DICOMA: DIsaster **CO**ntrol **MA**nagement

Deliverable 1.3

Requirement specification

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1 Introduction

As the project name implies (Dicoma = Disaster Control Management), the main goal for Dicoma project is to provide better tools for disaster control management. Disasters like earthquakes, forest fires, massive storms and floods are far beyond the ability of a single agency to deal with, and require cooperation between multiple agencies.

Moreover, decision makers dealing with such disasters are frequently swamped with massive amounts of often-conflicting information, on which decisions need to be made in real-time. Adding this to the need to take into account, social, political and economic factors, it is no wonder that many incorrect decisions are made, worsening an already difficult situation. On the other hand effective training of such situations, especially in a multinational setting, requires an enormous effort and thus cannot be used very often.

The Dicoma project aims to provide a set of tools to improve the effectiveness of decision makers in dealing with disasters by better training and in situ support in the field. This toolset will include:

- Data Abstraction tools – A Comprehensive set of tools designed to process and correlate information from a large variety of public and private sources, allowing the creation of a unified data set, which can be easily explored and understood by decision makers.
- Simulation and Modeling Tools - DiCoMa proposes to create a suite of simulation tools that model both human behavior and natural phenomena (i.e. fires, earthquakes, weather patterns).
- Decision Support and Training tools – DiCoMa intends to create applications to be used by decision makers during both real and simulated disasters, that presents information to the decision maker in a manner that is easily and quickly understood, proposes alternative actions, indicating the implication of each alternative.

1.1 Purpose for this document

This document describes the requirement specification of the Dicoma system. The origin for all the requirements presented in this document is the RTH tool used by Dicoma project. This document is an export from the RTH tool and it is intended to be used as a way to communicate requirements to those parties that do not have an access to RTH tool. If requirements listed in this document conflicts with the ones found in RTH tool, the RTH tool should be considered as the master for information.

The document is intended to be used as basis for system architectural design as well as for technical design and implementation.

2 General description of the system

2.1 Context of use

2.1.1 Finland

In Finland there are two main contexts of use in DiCoMa. The first is a local or regional crisis situation caused by an accident in rail transport of hazardous goods. In this kind of a situation a train with wagons filled with hazardous goods or material (for instance gas) has fallen in the rail yard in a medium sized city. When a a gas wagon for instance falls and breaks down, there is a threat of a dangerous gas leakage in the city.

The other context is a crisis situation caused by a storm in Northern Finland. In this case there may be a lot of obstacles, for instances fallen trees blocking the roads. Additionally the wired and wireless connections may be out of order or working only partially. These kinds of situations have become rather common in Finland lately.

2.1.1.1 Present challenges

In both cases there are challenges to overcome today. The Finnish user contexts and requirements were studied in DiCoMa. The focus was on transmission of important information of the operative higher officers from different authorities (police, fire and rescue, medical emergency) in disaster and crisis situations. Situation of today, the future visions, needs and wishes were studied.

The results show that it is hard to get enough information of the situation. Normally the only means and source in use is the VIRVE authority line (State security network). When several users online, this authority line often falls down or gets stuck.

There are different authorities trying to work together. They have different map and management systems, which are synchronized poorly. The information available is fragmented and defective. Very often same things have to be repeated several times through the authority line. There are also many different persons in emergency exchange who are involved in one disaster case. At the moment different authorities have no uniform action models or management systems.

Fire and rescue normally arrives first to the destination, the crisis area. Their channel of the authority line can be different from the line of the medical emergency or police. The other authorities have problems to get connection to the general manager of the fire and rescue, because all his time goes to leading his own crew.

In the beginning of the disaster or emergency situation there is lack of information. Building the overall view is hard, because information is fragmented and comes quite slowly. Field management systems of the different authorities are mot synchronized and there is no secure of the load of the systems.

2.1.1.2 The targeted future

Based on the responses of the survey there are some visions and targets for the future. The targeted year is 2030.

The role of Emergency exchange will be to give only the first stage alarm. Communication after the alarm will take place through the coherent management system where police, fire and rescue and medical emergency can communicate and lead the units together

Through the management system it will possible to see in real-time all units, crews and available tools. In the management system there should be a blog that can be updated trough speech and by writing. Photos and videos from the scene of an accident comes across the helmet cameras of the first units or across the camera helicopter.

Triage of the patients and their position info will be marked and registered straight into the management system. The units/rescuers can thus be guided to the right places

New information channels like tablets or smart phone will be used to give straight orders to the rescuers. Who will also have real-time view of the disaster/accident from air trough camera helicopter or airplane. All the leaders will be in the same physical or virtual place and act trough the same management system. All the leaders will have real-time information of the resource and needs what are available

2.1.2 Israel

The proposed platform/solution will be applied to natural disasters that Israel is faced with. We will initially focus on forest fires and earthquakes. The reasoning for the aforementioned focus is as follows:

- Forest Fires: Due to the current drought situation in Israel we have been plagued by a series of devastating forest fires. Most notably, the 'Carmel' forest fire from 2010 (Dec. 2 – Dec. 6). In this fire, 40 people were killed, among them commanders and responders.
- Earthquakes: We know that we are way overdue for a big one. Much money and effort is being expended in order to 'prepare' for this pending disaster. Infrastructures are being improved and emergency forces are being trained. The public is being prepared for the eventuality of 60,000 casualties.

In the case of the Carmel forest fire, we know that had a proper DSS system been in place, most, if not all, of the casualties could have been avoided. We are confident, that by applying the learned methodologies to earthquakes will yield similar benefits.

A full description of the proposed DSS methodology can be found in separate Appendix 'A'.

2.1.3 Spain

In Spain there are three main contexts of use in DiCoMa project; earthquakes, which the last years are very frequently in the Southeast of the country, forest fires, which are common during the hot months of the year and aircraft accidents, the most important recently in Madrid.

In recent years some major earthquakes have occurred in the southeastern Spanish. The most important of these occurred in Lorca (Murcia), with a magnitude 5.1 on Richter scale, and killed nine people and very important in many buildings damaged. Earthquakes need an infrastructure

to coordinate all emergency forces involves. In this kind of emergency is very important to know the best resources, escape, interesting buildings (schools, nursing homes, hospitals, etc.) to act as quickly as possible.

In the other context, in Spain, although there is a wide range of forest fire causes, the long drought periods are usually the main cause. Because of these periods, the forest and the wind become a chemical combustible. When a fire forest occurs, different actions will carried out depending on the fire intensity and other meteorological factors.

Also depending on the received information from sensors and with help of web services, the platform will be able to control the fire most efficiently.

Although in Spain the number of aircraft accidents since the 60's is less than twenty, in recent years has been one of the largest in its history.

20 August 2008, Spanair Flight JK 5022 from Madrid-Barajas Airport to Gran Canaria Airport crashed just after take-off from runway 36L of Barajas Airport at 14:24. The aircraft was a McDonnell Douglas MD-82. It was the first fatal accident for Spanair in the 20-year history of the company, and the 14th fatal accident and 24th hull loss involving MD-80 series aircraft. It was the world's deadliest aviation accident in 2008 and Spain's deadliest in 25 years. 154 people died; six died en route to the hospital, one died overnight and one died in the hospital three days later. Only 18 people survived.

For this reason, a platform has been incorporated for the management of events from sensors of the affected area. This platform will be responsible for the register of the first emergency call, the obtaining of affected area coordinates, acquisition of the received data from sensors present in the affected area, organization of an action plan, monitoring of personal position, planning of safe routes in order to provide to personal with access until the assessment of damages, to provide information about possible aftershocks, information about Point of Interest (POIs), etc.

