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GENERAL REMINDER (MAX 1 PAGE) OF PROJECT OBJECTIVES, PARTNERSHIP AND EXPECTED DELIVERABLES.

MELOGIC partnership consists of European University of Cyprus (coordinator), University of Aegean, Regional (Rome) Italian Red Cross (initially) replaced early April 2016 by Regional (Vicenza) Italian Red Cross, Provincial Responsibles of CARITAS, and Humanitarian Logistics and Supply Chain Research Institute.

The main project objectives are the following:

- ☐ Categorization of main emergency logistic problems from civil protection authorities point of view
- ☐ Creation of an e-library (data repository) of best practices and lessons learnt in emergency logistics
- ☐ Modeling of specific emergency logistics problems and development of efficient methods to solve them
- ☐ Design and development of a toolbox that will improve preparedness levels against natural emergencies
- ☐ Theoretical and practical training of users and decision makers
- ☐ Communication Plan and activities for diffusing emergency logistics importance to stakeholders

Expected deliverables are:

1 Kick-Off Meeting in Cyprus / 4 Progress reports to the Commission (1 report per 6 months) / 5 Partnership Meetings (all partners) / 1 specific workshop on financial management issues (embedded in the kick-off meeting in Cyprus) / 1 Report with the categorization of main logistics problems in the preparedness phase, best practices, lessons learnt and existing emergency logistics tools / 1 Pool (data repository in the form of "living document) of Best Practices and Lessons Learnt / 1 Report with modelling of logistics problems in preparedness operations / 1 kit with algorithmic tools / 1 Design document of the planning software tool / 1 software (planning tool) / 1 Report with testing results of the planning software tool / 1 complete training guide (in electronic dynamic form) that will include both theoretical and practical material in logistics processes for preparedness operations. The planning tool developed in Phase C, will be used for practical training. / 3 complete training sessions (1 per operational partner and 1 in Greece) / 1 report with evaluation of the training sessions /

1 report with implementation methodology for small scale pilot test (design of test, evaluation criteria, etc) / 1 Small Scale Pilot test (real-life cases to be tested) / 1 Evaluation Workshop (at the end of small scale pilot test) / 1 Project Logo /

1 Project official web site and Web2.0 toolkit (Facebook, LinkedIn, Twitter) /

1 Raising Awareness Campaign, Publicity and Dissemination Plan / 4 Project e-Newsletters / 20 Publications on Local, Regional, National and European Union Media /

Project Official Communication Material (200 Posters, 2000 Leaflets, 100 DVDs with useful material developed by the MELOGIC project) / 5 National Events, organized by each partner in own country / 1 Final Conference on Emergency Logistics in Disaster management in Brussels – Representation of European Civil Protection Community, Vulnerable social groups related entities/ associations including International ones / 1 White Paper on emergency logistics

GENERAL SUMMARY OF PROJECT IMPLEMENTATION PROCESS

- ☐ General overview of the process: Project implementation was smooth, with partners having excellent cooperation –including the late coming Red Cross Vicenza- which were obvious in mega event Field Exercise in Teruel and the Training Activities and National Events in all countries.

- Initial and actual time schedule: Only small deviations between initial and actual time schedule were observed, that reflected the need for realistic –based on everyday operation-event scheduling. For example the Training Event took place in Vicenza late October 2016 as earlier due to summer earthquakes in Italy that was not possible (and even during the October event a new earthquake hit Italy influencing conference attendance).

- planned and used resources: All the resources planned initially were used and even more, many volunteers and students supported MELOGIC activities.

- expected and actual results: The initially planned results were reached as MELOGIC underlined clearly the importance of logistics in Civil Protection and the need for taking carefully planned steps to optimize the civil protection system in big areas at risk. The interest raised during project duration led to new initiatives that are under elaboration for further cooperation in the field of emergency logistics, expanding the initial partnership.

