3 prediction hours.
Computer system	*Locally*: HP Itanium-based system *ECMWF*: IBM Power4-based system
Surface data parameters	Mean Sea Level Pressure Wind 10m Maximum wind 10 m Temperature 2m Dew point temperature 2m Maximum temperature 2m Minimum temperature 2m Total cloud cover High cloud cover (0-400 hPa) Medium cloud cover (400-800 hPa) Low cloud cover (800 hPa-Surface) Specific humidity Precipitation Convective precipitation Snowfall
Upper-level data parameters	Geopotential height Temperature Omega parameter of vertical motion Wind

	Specific Humidity
Vertical Resolution (hPa)	200, 250, 300, 400, 500, 600, 700, 850, 950, 1000
Horizontal Resolution	0.0625oX0.0625o in rotated grid with North Pole (32.5, 170.9), and width 12 degrees in longitude and 14 degrees in latitude.
Covered area	Part of Italy, Adriatic Sea, Balkan peninsula and west part of Asia Minor
Results form	GRIB

Numerical Weather Prediction Model RAMS (Non-Hydrostatic) & WAM	
Time prediction range and step	Initialization from ECMWF analysis of 12 UTC and corrected with LAPS. Prediction range of 36 hours from analysis hour. Data are displayed for every prediction hour.
Computer system	HP cluster based on Itanium Processor
Surface data parameters	Mean Sea Level Pressure Wind 10m Temperature 2m Total cloud cover Precipitation Wave height and direction (WAM)
Upper-level data parameters	Geopotential height Temperature Wind Relative humidity Specific humidity

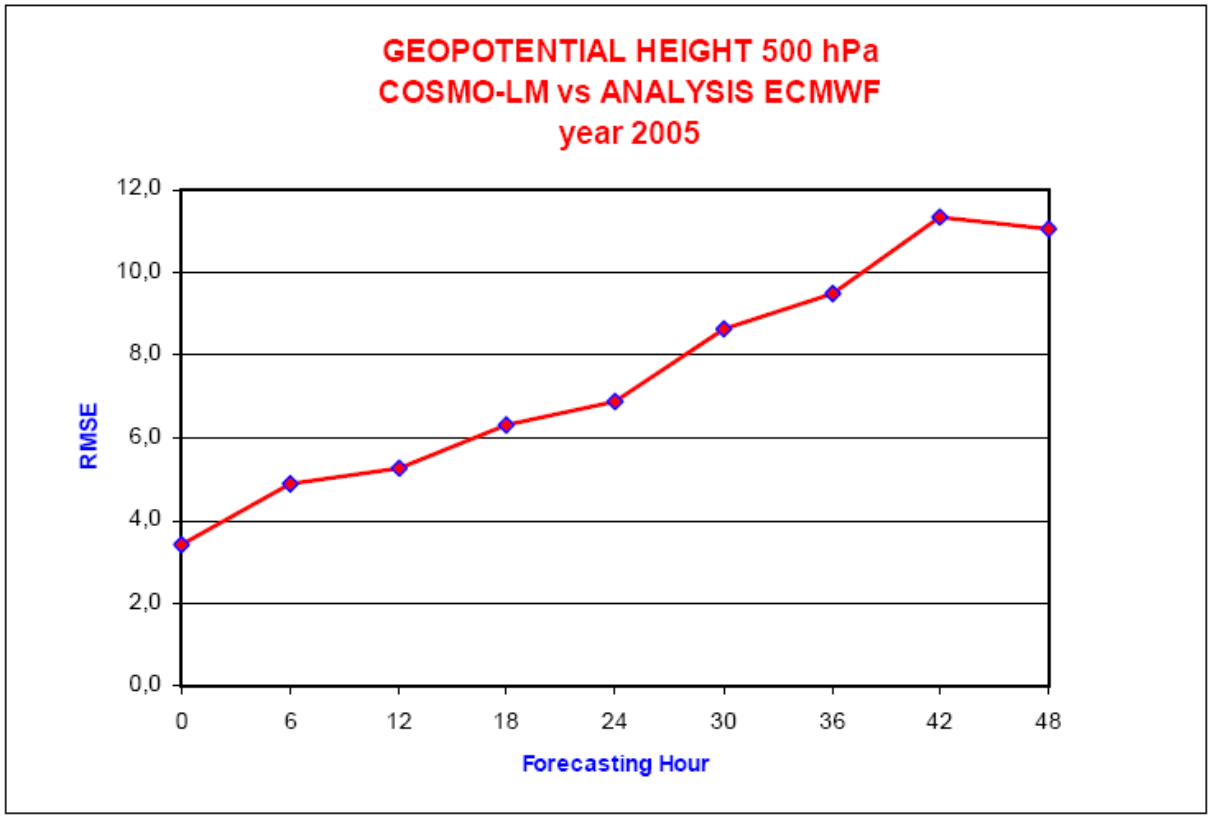
Vertical Resolution (hPa)	100, 150, 200, 250, 300, 400, 500, 700, 850, 1000
Horizontal Resolution (Three nested Grids)	Grid 1: 48 Km Grid 2: 12 Km Grid 3: 3 Km
Covered area	Grid 1: Europe, North Africa, Turkey, Middle East, Black Sea Grid 2: Greece, Asia Minor, Albania, FYROM and South Bulgaria Grid 3: Central Aegean, East Sterea Hellas, East Peloponnese and South Evia.
Results form	Packed ASCII, GRIB