2.1.4 Turkey

In Turkey there are two major uses for the outcomes from the DiCoMa project. Earthquakes, which are more frequent than the other European countries, and crisis management in the cased of a plane crash in a major airport.

Earthquakes are the most complex form of disasters which require a tremendous amount of effort for managing and auctioning correctly. The recent earthquakes in Turkey showed that even if you have a very good action plan to deal with, management of the situation is a challenging task. The most challenging issue in the 1999 Golcuk earthquake was communication. The earthquake affected a populatıon of approxımately 15 million people and the public communication infrastructure was quickly saturated after just 2 minutes from the time of earthquake not only because of the destruction of infrastructure but also because of heavy use. GSM operators and telephone exchange routers were not designed to deal with such a situation.

Airplane crash may not be so frequent but it is still a clanging situation because usually the airports in Turkey have separate crisis management centers and coordination with provincial crisis management centers becomes very important. DiCoMa project will provide a common framework which will improve effective communication between different units.

Currently, in Turkey, every province and airport have their own action plan for disaster management. In the case of disasters that require interventions from more than one province, coordination may be difficult as the plans may not use the same concepts, same personas and

scenario definitions. By providing common use case definitions, DiCoMa project outcomes will provide quick and effective management of such situations when dealing with earthquakes and airport crisis situations.

2.2 Users

2.2.1 Finland

As described in Dicoma deliverable D1.2, in both of the Finnish contexts, scenarios and use cases will be:

- Fire and rescue authorities - responsibility of the needed fire and rescue activities during the crisis. Co-operation with other related stakeholders. Fire and rescue chief – leading the fire and rescue units, communicating with other Personas/Users. In the future new tools are needed such as:
- Police - responsibility of the needed police activities during the crisis. Co-operation with other related stakeholders. Police chief – leading police units, communicating with other personas/users
- Medical emergency authorities - responsibility of the needed medical emergency activities during the crisis. Co-operation with other related stakeholders. Medical emergency response unit chief – leading medical response units, communicating with other personas/users
- Army – military help and support provision. Army officer(s) – Leading military units, communication with other personas/users. Co-operation with other related stakeholders. Medical emergency response unit chief – leading medical response units, communicating with other personas/users
- Traffic control center – provision of real-time traffic related information, communication with other Personas/Users. Co-operation with other related stakeholders. Medical emergency response unit chief – leading medical response units, communicating with other personas/users
- FMI – provision of needed weather forecasts, alarms, etc. Co-operation with other related stakeholders. Medical emergency response unit chief – leading medical response units, communicating with other personas/users

All these users are aiming to take into use the following new technologies in the future:

- The real-time picture /video will be in use and available from helmet camera or air
- All the resource information will be in use and available automatically by GPS
- Common information to the leaders will be in the same system: terrain, street map, city map, weather report, rescue units, rfid of the patient, other resources
- All rescuers will have tablets or smar phones in use to get orders
- All patients will be marked with RFID code and position info
- Virtual video conference systems will be in use

2.2.2 Israel

The main objective is introducing, the concept of Relief stations (both static and mobile). These Relief stations are a conglomeration of the conventional relief forces (police, fire, ambulance, army, national guard, etc.) and form the main personas/users in DiCoMa. Creating 'bundles' of these assorted forces, training them to work together as a unit, has proven most effective in reducing disaster damages.

The goal/purpose of a relief station is to minimize the losses/damages that are incurred during a disaster. Through proper deployment of these relief stations at the right time and in the right place the potential relief can be maximized. The users of the DiCoMa platform will be the body that is responsible for the deployment, placement and maintenance of these relief stations. The DiCoMa DSS will assist the users in optimizing the relief station placements.

2.2.3 Spain

Following personas/users in Spain can be identified.

The National Police

- Establish a system of prevention and policing of the areas assigned to the National Police, coordinating actions with the other Security Forces.
- Collaboration and coordination with the emergency Services, rescue and evacuation of victims.
- Control and identification of possible perpetrators of forest fires.
- Checking the contents of calls to complex operation centers (COC) and other Civil Guard units in order to identify possible witnesses at the start of the fire or any other circumstance that relates the fire.
- Interview with witnesses of affected areas.
- Interviewing staff of the brigades of forest fire.
- Study the degree of intent of the fire.
- Study of the physical evidence found at the point of beginning and establish connection with the fire.
- Identification of people suspected in the zone that could be the cause of the fire. Surveillance of suspects.

Regional Police

- Has jurisdiction over a particular area. Organizes, regulates and designates its authorities.

Municipality

- Making investments to provide safety measures and fire fighting
- Set plan and coordinates of actions in case of forest fires.

Press

- Collects and spreads the information.
- Delivery the information of latest news all people.
- Informs the latest developments of the forest fires.
- Transmits information by television, radio, magazines, newspapers, etc.

The Civil Guard

- Performs analysis of the fact happened.
- Obtains the reasons that individuals realized the fire forest.
- Request Test of alcohol.

COC (Operation Center Complex) Civil Guard

- Determines the source of the fire forest.
- Helps extinguish the flames of a forest fire.
- Conducts research to find the culprit of the fire forest

Service of attention to the citizen 112

- Establishes a prioritization of response in telephone communications and the collection of research data.
- Treatment and evaluation of incoming calls.
- Responsible for transmission of the request for assistance to relevant departments, indicating the exact location of incident

Telephone 085 (phone for forest fires)

- Responsible for reception and care of calls because forest fire.
- Identification and classification of emergency.
- The transmission of the request for assistance.

Resident

- Call the firefighters, 085.112, police, firefighters, etc..
- Provide data on the location of fire.
- Provide details about suspicious of fires.
- If you are at home, disconnect LP gas, natural gas, diesel, etc.
- Remove objects that are around the house that can burn.
- Close doors and windows of the house to keep out sparks that are transported by wind.

Firefighters

- Coordinate and implement prevention, control and extinguishing forest fires, as well as developing and updating the national strategy of management and fire management.
- Establish prevention and early detection to prevent forest fires and / or lessen their impact.
- Be constantly alert in case of fire.

- Receive information about the incident.
- Make a report of the incident.
- Review the tools available and the units.
- Receive information about the fire.

Security and police forces (FCS)

- Assist and protect people
- Receive the report of the incidence and analyze it for further investigation.
- Maintain order and public safety
- Collaborate with other entities for research for joint action

The civil guard Trafico

- Receive the report of the suspects who violated a traffic law to receive its appropriate sanction

Seprona (Protection Service of the Civil Guard's Nature)

- Protects the nature: soil, water and environment.
- Protects the living species in the nature.
- Prevents pollution of the environment through monitoring and control of activities.
- Encourages behavior respect for nature and the environment.
- Give Assistance to patrols.
- Makes the necessary inquiries for detecting causes of forest fires.

Forest rangers

- Control and authorization of burning.
- Preventive monitoring and fire detection.
- Damage assessment and data collection about each forest fires.

Aemet

- Develop a weather index, where they develop fields of analysis and forecasts of operating models. The system takes into account the dead fuel moisture in the soil and subsoil, estimated from their starting values and the analyzed and forecast meteorological fields (temperature, relative humidity, wind, precipitation). The wind is taken into account to estimate the intensity about propagation of a fire.

2.2.4 Turkey

In Turkey there are different personas, roles and users for the context of airport crisis and earthquake.