EVALUATION OF PROJECT MANAGEMENT/IMPLEMENTATION PROCESS

- Positive aspects / opportunities: Cooperation with the Commission and the partners during the inevitable change of partner from Italy. Also, the smooth joint effort to achieve promised outputs and results benefiting the whole consortium, the civil protection community and general public.
- Internal and external difficulties encountered: The major difficulty was the slow reaction of Red Cross Rome until its replacement in the MELOGIC scheme and the absence of experience in projects financed by DG ECHO for some partners that created some temporary difficulties in linking activities with cash flow, yet with cooperation all issues have been internally overcome.
- Partnership/core group cooperation (as appropriate): The cooperation was excellent as shown also in all joint events and media applications. Each partner had a clear role, complementary to those of the others optimizing project implementation and influence.
- Cooperation with the Commission: Cooperation with the Commission and especially the project officer was excellent. Working together the big challenge of changing partner was successfully faced. Also the office of the Commissionaire Mr. Stylianidis was very helpful during the final phase of the project to evaluate the potential of emergency logistics in civil protection. Here again, project officer –being present also in final project event in Brussels- was very supportive.
- Comments on European value added: During Melogic implementation we made clear that the term logistics –usually being mentioned in a small paragraph of emergency plans- means much more than most experts believe. In fact, the whole planning is based on logistics and the actual earthquakes in Italy during the last phase of project implementation revealed the European added value MELOGIC brought in.
- Lessons learnt and possible improvements: The most important lesson learnt is the emergency logistics can be used for re-organizing and optimizing the whole civil protection system of a region / province or big municipality. That was the case of Teruel province where using as catalyst the field exercise on emergency logistics the authorities recorded the civil protection structure and procedures and through many bilateral and multilateral meetings and activities optimized the whole civil protection system.

ACTIVITIES

- Comparison between initially planned and actually implemented activities, including monitoring, evaluation and dissemination: The MELOGIC activities scheduled as initially planned with the exception of F task (dissemination activities) that were delayed due to change of responsible partner. The delay was in fact for the benefit of the project due to the unfortunate event of the earthquakes that hit Italy and got involved people from Red Cross Vicenza that transferred experience to MELOGIC field exercise in Teruel, Spain. The in depth analysis and media coverage of the event allowed also transfer of Melogic methodology to partners through the national events that took place the last 3 months of the project, compare field exercise findings with actual logistic needs through the Italian experience and sketch the next steps in emergency logistics at local and regional levels through high level presentations at project final conference in Brussels, November 2016.
- Qualitative evaluation of the activities: All the activities were up to the promised level, with many compliments from civil protection authorities and volunteer organizations for revealing the importance of emergency logistics for the whole civil protection system planning and structuring. Even more, as it is presented in the separate dissemination folder of MELOGIC, many unscheduled bilateral and multilateral meetings took place in Teruel, Spain for the optimization of civil protection system. Those meetings brought trust and confidence at all levels.

PRESENTATION OF THE TECHNICAL RESULTS AND DELIVERABLES (ONE SECTION PER DELIVERABLE)

In the following section we shortly describe the deliverables that are not so technical (meetings, events, dissemination), while we explain in more details the technical results and deliverables:

Description of individual deliverables: **Deliverables of Actions A1, A2, A3: Meetings and Reports**

- Purpose of the deliverable: The purpose of those deliverables is project management, internal reporting and reporting to the Commission.
- Evaluation of the deliverable: All deliverables promised were done. All meetings have been organized - including the specific workshop during Cyprus Kick Off meeting- in the most proper way to maximize the benefit for project implementation. Reporting to the Commission was detailed.

Value-added – in particular European value-added and transferability - of the deliverable: The value-added of this deliverable is the smooth cooperation between the consortium and the Commission, as well as among partners.

- Dissemination: The meetings themselves were disseminating events –especially when coupled with a training or exercise related activity. During them media and stakeholders were addressed.

Description of individual deliverables: **Deliverable of Actions B1 & B2: Report with the categorization of main logistics problems in the preparedness phase, best practices, lessons learnt and existing emergency logistics tools.**

- Purpose of the deliverable: Under the Project Task B (Mapping of emergency logistics problems and creation of data repository), this deliverable aimed to provide better understanding of the elements of emergency logistics management and its process of preparedness.

- Evaluation of the deliverable: Considering the specific circumstance of the end-user's locality embedded in the European civil protection system, the needs and challenges of disaster logistics preparedness in Aragón, Spain were identified. This result of the case study was a valuable knowledge to build optimization model and further emergency logistics training both in Spain and Italy.
- Value-added – in particular European value-added and transferability - of the deliverable: The challenges of Aragón are unique but also can be compared and applied to other civil protection logistics cases of similar sparsely populated areas in other European context.
- Dissemination: Regarding the study related to the deliverable, a project report was produced and conference papers were presented. Further publication is in progress. Also the result was disseminated through various stakeholder meetings and national project dissemination events.

