driver+

Driving Innovation in Crisis Management for European Resilience

SUMMARY OF THE FINAL DEMO, WARSAW, POLAND & THE HAGUE, THE NETHERLANDS

25-29 NOVEMBER 2019

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The DRIVER+ project

Current and future challenges, due to increasingly severe consequences of natural disasters and terrorist threats, require the development and uptake of innovative solutions that are addressing the operational needs of practitioners dealing with Crisis Management. DRIVER+ (Driving Innovation in Crisis Management for European Resilience) is a FP7 Crisis Management demonstration project aiming at improving the way capability development and innovation management is tackled. DRIVER+ has three main objectives:

1. Develop a pan-European Test-bed for Crisis Management capability development:
    a. Develop a common guidance methodology and tool, supporting Trials and the gathering of lessons learnt.
    b. Develop an infrastructure to create relevant environments, for enabling the trialling of new solutions and to explore and share Crisis Management capabilities.
    c. Run Trials in order to assess the value of solutions addressing specific needs using guidance and infrastructure.
    d. Ensure the sustainability of the pan-European Test-bed.

2. Develop a well-balanced comprehensive Portfolio of Crisis Management Solutions:
    a. Facilitate the usage of the Portfolio of Solutions.
    b. Ensure the sustainability of the Portfolio of Solutions.
3. Facilitate a shared understanding of Crisis Management across Europe:
    a. Establish a common background.
    b. Cooperate with external partners in joint Trials.
    c. Disseminate project results.

In order to achieve these objectives, five Subprojects (SPs) have been established. **SP91** ***Project Management*** is devoted to consortium level project management, and it is also in charge of the alignment of DRIVER+ with external initiatives on Crisis Management for the benefit of DRIVER+ and its stakeholders. In DRIVER+, all activities related to Societal Impact Assessment are part of **SP91** as well. **SP92** ***Test-bed*** will deliver a guidance methodology and guidance tool supporting the design, conduct and analysis of Trials and will develop a reference implementation of the Test-bed. It will also create the scenario simulation capability to support execution of the Trials. **SP93** ***Solutions*** will deliver the Portfolio of Solutions which is a database driven web site that documents all the available DRIVER+ solutions, as well as solutions from external organisations. Adapting solutions to fit the needs addressed in Trials will be done in **SP93**. **SP94** ***Trials*** will organize four series of Trials as well as the Final Demo (FD). **SP95** ***Impact, Engagement and Sustainability***, is in charge of communication and dissemination, and also addresses issues related to improving sustainability, market aspects of solutions, and standardisation.

The DRIVER+ Trials and the Final Demonstration will benefit from the DRIVER+ Test-bed, providing the technological infrastructure, the necessary supporting methodology and adequate support tools to prepare, conduct and evaluate the Trials. All results from the Trials will be stored and made available in the Portfolio of Solutions, being a central platform to present innovative solutions from consortium partners and third parties, and to share experiences and best practices with respect to their application. In order to enhance the current European cooperation framework within the Crisis Management domain and to facilitate a shared understanding of Crisis Management across Europe, DRIVER+ will carry out a wide range of activities. Most important will be to build and structure a dedicated Community of Practice in Crisis Management, thereby connecting and fostering the exchange of lessons learnt and best practices between Crisis Management practitioners as well as technological solution providers.

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1. Background

A Trial is an organised and systematic process of searching for innovation in Crisis Management. This process is to be prepared, executed and evaluated in line with the **Trial Guidance Methodology (TGM)** with support of the **Test-bed Technical Infrastructure (TTI)** and the **Trial Guidance Tool (TGT).** These three elements are designed in order to assist a Trial Owner to realize this challenge in a way which provides a realistic environment for testing innovative solutions.

A Trial should be tailored for finding innovations that show potential to limit or cover identified Crisis Management Gaps related to Crisis Management Functions. However, to achieve this ambitious goal in a manner which enables relevant and representative results, it is important to organise a Trial in conditions as realistic as possible in order to minimise research biases. The TGM, as a systematic and research-based method, assists Trial Owners in this challenge. Further, the TTI facilitates creating a realistic set-up for that purpose. A Trial Owner is also actively supported by a Trial Committee including the Trial Host who is, in case of all the Trials, a crisis management institution. The Trial Committee is a Trial organisational body which consists of experts supporting the TGM and Test-bed infrastructure implementation, coordination of solution providers and practitioners. The Trial Committee is permanently working with the Trial Owner through the entire process of the Trial organisation.