When it comes to **earthquake the personas/users** are (in the City of Ankara), governor, army, police, mayor, provincial disaster action unit, city planning unit, agriculture and food unit, fire brigade, red crescent, provincial medical emergency organizations and other institutions

designated by the governor. The heads of all these units forms the "Provincial Emergency Response Team". This team is led by the governor and performs the following tasks when there is a disaster:

- Preparation and execution of emergency response plan
- Supervision of county emergency plans
- Formation of emergency response team and assigning roles
- Initiating the emergency response activities performed by different units
- Coordination of different units involved
- Decision about the type of help needed and the needs of the affected people
- Requesting government funds when needed
- Analyzing emergency response efforts
- Coordination of transportation of personnel and utilities
- Supervision of the following activities (ordered by priority):
  - Provide communication between different action units
  - Transportation activities and traffic management
  - Search and rescue
  - Medical emergency services
  - Transport of patients to the hospitals
  - Fire fighting
  - Establishing security
  - Provision of food, cloths, heating and lighting
  - Providing provisional shelters
  - Burying the dead
  - Cleaning the wreckages
  - Fixing water, electricity and sewage systems
  - Application of quarantine when needed

    The order of activities can be adapted to the type of disaster but usually the order above needs to be followed.
- Government disaster management unit is responsible for providing the funds needed.

Governor is responsible for leading the disaster management efforts. Police is responsible for traffic management, security and communication. Army is coordinated with the police and carries out the rescue efforts. Red Crescent distributes food and shelter and the medical emergency – leading rescue efforts

In the case of the **airport ground services plane crash the personas/users** are "the airport disaster and emergency management center", head of the center, coordinator, personnel management, action unit, transport unit, operator, police and army. The head of the critical situation management center head is responsible for starting the action plan. The coordinator the

takes care of assigning people to roles. The action unit carries out the needed processes to fight the consequences of the crash. Police and army are responsible for security of the airport and the passengers, possible terrorism investigations. The Airport Disaster and Emergency Management Center has the following tasks/roles:

- Creating an action plan in accordance with the regulations from Ministry of Transportation and Communications.
- Coordination with the Government Disaster Management Control Center in the case of disaster.
- Airport Management is responsible for the following actions:
  - Provide an environment for air transportation requirements by the organizations designated by the Ministry of Transportation and Communication for helping the disaster control actions.
  - Making sure that parts of the airport are in good usable state for rescue and disaster control efforts.
  - Provide reports to the Ministry about capacity of regional airports to be used for rescue and disaster management efforts.
  - Management of transportation fee policies for rescue efforts
  - Management of voluntary contributions to the rescue efforts
  - Rapid reparations of damaged airports
  - Planning of all these efforts

3 Functional requirements

The requirements in chapters 3 to 6 are derived from the RTH tool. Requirement naming uses the following nomenclature.

REQ_Scenario_Category_Functionality _Three main words of the requirement

Where:

1. Scenario: It should be one of the listed below:
   - Forest Fire → **FF**
   - Aircraft crash → **AC**
   - Heavy Winter Storm → **HS**
   - Chemical Good Crash → **CC**
   - Earthquake → **EQ**
   - General Scenario → **GE**
2. Category (Areas covered indicate the category of the requirement) : it should be one of the listed below:
   - Functional → **F**
   - Environment → **E**
   - User interface → **US**
   - Maintenance → **M**
   - Integration → **I**
   - Performance → **P**
   - Usability → **U**
   - Information security → **IS**
   - Reliability → **R**
   - Other →**O**
3. Functionalities: it should be one of the listed below:
   - User Interface Techniques
     - UI_Techniques-Technological → **UI_TECH_TECH**
     - UI_Techniques-Interface definition → **UI_TECH_INTER_DEF**
     - UI_Techniques-Context and location → **UI_TECH_CON_LOC**

- UI_Techniques-Interaction → **UI_TECH_INTER**

- Disaster Support Management and Training
  - Ds_Manag_Train-Simulation and modeling → **DS_MANAG_TRAIN_SIM_MODEL**
  - Ds_Manag_Train-Event Management → **DS_MANAG_TRAIN_EVENT_MANAGE**
  - Ds_Manag_Train-Control Support Systems → **DS_MANAG_TRAIN_CONTROL_SS**
  - Ds_Manag_Train-Decision Support System → **DS_MANAG_TRAIN_DEC_SS**
  - Ds_Manag_Train-Data Mining / Post Mortem Analysis →**DS_MANAG_TRAIN_DMPMA**
  - Ds_Manag_Train-Geographical Information system → **DS_MANAG_TRAIN_GIS**
  - Ds_Manag_Train-Microscopic and Macroscopic Simulation engines →**DS_MANAG_TRAIN_MM_SIM_ENG**
- Data and Services Integration Platform
  - Ds_Integ_Platf-Data Framework → **DS_INTEG_PLATF_DATA_FRAME**
  - Ds_Integ_Platf-Information Services → **DS_INTEG_PLATF_INF_SERV**
  - Ds_Integ_Platf-Security → **DS_INTEG_PLATF_SEC**
  - Ds_Integ_Platf-Middleware Technologies → **DS_INTEG_PLATF_MIDDLE_TEC**
- Communications and Validation
  - Comm_Valida-Communication Systems → **COMM_VALIDA_COM_SYS**

4. Three main words of the requirement: do a summary of the key words that describe the requirement.

ReqID	Requirement Name	Requirement Detail	Functionality
648	REQ_GE_F_DS_INTEG_PLATF_SEC_Authentication required	Authentication is required for all functionalities	DS_INTEG_PLATF-SECURITY:
649	REQ_GE_F_DS_INTEG_PLATF_SEC_Authentication mechanisms	Multiple authentication mechanisms must be supported. These mechanisms must include username/password, fingerprint and face recognition	DS_INTEG_PLATF-SECURITY:
650	REQ_GE_F_DS_INTEG_PLATF_SEC_Automatic logout	Users must be automatically logged out after 30 minutes of inactivity.	DS_INTEG_PLATF-SECURITY:
651	REQ_GE_F_UI_TECH_INTER_Show only available functionalities	Once user is authenticated, only the functionalities has user has been granted rights are presented in the user interface	UI_TECHNIQUES-INTERACTION:
652	REQ_GE_F_UI_TECH_INTER_Toggle visibility single unit	In the GIS user interface, user can toggle the visibility of a single unit (police patrol, fire department unit, etc)	UI_TECHNIQUES-INTERACTION:
653	REQ_GE_F_UI_TECH_INTER_Toggle visibility fleet	In the GIS user interface, user can toggle the visibility of a entire unit category (all police patrols, all fire department units, etc)	UI_TECHNIQUES-INTERACTION:
654	REQ_GE_F_UI_TECH_INTER_GIS maximum units shown	The GIS user interface must be able to show 1000 units in same time	UI_TECHNIQUES-INTERACTION:
691	REQ_FF_F_DS_MANAG_TRAIN_EVENT_MANAGE_Disaster Management Sequence	A list of tasks defines the steps to be executed sequentially during disaster management. No loops are allowed but it is possible to go back	DS_MANAG_TRAIN-EVENT MANAGEMENT:
692	REQ_FF_F_DS_MANAG_TRAIN_EVENT_MANAGE_ Disaster Management Attributes	There is a list of attributes (parameters and variables) associated with each task. Each attribute must contain additional information such as the type (numeric, binary, categorical ...), origin (manual, sensor, DB ...) and the range of values	DS_MANAG_TRAIN-EVENT MANAGEMENT:
693	REQ_FF_F_ DS_MANAG_TRAIN_DMPMA_Selection Significant Attributes	The system evaluates the available parameters to extract the most significant ones	DS_MANAG_TRAIN-DATA MINING/POST MORTEM ANALYSIS:

694	REQ_FF_F_DS_MANAG_TRAIN_EVENT_MANAGE_ Disaster Management Tasks	There should be a disaster management workflow in XML format	DS_MANAG_TRAIN-EVENT MANAGEMENT:
695	REQ_FF_F_DS_MANAG_TRAIN_DEC_SS_ Disaster Management Experiences	There should be previous cases (real or simulated), or logic conjunction rules (convertible to cases), to be used during the inference procedure for decision support	DS_MANAG_TRAIN-DECISION SUPPORT SYSTEM:
698	REQ_FF_F_ DS_MANAG_TRAIN_DEC_SS_Decision Suport System	Previous cases are used to suggest possible solutions during the evolution of the disaster management based on a distance criteria	DS_MANAG_TRAIN-DECISION SUPPORT SYSTEM:
708	REQ_COMM_VALIDA_COM_SYS_Action&Interaction	Action and Interaction Real-time Management	DS_MANAG_TRAIN-CONTROL SUPPORT SYSTEMS:
709	REQ_COMM_VALIDA_COM_SYS_Variables Based Gathered Data	Generate new variables based on the gathered data	DS_MANAG_TRAIN-CONTROL SUPPORT SYSTEMS:
710	REQ_DS_MANAG_TRAIN_DEC_SS_IdentificationZonesEarthquake	Identification of the diferent zones of the earthquake	DS_MANAG_TRAIN-DECISION SUPPORT SYSTEM:
711	REQ_DS_MANAG_TRAIN_DEC_SS_ConflictiveZoneAnalysis	Conflictive Zone Analysis and Decision Making with regards to the evacuation areas	DS_MANAG_TRAIN-DECISION SUPPORT SYSTEM:
712	REQ_DS_MANAG_TRAIN_DEC_SS_GenerateSimulationsEarthquake	Generate simulations about the evolution of the earthquake	DS_MANAG_TRAIN-DECISION SUPPORT SYSTEM:
713	REQ_DS_MANAG_TRAIN_DEC_SS_ScapeRoutesEarthquake	Obtain scape and transport routes of the earthquake	DS_MANAG_TRAIN-DECISION SUPPORT SYSTEM:
714	REQ_DS_MANAG_TRAIN_DEC_SS_SelectionTeamsEarthquake	Selection of the most adequate teams for giving a proper response to the eartquake	DS_MANAG_TRAIN-DECISION SUPPORT

			SYSTEM:
715	REQ_DS_MANAG_TRAIN_DEC_SS_SimulationsPeopleLeaveBuildings	Generate simulation about how people is goint to leave the buildings	DS_MANAG_TRAIN-DECISION SUPPORT SYSTEM:
716	REQ_DS_MANAG_TRAIN_DEC_SS_Real-time optimization of routes	Real-time optimization of routes for the access of the emergency teams	DS_MANAG_TRAIN-DECISION SUPPORT SYSTEM:
717	REQ_DS_MANAG_TRAIN_DEC_SS_Calculus Stationary state t+1	Calculus of the stationary state t+1 of how the disaster situation is affecting to the environment	DS_MANAG_TRAIN-DECISION SUPPORT SYSTEM:
718	REQ_DS_MANAG_TRAIN_DEC_SS_DataFusion Input Data	Data fusion for homogenising the input data for the decision support system	DS_MANAG_TRAIN-DECISION SUPPORT SYSTEM:
719	REQ_DS_MANAG_TRAIN_DEC_SS_Data analysis techniques	Addition of data analysis techniques to manage incomplete data and non-trustable (trust modelling)	DS_MANAG_TRAIN-DECISION SUPPORT SYSTEM:
720	REQ_DS_MANAG_TRAIN_DMPMA_Management and labelling of the results	Management and labelling of the results of every action taken during the crises	DS_MANAG_TRAIN-DATA MINING/POST MORTEM ANALYSIS:
721	REQ_DS_MANAG_TRAIN_DMPMA_Definition&Monitoring System variables	Definition and Monitoring of the system variables during the crisis	DS_MANAG_TRAIN-DATA MINING/POST MORTEM ANALYSIS:
722	REQ_DS_MANAG_TRAIN_DMPMA_Definition Format Outcomes	Definition of the format of outcomes the Post Mortem System for each crisis or event	DS_MANAG_TRAIN-DATA MINING/POST MORTEM ANALYSIS:
723	REQ_DS_MANAG_TRAIN_DMPMA_Definition Format Inputs	Definition of the format of inputs the Post Mortem System for each crisis or event	DS_MANAG_TRAIN-DATA MINING/POST MORTEM ANALYSIS:
725	REQ_DS_MANAG_TRAIN_DMPMA_Definition&Implementation/Adaptation Forecasting algorithms	Definition and Implementation/Adaptation of Forecasting algorithms	DS_MANAG_TRAIN-DATA MINING/POST MORTEM

			ANALYSIS:
726	REQ_DS_MANAG_TRAIN_DMPMA_EarthquakeSimulations	Generate earthquake simulations using previous data	DS_MANAG_TRAIN-DATA MINING/POST MORTEM ANALYSIS:
727	REQ_DS_MANAG_TRAIN_DMPMA_Alternate Answers	Generate alternate answers and indicate variations that had to be have been performed for a better handling of the crisis	DS_MANAG_TRAIN-DATA MINING/POST MORTEM ANALYSIS:
728	REQ_DS_MANAG_TRAIN_DMPMA_Definition&Implementation/Adaptation Data Filtering algorithms	Definition and Implementation/Adaptation of Data Filtering algorithms	DS_MANAG_TRAIN-DATA MINING/POST MORTEM ANALYSIS:
729	REQ_DS_INTEG_PLATF_DATA_FRAME_Defining & Developing Ontologies	Defining and developing the ontologies to determine the parameters needed to build the data framework	DS_INTEG_PLATF-DATA FRAMEWORK:
735	REQ_DS_INTEG_PLATF_MIDDLE_TEC_Integration Different Middlewares	Integration of the different middlewares without sacrificing response time	DS_INTEG_PLATF-MIDDLEWARE TECHNOLOGIES:
736	REQ_DS_INTEG_PLATF_MIDDLE_TEC_Coordination & Consolidation Information	Coordination and consolidation of information obtained from different middleware	DS_INTEG_PLATF-MIDDLEWARE TECHNOLOGIES:
821	REQ_FF_F_DS_MANAG_TRAIN_GIS_Data Sensors Management	Management of the resulting data from sensors located near the disaster area.	DS_MANAG_TRAIN-GEOGRAPHICAL INFORMATION SYSTEM:
825	REQ_FF_F_DS_MANAG_TRAIN_GIS_Meteorological Data Capture	Meteorological (dynamic data) data acquisition related to fire spread.	DS_MANAG_TRAIN-GEOGRAPHICAL INFORMATION SYSTEM:
826	REQ_FF_F_DS_MANAG_TRAIN_GIS_Geographical Data Management	Access and management of geographical data (static data) from different sources using OGC standards and open source solutions.	DS_MANAG_TRAIN-GEOGRAPHICAL INFORMATION SYSTEM:
827	REQ_FF_F_DS_MANAG_TRAIN_GIS_Area Affected Measuring	Measuring of the area affected by fire.	DS_MANAG_TRAIN-