Description of individual deliverables: Deliverable of Action B3: (data repository in the form of “living document) of Best Practices and Lessons Learnt

- Purpose of the deliverable: Under the Project Task B (Mapping of emergency logistics problems and creation of data repository), this deliverable aimed to construct a data repository of best practices in civil protection logistics.
- Evaluation of the deliverable: The repository was built in one of the partner's website and open for public use. Several updates have improved a better user-friendly interface.
- Value-added – in particular European value-added and transferability - of the deliverable: As one of the few data repositories, focusing on emergency logistics preparedness, the website provide a rich materials with different search functions.
- Dissemination: The repository was disseminated through various stakeholder meetings and national project dissemination events.

Description of individual deliverables: Deliverable of Action C1: Modelling of key emergency logistics problems

- Purpose of the deliverable: This deliverable presents the modelling of key emergency logistics problems. The latter described in this deliverable are as follows: a) Population Evacuation using Heterogeneous Fleet Problem (PEHFP) thereafter called PEHFP, and b) Emergency Supply using Heterogeneous Fleet Problem (ESHFP), thereafter called ESHFP. The first problem concerns planning the evacuation of population centers, and transporting the evacuees to shelters. The related application is the evacuation of one or more villages of the Province of Teruel, in case of a major forest fire, and the transportation of the evacuees into one or more shelters. The second problem concerns the supply of

consumable and non-consumable provisions to evacuees and to intervention groups from multiple inventory holding locations. In both problems the vehicle fleets (passenger and freight vehicles, respectively) have a range of capacities (heterogeneous fleets).

- Evaluation of the deliverable: The evaluation of the deliverable has been made by key stakeholders of emergency logistics as well as researchers that are experts in the area of disaster relief logistics.
- Value-added – in particular European value-added and transferability - of the deliverable: The value added and transferability of each model is described as follows: The model for the PEHFP seeks to determine the set of routes that minimize the total evacuation time; among the possibly multiple solutions with the minimum evacuation time, the one with the minimum operational cost (time) is selected. The proposed model includes multiple constraints that concern key operational issues, such as routing, timing, capacity and other constraints. The model was applied to two case studies: i) A point-to-point evacuation problem which concerns the evacuation of Tramacasteil (small village) and the transportation of the evacuees to the Sports Hall "Los Planos" in Teruel, and ii) the multipoint-to-point evacuation problem which concerns the evacuation of Rubiales, and El Campillo (small villages) and the transportation of the evacuees to the Sports Hall "Los Planos" in Teruel. The model for the ESHFP seeks to determine the set of routes that minimize the total time to provide all required provisions to the evacuees and to the intervention groups at the corresponding shelters; among the possibly multiple solutions with the minimum supply time, the one with the minimum operational cost (time) is selected. Related constraints considered by the model include again routing, timing, capacity, supply and other constraints. The case study for this problem deals with supplying provisions to evacuees during their 36-hour stay to Teruel, and to intervention groups at a selected location close to the theatre of the emergency.
- Dissemination: The dissemination of the developed algorithms has been made via the training workshops that have been organized during the MELOGIC. Furthermore, the research team of the University of the Aegean has presented the modelling of these two problems to undergraduate and postgraduate students of the Department of Financial and Management Engineering of the University of the Aegean.

Description of individual deliverables: Deliverable of Action C2: Development of algorithms for solving the emergency logistics problems

- Purpose of the deliverable: This deliverable deals with the development of algorithms for the two logistics problems under consideration; that is, a) planning the evacuation of certain pick-up locations and the transportation of the evacuees to a shelter and b) planning the supply of consumable and non-consumable provisions to both evacuees and intervention groups from multiple inventory holding locations.
- Evaluation of the deliverable: The deliverable has been evaluated positively via the MELOGIC tool that has been developed, which embraces both algorithms. Indeed, both algorithms were embedded in the MELOGIC tool and can be used for both the evacuation of population as well as for supply of goods (population and intervention groups).
- Value-added – in particular European value-added and transferability - of the deliverable: For both these problems, i.e. the Population Evacuation using Heterogeneous Fleet Problem (PEHFP) and the

Emergency Supply using Heterogeneous Fleet Problem (ESHFP), two novel OR algorithms have been developed. More specifically, for PEHFP, we have developed two algorithms that aim in determining the set of routes and vehicles that minimize the total evacuation time with respect to multiple constraints concerning key operational issues, such as routing, timing, capacity and other constraints. For ESHFP the proposed algorithm aims in determining the set of routes and the vehicles that can be used to minimize the total time to provide all required provisions to evacuees and intervention groups at the corresponding shelters with respect to constraints concerning routing, timing, capacity, and supply.