Therefore, a Trial aims to actively involve Crisis Management practitioners in the search for innovation which meets their expectations. Gaps are revealed and defined by them on the basis of their experiences and problems they face in the realisation of their missions. These expectations and gaps are to be met and covered (partially or completely) by solution providers who address them with their solutions. By the inclusive approach of the DRIVER+ Trial organization it is possible to reach out to external organisations (solution providers and CM practitioners) to enhance external cooperation and shared understanding. Broad involvement of these two groups at a relatively early stage of a Trial organization facilitates building a common platform. Furthermore, it enhances the understanding between those groups, which provides positive prospects for fulfilling their expectations, as well as achieving the main aim, to find and adopt innovation in Crisis Management.

It is important to underline that the briefly described process of the Trial implementation during the project period has been done in order to test, verify and improve the project outputs, i.e. the Trial Guidance Methodology (TGM), the Test-bed Technical Infrastructure (TTI) and the Trial Guidance Tool (TGT). This made it ready for an effective and sustainable utilization after the project's end. Building, testing and maintaining this concept beyond the project will create a universal solution for assessing innovative solutions for Crisis Management that is both practitioner driven and research-based.

The last Trial concluding a series of DRIVER+ Trials, called **the Final Demo,** took place from **25 to 29 November 2019** in two cities and in three different locations: Warsaw, Poland, at the Main School of Fire Service (SGSP) and at the Space Research Centre of the Polish Academy of Sciences (SRC PAS), and in The Hague, the Netherlands, at the Safety Region Haaglanden (SRH). The organisation was a shared responsibility between the Trial Owner (SRC PAS) and the Trial Host (SGSP). The event has been tailored to the needs of the main end-user, being the **Emergency Response Coordination Centre (ERCC).**

The Final Demo involved 155 persons from 17 countries: 145 of them were located in Warsaw and 10 participants in The Hague. Of this group, 113 participants were directly involved in the Final Demo preparation and execution, and 42 persons were observing and documenting the event. Since the scenario was addressing information exchanges among **Union Civil Protection Mechanism (UCPM)** entities (including

ERCC, expert based coordination teams (EUCPT)[1] and certified **Response Capacities** of **the European Civil Protection Pool**), only participants and observers with adequate experience were selected.

The **general purpose** of the Final Demo was to improve cooperation and coordination among agencies and organisations, using innovative solutions, and providing a Common Operational Picture to support handling large scale crises outside the EU.

Figure 1.1: Two out of seven simulated command posts of Final Demo

2. Context

This section presents the practitioners' needs (gaps) which the selected solutions aimed to address, the research questions guiding the Final Demo overall process, as well as the scenario on which the Final Demo realisation is based.

2.1 Crisis Management Gaps

In DRIVER+, a capability gap is understood to be "the difference between a current capability and the capability considered necessary for the adequate performance of one or more disaster management tasks."[2] The list of three Crisis Management capability gaps proposed by Final Demo practitioners is presented below, with the first as highest priority:

- Gap 1: Shortcomings in interoperability in the ability to exchange crisis-related information among agencies and organisations.
- Gap 2: Lack of a "Common Operational Picture" to integrate data sources and calculation results from different models crucial for the decision-making process.
- Gap 3: Limitations in the ability to merge and synthesise disparate data sources and models (e.g. historic events, spreading models, tactical situation, critical assets map) in (near to) real time to support decision making.

All these gaps have been discussed and validated during the DRIVER+ gaps assessment workshop[3] in January 2018 and subsequently confirmed during two thematic workshops with the ERCC.

[1] European Union Civil Protection (coordination) Team, supported by the Technical Assistance and Support Team (TAST). The TAST capacity was role-played by a team consisting of geoinformation specialists and solution operators tasked for helping practitioners to efficiently use the innovative solutions.

[2] ECORYS and TNO for European Commission DG HOME. First Responders - Identifying capability gaps and corresponding technology requirements in the EU. January 2016.

[3] DRIVER+ Project. D922.11 List of CM gaps. March 2018

2.2 Main Research Questions

The main research questions driving the FD process are the following:

RQ 1.1: How to combine information from different operating actors to increase the EUCPT and the EUCP Modules' situational awareness?

RQ 1.2: How to optimize communication between descending and ascending (taking over) EUCP Teams?

RQ 2: How to optimise the EUCPT to ERCC situation reporting?

RQ 3: How can access to recent geoinformation data and related analytical products affect the decision-making processes of the EUCPM Response Capacities?

2.3 Scenario outline

The Final Demo was executed as a command-post (in-door) event run in parallel in three physically distant locations. It was focused on information exchanges between UCPM entities, therefore all activities below the Response Capacity commander level were simulated by the FD simulation team. The scenario was created in the TTI and was administered semi-automatically via the Trial Management Tool (TMT). Actions were taken by the participants in a realistic information environment, based on currently available legacy tools and means, rescue procedures and good practices of the FD practitioners.

Scenario realism (and participants immersion) was facilitated by including as many as feasible realistic elements, such us reports from the field, ambient communication to support authenticity, the fire progress and crises development visualised on a map describing the whole fictional country Driverstan.

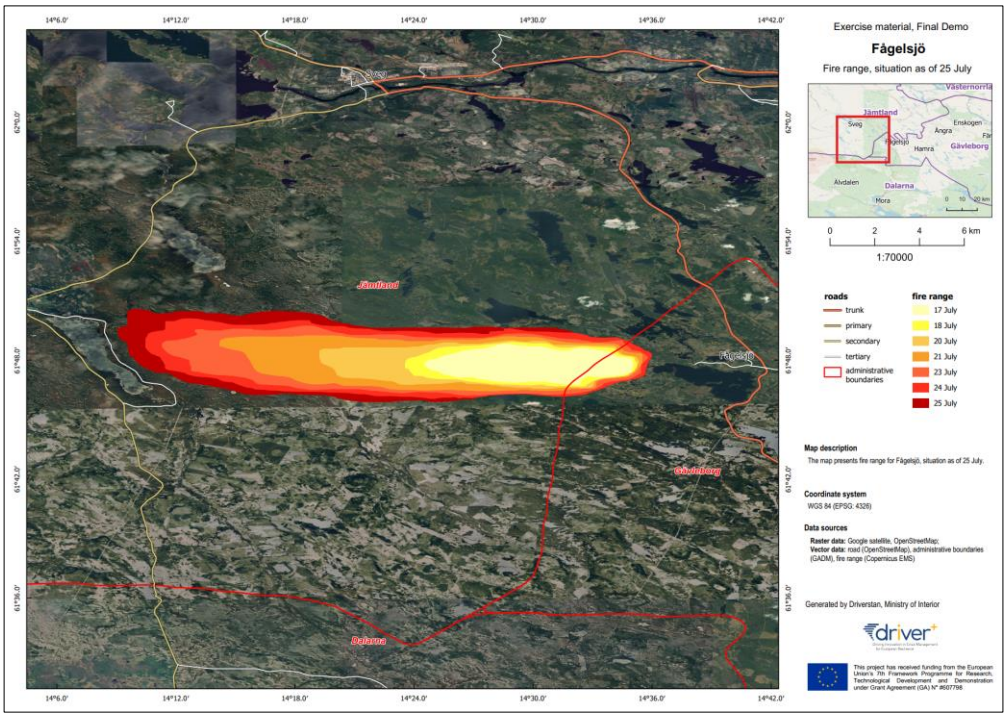

Figure 2.1: Visualisation (a print-ready map) of the fire extent[4]

Based on the objectives described above, the scenario initially revolved around a forest fire spanning across a neighbouring EU country. In the second part it was broadened by the discovery of an endangered illegal refugee camp and the resulting cascading effects like the coordination of medical evacuation by aircraft. Some activities not directly related to the assessment of trialled innovations were included to increase the

[4] This fire extent depicts the fire progression in Fågelsjö area, based on data from Copernicus EMS activations in Sweden, 2018. For the FD some data was altered or added, and artificial fires were created.

realism, as those activities are typical distractions during in-situ UCPM coordination (such as organising a briefing for VIPs, negotiating with local authorities, making press releases and attending press conferences).

Scenario setup

From organisational point of view, both scenario phases were divided into smaller blocks, called sessions. The sessions were further divided in episodes to structure the data collection processes and allowing better scenario control and facilitation. In total, five episodes were realised within four sessions. The first session was a semi-realistic warm up session, during which the participants could acknowledge and adjust operational procedures when using innovative solutions. It was also used to present and explain the differences between a Trial and a CPX MODEX exercise (which participants are used to).

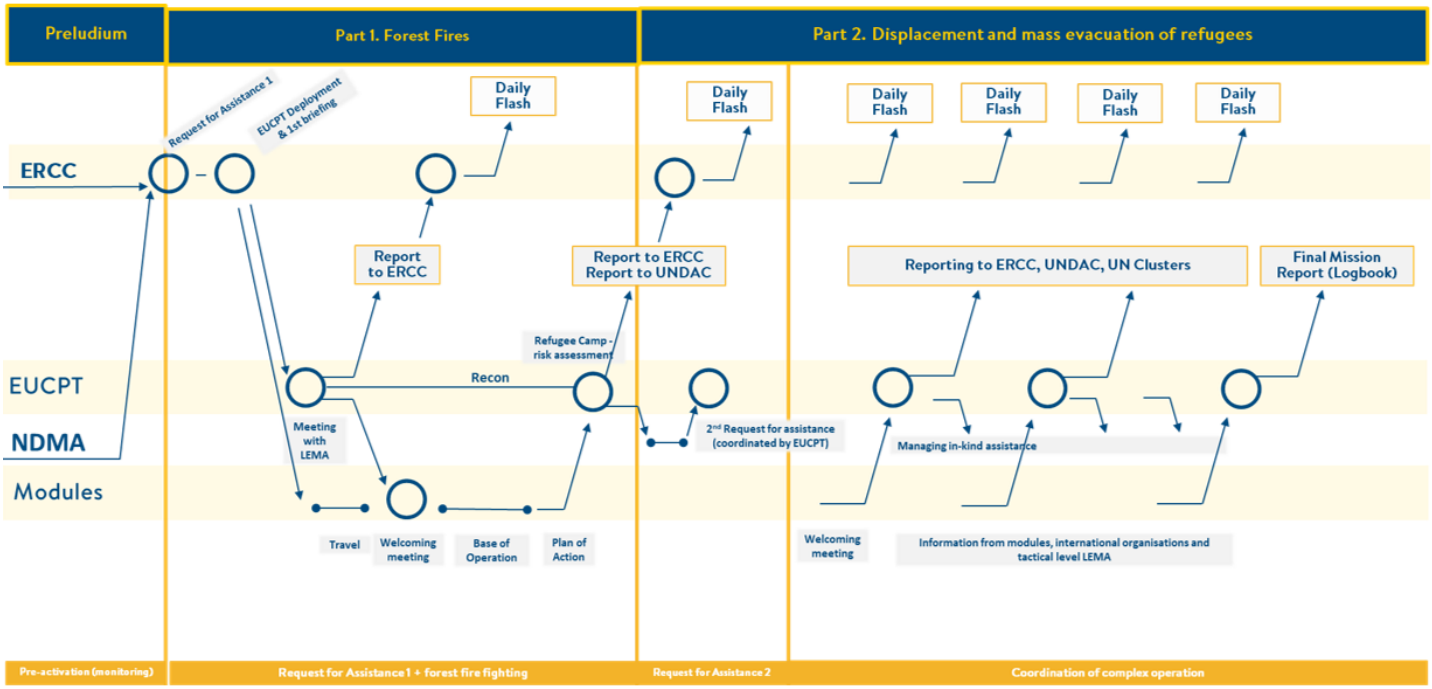

Figure 2.2: Final Demo scenario workflow

3. Solutions

After passing the selection process, the Dry Run 1 and Dry Run 2, five solutions were implemented in the Final Demo. Three of them (CrisisSuite, Drone Rapid Mapping and vieWTerra Evolution) were provided by non-DRIVER+ partner companies, while the other two (Socrates OC and Field Reporting Tool) were from project partners.

CrisisSuite (provided by Merlin Software B.V., the Netherlands), served as main platform for logging actions and decisions and requesting and exchanging standardised reports, performing the following main functions:

- Host CM plans and documents.
- Support the logbook(s) for sharing of vertical and horizontal information.
- Support the resource pooling information (related with CECIS).
- Display the Situation map.
- Help generating Situation Reports and other standard forms

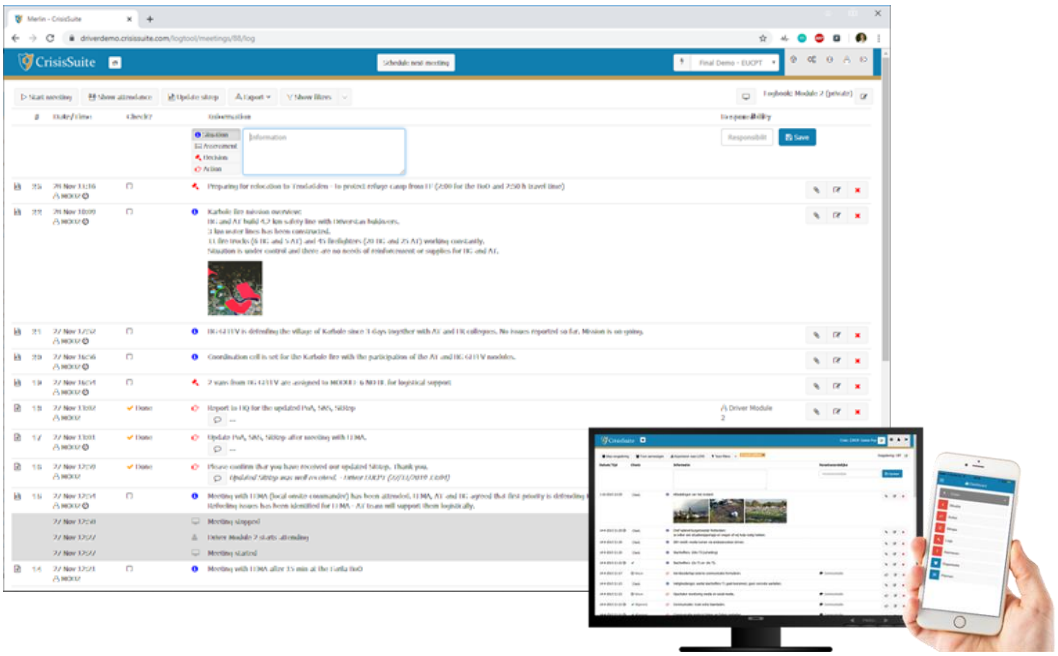

Figure 3.1: ERCC logbook during Final Demo and mobile interface of CrisisSuite

Socrates OC (provided by GMV, Spain), serving as primary COP, performing the following main functions:

- COP tool with geographical focus.
- Enable map-based situation management related to hazards, infrastructure and resources.
- Share its COP with other solutions (CrisisSuite, vieWTerra Evolution).

Figure 3.2: View on Final Demo Socrates OC map situation

vieWTerra Evolution (provided by VWORLD, France), performing the following main functions:

- Display 3D model of area.
- Display Socrates OC map situation in 3D view.
- Enable terrain analysis.

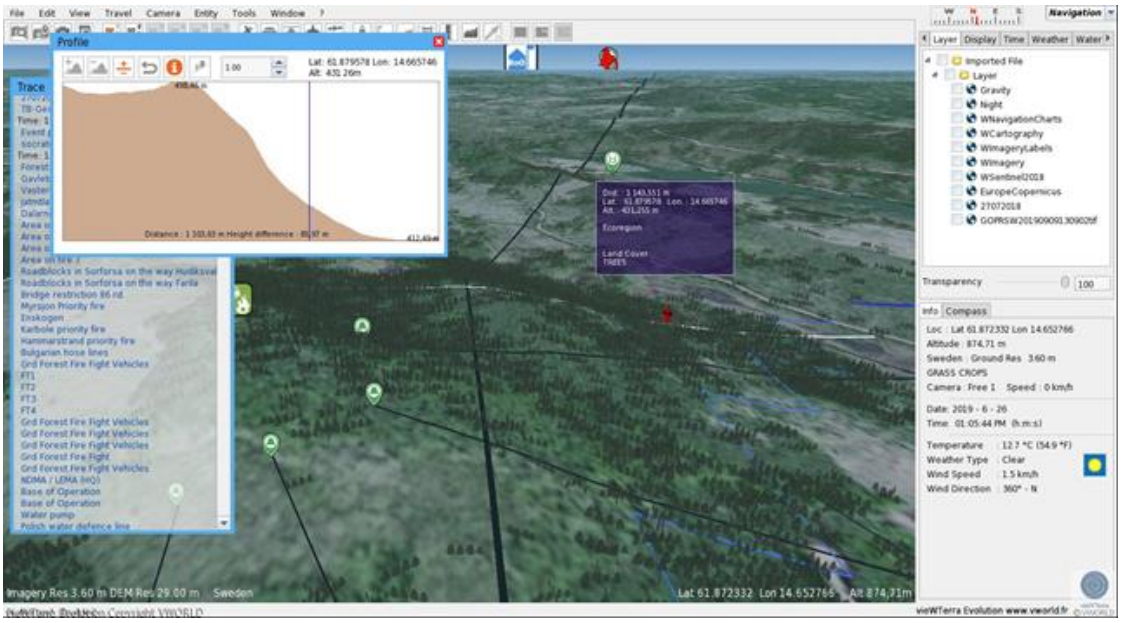

Figure 3.3: vieWTerra Evolution 3D map of the Final Demo situation

Drone Rapid Mapping (provided by Creotech Instruments; Poland), performing the following main functions:

- Process drone data for generation of high resolution orthophoto maps as images of WMS layers.
- Process drone data for generation of high-resolution 3D terrain models (photogrammetry).

Figure 3.4: 3D visualisation generated by DRM from drone images *(left)* **and DRM processing unit** (right)

Field Reporting Tool (provided by Joint Research Centre; European Commission), performing the following main function:

- Send geo-located pictures, voice messages and text reports from the field.

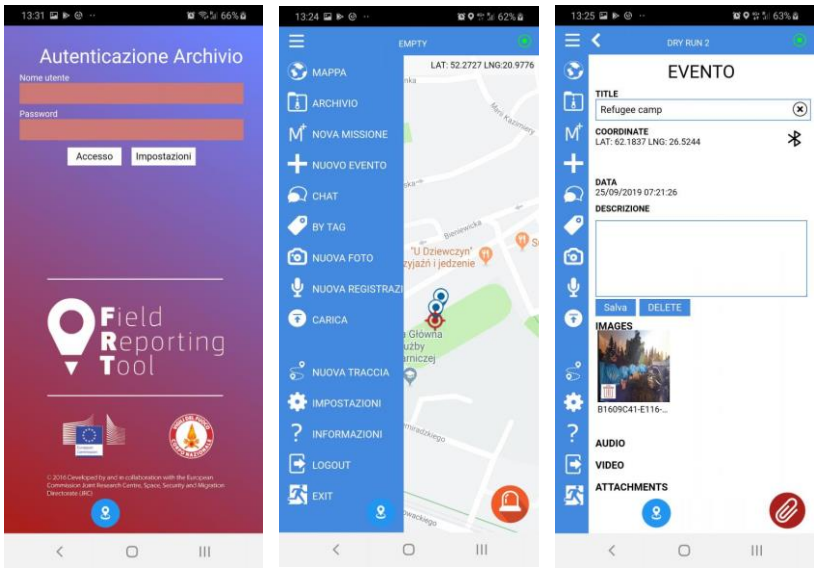

Figure 3.5: Field Reporting Tool solution used by simulation team to generate field reports
(1: logging screen; 2: general map view; 3: report creation view)

4. Results

The results are structured along three dimensions: the Trial dimension, the solution dimension and the Crisis Management dimension. The **Trial dimension** relates to the Trial organisation: everything that has to do with the Trial run in very "hands-on" manner is part of this dimension. The **solution dimension** tackles all functionalities as well as the usability of each solution that is trialled. The most important dimension is the **Crisis Management dimension**, because this is looking at the potential impact a solution has on the selected CM gaps.

4.1 Trial Dimension

The data were collected with questionnaires, which were filled in by the practitioners (ERCC, EUCPT and CP Modules) and the observers. The major outcomes related to the Trial dimension confirm that the participants' number, background and commitment supported the FD adequately. The main organisational challenge was the practitioners' time they can devote to the execution of the scenario. Furthermore, the Test-bed Technical Infrastructure and its components worked well without major issues.

4.2 Solution dimension

The objective of this evaluation in the solution dimension is, for each innovative solution, to provide a detailed answer to the question "Does the selected solution fulfil the expected functions during the Trial?" In order to focus strictly on the gaps selected for the Final Demo, not all of the solutions' functionalities were evaluated.

CrisisSuite: The solution was primarily used for logging actions and decisions, sharing information (logbooks) vertically and horizontally within the chain of command, and generating reports. It also replicated the situation map. Practitioners rated CrisisSuite as having a great potential, and it was highly appreciated for its ease of use. The ability of CrisisSuite to log decisions and support sharing of information was positively perceived by the practitioners.

Socrates OC: The solution was primarily used for the map-based management of the situation and the resources. Socrates OC was recognized as a promising solution and easy to use. Its map view provided useful detailed information to the practitioners.

***vieWTerra Evolution*:** The solution was primarily used for its capability of 3D visualisation of the terrain and situation, and the corresponding 3D analysis. VieWTerra Evolution was perceived as a promising solution and much appreciated for the support it provided to the very specific task it was used for (positioning of Base of Operations and planning the water supply lines).

Drone Rapid Mapping: The mobile processing unit enabled acquiring 3D maps and 2D hi-resolution shareable layers of areas of interest from imagery acquired by a light drone. Its products allowed a better understanding of a terrain even before the Module arrived in the area. The solution received strong positive feedback on its ability to provide information faster, more reliably and in more detail than currently possible. Overall, the solution was praised for its potential and innovativeness.

Field Reporting Tool: The solution's main role was to share reports (georeferenced photographs with commentary) from the refugee camp to vieWTerra Evolution and CrisisSuite solutions. As the Final Demo was an indoor event, the actual use of FRT was limited to the use of the outcomes of this solution by the practitioners.

Overall, the solutions provided the expected functions. Additionally, the Final Demo provided useful and practical feedback to solution providers for specific task oriented adaptations enabling their solutions to be implemented fully operationally.

The whole set of solutions and their interoperability was perceived as a rather positive support to the overall tasks to be accomplished, especially in terms of speed. Although information was spread or duplicated among several solutions, practitioners got a clear picture of how information was shared. Generally, the high maturity of the individual solutions was probably a success factor.

4.3 Crisis Management dimension

The main outcomes in the Crisis Management dimension are that the trialled solutions demonstrated their potential to facilitate closing Gap 1 'Shortcomings in interoperability in the ability to exchange crisis-related information among agencies and organisations' and contributed to closing Gap 2 'Lack of a Common Operational Picture to integrate data sources and calculation results from different models crucial for the decision-making process' and Gap 3 'Limitations in the ability to merge and synthesise disparate data sources and models in (near to) real time to support decision making'. These observations are limited to the Trial specific conditions.

For the **information exchange between the ERCC and the EUCPT** there is some added value observed on the EUCPT site. The innovative solutions demonstrated to bring some extra potential in the formatting criterion in case of reusing briefing materials received before deployment from the ERCC. This improvement costs a bit more effort of the ERCC, however, this extra effort is most likely to be reduced when the ERCC would have been able to better familiarize with the new solution.

In the **communication flow** from the EUCPT to the ERCC being realized in a form of Situational Report, the innovative solutions show some extra potential regarding usability and structure. The ERCC regarded the innovative solutions more usable than the current legacy tool; however, at the same time the EUCPT has to dedicate more effort to use the solutions in order to produce the SitRep. This could be caused by a potential lack of sufficient training and familiarisation.

As it comes to the effort dedicated by the EUCPT on **structuring the SitRep**, the new solutions provide added value by reducing this effort, and at the same time the SitRep is perceived by the ERCC as better structured compared to using the legacy tool. These conclusions mainly cover the use of CrisisSuite. It is worth to underline that the SitRep produced by the current legacy tool is still meeting the expectations from the ERCC. The main room for improvement seems to be on reducing the EUCPT effort needed to generate and share the SitRep.

When looking at the **information exchange between the EUCPT and the Modules**, it can be stated that the information flow to the Modules is perceived as very beneficial. It requires lower efforts by the EUCPT and leads to a higher result for the Modules. It demonstrates high potential of the innovative solutions during

briefings for the Modules which is currently not always fully clear and structured. The information flow from Modules to the EUCPT is perceived less beneficial. However, the feedback of the practitioners suggests that the innovative solutions for the status updates from the Modules to the EUCPT have a high potential.

4.4 Answers to the main Research Questions

RQ 1.1: How to combine information from different operating actors to increase EUCPT and EUCP Modules situational awareness?

During the Final Demo the common information environment was created by the solutions CrisisSuite, Socrates OC, vieWTerra Evolution and the Field Reporting Tool. For the purpose of assessing the potential of the trialled solutions, taking into account that information varies considerably in form, the information flow was validated according to the following criteria: usability, editability, formatting, searchability, structure, visualisation, and relevance of produced and received information.

For the preparation and sharing of the initial briefing documents, the efforts appeared to be higher compared to the use of legacy systems. At the same time, the benefits were perceived as rather low when using the innovative solutions. The main reasons seem to be: (1) the variety and flexibility of the legacy systems (technical, organisational), (2) the fact that the innovative solutions were not fully adjusted to the needs, and (3) the lack of (training) time to familiarise with the solutions. This reinforces a strong natural habit of using the legacy tools which are commonly utilised in working routine.

The innovative solutions were recognized as having an added value by making the information easier to edit for own purposes. The *editability* showed decreasing effort on producing and giving the briefings. Furthermore, the briefing materials were assessed as better by those who receive it (in the sense that these were easier to be further edited). Moreover, almost all of the surveyed criteria indicated a high potential of the innovative solutions to be used in communication. Even though, the *effort* dedicated to produce information and the *effort* to digest briefing information are in all cases (besides above mentioned *editability*) higher. The result, understood in terms of how the information facilitates an action, is perceived as much better. This indicates a high potential of the innovative solutions for improving the quality and efficiency of briefings organized at operational level.

RQ 1.2: How to optimise communication between descending and ascending (taking over) EUCP Teams?

The innovative solutions facilitated an adequate and efficient transfer of information to the upcoming teams before a new EUCPT deployment. It provided the opportunity to be better prepared for the mission as well as decreased time pressure and potential stress when preparing for the mission. The results show that the innovative solutions did lead, in most cases, to a higher increase of the perceived *results* (benefits) with only a slight increase of the required *efforts*. This suggests that if the practitioners would use the innovative solutions during a longer period, gaining more experience in operating them, the effort could be comparable (or even less) to producing information in a legacy system, while the final product could bring higher added value on the side of the receiver.

RQ 2: How to optimize EUCPT to ERCC situation reporting?

Situational reports are a form of regular information exchange. Optimising the reporting process should be based on efficient preparation of a set of data which could be transferred between EUCPT and ERCC. This could be realised by the systematic collection of all data during the entire mission cycle, analysing them (e.g. in order to filter the important ones), processing them into more adequate information (e.g. by producing informational synergies better matching the receiver's requirements) and presenting them in the best possible way in a structured form. Using CrisisSuite appeared very promising in this respect.

The main findings suggest that the SitRep needs from the ERCC are met by both the legacy system and the innovative solutions. However, the perceived *efforts* for the EUCPT working with the innovative solutions have increased significantly, although the data suggest that a learning effect lowers this increase.

RQ 3: How can access to recent geoinformation data and related analytical products affect the decision-making processes of EUCP Modules team leaders?

The exchange of the status updates with a possibility to use geoinformation, seems to offer only limited added value. In most cases the efforts to generate the messages are perceived lower, while the perceived benefits have decreased. However, the practitioners recognised that the trialled solutions bring some added value in *structuring* the information prepared as a status update. This is based on the observation that there was less effort dedicated by the EUCPT in using the innovative solutions to structure the information product, which actually brought better results to the Modules when they arrived on the scene. Moreover, the innovative solutions provided added value by making the process of searching for specific data easier, while the needed effort remained the same.

5. Conclusions and policy recommendations

The FD has met its objectives by the active involvement of Crisis Management practitioners at the EC-level in searching for the innovation that meets their expectations. Trialling five promising solutions in the context of a cross-border crisis allowed the practitioners to test the solutions in a close to real environment. The Test-bed proved a useful environment to plan and execute the FD in line with the TGM. The FD has led to collecting data which enabled answering a set of research questions and through that proved the solutions' innovative functionalities which revealed to cover the identified gaps to certain extent.

The results clearly indicate the potential of the innovative solutions to improve communication between EUCPT and CP Modules. The improvement in quality of communicated information and efficiency of information exchange would be relevant to the provision of an initial set of information, regular briefings for Modules, and a rapid provision of situational updates. The appropriate developments should in particular focus on adoption of common interoperability standards for information exchange. They should also aim at optimisation of user interfaces and information processing methods to decrease effort required from the operator. Using new solutions in information management could also optimise the time spent by the EUCPT and/or CP Modules while travelling to the disaster stricken country. Having a common information space shared by multi-stakeholders will work out for a better situational awareness through a common operational picture shared by all involved actors.

The Trial Guidance Methodology may be applicable for the evaluation of the civil protection exercises and training courses, as it helps to make the evaluation results more objective. Furthermore, such systematic evaluation process could support the planning of upcoming UCPM exercises and training courses, especially in respect to following up on lessons identified. Elements of the TGM and its systemic approach may also be used for the purpose of conducting evaluations of real civil protection and humanitarian aid missions, facilitating the conduct of lessons learnt sessions.

The Final Demo findings address mainly two EU policies the UCPM is involved in:

- **Civil protection:** the Commission coordinates the response to disasters worldwide by pooling civil protection resources from countries in the EU Civil Protection Mechanism.
- **Humanitarian aid:** aid is delivered to victims of humanitarian crises and disasters based on the needs of affected populations by funding humanitarian projects carried out by non-governmental humanitarian organisations, UN agencies and the Red Cross.

Within this scope it is possible to formulate recommendations related to optimisation of information exchange among different UCPM elements.

a) Establishment of a dedicated IT system aimed at facilitating information exchange between EUCPT and UCPM Modules should be considered as an element of establishing the rescEU capacities in line with the relevant Commission Implementing Decisions. To ensure maximum efficiency of such a system, the appropriate technical interoperability standards should be defined and operational procedures for its use should be developed.

b) The EUCPT–ERCC information exchange may benefit from the establishment of such a Common Information Space. The effectiveness of communication between these entities is already very high and the expected improvement would be mainly related to decreasing effort on information processing and report preparation in the EUCPT. The appropriate requirements should in particular emphasise optimisation of user interfaces and information processing methods.

Improvement of the information management processes by more effective preparation and exchange of information products on both operational and strategic levels will have a direct positive influence on the efficiency of UCPM response as a whole.