			GEOGRAPHICAL INFORMATION SYSTEM:
828	REQ_FF_F_DS_MANAG_TRAIN_GIS_Obtaining Geographical Coordinates Rescue	Obtain the geographical coordinates of rescue areas near the disaster scenario.	DS_MANAG_TRAIN-GEOGRAPHICAL INFORMATION SYSTEM:
829	REQ_FF_F_DS_MANAG_TRAIN_GIS_ Maps Vegetation Combustible Using	Using of maps with the different vegetation types or fuel kinds that are present in each area.	DS_MANAG_TRAIN-GEOGRAPHICAL INFORMATION SYSTEM:
830	REQ_FF_F_DS_INTEG_PLATF_DATA_FRAME_Sensors Head End Management	Management of sensors to alert of forest fires. Humidity sensors, temperature, wind direction and speed ... Management of Head End for the acquisition of such data.	DS_INTEG_PLATF-DATA FRAMEWORK:
840	REQ_FF_F_DS_INTEG_PLATF_INF_SERV_CEP Rules Definition	Definition of CEP rules in an abstraction language which can be easily implemented for standard CEP engines.	DS_INTEG_PLATF-INFORMATION SERVICES:
841	REQ_FF_F_DS_INTEG_PLATF_INF_SERV_State Changes Detection	Detection of significant state changes.	DS_INTEG_PLATF-INFORMATION SERVICES:
842	REQ_FF_F_DS_INTEG_PLATF_INF_SERV_Rules Event Correlation Definition	Capability to define rules for event correlation.	DS_INTEG_PLATF-INFORMATION SERVICES:
843	REQ_FF_F_DS_INTEG_PLATF_INF_SERV_Tools Development Knowledge	Development of knowledge presentation tools.	DS_INTEG_PLATF-INFORMATION SERVICES:
844	REQ_FF_F_DS_INTEG_PLATF_INF_SERV_Perimeter Agents Establishing	Establishing of the perimeter from which the agents will act over the fire.	DS_INTEG_PLATF-INFORMATION SERVICES:
845	REQ_FF_F_DS_INTEG_PLATF_INF_SERV_Periods Frequently ForestFire	Determine periods where forest fires arise most frequently	DS_INTEG_PLATF-INFORMATION SERVICES:
846	REQ_FF_F_DS_INTEG_PLATF_INF_SERV_Statistics Fire Causes Generation	Generation of statistics of the fire causes.	DS_INTEG_PLATF-INFORMATION

			SERVICES:
847	REQ_FF_F_DS_INTEG_PLATF_INF_SERV_Current Condition Dire RealTime Monitoring	Monitoring in real time of the current conditions of fires to know the strategy to be executed, staff distribution, equipment and needed tools.	DS_INTEG_PLATF-INFORMATION SERVICES:
848	REQ_FF_F_DS_INTEG_PLATF_INF_SERV_Early Warning Forest Fire	Early warning of forest fires. For that it is necessary to take into account environmental conditions, human presence, among others.	DS_INTEG_PLATF-INFORMATION SERVICES:
849	REQ_FF_F_DS_INTEG_PLATF_INF_SERV_Fire Simulators Using&Predicting	Use of fire simulators (sensor network) for predicting fire behavior based on a series of input data, such as the predominant fuel model in the area, weather conditions (temperature, wind speed and direction, etc.). and terrain features (MDT, etc.).	DS_INTEG_PLATF-INFORMATION SERVICES:
850	REQ_FF_F_DS_INTEG_PLATF_INF_SERV_Algorithm Forecast Fire Definition	Ability to define an algorithm to forecast the fire behavior.	DS_INTEG_PLATF-INFORMATION SERVICES:
851	REQ_FF_F_DS_INTEG_PLATF_INF_SERV_Fire Classification Generation	Generate the fire classification according to its spread to know how to extinguish it.	DS_INTEG_PLATF-INFORMATION SERVICES:
852	REQ_FF_F_DS_INTEG_PLATF_INF_SERV_Spread Fire Calculation	Calculation of the spread time of fire.	DS_INTEG_PLATF-INFORMATION SERVICES:
853	REQ_FF_F_DS_INTEG_PLATF_INF_SERV_Time Alert Fire-fighters Receiving	Time since the alert is received to the fire-fighters arrive affected area.	DS_INTEG_PLATF-INFORMATION SERVICES:
854	REQ_FF_F_DS_INTEG_PLATF_INF_SERV_Sources Fire Real Time Knowing	Knowing the sources of fire in real time and classify the types of fire, according to its spread on how to treat it.	DS_INTEG_PLATF-INFORMATION SERVICES:
856	REQ_FF_F_DS_INTEG_PLATF_MIDDLE_TEC_Scalable Service Architecture Evaluation&Especification	Evaluation and specification of a scalable service architecture that meets the needs of the Crisis Management domain.	DS_INTEG_PLATF-MIDDLEWARE TECHNOLOGIES:
864	REQ_GE_F_UI_TECH_INTER_GIS_Show all related information	The Dicoma GIS must be able to show all units that are related to a certain disaster	UI_TECHNIQUES-INTERFACE DEFINITION:
865	REQ_GE_F_UI_TECH_INTER_GIS_Show all geographical information	The Dicoma GIS must have functionalities for presenting	UI_TECHNIQUES-INTERFACE

		all geographical information related to the disaster area.	DEFINITION:
866	REQ_GE_F_UI_TECH_INTER_GIS_Current information and prognosis	The Dicoma GIS must be able to show all current information and prognosis that is required to handle disaster situations.	UI_TECHNIQUES-INTERFACE DEFINITION:
885	REQ_GE_F_UI_TECH_INTER_GIS showing all weather parameters	All weather related parameters must be shown in Dicoma GIS system.	UI_TECHNIQUES-INTERACTION:
887	REQ_GE_F_ DS_MANAG_TRAIN_DEC_SS_Exceptional weather conditions	Warnings about exceptional weather conditions should reflect the Decision Support System algorithms.	DS_MANAG_TRAIN-DECISION SUPPORT SYSTEM:

4 System requirements

4.1 Environment requirements

ReqID	Requirement Name	Requirement Detail	Functionality
655	REQ_GE_E_DS_INTEG_PLATF_DATA_FRAME_Separate environments	Production environment must be separated from simulation and training environment	UI_TECHNIQUES-TECHNOLOGICAL:
656	REQ_GE_E_DS_INTEG_PLATF_DATA_FRAME_Platform independent	All server and client softwares must be platform independent	UI_TECHNIQUES-TECHNOLOGICAL:
657	REQ_GE_E_DS_INTEG_PLATF_DATA_FRAME_Own map cluster	Dicoma system must have own map server cluster	UI_TECHNIQUES-TECHNOLOGICAL:
658	REQ_GE_E_DS_INTEG_PLATF_DATA_FRAME_No external resources	The functionality of all software must not depend on external software modules such as dynamic libraries etc.	UI_TECHNIQUES-TECHNOLOGICAL:
823	REQ_FF_E_DS_MANAG_TRAIN_GIS_Geo-visualization functionality Adaptation	Adaptation of the geo-visualization functionality to a wide range of interaction platforms from control rooms to mobile devices.	DS_MANAG_TRAIN-GEOGRAPHICAL INFORMATION SYSTEM:
860	REQ_FF_E_DS_INTEG_PLATF_MIDDLE_TEC_Operating System Analysis&Selection	Analysis and selection of operating systems which ensure the information exchange in real time.	DS_INTEG_PLATF-MIDDLEWARE TECHNOLOGIES:
877	REQ_GE_E_DS_MANAG_TRAIN_SIM_MODEL_Support for teaching environments	The Dicoma system must support installations to teaching/educational environments such as simulation lab in OAMK.	DS_MANAG_TRAIN-SIMULATION AND MODELING:
888	REQ_GE_E_DS_MANAG_TRAIN_SIM_MODEL_OAMK simulation environment	The Dicoma system must support installation to simulation environment in OAMK.	DS_MANAG_TRAIN-SIMULATION AND MODELING:
889	REQ_GE_E_DS_MANAG_TRAIN_SIM_MODEL_OAMK simulation studios	The Dicoma system must support OAMK simulation studios.	DS_MANAG_TRAIN-SIMULATION