- Dissemination:** The dissemination of the developed algorithms has been made via the training workshops that have been organized during the MELOGIC project as well as in the national events/ final conference event. Furthermore, the research team of the University of the Aegean has presented these algorithms to undergraduate and postgraduate students of the Department of Financial and Management Engineering of the University of the Aegean.

Description of individual deliverables: Deliverables of Action C3 & C4: Design and implementation of the planning software tool / Testing and Optimization of planning software tool

Purpose of the deliverable: The present deliverable provides a detailed reporting on the architecture of the Melogic web-GIS planning tool (software). The Melogic web-GIS planning tool aims to assist relevant entities in planning activities and processes in cases of natural disasters. The tool will be able to provide assistance in the fields of optimal warehouse facilities location and of preposition of supplies. The tool will be built upon open source and expandable technologies, so as to allow the integration and use of various algorithms for the solution of operations research problems, such as the optimal location of permanent facilities (e.g. logistics centres) and the optimal location of temporary facilities and means (e.g. local distribution centres).

The Melogic web-GIS planning tool will allow the solution of such problems in a systematic way, providing:

- Functionalities for integrating operations research algorithms,
- Web-integration and web-access,
- User friendly and easy-to-use user interfaces,
- User-friendly and easy-to-use forms for data and parameters input,
- Integration of a web-GIS engine,
- Data and outputs visualization on digital maps

The structure of the present deliverable is as follows. Following an overview of the Melogic project and the positioning of the web-GIS planning tool in the framework of the project, the deliverable provides a description of the methodological framework that has been adopted for the development of the software and the functional requirements that arise from the decomposition of specific user needs and use cases.

Functional requirements are grouped in three main categories, covering generic requirements, user management requirements and visualization requirements. Generic requirements cover issues of use of open-source technologies for the development of the tool, cloud enabled solutions to allow ease of use and

scalability in the future, ability to easily access the tool so as to account for a variety of various users that may neither have specialized software installed locally nor high-end computing capabilities, and finally the ability to use the tool through a variety of various end-user devices, including all commonly met internet enabled solutions widely used (e.g. desktop PCs, Laptops, Smartphones or Tablets). User management requirements include the ability of the tool to handle user accounts (creation and management), ability to insert information related to the entity/authority that the user belongs to, the ability to insert and edit user related personalized information, the provision of easy to use user-interfaces when registering a user, the ability to modify user information after one has been registered and the ability to have users with administrator roles. Visualization requirements include the ability of the tool to provide mapping information using web-enabled Geographic Information Systems technologies (web-GIS), the ability to have common GIS functionalities (such as pan and zoom) at the user interface, the ability to use Layers for viewing specific content at the selected location and the ability to select specific entities and retrieve contents from the tools database when selecting specific features.

Following the description of the functional requirements, the deliverable presents the proposed system architecture, which is composed by five distinct layers, covering user and scenarios management, system intelligence, GIS and data processing and storage and finally visualization. The User management & scenarios management layer ensures that all functionalities related to user management and scenario related content storage and retrieval are met. The Intelligence layer ensures that all optimization algorithms related to Melogic use cases for emergency logistics are successfully executed. The GIS processing and data storage layer ensures that all GIS related functionalities are met according to the specified requirements and that all related data processing and management is successfully executed. Also, the implementation of this layer is based on open-source database technologies (PostGIS and PostgreSQL), meeting the relevant generic functional requirements. Finally, the Visualization and user interface layer provides to the end user of the tool the ability to easily interface with all tool's functionalities in a convenient and user-friendly way. All user interface elements are designed following all common standards for web-based systems.

Finally, the deliverable presents the technologies that are used for the actual software development, covering front-end, storage and processing tools. Ajax, jQuery, HTML and node.js will be used for the front end development. Data storage, management and processing will be developed upon PostgreSQL and PostGIS databases. The application layer will be built on REST technologies.