4.7.3.3. Operational techniques for application of NWP products

The 2-meter temperatures forecasted from the Local Models are used to derive daily maximum and minimum temperatures via the method of Kalman filtering.

4.8 Verification of prognostic products

A set of algorithms is developed to allow the comprehensive verification of surface and upper-air point forecasts in a systematic fashion. The variables under consideration include 2m temperature, 2m dew point temperature, 10m wind, precipitation, msl pressure, as well as upper air geopotential height, temperature and wind speed.

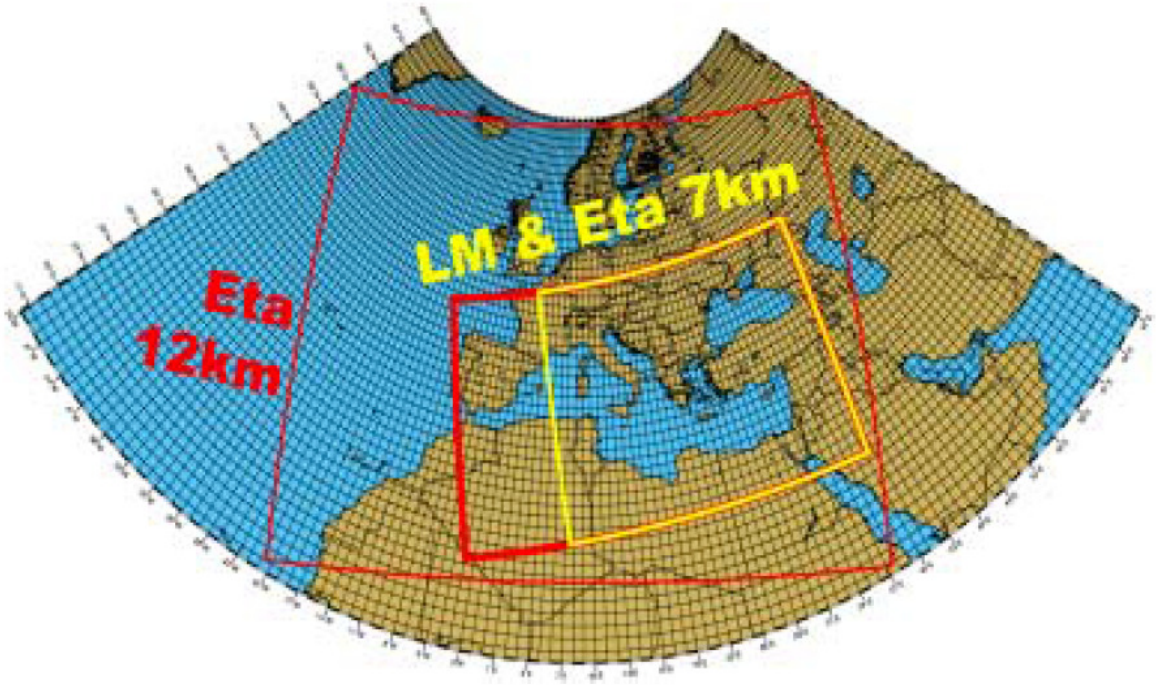


4.9 Plans for the future.

4.9.1. Development of GDPFS.

A new IBM High Performance Computing System has been recently acquired and installed at HNMS. The Local Numerical Weather Prediction Models are in the process of installation and test mode runs. Within this new operational framework, the Local Models are estimated to run for extended prognostic ranges as well as significantly larger domains with higher horizontal and vertical resolution.

Current operational domains of ETA and LM.



Future operational domains of ETA and LM

4.9.2. Research activities in NWP.

The research activities at HNMS are focused in the implementation of statistical methods in order to improve the quality of the forecasted NWP products. There is close collaboration within COSMO community towards the continuous development of LM. In particular, there is contribution to the development of a new version of the model (LMZ) that uses a numerical scheme based explicitly on height coordinates instead of the terrain following coordinates standard approach. Also the sub-grid scale processes, especially for cloudiness, are investigated. The implementation of nesting techniques is in progress towards the effort of very high resolution NWP (~2km). Additional issues regarding numerical weather prediction and data manipulation for research purposes are also addressed in collaboration with Greek Universities as well as National Research Organizations.