			AND MODELING:
890	REQ_GE_E_DS_MANAG_TRAIN_SIM_MODEL_OAMK direction rooms	The Dicoma system must support OAMK direction rooms.	DS_MANAG_TRAIN-SIMULATION AND MODELING:
891	REQ_GE_E_DS_MANAG_TRAIN_SIM_MODEL_OAMK debriefing rooms	The Dicoma system must support OAMK debriefing rooms.	DS_MANAG_TRAIN-SIMULATION AND MODELING:
892	REQ_GE_E_DS_MANAG_TRAIN_SIM_MODEL_Virtual management centers	The Dicoma system must support OAMK virtual management centers.	DS_MANAG_TRAIN-SIMULATION AND MODELING:
893	REQ_GE_E_DS_MANAG_TRAIN_SIM_MODEL_Communication between educational rooms	The Dicoma system must support communication between educational rooms in OAMK simulation environment.	DS_MANAG_TRAIN-SIMULATION AND MODELING:
894	REQ_GE_E_DS_MANAG_TRAIN_SIM_MODEL_Video and audio recording	The Dicoma system must support multiple video cameras and sound recorders in an educational room at OAMK simulation environment.	DS_MANAG_TRAIN-SIMULATION AND MODELING:
895	REQ_GE_E_DS_MANAG_TRAIN_SIM_MODEL_Video simulated disasters	The Dicoma system must video simulated disasters in OAMK simulation environment.	DS_MANAG_TRAIN-SIMULATION AND MODELING:
896	REQ_GE_E_DS_MANAG_TRAIN_SIM_MODEL_Simulation room linking	The Dicoma system must support linking multiple simulation studios as a one large disaster in OAMK simulation environment.	DS_MANAG_TRAIN-SIMULATION AND MODELING:
897	REQ_GE_E_DS_MANAG_TRAIN_SIM_MODEL_Simulation room linking 2	The Dicoma system must support linking multiple simulation studios as first-aid-chain (e.g. on-site first aid, hospital reseption, surgery room) in OAMK simulation environment.	DS_MANAG_TRAIN-SIMULATION AND MODELING:
898	REQ_GE_E_DS_MANAG_TRAIN_SIM_MODEL_Testing and training	The management tools id Dicoma system must support testing and training functionalities.	DS_MANAG_TRAIN-SIMULATION AND MODELING:

899	REQ_GE_E_DS_MANAG_TRAIN_SIM_MODEL_Patient simulators	The Dicoma system must support computer directed patient simulators in OAMK simulation environment.	DS_MANAG_TRAIN-SIMULATION AND MODELING:
900	REQ_GE_E_DS_MANAG_TRAIN_SIM_MODEL_Configuration of patient simulators	The patient simulators used in OAMK simulation environment must support disaster based configurations	DS_MANAG_TRAIN-SIMULATION AND MODELING:
901	REQ_GE_E_DS_MANAG_TRAIN_SIM_MODEL_Video simulated environments	The Dicoma system must support video simulated environments inside the simulation studios in OAMK simulation environment.	DS_MANAG_TRAIN-SIMULATION AND MODELING:
902	REQ_GE_E_DS_MANAG_TRAIN_SIM_MODEL_Video based debriefing	The Dicoma system must video based debriefing in OAMK simulation environment.	DS_MANAG_TRAIN-SIMULATION AND MODELING:

4.2 User interface requirements

ReqID	Requirement Name	Requirement Detail	Functionality
659	REQ_GE_US_UI_TECH_INTER_Multicultural interfaces	All user interfaces must be multicultural	UI_TECHNIQUES-INTERACTION:
660	REQ_GE_US_UI_TECH_INTER_Visual disadvantages	All user interfaces must be usable for people with minor visual disadvantages such as color blindness	UI_TECHNIQUES-INTERACTION:
661	REQ_GE_US_UI_TECH_INTER_Fitting Uis for different devices	All user interfaces must be fitted to end user device displays	UI_TECHNIQUES-INTERACTION:
662	REQ_GE_US_UI_TECH_INTER_Multilingual interfaces	All user interfaces must be multilingual	UI_TECHNIQUES-INTERACTION:
699	REQ_FF_UI_UI_TECH_INTER_Monitoring Current Task	In the workflow, the current task will be displayed and also the access to its attributes	UI_TECHNIQUES-INTERACTION:
822	REQ_FF_US_DS_MANAG_TRAIN_GIS_Visual-Interactive Analisys Presentation	Presentation and visual-interactive analysis at the user-interface level.	DS_MANAG_TRAIN-GEOGRAPHICAL INFORMATION SYSTEM:
870	REQ_GE_US_UI_TECH_INTER_GIS_UI filtering capabilitis	The user interface must have efficient filtering capabilities.	UI_TECHNIQUES-INTERFACE

			DEFINITION:

4.3 Maintenance requirements

ReqID	Requirement Name	Requirement Detail	Functionality
663	REQ_GE_M_DS_INTEG_PLATF_DATA_FRAME_Audit log for systems functions	All actions made by system must be recorded in audit log	UI_TECHNIQUES-TECHNOLOGICAL:
664	REQ_GE_M_DS_INTEG_PLATF_DATA_FRAME_Audit log for user functions	All actions made by users must be recorded in audit log	UI_TECHNIQUES-TECHNOLOGICAL:
665	REQ_GE_M_DS_INTEG_PLATF_DATA_FRAME_Audit log storage time	Audit logs must be stored for 10 years	UI_TECHNIQUES-TECHNOLOGICAL:
666	REQ_GE_M_DS_INTEG_PLATF_DATA_FRAME_Information backup	All information stored by the system must be backupped	UI_TECHNIQUES-TECHNOLOGICAL:
667	REQ_GE_M_DS_INTEG_PLATF_DATA_FRAME_Configurations affect immediately	All configuration and setting modifications must be applied at once.	UI_TECHNIQUES-TECHNOLOGICAL:
668	REQ_GE_M_DS_INTEG_PLATF_DATA_FRAME_Map updates	Map data must be easily updated by administrators	UI_TECHNIQUES-TECHNOLOGICAL:
669	REQ_GE_M_DS_INTEG_PLATF_DATA_FRAME_Password resets	Administrators can reset user passwords	DS_INTEG_PLATF-SECURITY:

4.4 Integration requirements

ReqID	Requirement Name	Requirement Detail	Functionality
670	REQ_GE_I_DS_INTEG_PLATF_INF_SERV_External integration secure connections	All integrations to external system (such us sensor networks) must use sceured connections	DS_INTEG_PLATF-SECURITY:
671	REQ_GE_I_DS_INTEG_PLATF_INF_SERV_Disable integrations	Single integrations to external system can be disabled during run time by administrators	DS_INTEG_PLATF-SECURITY:
696	REQ_FF_I_DS_INTEG_PLATF_DATA_FRAME_Past Experiences Database	Previous cases are read from a file in CSV or XML format	DS_INTEG_PLATF-DATA FRAMEWORK:
697	REQ_FF_I_DS_INTEG_PLATF_DATA_F	New attributes from the	DS_INTEG_PLA