Evaluation of the deliverable: The main objective of the 3rd deliverable of the subcontract on “Design and Full Development of WebGIS Interface for using algorithmic tools” of the Melogic project, is to develop and apply a methodology for evaluating all respective functionalities of the software that has been developed. The final functionalities of the Melogic software include:

Data management

The database server stores all information relevant to the developed web GIS tool. Available resources that are provided by the server and used by the algorithms are villages (pickup points), shelters, supermarkets,

commodities, and private or public vehicles. Geographic information, such as the location of a shelter or a village, is stored as spatial data in order to be used efficiently in map oriented services. PostgreSQL is used as the main database server.

Web API

The Web API is provided through REST service protocol exposing functionalities to retrieve and update information stored at the database server are developed using PostgREST framework. Web clients can access the data, through the established authentication mechanism, using REST service protocols.

Web-GIS interface

In Melogic, an intuitive and user-friendly web GIS tool has been developed so that all developed algorithms are able to be used. The web GIS tool provides user management functionalities; a user can register and sign in to tool while the top level administrator of the tool has to grant him/her with access. The main scope of the developed tool is to provide the ability to authorities to add information related to the region under their responsibility (villages, shelters, supermarkets, etc.) and all other information in order to get a visualized solution for the evacuation and supply issues. Users have to submit all related information for each entity in order to receive optimal results. The web tool provides an easy and friendly interface using forms to edit the information, and an interactive map to locate the position of an entity on a map. Solutions to both problems (evacuation and supply) are in the form of routes (e.g. from village 1 to shelter 1) that are followed/executed by available vehicles. The route computation is managed by the routing service described next.

Routing service

For both the evacuation and supply problem solution, and after the vehicle assignment is completed, vehicles must immediately proceed to the emergency locations (shelters), or supermarkets they have been assigned to. Each vehicle can proceed to the destination, as soon as the shortest route to their final destination is provided by the routing machine. The shortest path is computed taking into account the distance or duration of the route, and is visualized to the map component of the web GIS tool. The OSRM routing machine is used to facilitate this service. Moreover, the routing service is used in order to calculate the distance and duration matrix table that is used as an input for the two solution algorithms (evacuation and supply).

Algorithms wrapper

The two developed algorithms (supply and evacuation) are developed using MATLAB. MATLAB functions are wrapped up in a .net library. A web api is built at the top of the .net library in order to provide REST services that are used by the web GIS tool to provide the results to the end users. The algorithm wrapper retrieves all the data from the database using the provided Web API, transforms the data to the appropriate structure in order to call the MATLAB functions. The algorithm result is served as JSON response to the clients (web gis tool).

The planning software tool was tested with data from Spain, Cyprus, Greece and Finland giving excellent results and it was also tested during the visit of Commissioner Mr. Stylianidis in EUC, Nicosia, Cyprus during his visit in early February 2017. Testing with data from other countries will continue, as the software tool is

open and free for use by all parties interested. Being in a server of EUC will be available upon request to be tested and the EUC will provide –for free- the necessary support.

- Value-added – in particular European value-added and transferability - of the deliverable: Even though many planning tools have been created during various initiatives, the difference here is the simple use for non-specialized users, and the algorithms that are coupling the tool. The set of tools can be expanded based on needs of operational users in order to consist a powerful, simple in use decision support system, used by professionals and volunteer organizations. The tool can be used also for planning ahead of a risk appearance and for organizing field exercises and simulation training.
- Dissemination: The software, its elements and characteristics have been disseminated through e-mails to more than 1000 relevant people in Europe – the ones that received an invitation for project final conference in Brussels. Moreover, the software use after project termination was announced in all national events in participating countries and the following months will be the epicenter of a raising awareness campaign from EUC towards many entities related to civil protection in Europe.

Description of individual deliverables: **Deliverable of Action D1: Design of Training Sessions (Theory & Practice)**

- Purpose of the deliverable: This deliverable describes the methodology, the material and the schedule of the seminars that were conducted during the training courses of MELOGIC project.
- Evaluation of the deliverable: The evaluation of the deliverable has been made by key stakeholders of emergency logistics as well as researchers that are experts in the area of disaster relief logistics.
- Value-added – in particular European value-added and transferability - of the deliverable: The value-added of this deliverable is the methodology and the content that was created in order to cover the area of disaster relief logistics. Furthermore, another important issue is that this training material was designed in such a way to fulfil the need for vocational training of the authorities and groups that are involved in a case of a natural disaster.
- Dissemination: The dissemination of the developed algorithms has been made via the training workshops that have been organized during the MELOGIC.

Description of individual deliverables: **Deliverable of Action D2: Elaboration of Training Sessions (Theory & Practice)**

- Purpose of the deliverable: The purpose of this deliverable was the development of training material for the field of disaster relief logistics. More specifically, the syllabus of the training material included the following sections:
 - Operational environment
 - Logistics processes
 - Legal status
 - ICT
 - Best practices
 - Disaster relief exercises – demonstrators

- Evaluation of the deliverable: The evaluation of the deliverable has been made by key stakeholders of emergency logistics as well as researchers that are experts in the area of disaster relief logistics. Furthermore the trainees have evaluated positively the training material developed.
- Value-added – in particular European value-added and transferability - of the deliverable: The value-added of this deliverable is training material that was created in order to cover the area of disaster relief logistics. Indeed, the material that has been developed consists of a full course on emergency/disaster relief logistics and includes a good mix of theory and practical issues in logistics operations.
- Dissemination: The dissemination of the developed algorithms has been made via the training workshops that have been organized during the MELOGIC.

Description of individual deliverables: Deliverable of Action D3: Organization of training events in operational partners' territory

- Purpose of the deliverable: All training events had the aim to familiarize the civil protection stakeholders with logistics' concepts, and elaborated material and also to identify their own needs in the field and how these could be served by the project. The context within which training took place was quite different as in Cyprus an evaluation of training material took place, in Teruel the event served the preparation of the field exercise and in Vicenza the results and lessons learnt from the field exercise were analysed and adapted to specific scenarios in a 2nd table top exercise (the 1st one took place in Teruel during the training event).
- Evaluation of the deliverable: Despite the differences in framework and implementation, all training events showed clearly the need to analyse and solve the logistic problems faced by civil protection authorities by using scientific methods and tools, replacing the empirical methods being used. The earthquakes that hit Italy near Perugia the day after the 3rd training event in Vicenza and during the dissemination seminar put even more emphasis on the effort made by MELOGIC project to optimize specific logistic procedures. To this end, the evaluation of the deliverable was positive by all partners and stakeholders.
- Value-added – in particular European value-added and transferability - of the deliverable: The training events organized in Nicosia, Teruel and Vicenza served the need to underline the emergency logistics importance for effective civil protection operations. Both at preparedness and emergency management phase, emergency logistics can be the backbone of the planning phase and operations of both state civil protection entities, as well as of organizations such as Red Cross and Caritas.
- Dissemination: The dissemination of the developed algorithms has been made via the training workshops that have been organized during the MELOGIC.

Description of individual deliverables: Deliverable of Actions E1 & E2: Planning of Small Scale pilot test & Small Scale pilot execution and Evaluation Workshop

- Purpose of the deliverable: The whole procedure till the implementation of field exercise in Teruel Spain and its evaluation aimed in optimizing the whole civil protection system in Teruel province using as leverage the emergency logistics. It is considered the major success of MELOGIC since it combined risk assessment, mapping of civil protection system needs, identification of critical logistic problems and mobilization of all key stakeholders at local, regional and even national levels. Testing of developed algorithmic tools was also a key objective since in MELOGIC project research methods and decision support tools were combined with real operational needs and local special characteristics of civil protection authorities and cooperating volunteer organizations.

Caritas Teruel with all partners' support considered collaboration between local, regional and national stakeholders as the main success. Both Civil Protection staff and national entities were willing to take part in MELOGIC project. In fact, all of them did actively interact in any of the events, especially in preparations and in the recreation of the small-scale exercise. Thus, 60 representatives belonging to 17 national entities related to Security and Civil Protection collaborated with members and volunteers from NGOs. As for further means, a total of 25 vehicles (ambulances, buses, transport trucks, helicopters and support vehicles) were used in the exercise. As for the human factor, a total of 200 people were included as crew in the intervention and observers – 115 of them where in the role of evacuees -. Thanks to the great labour with dissemination and popular involvement carried out by Caritas, MELOGIC training and its final exercise acquired a much larger dimension than initially planned.

A joint effort made by Caritas Teruel and Humlog (Hanken University) Institute was essential to develop the Report and categorization of main logistic problems in preparedness, best practices, conclusions and existing tools. Their collaboration succeed in getting a great stakeholders involvement at a local, regional and national level throughout the project The meetings with every partner along the process allowed public and private actors with responsibilities in Civil Protection and emergency management to know about MELOGIC and its goals. They were also helpful to foster active participation in the project.