4.10 Greek contribution references

Avgoustoglou, E. and Papageorgiou, I., (2004), *Evaluation of the LM Two-Way Nesting Option during the recent Olympic Test Events in Greece*, COSMO Newsletter, Nr. 4, February 2004 p.197-202.

Alexiou I., Chatziapostolou E., Kamperakis N., Linardi A., Mavroudis A., Mouhassiri E., Pappa G, Sopotinou A., (2005), *Weather support for Athens Olympic Games 2004 using web based technology*, ECMWF Tenth Workshop on Meteorological Operational Systems, ECMWF, 14-18 November 2005, http://www.ecmwf.int/newsevents/meetings/workshops/2005/MOS_10/presentations.

Mamara, A. and Anadranistakis, M., (2005), *Application and Verification of ECMWF Products in Greece*, Verification of ECMWF Products in Member States and Co-Operating States, Report 2005, European Center of Medium Range Forecasts, p. 40-42.

Steppeler, J., Bitzer, H.-W., Janjic S., Schättler, U., Prohl, P., Parfiniewicz, J., Damrath, U., and Avgoustoglou, E., (2005), *A Z-Coordinate Version of the Nonhydrostatic Model LM*, COSMO Newsletter Nr. 5, April 2005 p. 149-150.

CONCLUSION

The fundamental knowledge of Civil Protection agencies was developed in the previous deliverable (D06) where the global organisation of each Civil Protection included in the Cyclops project has been detailed. This present deliverable completes this pre-required analysis. The main challenge of this deliverable was to choose some services to describe exiting resources, but it was impossible to present all the existing resources of each Civil Protection.

At the initial stage of this deliverable development, a global methodology was presented, based on the selected use-cases (Figure 27).

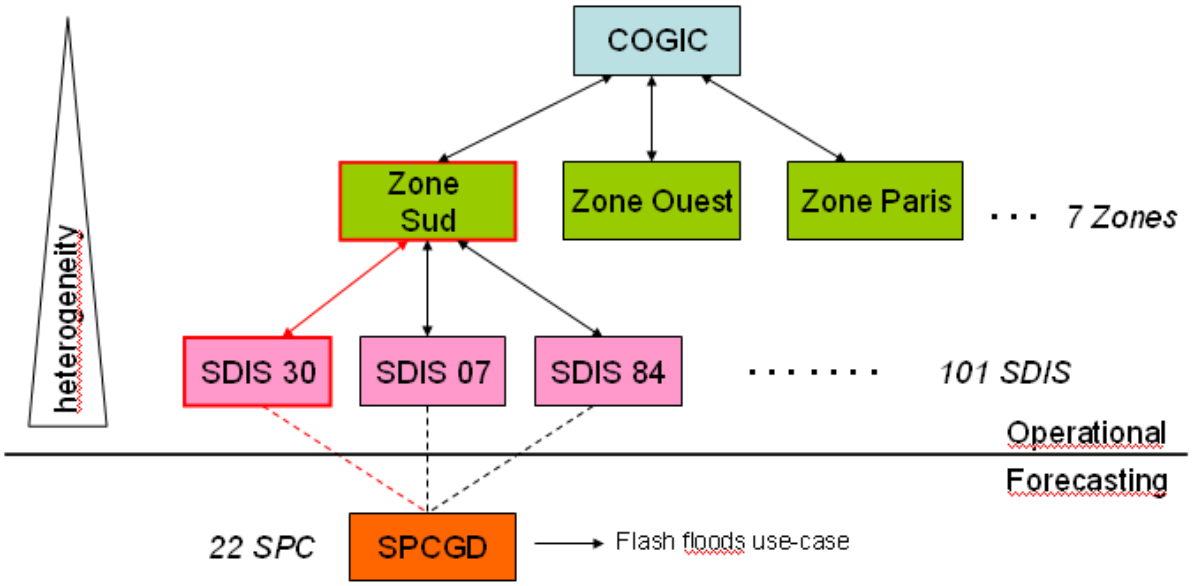


Figure 27 : Initial D8 methodology

The objective was to describe existing resources of linked services of the use-case service (outlined objects in red for French case). Also, Portuguese and Greek partners had to choose flood or forest fire management in their own country to perform this deliverable. Italian chose to present Civil Protection services included in the winter fires fighting. During project meetings and the “Business Process

Document" deliverable (D06) writing, this methodology has been cancelled, except for France. Some different reasons justified this choice:

- Different organisational structure
- Low level of resources
- Not adapted structure to Grid technology adoption

Finally, each partner had the choice to present the existing resources of not imposed services. This is the reason why this deliverable has a heterogeneous structure. Italian partners have chosen to describe all existing models and resources used in the "Centri Funzionali" National which manage warning and forecasting phase of Civil Protection issues. For French and Portuguese partners, emergency management services have been described. For French case, the previous methodology has been followed while Portuguese partner decided to present the headquarters of ANPC given the low level of regional services development. Finally, for the same reason, Greek partners decided to present the Hellenic National Meteorological Service already involved in the European Grid technology development.

Except the Hellenic National Meteorological Service, already Grid technology provider and probably Italian "Centri Funzionali", the main lesson drawn from this study is that these existing systems are presently not so adapted to use Grid technology. The technical difficulty seems to be high to port existing applications and systems on a Grid infrastructure.

The future study of this project will be to take into account these issues. It seems it will be difficult to adopt Grid technology in the whole of Civil Protection structures. However, some specific services could really take advantage of Grid technology adoption to improve their functioning. The use-cases study, in the next deliverable "Use-Cases Analysis Document", certainly will point out the fact that especially warning and forecasting systems seem to be good candidate to Grid technology adoption.

WEB REFERENCES

ANPC: http://www.proteccaocivil.pt/Pages/default.aspx

DDSC: http://www.interieur.gouv.fr/sections/a_l_interieur/defense_et_securite_civiles

DPC: http://www.protezionecivile.it/

EGEE project: http://public.eu-egee.org/

The Enabling Grids for E-sciencE (EGEE) project is funded by the European Commission and aims to build on recent advances in grid technology and develop a service grid infrastructure which is available to scientists 24 hours-a-day

Hellenic National Meteorological Service:
http://www.hnms.gr/hnms/english/index_html

PÔNT: http://pont-entente.org/
Pôle Nouvelles Technologies

World Meteorological Organisation: http://www.wmo.int/pages/index_en.html