	RAME_Current Situation Attributes	current situation can be read if they are written in a CSV or XML file, or following a subscription method facilitating the integration on the DICOMA framework (to be defined)	TF-DATA FRAMEWORK:
706	REQ_COMM_VALIDA_COM_SYS_Identification&communication	Identification and communication with the relevant agencies regarding the solution of the crisis	DS_MANAG_TRAIN-CONTROL SUPPORT SYSTEMS:
724	REQ_DS_MANAG_TRAIN_DMPMA_IntegrationPMWithDSS&CSS	Integration of the post-mortem system with the DSS and CSS	DS_MANAG_TRAIN-DATA MINING/POST MORTEM ANALYSIS:
819	REQ_FF_I_DS_MANAG_TRAIN_GIS_ Spatial Data Integration Presentation	Integration and presentation of the spatial data of the disaster situation.	DS_MANAG_TRAIN-GEOGRAPHICAL INFORMATION SYSTEM:
820	REQ_FF_I_DS_MANAG_TRAIN_GIS_Technologies Integrate Unify Spatial Data	Use of technologies to integrate and unify spatial data from different sources (including existing spatial data sets, earth-observation data, simulation data and sensor data, etc).	DS_MANAG_TRAIN-GEOGRAPHICAL INFORMATION SYSTEM:
824	REQ_FF_I_DS_MANAG_TRAIN_GIS_ Algorithms Integration Data Definition Implementation	Definition and implementation of algorithms for the integration of all spatial data.	DS_MANAG_TRAIN-GEOGRAPHICAL INFORMATION SYSTEM:
832	REQ_FF_I_DS_INTEG_PLATF_DATA_FRAME_Domain Sematics&Syntactic Definition	Data and domain semantics and syntactic definition	DS_INTEG_PLATF-DATA FRAMEWORK:
833	REQ_FF_I_DS_INTEG_PLATF_DATA_FRAME_Integration Data Models Generation	Generation of integrated data models, both syntactic and semantic, for crisis management situations.	DS_INTEG_PLATF-DATA FRAMEWORK:
834	REQ_FF_I_DS_INTEG_PLATF_DATA_FRAME_OGC-SWE Standard Implementation	Implementation of the OGC-SWE standard, for the recognition and the exploitation of sensors.	DS_INTEG_PLATF-DATA FRAMEWORK:
835	REQ_FF_I_DS_INTEG_PLATF_DATA_FRAME_Traceability CEP Rules	Building of the traceability with CEP rules. Complex Event Processing (CEP) is a	DS_INTEG_PLATF-DATA FRAMEWORK:

		technology for correlating, aggregating, and computing on real- world event data.	
836	REQ_FF_I_DS_INTEG_PLATF_DATA_FRAME_Data Format Simulation Specification	Specification of data formats for simulation data, sensor data (including sensor networks), high bandwidth sensors (optical, SAR, LIDAR) and others in real time. In general, data formats will be specified for all relevant data providers with a view to interoperability with geographic data in OGC formats.	DS_INTEG_PLATF-DATA FRAMEWORK:
837	REQ_FF_I_DS_INTEG_PLATF_DATA_FRAME_Gateways APIs Identification&Development&Testing	Identification, development and testing of gateways or APIs in order to convert the imput data to the defined format.	DS_INTEG_PLATF-DATA FRAMEWORK:
838	REQ_FF_I_DS_INTEG_PLATF_DATA_FRAME_Data Domain Development	Development of data domains according to the defined data model.	DS_INTEG_PLATF-DATA FRAMEWORK:
839	REQ_FF_I_DS_INTEG_PLATF_DATA_FRAME_Storage Element Definition&Development&Testing	Definition, development and testing the storage elements. Definition of the data which have to be stored (raw events, elaborated events, cop elements, etc.), the architecture and storage tools.	DS_INTEG_PLATF-DATA FRAMEWORK:
857	REQ_FF_I_DS_INTEG_PLATF_MIDDLE_TEC_Interfaces Connecting Middleware Development	Development of the necessary interfaces for connecting with the middleware solution for legacy systems and third-party applications.	DS_INTEG_PLATF-MIDDLEWARE TECHNOLOGIES:
858	REQ_FF_I_DS_INTEG_PLATF_MIDDLE_TEC_CEP Engines Algorithm Integration&Development	Integration with CEP engines and algorithm development.	DS_INTEG_PLATF-MIDDLEWARE TECHNOLOGIES:
859	REQ_FF_I_DS_INTEG_PLATF_MIDDLE_TEC_ServiceQuality&DataStructures&StorageRepositories Definition&Implementation	Definition and implementation of service quality, data structures and integration with storage repositories.	DS_INTEG_PLATF-MIDDLEWARE TECHNOLOGIES:
862	REQ_FF_I_DS_INTEG_PLATF_MIDDLE_TEC_CEP Engines Definition&Development&Testing	Definition, development and testing of CEP engines for correlating, aggregating, and	DS_INTEG_PLATF-MIDDLEWARE

		computing real-time event data generated on the Crisis Management domain.	TECHNOLOGIES:
867	REQ_GE_I_DS_INTEG_PLATF_DATA_FRAME_Point-2-point communication	All units must be able to communicate with each other	DS_INTEG_PLATF-DATA FRAMEWORK:
868	REQ_GE_I_DS_INTEG_PLATF_DATA_FRAME_Helmet cameras	The Dicoma system must support helmet cameras	DS_INTEG_PLATF-DATA FRAMEWORK:
869	REQ_GE_I_DS_INTEG_PLATF_DATA_FRAME_Center-2-unit communication	Management centers must be able to establish voice connection to mobile units	DS_INTEG_PLATF-DATA FRAMEWORK:
871	REQ_GE_I_DS_INTEG_PLATF_DATA_FRAME_Vehicle sensor data	The sensor data from mobile units must also be available in DSS	DS_INTEG_PLATF-DATA FRAMEWORK:
872	REQ_GE_I_DS_INTEG_PLATF_DATA_FRAME_Vehicle bus data	Vehicle bus (FMS, CAN) information from mobile units should be available in the Dicoma system.	DS_INTEG_PLATF-DATA FRAMEWORK:
873	REQ_GE_I_DS_INTEG_PLATF_DATA_FRAME_Satellite pictures	The satellite pictures must be usable in GIS and DSS functionalities.	DS_INTEG_PLATF-DATA FRAMEWORK:
875	REQ_GE_I_DS_INTEG_PLATF_DATA_FRAME_Multiple ways to communicate	The Dicoma system must support multiple alternative communications methods which can be changed and configured during run time. The basis for this requirement is that in disaster situations, some communication networks might not work.	DS_INTEG_PLATF-DATA FRAMEWORK:
876	REQ_GE_I_DS_INTEG_PLATF_DATA_FRAME_Satellite positioning	All units must use at least satellite positioning.	DS_INTEG_PLATF-DATA FRAMEWORK:
879	REQ_GE_I_DS_INTEG_PLATF_DATA_FRAME_Multipath radio selection	Multipath radio selection (smooth handovers, optimized bandwidth etc.)	DS_INTEG_PLATF-DATA FRAMEWORK:
880	REQ_GE_I_DS_INTEG_PLATF_DATA_FRAME_Mobility management	The Dicoma system must provide means to manage the mobility of sensor networks.	DS_INTEG_PLATF-DATA FRAMEWORK:
881	REQ_GE_I_DS_INTEG_PLATF_DATA_FRAME_Energy optimized protocols	The Dicoma system must use energy optimized protocols for sensor network integrations (Constrained Application Protocol CoAP)	DS_INTEG_PLATF-DATA FRAMEWORK:
882	REQ_GE_I_DS_INTEG_PLATF_DATA_FRAME_Wireless and wired sensor networks	The Dicoma system must support both wireless and wired sensor networks	DS_INTEG_PLATF-DATA FRAMEWORK:
883	REQ_GE_I_DS_INTEG_PLATF_DATA_FRAME_Sensor data processing	Data from sensor networks must be stored and	DS_INTEG_PLATF-DATA

		processed (complex event processing with distributed decision engine DDE)	FRAMEWORK:
884	REQ_GE_I_DS_INTEG_PLATF_DATA_FRAME_Gateway management	The gateway for sensor network must have following functionalitis: QoS support, routing, and standalone operations such as automatic updates and self-recovery	DS_INTEG_PLATF-DATA FRAMEWORK:
886	REQ_GE_I_DS_INTEG_PLATF_DATA_FRAME_Satellite picture integration	The Dicoma system must support preconfigured process for satellite picture integration	DS_INTEG_PLATF-DATA FRAMEWORK:
903	REQ_GE_I_DS_INTEG_PLATF_DATA_FRAME_Standardized APIs	APIs must use standardized and de-fecto solutions.	DS_INTEG_PLATF-DATA FRAMEWORK:
904	REQ_GE_I_DS_INTEG_PLATF_DATA_FRAME_Data usage in 3rd party	The information stored by Dicoma system must usable in other systems.	DS_INTEG_PLATF-DATA FRAMEWORK:

5 Non-functional requirements

5.1 Performance requirements

ReqID	Requirement Name	Requirement Detail	Functionality
672	REQ_GE_P_UI_TECH_INTER_Information presented in realtime	All information presented to user must be in realtime or near realtime	UI_TECHNIQUES-TECHNOLOGICAL:
673	REQ_GE_P_UI_TECH_INTER_Data latency from sensor networks	The maximum information transfer time from sensor networks to user interface is 10 seconds	UI_TECHNIQUES-TECHNOLOGICAL:
674	REQ_GE_P_UI_TECH_INTER_Data interval from sensor networks	The update interval for sensor data is 5 seconds	UI_TECHNIQUES-TECHNOLOGICAL:
675	REQ_GE_P_UI_TECH_INTER_Data latency from rescue units	The maximum information transfer time from rescue units to user interface is 5 seconds	UI_TECHNIQUES-TECHNOLOGICAL:
676	REQ_GE_P_UI_TECH_INTER_Data interval from rescue units	The update interval for rescue unit data is 1 seconds	UI_TECHNIQUES-TECHNOLOGICAL:
677	REQ_GE_P_UI_TECH_INTER_Screen updates	The screen updates must be smooth and flickering or page uploads are not acceptable	UI_TECHNIQUES-INTERACTION:
678	REQ_GE_P_UI_TECH_INTER_Handling heavy load situations	In case of performance decrease during heavy load, Dicoma system must prioritize users with highest rank in user roles.	UI_TECHNIQUES-TECHNOLOGICAL:
707	REQ_COMM_VALIDA_COM_SYS_OptimizationWorkflows	Optimization of the workflows of the generated solutions	DS_MANAG_TRAIN-CONTROL SUPPORT SYSTEMS:
831	REQ_FF_P_DS_INTEG_PLATF_DATA_FRAME_DistributedCaches&NoSQLDatabases Management	Management of data storage system based on Distributed caches or NoSQL databases.	DS_INTEG_PLATF-DATA FRAMEWORK:
855	REQ_FF_P_DS_INTEG_PLATF_INF_SERV_ Stored Data NoSQL Processing	Processing of stored data (no SQL repositories)	DS_INTEG_PLATF-INFORMATION SERVICES:

861	REQ_FF_P_DS_INTEG_PLATF_MIDDLE_TEC_Middleware RealTime Using	Using of different middleware in real time.	DS_INTEG_PLATF-MIDDLEWARE TECHNOLOGIES:
906	REQ_GE_P_DS_INTEG_PLATF_DATA_FRAME_Event priorization	The Dicoma system must support event priorization.	DS_INTEG_PLATF-DATA FRAMEWORK:

5.2 Usability requirements

ReqID	Requirement Name	Requirement Detail	Functionality
679	REQ_GE_U_UI_TECH_INTER_DEF_Usability design	Usability best practices must be carried out in all phases of system developement. See ISO/TR 16982:2002 for more detail.	UI_TECHNIQUES-INTERFACE DEFINITION:
680	REQ_GE_U_UI_TECH_INTER_DEF_Usability tests	Usability tests must be run after interface design	UI_TECHNIQUES-INTERFACE DEFINITION:
681	REQ_GE_U_UI_TECH_INTER_DEF_Interface design standards	User interfaces must follow ISO-9241 standard	UI_TECHNIQUES-INTERFACE DEFINITION:
705	REQ_COMM_VALIDA_COM_SYS_MonitoringEvolution	Monitoring of the evolution of the crisis	DS_MANAG_TRAIN-CONTROL SUPPORT SYSTEMS:

5.3 Information security requirements

ReqID	Requirement Name	Requirement Detail	Functionality
682	REQ_GE_IS_DS_INTEG_PLATF_SEC_Functionality level access rights	Administrators must be able to configure functionality level access rights.	DS_INTEG_PLATF-SECURITY:
683	REQ_GE_IS_DS_INTEG_PLATF_SEC_Security attack logging	All attacks and breaking in attempl to system must be logged	DS_INTEG_PLATF-SECURITY:
684	REQ_GE_IS_DS_INTEG_PLATF_SEC_Password changing interval	System must force users to change passwords in 3 months intervals.	DS_INTEG_PLATF-SECURITY:
685	REQ_GE_IS_DS_INTEG_PLATF_SEC_Password changes	Users can change their passwords in any given time	DS_INTEG_PLATF-SECURITY:
730	REQ_DS_INTEG_PLATF_SEC_Role Management	Role Management for data access	DS_INTEG_PLATF-SECURITY:
731	REQ_DS_INTEG_PLATF_SEC_Contingency Plan for recovering system	Contingency Plan for recovering the system to	DS_INTEG_PLATF-SECURITY:

		errors	
732	REQ_DS_INTEG_PLATF_SEC_Identity verification systems	Adding identity verification systems to prevent identity theft	DS_INTEG_PLATF-SECURITY:
733	REQ_DS_INTEG_PLATF_SEC_Compliance with ISO/IEC15408	Compliance with security and safety standards by ISO/IEC15408 certification (Common Criteria)	DS_INTEG_PLATF-SECURITY:
734	REQ_DS_INTEG_PLATF_SEC_Encryption communication & stored data	Encryption of every communication and stored data in the system	DS_INTEG_PLATF-SECURITY:
874	REQ_GE_IS_DS_INTEG_PLATF_SEC_Information security standards	Information and communication must be secured and information security and identity security standards must be followed.	DS_INTEG_PLATF-SECURITY:

5.4 Reliability requirements

ReqID	Requirement Name	Requirement Detail	Functionality
686	REQ_GE_R_DS_INTEG_PLATF_DATA_FRAME_Availability time	System must have 99,99% availability times (four nines)	UI_TECHNIQUES-TECHNOLOGICAL:
687	REQ_GE_R_DS_INTEG_PLATF_DATA_FRAME_No single point of failures	All system components must be clustered so that there is no single point of failure	UI_TECHNIQUES-TECHNOLOGICAL:
688	REQ_GE_R_DS_INTEG_PLATF_DATA_FRAME_Duplicated data centers	The entire Dicoma system must be run in two separate data centers.	UI_TECHNIQUES-TECHNOLOGICAL:
689	REQ_GE_R_DS_INTEG_PLATF_DATA_FRAME_Handling power failures	Both data centers must have own electricity capasity for 2 days	UI_TECHNIQUES-TECHNOLOGICAL:
690	REQ_GE_R_DS_INTEG_PLATF_DATA_FRAME_Duplicated internet connections	Both data centers must have duplicated internet connections	UI_TECHNIQUES-TECHNOLOGICAL:
905	REQ_GE_R_DS_INTEG_PLATF_DATA_FRAME_Modular system	The Dicoma system must use modularized approach so that single components can be easily replaced with another implementation.	DS_INTEG_PLATF-DATA FRAMEWORK:

6 Other requirements

ReqID	Requirement Name	Requirement Detail	Functionality
878	REQ_GE_O_DS_INTEG_PLATF_DATA_FRAME_Standardization	Since Dicoma system aims to be a global standard, all related standards must investigated during system design phase.	DS_INTEG_PLATF-DATA FRAMEWORK: