

Disaster Management Framework

Presentation Content



The purpose of the presentation is the brief description of the integrated system Disaster Management Framework (DMF)

Although the system is called the "Disaster Management Framework" it covers all cases of crises, disaster situations and emergencies that will be presented below.

The Disaster Management Framework :

- It is an open architecture system with integrated state-of-the-art technologies(Artificial Intelligence, Machine Learning, Simulation, Text2Speech, Translation, Notification, GIS etc).
- It supports hierarchical-territorial connection of the Agencies that use it (Country Region Regional Unit Municipality Municipal Unit)
- It works in the Cloud and does not require a business center or general IT equipment (servers, ups, κέντρο μηχανογράφησης etc) to the Agencies.
- The system is accessed by devices connected to the Internet.

business logic D.M.F.



Disaster Management Framework

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fires floods water supply interruption radioactive leak air pollution insect attack dam destruction food chain hazards extreme cold, storms emission of chemicals telecommunications outage heat earthquakes epidemics landslides sea pollution snowfalls major accidents refinery fires

- What can we do to prevent a disaster.
- What can we do to reduce the risk.
- How can we prepare to react properly if it does the disaster

after the disaster

- How can we recover faster after a disaster.
- How will we manage the experience after every disaster to us help in the future.





disaster

- What can we do to stop a disaster
 - How can we reduce them effects of a disaster on:
 - ανθρώπινες ζωές
 - καταστροφή υλικών
 - environmental impacts

The assistance of the Commands in dealing with Emergencies with

- The application of standardized simple planning and action methodology.
- The exploitation of the new technologies of surveillance, alarm and communications in the execution of the actions.
- In the methodical registration of the multitude of information related to emergencies.
- Citizens' information about Local Emergencies.

To achieve the above objectives, the DMF has

- Software. Geographical Information Systems, Databases of Disasters, Personnel, Organization, Agencies, Materials, Vehicles, Supplies, Actions, Plans and reports concerning each level.
- Equipment for surveillance, alarm, information presentation, signaling, etc.
- Advanced Communications GPS, IoT, SMS, email, etc.

Forecast

Main and necessary element of dealing with an undesirable situation, which likely to include a risk of causing damage to life, health and property citizens and the environment is the Identification, the Registration and the Communication of the relevant risks to the interested parties either for information or for further management actions.



What does DMF cover

Πυρκαγια

Ονομασία

It provides the possibility of recording the types of risk per emergency and recording them on the map. They are appointed responsible for each body Allow authorized users to record risks. Hazards in lists and on the map



Prevention

The amount of damage that a hazard can cause is a function of that **hazard**, its **vulnerability** of the system, the ability of the system to **recover**, the extent of **exposure** to risk and system **tolerances**. The main axes of prevention are risk reduction (frequency, intensity and extent) and limiting the effects by improving other functions



What does DMF cover

In order to prevent disasters, it is possible to organize and record infrastructure, personnel, means, available materials and supplies. It is possible to plan preventive actions for each risk. Ability to define missions for each task force

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What does DMF cover

Assessment

In this general term, the identified situations are associated with the possible ones Risks, risks and impacts are assessed and the means required for it are estimated Reduction or elimination



It is possible to identify and record the causes for each risk It is possible to estimate damages using

simulations

A flexible system for organizing personnel and media into groups is provided

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Συνεργείο Ελέγχου Ιρλανδικών Διαβάσεων κ Γεφυρών	Δήμος Ραφήνας - Πικερμίου αι	Ομάδες και Συνεργεία Πλημμυρών			el-GR	0	0	0	⊠ & ⊄ ∎

Coping

Main and necessary element of dealing with an undesirable situation, which may involve danger causing damage to life, health and property of citizens and the environment is the existence of a Plan Coping. This plan can be some predetermined simple actions that do not require either recording nor widespread notification. However, it usually requires the involvement of many agencies, coordination, detailed

design, many means and materials so that the Plan is complex, coordination difficult and the execution of the large-scale operation



What does DMF cover

An automatic planning system is provided based on:

- the ground
- the weather conditions
- the listed risks
- the staff
- Means
- the organization in action groups
- determining missions

An advance notification system is provided that sends time-scheduled alerts and commands Uses technologically advanced personal and media tracking devices (gps tackers) DMF is designed as an "open" system, accessible by many simultaneous users.

It covers the whole area of Greece.

It supports all areas of Municipal Units, Municipalities, Regional Units and Regions, with a flexible system of integrating two or more areas into one entity (Structure).

It supports unlimited Carriers for each structure.

The maps presented are free of charge and the presentation for each area is done using the Google Maps API. Google Maps, DEM, Cover-Vegetation Maps (Copernicus), Hydrographic maps (Copernicus) are presented for all areas.

It supports as overlay Video, KMZ, Raster, Photos.



GIS

The DMF has been integrated DEM from satellite raster images and after processing have been incorporated into the vector database data for the whole of Greece in such a way that the recall and presentation on the map is immediate.

Apart from the presentation, many functions of dmf are based on calculations on the digital model of the terrain (visibility, simulations, distances, etc.).

Using PostGis with its multiple possibilities of mathematical operations on geographical data, dmf "answers" directly complex geographical questions. The image on the right shows Aegina with an overlay of 10 meters



DMF's GIS supports the drawing of points, lines and polygons by users, which is sufficient to meet the needs of hazard and infrastructure location registration.

It incorporates functions for calculating distance, area, visibility from a point, azimuth, elevation differences.

Embeds elevations for areas of interest and stores elevations for areas at the user's discretion.

Responsive icons that change size according to the size of the area presented (zoom) are used to display the infrastructure, risks and performances on the map.

GIS Editing

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In the DMF each region can be assigned to one or more Hierarchical Structures.

One or more Agencies may be defined for each Structure.

One or more users can be assigned to each carrier.

A user can belong to an unlimited number of bodies.

Users can have one or more roles for each Agency separately.

The main roles that users can have are Controller who manages everything related to an Agency or Volunteers, Citizen and certified user.

Users-Entities-Structures-Regions

GEORGE KOTOYLAS

geokot@dimicro.gr

Φορείς

Περιφερειακή ενότητα Αχαΐας Δήμος Ηρωικής Νήσου Κάσου Περιφερειακή ενότητα Ανατολικής Αττ Δήμος Ραφήνας - Πικερμίου Περιφερειακή ενότητα Έβρου Περιφερειακή Ενότητα Δυτικής Αττική Δήμος Παιανίας Δήμος Παλλήνης Δήμος Σπάτων - Αρτέμιδος Δήμος Μάνδρας - Ειδυλλίας Δήμος Μεγαρέων Περιφέρεια Θεσσαλίας (Εδρα: Λάρισα, Περιφερειακή ενότητα Ρεθύμνου Δήμος Λουτρακίου - Περαχώρας - Αγίω Δημοτική ενότητα Αγίων Θεοδώρων Περιφερειακή ενότητα Κερκύρας Αερολέσχη Ν. Καρδίτσας ΣΕΔΙΠ Δυτικής Αχαΐας Δήμος Αθηναίων

Δήμος Σαλαμίνας

Ρόλοι

Administrator

Ground Equipment

DMF works in the cloud, all the data required is collected

The required ground equipment is connected to the system with communication networks (WiFi, LoraWan, 4g, 5G, Datalink, etc.)

No equipment is required locally at each carrier.

An exception is the video recorders that save the video recordings of the cameras due to the volume of data.

Frames and small segments of video recordings of events are stored in the cloud for event history purposes.



Event Management

Events managed the are from business map where the user can easily activate an event for each type of disaster by selecting the point or area of the event.

Activating the event displays a table on the map with the actions planned for each type of event.

By selecting any action it deems to be activated automatically and the relevant commands are transmitted to the groups and individuals that have been specified.

Event activation occurs automatically as a result of fire detection by a camera. In this case, the event is automatically displayed on the map and those responsible for its handling are notified.

Historical records of past events are including kept, maps, images, notifications, etc.

Πληροφορίες και Ενέργειες επί ενεργού Συμβάντος Ενέργειες Κάλυψη Περιοχής "Εκτάσεις με αραιή Βλάστηση" Ειδοποίηση Υπευθύνων Φορέα για νέο Συμβάν Σύγκληση Σ.Τ.Ο. Ειδοποίηση Εθελοντών της Περιοχής Ειδοποίηση Χειριστών Οχημάτων, Μηχανημάτων OUTO Ειδοποίηση ΜΜΕ Ενεργοποίηση Ενεργειών Φορέα Ειδοποίηση Ομάδων Φορέα Ειδοποίηση του εμπλεκόμενου Προσωπικού του Φορέα Απενεργοποίηση-λήξη Συμβάντος Καλλιτεγούπολη

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Meteorological data

The meteorological data of an area is drawn from meteorological stations installed for the DMF. They are also drawn from services that provide meteorological data (Metar-Taf, Open Weather, etc.).

They are immediately available for each region and are immediately presented on the business map.

They are used in running simulations.

Weather data is stored in the cloud. Short-term forecasts drawn from online services are presented on the business map instantly.



GIS - ViewPoint

Soil is a key parameter of disaster management. Especially in isolated, inaccessible and mountainous areas. The surveillance of these areas either by going to high visibility points, or by placing cameras or by moving a mobile camera during the event always raises the question of choosing the point with the greatest or most appropriate visibility. DMF has incorporated the ability in the Business Map by simply selecting the user of a location on the map, to present in minimum time the visibility from the point in a circle with a radius of kilometers. This function is an easy solution for

selecting camera positions over a wide area to achieve maximum visibility



In emergency management, the locations of personell, vehicles and machinery as well as the latest movements are essential information.

DMF has integrated a resource tracking system that presents at any time the location of personnel and assets with the ability to calculate proximity from an incident site.

Communication is carried out by automated procedures such as transmission of the content message "....." Volunteers who are X meters away from the "so-and-so" event.

The protection of personnel and resources is not only up to them but also to leaders who understand the dangerous areas of an incident

Resource Tracking



Use of sensors

loT sensors are necessary data collection devices of various kinds. DMF supports smoke, carbon dioxide, temperature, water level, container filling level, sump, approach, passage, etc. sensors.

The sensors and the use of IoT in general finds useful applications in Fires, Floods, Snowfall, Air and Sea Pollution etc.

It supports WiFi data transfer technologies, LoraWAN ect.

It provides a visual presentation on maps of installation points and sensor status.

Triggers, notifications according to sensor status.



Smoke & Fire Detection in DMF

- DMF incorporates an Artificial Intelligence model that has been trained with a dataset of images from fires in Greece.
- The detection speed is in the order of seconds
- Detection distance ONLY depends on image quality
- The model perfectly covers fire detection at night

WILDFIRE & SMOKE DETECTION

WILDFIRE & SMOKE DETECTION



Smoke & Fire Detection in DMF

The system triggers "incident" and all alarm and operator notification procedures defined.





1.

The video camera patrols (rotates) scanning the area for signs of fire (smoke or fire) by sending images (frame 1/30..60 sec) to the DMF.

- The DMF, applying the AI algorithm, detects the image (frame) in less than 1 second and precisely determines the location of the fire or smoke in the detection image.



2.

The DMF sends SMS or Email with the image (frame) with the position of the possible fire marked on the frame, to the people who have been predetermined for control and confirmation.



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3.

-DMF instructs the camera through the camera handling API to stop patrolling (rotation) and turn precisely to the point of fire, using autofocus -DMF gets the direction from the camera and calculates the approximate distance based on the focus reading



DMF calculates the coordinates of the fire point on the map, the direction and distance from the cameras, the vegetation of the area and the visibility from other cameras of the system.

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6,8.

- DMF creates description of the fire point, for those not using a map, associating the point with known locations.

- Based on the location of each camera and the coordinates of the fire point, the DMF calculates the direction and distance from each camera. At the same time, it excludes cameras that do not have visual contact with the scene of the fire.



PTZ 0 PTZ ⊚ PTZ

The DMF selects which cameras have a visual image of the fire point.

7.



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DMF

9.

- DMF instructs, via camera handling API, the selected cameras to turn to the point of fire.

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The DMF records an active fire incident at the location of the fire, on the operations map.

Stores all data related to the event in the event history.

This stored data are: maps, video, fire detection images, alerts, meteorological data, persons who handled the incident, etc.

All entries are made automatically, without user intervention.



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12.

-The automatic creation of the incident from the fire detection module, shows a flashing fire icon on the map at the location of the fire.

Clicking on the icon displays an action panel with an activation buttons.

By clicking on each of the actions, the user activates the procedures for performing the tasks according to the design of each organization.

Πληροφορίες και Ενέργειες επί ενεργού Συμβάντος	Ενέργειες
Ειδοποίηση Υπευθύνων Φορέα για νέο Συμβάν	
Σύγκληση Σ.Τ.Ο.	
Ειδοποίηση Εθελοντών της Περιοχής	
Ειδοποίηση Χειριστών Οχημάτων, Μηχανημάτων	
Ειδοποίηση ΜΜΕ	
Ενεργοποίηση Ενεργειών Φορέα	
Ειδοποίηση Ομάδων Φορέα	
Ειδοποίηση του εμπλεκόμενου Προσωπικού του Φορέα	
Απενεργοποίηση-λήξη Συμβάντος	



Detection of a Person, Car, Bicycle in an Area

In sensitive areas, the presentation of a person, car or two-wheeler may be an indication of impending malicious action.

DMF provides the possibility to enable this detection for each camera separately and for a period or time of 24 hours.

Alarms in this case are "silent" and automatically trigger predefined warning, notification or other actions.

Drape Video overlay (drape) from airplane on GIS map

The combination of the camera image and the location of that image on the map, was a necessity even for fixed cameras.

In the case of aerial and drone cameras, the video map connection is necessary. In the dmf the presentation of the map follows the position of the aircraft and the video is presented, with adjustable transparency, on the map in the area it shows.

This feature does not prevent the presentation of map and video separately



Video overlay from Camera on GIS map

The combination of the camera image and the location of that image on the map was a necessity even for fixed cameras.

In the case of rotating cameras, the video and map connection is necessary. This need is greater in the case of recording and saving the video for future use.

In dmf there is a function that implements Key Length Value technology to integrate telemetric data into the stream of cameras.

The dmf shows the direction intended by the camera and the video with adjustable transparency on the map in the direction it is pointed.

This feature does not prevent the presentation of map and video separately.



Simulation in DMF

DMF has a built-in simulation system for situations, events and events for every

emergency. Supported with globally accepted simulation algorithms for:

Forest Fires

- Floods
- **Evacuation of Areas**
- **Facility Evacuations**

All the required parameters of the simulations are easily entered by the user. Parameters such as vegetation, weather data, land slopes, watersheds, etc. are automatically provided by the Geographical Information System and automatically pumped weather data from DMF

Wild Fire Simulation

Defining Data.

Required common data is

- 1. Time
- Terrain, whose slopes and vegetation are embedded in the DMF maps
- 3. The weather conditions, drawn from the nearest Meteorological Station or determined by the user.
- 4. Favorable Countermeasures.
- 5. Adverse Events.

These data are general categories that are analyzed and determined according to the disaster.



Flood Simulator Data

Modeling includes the identification, recording and assessment of all factors likely to influence the creation and development of a flood.

Possible scenarios and the effects they will have are identified and recorded.

Modeling may include details or only basic data depending on the desired outcome and the criticality of the potential flood.

Basic modeling elements are

-Nodes that define the flows of Rivers, Canals, Pipes, etc

-Bridges, narrows, etc.

-Lateral inputs

-Rainwater supply area

The above is drawn from the EU's Copernicus system and integrated into the DMF maps.

-Estimation of inflow based on the amount of rain and the reduction of infiltration, retention of vegetation and soil.
-Estimation of outflow from the area under consideration through Rivers, Canals, Pipelines, etc.

-Assessment of "capacity" of the area -Estimation of the caused flood.



Flood Simulator

Simulation is testing the conditions, assumptions and estimates of a model for a specified time to estimate the outcome and estimate the effect of each factor.

The ultimate goal is to evaluate the effect of each factor and take measures to reduce the effect. Running the simulation should be easy, readily available to everyone, for all regions, fast, and without the requirement to enter parameters of small effect or variance.

In DMF running the simulation is simple for each user, multiple simulations can be run simultaneously in multiple regions by multiple users.

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Design Methodology in DMF

Necessary for dealing with any Emergency is the existence of a simple, comprehensible, flexible and complete - as far as possible – Plan, that includes all the stages of dealing with each Emergency. The complexity and precision of the Plan depending of the risks faced by an area for each Emergency, is. The content of a Plan is divided in following section:

- **Situation.** The risks, available countermeasures, and the conditions for implementing the Plan are described.
- **Z Mission**. The mission of the Planning Agency is described, depending on the disaster, with an analysis of all the factors affecting it and the resulting obligations of the Agency.
- **5 Implementation.** The action idea is described, the formation of action groups is mentioned and missions are given to the groups and agencies that are under or are in the area of responsibility of the Planning Agency. All coordination details are listed.
- **4** Logistics. It refers to personnel, means, supplies and materials, and transporttation.
- **Administration-Communications.** The hierarchy , the places, the way of communication and the management of those involved are recorded.

Coverage of the "Situation" Section in DMF

- The territory of the Agency's area of responsibility, as the main cause of Emergencies, is represented in GIS Maps.
- In the "Disasters" and "Hazards" options, for each disaster all locations and situations involving danger are recorded on a map (GIS).
- All establishments likely to be related to any emergency (camps, schools, hospitals, etc.), in each region (District, Regional Unit, Municipality, Municipal community) are recorded on the maps
- The infrastructure and the works that have been done to deal with Emergencies (Airconditioned areas, fire hydrants, tanks, private tanks, surveillance cameras, sensors, access control devices, etc.) are recorded on the maps.
- The involved agencies, personnel, means, supplies and materials, available by the Agency are recorded in the DMF.
- Personnel and means that are likely to be available during each phase of the disaster are mentioned accordingly.

For each Agency, the formulation of the mission without any analysis and processing would have no benefit.

- Indeed, the mission "The Municipality ... to take all measures to deal with the emergency, in his area of responsibility for limiting or even eliminating the effects on the Citizens", while answering the basic questions of the mission (who, what, when, where, why), does not help at all in the creation of the Plan.
- A mission analysis is required to determine the obligations arising from the "general" mission.
- Recording risks in the DMF is a way to continuously analyze the mission.

Covering the "Implementation" Section in DMF

- The main chapter of this section is the definition of the way of action to carry out the Agency's mission.
- Although the way seems self-explanatory, the simple report "will take all necessary measures etc. » doesn't help at all.
- DMF Defines standard 'Actions' and 'Actions' with a defined purpose. The selection of these and the inclusion in the Energy method chapter helps to specify the energy method.
- The following paragraphs of the "Execution" Section give the missions of the "Teams" as they have been set up in the "Teams" options of the DMF.
- As the last chapter of this section are the coordinating instructions that are automatically extracted from the DMF (Hierarchical structure, times of actions and actions, etc..

Coverage of the "Logistics" Section in DMF

- In the "Organization" part of the DMF, the Agencies, Personnel, Materials, Supplies and Warehouses available to the Agency with any ownership status, are registered.
- Staff are organised into 'Teams' with a specific mission on an emergency basis.
- The "Teams" are endowed with means, materials and supplies.
- Many "Activities" and "Actions" pertain to this Section of planning. These activities and actions are presented in this section of the Plan.

Coverage of the "Administration-Communications" Section in DMF

They are listed in this chapter

- Citizen notification procedures are supported.
- All the addresses and telephone numbers of those involved are recorded.
- Information flow rules are recorded.
- Hierarchical structure of "Groups" are supported.
- The are procedures for changing the status of personnel and resources
- Bulletins and Reports are produced automatically.

Features of the Plans produced by DMF

- The Plans are Electronic Drawings available on the Internet at all times for everyone to have access to.
- Plans are always up to date, with any staff changes. In the DMF, for each person deletion, the system requests a replacement definition.
- Every new Action and Activity is included in the plans as long as it is recorded in the system.
- Activities and Actions are scheduled by the "scheduler" of DMF. Notifications are notified send to those in charge at specified intervals and defined ways (email ,SMS).
- Activities and Actions are scheduled in the system and notifications are used to notify those in charge at specified intervals and ways or phase of the Plan.

The Equipment and External Devices in DMF

- DMF is a multitenant system on Cloud. No common IT equipment (server, ups, backup devices, etc.) are required from the customers.
- An alarm system is supported for all external facilities with multiple notification recipients in the event of a breach of the facilities.
- WiFi networks are supported to transmit the image and data of Cameras, Weather Stations, sensors and other devices.
- GPS systems are supported for the presentation of Vehicles and Personnel on the map.
- New technology signal and data transmission networks are supported (LoraWAN, 4G,5G).
- As far as devices are concerned, the following are supported:
 - Surveillance cameras
 - Weather stations
 - Fire , Smoke sensors
 - Proximity Sensors

Access Sensors

- Variable Message Systems
- Fire hazard signs
- Sirens etc.

Χαρακτηριστικά και οφέλη

Characteristics /	Benefits for the customer
Unified System →	One system to cover all aspects of disaster management, emergencies and crises
Use of tried and tested \rightarrow Technologies	Certainty, Optimism and Usefulness
Application open Architecture →	Scalability

thanks for the attention