Community support in MELOGIC was remarkable as Caritas Teruel counted on inhabitants in rural areas to get involved and raised awareness of the project development. Among other dissemination actions, training sessions within three days in Tramacastiel, Rubiales and El Campillo were held so as to address three main concepts. Evacuation, logistic operations during the exercise in September 2016 and Caritas desire to foster social commitment in every background, from those inhabiting rural areas to students and trainees related to emergency protocols performing for the exercise. The later were playing the role of evacuees or were integrated among the different Civil Protection and Health teams.

The preparation, execution and evaluation of the field exercise was a key mission to accomplish for the whole Teruel province before that day and after that a success story to continue...

Evaluation of the deliverable: It is very encouraging that the operational partners participating in MELOGIC with huge experience in humanitarian operations found the field exercise and testing of algorithmic tools very interesting and have the intention to exploit further MELOGIC results. Caritas Europe and its active involvement in the project means that the tools designed by MELOGIC have an international character and that they can also be applied also in developing countries, where the presence of organizations such as Red Cross or Caritas is very prominent. In this regard, Caritas Europe has shown its commitment to evaluate the

possibilities of applying the MELOGIC algorithm to logistical operations in future natural catastrophes occurring in Latin America or Southeast Asia.

To a large extent, the success of the project in the province of Teruel -and especially the exercise of logistic operations- lies in the communication and dissemination both by the community and local, regional and national stakeholders. From its origins, MELOGIC project has been open to active participation of all relevant territorial actors in of civil protection management, an issue that be determining for the future. The tools designed could be integrated into local, regional and national emergency response protocols, both in Teruel and other European territories.

□ Value-added – in particular European value-added and transferability - of the deliverable:

With regard to the added value it is especially interesting to highlight the following:

MELOGIC has contributed to emphasize the importance of civil protection emergencies in rural, mountain areas with a weak demographic structure. From partnership point of view, the tools designed in the project will be suitable not only in this type of territories but also in different points of Europe, understood as an added value in the project.

The participation of partners from different countries made it possible to compare the different civil protection structures and organizations and the way in which emergencies are dealt in Europe. It can be seen as a learning experience linked to the "European value" shown in the draft.

- Dissemination: Caritas Teruel mainly will promote a set of actions to share and leverage the data obtained from the project. Its "next steps" are aimed at encouraging local, regional and national stakeholders to collect information and best practices and to apply the tools developed by MELOGIC in other areas of Spain (and Europe through Caritas international) through field exercises. The following actions include: By the end of February 2017, a technical meeting is planned to invite all the local, regional and national administrations, departments and organizations involved in the different phases of the project - still to be confirmed-. The purpose of this round table discussion is to share conclusions about the tools (algorithm) elaborated throughout the project and also to answer arising doubts about practical applications in the future.

Online and offline media publications - both from Cáritas Española and Caritas Europa- will include articles to disseminate the results achieved during the project. Likewise, Caritas Española plans to include MELOGIC project in its best practices catalogue which is available in every Caritas point in the province. Therefore, logistic experts in Caritas Teruel who were previously participating in MELOGIC project will collaborate with those in the province willing to know and apply the results of the project in their own territories.

Finally, Caritas Europe is interested in putting into practice MELOGIC algorithm not only in European territory but also in other developing countries - especially in Latin America and Southeast Asia -. It could be useful for first interventions in natural disasters or even in a second phase in which, after the initial emergency, protocols are needed and logistic tools make in field operations easier. In this respect, both Caritas Spain and Caritas Europe have shown their compromise to disseminate the results of MELOGIC on a national and international scale. By February 2017, articles will be appearing in digital sites: <http://www.caritas.eu/tags/blog> or in the institutional magazine of Cáritas Española.

Also Red Cross Vicenza will apply the tools in their planning operations, based on the experience of field exercise in Teruel and the earthquake events in central Italy the 2nd semester of 2016.

EUC has already put online the system using the algorithmic tools using maps from Cyprus, Greece and Italy, besides Spain. Together with University of Aegean update the algorithms after project end to cover the needs of potential operational partners. In that process the lessons learnt from the Teruel exercise have been proven precious.

Description of individual deliverables: Deliverables of Task F: Publicity, Raising Awareness Campaign and Dissemination of Results

- Purpose of the deliverable:** to support partners in designing and organising project-related communication and dissemination activities, attracting publicity from stakeholders and general public. The relevant plan was elaborated proving a reference guideline, common strategies and suggestions, and coordinated tools in order to increase the effectiveness of communication activities, during and beyond the project itself. The project has its own logo, website <http://www.melogicproject.eu/> and has been spread in Facebook and social media. All 4 newsletters have been spread out reaching thousands of interested people. All promised publications have been made and even more in all kinds (scientific journals, operational ones, newspapers), media appearances exceeded all expectations and especially during the preparation and implementation of the field exercise in Teruel (radio, television, internet, newspapers), while the recognition of Melogic project team in Teruel was astonishing, due to a campaign of bilateral and multilateral meetings organized by the Spanish partner in Teruel the whole period from the Spain's partners meeting to Field Exercise implementation. All promotional material promised have been created including professional 25 minutes video of the field exercise, DVDs, t-shirts and many others. All national events scheduled were organized, the final event in Brussels took place as initially planned and the white paper reflects the project implementation methodology and the next steps in the field of emergency logistics. Melogic was also presented in another DG ECHO project final conference (EcosHaz), and in Greek 2016 National Civil Protection Conference.
- Evaluation of the deliverable:** The whole raising awareness, dissemination and publicity campaign can be judged as successful based on the measurable results and the fact that Melogic project was widely acknowledged in civil protection communities in all participating countries.
- Value-added – in particular European value-added and transferability - of the deliverable:** The specific set of actions and the ones not initially scheduled (the series of bilateral and multilateral meetings in the wider area of Teruel) show that a DG ECHO project must address all target groups, including media and local population (also citizens of all ages in villages to be evaluated during the exercise).
- Dissemination:** MELOGIC created a separate dissemination folder to be provided with the reports and the deliverables to the Commission, reflecting the huge effort in this field.

EVALUATION OF THE TECHNICAL RESULTS AND DELIVERABLES

- General lessons learnt: The most important lesson learnt was that in order to optimize a field in civil protection such as emergency logistics, you have to work together with all key stakeholders and people that influence citizens. Also, you have to look the big picture, take into consideration past events and personal experiences that are not included in plans and procedures (tacit knowledge). Doing so, the field that will be optimized will be bigger than the initial one, changes will be permanent and the revision of procedures and plans will be a regular step in civil protection system.
- Strengths: The combination of early involvement of stakeholders, support of research institutes by providing in depth analysis, scientific methodology and advanced tools, together with field exercises to test all elements was the strong point of MELOGIC. The evaluation revealed that followed methodology has excellent and permanent results in improving civil protection systems where applied.
- Possible challenges and/or improvements to be tackled through further action: Emergency logistics have many hidden aspects that cannot be seen from the very beginning (i.e. the donors in kind management), that all link the demands of general operations. Also the logistics and management of personnel (professionals and volunteers) during and after an emergency. Therefore the next steps should be in tackling various emergency logistics problems as a mean to optimize the general civil protection system / operations / planning.
- Recommendations to stakeholders, partners, and authorities in charge, National and EU institutions: All parties engaged in European Civil Protection Community must identify, analyse and try to optimize those elements that improve the effectiveness and efficiency of civil protection system the most. Logistics is one of those elements. Even though in most cases each stakeholder tries to optimize its role (due to scarcity of resources or/ and absence of guidance) and added value in civil protection system the big picture must be kept always in mind. Real events evaluation and field exercises help towards that direction.

FOLLOW-UP

- Comparison between initial and current follow-up measures: As it was promised, partners will continue working in the field of emergency logistics together with civil protection authorities and volunteer organizations. During the field exercise in Teruel, Spain, the national events and the interaction with Red Cross Vicenza that was directly engaged in the big earthquakes in Italy the last 4 months of Melogic implementation, many aspects that need further investigation arose. Examples are the management of donations in kind, the location and organization of camps logistics, the repository of goods, supplies, the mix of skills needed etc. Such cooperation has started and new project proposals will follow during 2017. Moreover, EUC in order to further invest in emergency logistics uses the decision support platform developed during Melogic to train authorities and volunteer organizations in logistic issue, with the first series of training being scheduled for end of spring 2017.
- Additional follow-up approaches: Based on the presentations made in Brussels MELOGIC final conference pinpointing regions as the optimum territorial authority to optimize emergency logistics using existing and planned infrastructures, all partners are working in the field with relevant civil

protection authorities. This shift of orientation needs joint work between public authorities, research institutes and volunteer organizations and citizens.