driver+

Driving Innovation in Crisis Management for European Resilience

D942.25 REPORT ON THE APPLICATION OF THE SOLUTIONS IN FINAL DEMO

SP94 - TRIALS

DECEMBER 2019 (M68)

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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 an 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.

Executive summary

The main objectives of this document are to describe the application of solutions in the Final Demonstration (FD) of DRIVER+, the main functions of the solutions which were applied, the preparation activities for the FD and the way these solutions were finally integrated into the crisis management (CM) procedures of the participating practitioners during the FD itself. This deliverable is aimed at non-technical readers interested in the FD and Trials in general. It is focused on the application of solutions and closely connected to the upcoming **D947.12** ***Report on Trial evaluation – Final Demonstration*** (M72/April, 2020), the DRIVER+ deliverables **D947.11** ***Report on Trial Action Plan - Final Demonstration*** (M70/February, 2020). The selection process was specific to the Final Demonstration as participating solutions were selected among the already trialled solutions.

The general purpose of the FD was twofold. After four DRIVER+ Trials conducted successfully, the first aim of the FD was to demonstrate the trailing process itself to the relevant stakeholders at EU level. However, the FD was more than only a demonstration activity: it could be regarded as a Trial itself, and even one of the most complex in terms of scenario. The main focus of the FD was on the exchange at the highest European level of coordination, namely between ERCC (Emergency Response Coordination Centre) and EUCPT (European Union Civil Protection Team) during a crisis in a country located outside of the EU where the EUCP Mechanism is activated and Civil Protection Modules from several member states are deployed. The multinational aspect was one of the key aspects of the Final Demonstration which involved practitioners from several nationalities during the Trial located in two locations in Poland and in one location in the Netherlands.

The FD was coordinated by SRC and SGSP and was conducted as a table-top Trial at the premises of SGSP (Warsaw), SRC (Warsaw) and SRH (The Hague). The scenario covered a forest fire with cascading effects resulting from the discovery of an unknown refugee camp in the forest.

Highly qualified CM practitioners from ERCC and Member States (MS), with strong experience in the EUCP Mechanism, EUCPT and Modules, were involved to work with and evaluate the solutions.

The following solutions were applied during the FD:

- CrisisSuite (from Merlin Software B.V.) which provided logbook, information sharing and report generation functionalities.
- Socrates OC (from GMV) which provided situation map management functionalities.
- vieWTerra Evolution (from VWorld) which offered 3D visualisation of the situation and terrain analysis functionalities.
- Drone Rapid Mapping (from Creotech Instruments) which provided generation of orthophotomaps and photogrammetry from drone images.
- Field Reporting Tool (from JRC) which provided geo-located text and image reports from the field.

Further details of these solutions can be accessed via the DRIVER+ Portfolio of Solutions website (https://pos.driver-project.eu/en/PoS/solutions).

Although the FD is the last DRIVER+ Trial, this document draws lessons learnt from the experience of the FD, which may be useful for post DRIVER+ Trials.

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List of Acronyms

Acronym	Definition
3D	3 Dimensions (of space)
4D	4 Dimensions (of space, plus time)
AC	Alternative Current
AFFF	Aerial Forest Fire Fighting
ATV	All Terrain Vehicle
BoO	Base of Operation
C3	Command, control and coordination
CAP	Common Alerting Protocol
CCIM	Crisis Communications and Information Management
CECIS	Common Emergency Communication and Information System (European Commission)
CM	Crisis Management
CME	Crisis Media
CM Function	Crisis Management function as identified in the DRIVER+ Taxonomy
CMMI	Capability Maturity Model Integration
CNVVF	Corpo nazionale dei vigili del fuoco
COP	Common Operational Picture
CS	CrisisSuite
DIAS	Data and Information Access Services
DR1, DR2	Dry Run 1, Dry Run 2
DRM	Drone Rapid Mapping
EC	European Commission
ECML	European Crisis Management Laboratory
EFFIS	European Forest Fire Information System
EMSI	Emergency Management Shared Information (ISO/TR 22351:2015)
ERCC	European Response Coordination Centre
EU	European Union
EUCPM	European Union Civil Protection Mechanism
EUCPT	European Union Civil Protection Team
EXCON	EXercise CONtrol
FD	Final Demonstration

Acronym	Definition
FRT	Field Reporting Tool
GIS	Geographic Information System
IT	Information Technology
LAN	Local Area Network
NDMA	National Disaster Management Authority
NL	The Netherlands
OC	Operation Centre
OGC	Open Geospatial Consortium
OS	On Scene
PC	Personal Computer
PL	Poland
R&D	Research and development
REA	Research Executive Agency
RPAS	Remotely Piloted Aircraft System
SDK	Software Development Kit
SITREP	Situation Report
SOC	Socrates OC
TAST	Technical Assistance Support Teams
TGM	Trial Guidance Methodology
TIM	Trial Integration Meeting
TRL	Technology Readiness Level
TTI	Test-bed Technical Infrastructure
UN OCHA	United Nation Office for the Coordination of Humanitarian Affairs
VOSOCC	Virtual On-Site Operations Coordination Centre
VT	vieWTerra Evolution
WMS	Web Map Service
WMTS	Web Map Tile Service

1. Introduction

This document reports on the work done and the results of the task **T942.2** ***Applying solutions in the trials*** for the Final Demonstration (FD). The main objectives of this task are to ensure that selected solutions are ready to be used in Trials, which includes:

- Adapting and configuring the solutions as required by the Trial Committee or practitioners for its usage in the Trial.
- Deploying solutions and supporting their usage during the Trial.

The main output of this task is a set of adapted solutions, offering the planned functions, supporting the Final Demo specific data, configured and deployed in the targeted technical set-up (rooms, network) and made available to participants for evaluation during the Final Demo.

The **main objectives of this document** are to describe the solutions used during the Final Demo, explain the preparation work and discuss how the prepared solutions did perform during the Final Demo execution phase. It aims at drawing lessons learnt which will contribute to the final updates of the TGM for future application of the methodology after DRIVER+.

The **intended audience** of this document are non-technical readers interested in the FD set-up and context, and Trials in general. This document is complementary to the FD evaluation report (1), and the Trial Action Plan (2).

In order to avoid redundancy, some information which is helpful for the understanding of this document, but are already part of other documents, are not included in this deliverable:

- The description of the Final Demo, its objectives, gaps, research questions, the selection process and results, and the scenario, which is described in (2).
- The description of Test-bed Technical Infrastructure related adaptations made on solutions can be found in (3).
- The trainings on the selected solutions are reported in (11).

The document is structured as follows:

- After this introduction, Section 2 presents an overview of the solutions in the Final Demo as a whole, where they were deployed (physically and organisationally), which major functions they were covering, what information they were processing in the Final Demo and the main challenges faced during the preparation of the solutions. Section 2 presents the solutions individually. It is divided in three sub-sections:
  - Section 2.1 describes innovative solutions and discusses their roles, functional scope, planned activities and adaptations made for the FD (other than Test-bed Technical Infrastructure related adaptations).
  - Section 2.2 describes the preparation stages of integration and the Dry Runs which occurred before the execution of the Final Demo.
  - Section 2.3 discusses the application of solutions during the execution of the FD, the organisation of the technical support, deployment of solutions and the observation of performance.
- Section 3 discusses the achievements and lessons learnt of the preparation and execution of the FD.

2. Application of the solutions

2.1 Gaps addressed and scenario context

As described in (4) three gaps were defined and served as a basis for the definition of the scenario and the selection of solutions:

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

Together with practitioners of different disciplines a forest fire scenario was developed to address these gaps in the most realistic way.

The scenario deals with large forest fires spreading in a fictional, non-EU country, Driverstan. National response capabilities are not sufficient to manage the fire and a request for assistance is issued by the Driverstan's authorities and EUCPM is activated. Modules and assets are offered by the Member States. Upon acceptance of the Modules, Driverstan's National Disaster Management Authority (NDMA) is working closely with EUCPT on site. As the response is going on, one of the Modules discovers a non-official refugee camp in the forest, which put the focus on the humanitarian dimension. The scenario deals with the response phase and focuses on information exchange among the EUCP Modules, EUCPT - closely linked to the Technical Assistance Support Teams (TAST) - and NDMA, as well as situation reporting to ERCC.

This scenario is presented in detail in (1).

2.2 Solutions overview

This section provides an overview of the solutions in the FD as a whole, where they were deployed (physically and organisationally), what major functions they were covering, and what information they were processing.

The legacy solutions applied during the baseline runs are the following:

- VOSOCC (5).
- CECIS.
- WhatsApp.
- Mail.

The innovative solutions which were selected to be applied during the innovative runs of each session are the following:

- CrisisSuite (CS).
- Socrates OC (SOC).
- vieWTerra Evolution (VT).
- Drone Rapid Mapping (DRM).
- Field Reporting Tool (FRT).

The selection of the innovative solutions to be applied in the FD was not based on an open call. The FD was to use solutions which had been already trialed in DRIVER+, and were in adequacy to the FD's gaps and research questions.

In addition, FRT which had not been used in a previous DRIVER+ Trial was included on JRC's request after the FD Trial Committee made sure it reached the selection criteria for the FD in terms of alignment with the scenario's needs.

Table 2.1 presents the correspondence between selected innovative solutions and the FD's gaps.

Table 2.1: Selected solutions and relevant gaps

Solution name	Solution provider	Relevant gap (s)
Drone Rapid Mapping	Creotech Instruments S.A.	Gap 3, Gap 2
vieWTerra Suite (external)	VWORLD / France	Gap 3, Gap 2
Socrates OC	GMV	Gap 1, Gap 2
Crisis Suite	Merlin Software B.V.	Gap 1, Gap 2
Field Reporting Tool	JRC	Gap 3, Gap 2

CrisisSuite, vieWTerra Evolution and Drone Rapid Mapping are provided by organisations which are not part of the DRIVER+ consortium, also called external solution providers.

Table 2.2 displays the name and main utilisation of the innovative solutions applied in the FD.

Table 2.2: FD innovative solutions' CM main functions

Solution	Organisation	Stage	Short description	Utilization in FD
CrisisSuite	Merlin Software	Market Growth	Logbook, map & Reporting tool	Hosts CM plans documents. Supports the logbook(s) for sharing of vertical and horizontal information. Supports the resource pooling information (related with CECIS) Displays the Situation map. Helps generating Situation Reports and other standard forms.
Socrates OC	GMV	Early Adoption/ Distribution	Common Operational Picture	COP tool with geographical focus. Enables map-based situation management related to hazards, infrastructure and resources. Shares its COP with other tools (CrisisSuite, vieWTerra Evolution)
Drone Rapid Mapping	CreoTech Instruments	Early Adoption/ Distribution	Rapid mapping	Processes drone data for • generation of orthophoto maps • generation of 3D terrain models (photogrammetry)
Field Reporting Tool	JRC	Early Adoption/ Distribution	Sends pictures and text reports from the field	Sends geo-located pictures and text reports from the field.
vieWTerra Evolution	VWorld	Early	Displays 3D views of	Displays 3D model of area

		Adoption/ Distribution	Operation area	Displays Socrates OC map situation in the 3D view Enables terrain analysis

Table 2.3 presents the functional coverage of the innovative solutions applied in the FD. This coverage is established in accordance to the DRIVER+ CM functions taxonomy (6), with the following colour code:

- **Dark green**: key functions which are actually provided and activated during the FD. These functions will structure the evaluation process (1).
- **Light green**: secondary functions provided and activated by the solution in FD.
- **Grey and white lines** are reported to provide the taxonomy's hierarchical path which leads to the green cells, and thus better explain the context of these functions.

Table 2.3: Functional coverage of solutions in FD

				Source	vieWTerra Evolution	CrisisSuite	Socrates OC	Drone Rapid Mapping	Field Reporting Tools
5				RESPONSE					
	5.1			Orient and decide					
		5.1.1		Determine the nature of crisis					
			5.1.1.1	Survey and/or investigate the affected area					
			5.1.1.2	Determine the nature of crisis / Conduct flights to collect information					
		51.2.		Conduct damage and needs assessment					
	5.2			Respond to the hazard					
		5.2.2		Maintain shared situational awareness					
			5.2.2.2	Develop and sustain COP					
			5.2.2.3	Disseminate COP and assessment					
		5.2.3		Conduct coordinated tasking and resource management					
		5.2.4		Deploy responders					
			5.2.4.1	Determine the area of operations					
7				CRISIS COMMUNICATION AND INFO MANAGEMENT (CCIM)					
		7.2.6		Maintain a record of planning and decisions					
			7.5.2.1	Communicate operational information accross chain of command					
		7.5.3		Support C3 decision making					
8				COMMAND, CONTROL, AND COORDINATION (C3)					
	8.5			Exploit C3 systems					
		8.5.1		Monitor the affected area					
		8.5.2		Provide situational awareness, share COP					

This mapping shows that the most covered functional area is the response domain (eight key functions), second are the CCIM domain and the C3 domain (with four key functions each).

The importance of these main functional areas seems relevant as the FD deals with the coordination of cross border resources to produce a response effort. The response functional areas, CCIM and C3 are defined in (6) as follows:

- *"Operations are the essence of the response function. They are defined in two basic directions: to limit the scope of the damage and to support the affected people. The taxonomy elaborates operational tasks across the full cycle of orientation, decision-making, mobilisation of responders and resources, command of operations, and preparation for immediate relief and comprehensive recovery."*
- *"The structuring of the Crisis Communications and Information Management* ***(CCIM) functional area*** *is developed within two main assumptions: an integrated communications system is established to provide opportunities for agencies and levels of command and management to communicate; information flows are managed according to a coordinated architecture and procedures."*
- *"The Command, control and coordination (C3) area of the taxonomy is designed with the aim to reflect requirements and processes of effective and timely decision-making and implementation coordination and control at every level of jurisdiction (central, regional, and local) and across the professional and voluntary organisations"*

2.2.1 CrisisSuite, Merlin Software B.V.

This section presents the CrisisSuite solution from Merlin Software B.V. This solution has a Technology Readiness Level (TRL) of 9 which means that it is actually already being used in an operational environment.

2.2.1.1 About the solution

CrisisSuite is an online software application enabling organisations to successfully manage information during a crisis. All crisis information is securely stored in the cloud and is available anytime, anywhere. This solution supports the net-centric working method (an information management approach) of crisis teams by creating a universal picture of the crisis by sharing it horizontally and vertically with all the other teams in the crisis organisation. It also assists in maintaining an effective crisis meeting structure (Figure 2.1) and it decreases the administrative workload for the people managing the crisis.

Each member of a crisis organisation gets access to CrisisSuite and has their own personalised dashboard with the crisis plans that are relevant to them, an overview of the current crisis and a logbook with all their observations or planned actions for the current crisis.

The actions are immediately forwarded to the appropriate teams or individuals; and they, in turn, can indicate that the actions are being carried out or completed. At the same time, a reply can be sent as well. The crisis team can follow the proceedings of the actions in a simple overview.

Figure 2.2 shows an example of the logbook of EUCPT during the FD.

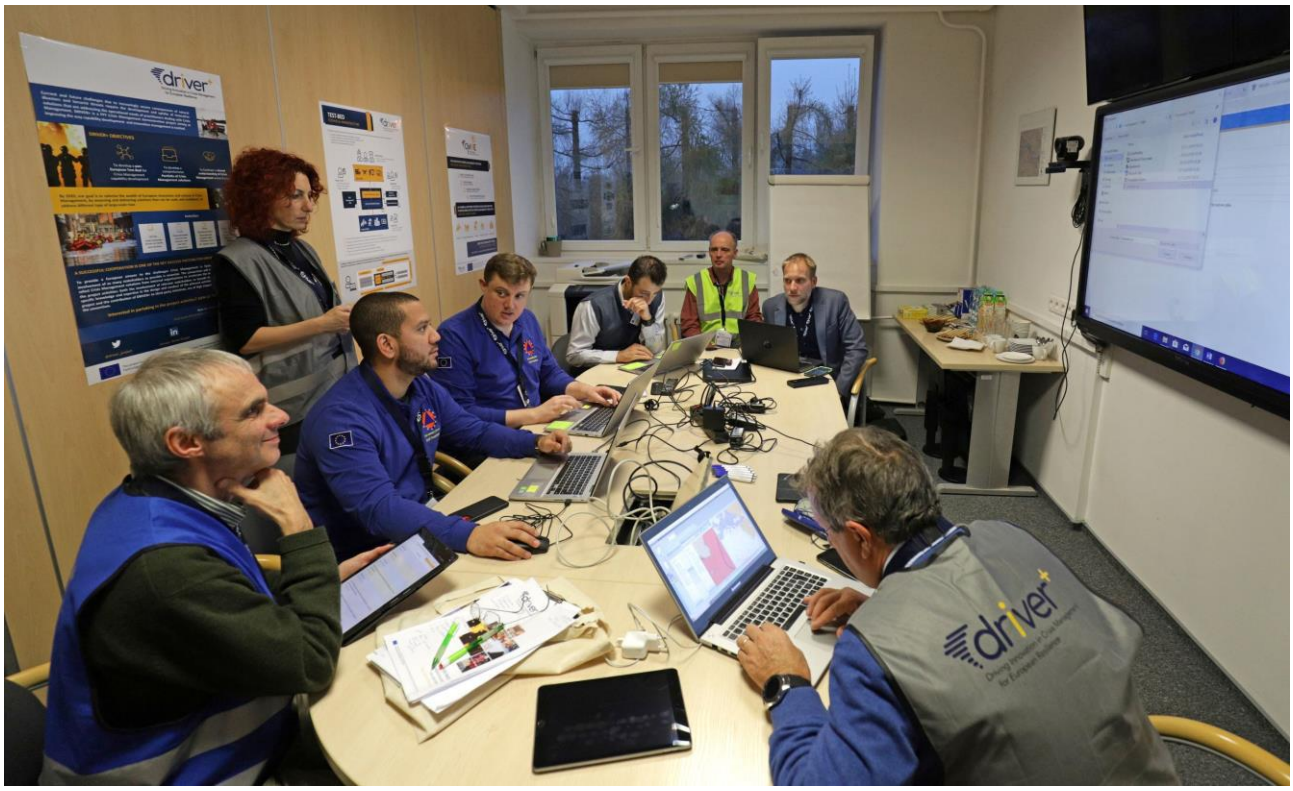

Figure 2.1: Crisis meeting supported by CrisisSuite logbook

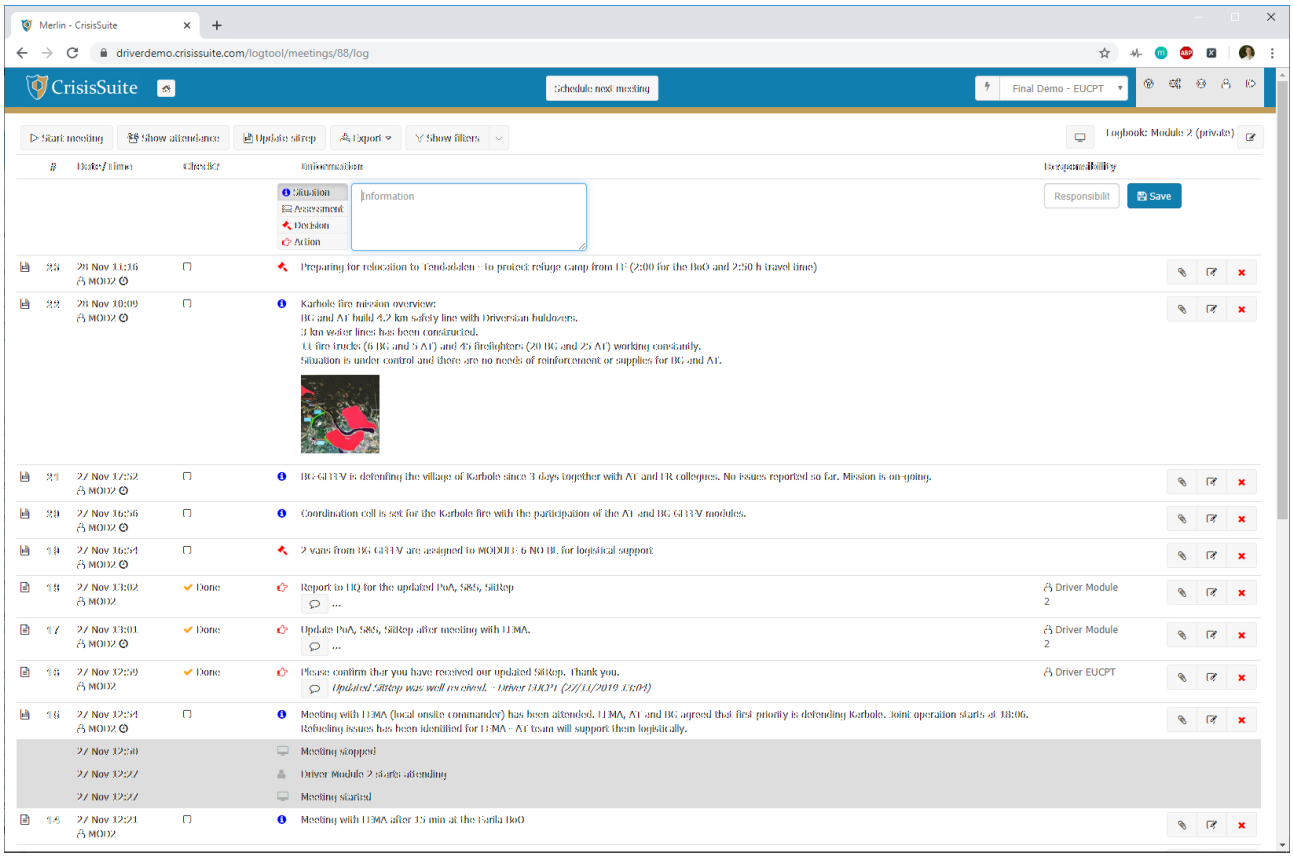

Figure 2.2: Example of CrisisSuite logbook

Based on the log, the crisis team may compile situation reports and share them with individuals, teams or with the entire organisation.

2.2.1.2 About the provider

Merlin Software B.V. (the Netherlands) develops practical software tools in the field of Crisis Management. These tools help an organisation to prepare for, respond to and learn from a crisis situation. Because crisis information is sensitive by nature, Merlin has spent the required efforts to obtain the ISO 27001 certificate for information security.

Merlin is affiliated with Parcival, a specialist in Crisis Management and education, training and exercise. For more details, see www.merlincrisis.com

2.2.1.3 Activities during the FD

During the FD, CrisisSuite was used by teams within the EU Civil Protection Mechanism: the ERCC, the EUCPT and the Modules from different Participating States that will be deployed to respond to the crisis. These teams used CrisisSuite for internal communication through logbooks and by sending out actions internally.

CrisisSuite was also used for vertical communication by sending out situation reports to other organisational parts. In addition to that, CrisisSuite was receiving geographical information from Socrates and made this information available to the organisational parts that did not work with Socrates.

In summary, CrisisSuite was used for the aggregation and dissemination of all crisis related information.

2.2.1.4 Required adaptations

The following adaptations were made on CrisisSuite to comply with the FD requirements;

- Logbooks' structure was adapted to fit the EUCPM needs.
- Highlighting of new information in updated reports.
- Support of FD map symbology.
- Synchronisation with the Socrates OC map via the CAP messages (7).
- Implementation of messages (SITREP) new templates (e.g. Plan of action).

2.2.2 Socrates OC, GMV

This section presents the Socrates OC solution from GMV. This solution has a Technology Readiness Level (TRL) of 8 in the Navigation, Maritime and Border Surveillance domain which means that the system is complete and qualified. In the Crisis Management domain, it has a Technology Readiness Level of 6, which means the technology was demonstrated in a relevant operational environment.

2.2.2.1 About the solution

Socrates Operation Center (OC) sets up a Crisis Management network whose objective is twofold. It aims to improve the shared situation awareness amongst the different bodies involved in the management of crisis events, and to help the practitioners making well- informed decisions by providing and supporting the real time exchange of information about the operational situation. It provides a web-based tool for generating a Common Operating Picture (COP) in Crisis Management, presenting functions which enable the reporting and tracking of events and resources.

Figure 2.3: Example of Socrates OC map situation

It brings support to both vertical (local, regional, national and/or international levels of command) and horizontal (inter-agency and cross-border) coordination and cooperation. Information on events and resources is displayed in a GIS (Geographic Information System).

The solution allows crisis managers to determine the magnitude of the event, assessing its impact and potential consequences as well as evaluating the needs. They are also able to access real-time information about the availability and location of resources. Socrates OC also provides snapshots to operational commanders of what is being taken and by/with which resources. This enables them to establish action plans and determine further operational needs.

2.2.2.2 About the provider

GMV (Spain) is a privately-owned technology business group founded in 1984. Trading on a worldwide scale in the following sectors: Aerospace, Defence and Security, Transport, Telecommunications and IT, GMV has a revenue of more than 130 million Euros and more than 1,500 employees. The company's growth strategy is based on continual innovation; 10% of its turnover is ploughed back into R&D. GMV has achieved the level 5 of the CMMI (Capability Maturity Model Integration), the world's most prestigious business-process improvement model and holds several international patents and is currently the world's top supplier of Ground Control System for commercial telecommunication operators.

For more information, see https://www.gmv.com.

2.2.2.3 Activities during the Final Demo

Socrates OC is the central map tool; it is the entry point for the management of map entities. This is where they are created, modified and deleted.

During the FD the activities on Socrates OC were for EUCPT and all Modules to update the situation in terms of hazard, and resources, and visualize the map situation updated by other participants. Figure 2.4 shows the situation of one of the many fires, with the fire area (in red) the defence and fire attack lines (north) as well as the pumps (south east of fire), and the Polish and Norwegian modules (west of fire).

The map situation updated in Socrates OC was automatically duplicated in CrisisSuite and vieWTerra Evolution through the sending of CAP messages (7). This process was not seen by the participants and did not require any effort from them.

Figure 2.4: Socrates OC Map

2.2.2.4 Required adaptations

The following adaptations were made on Socrates OC to comply with the FD requirements;

- Adaption of FD line and area symbology,
- Adaptation of FD icon symbology through connection to icon server
- Flashing of updated entities

2.2.3 vieWTerra Evolution, VWORLD

This section presents the vieWTerra Evolution solution from VWORLD. This solution has a Technology Readiness Level (TRL) of 7 which means that a solution prototype was demonstrated in an operational environment.

2.2.3.1 About the solution

vieWTerra Evolution, vieWTerra Base and vieWTerra Mobile form a combined "GIS & Simulation" suite of products allowing responders to rapidly build a virtual 4D representation (3D synthetic environment + Time dimension) of any potential crisis area on earth. These solutions provide a Common Operational Picture environment to both Command Centre and rescue units out in the field.

vieWTerra Evolution is a 4D Earth Viewer as well as data and assets integration and development platform (C/C++ SDK). It presents an ellipsoidal model of the Earth already defined globally at a medium resolution (vieWTerra Base 29m Imagery, 90m– incoming 29m-DEM, 29m Land Cover set of mosaics), and allows its users to integrate their own precise datasets anywhere on the Globe, without any area coverage limitations, or access available Open Geospatial Consortium-compliant WMS-WMTS (8) data streams (imagery, cartography layers).

Figure 2.5 provides an example of a 3D map view provided by vieWTerra Evolution.

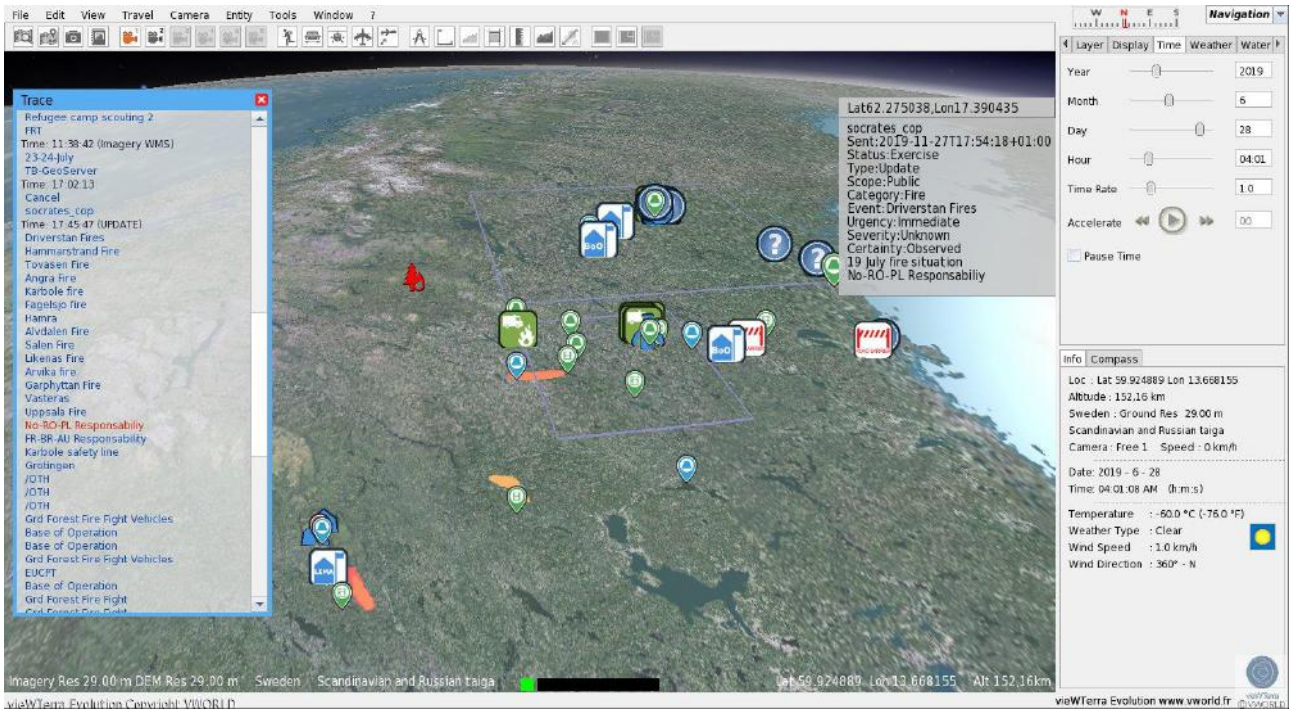

Figure 2.5: Example of a vieWTerra Evolution 3D map

vieWTerra Evolution can be used to model any type of 3D scene on Earth and create scenarios at their real-world location to simulate events in the Crisis Preparedness phase, and to serve as global repository for building a custom earth-wide GIS, either used perfectly off-line or ported on an on- line architecture in order to allow the sharing of multiple information, data and assets between all stakeholders in the Crisis Response phase.

2.2.3.2 About the provider

VWORLD (France) has bridged the gap between the Geospatial and Simulation worlds in providing a unique suite of 3D/4D Earth Viewers, data and assets integration and development platform software, available off-line or on-line on PC/Mac, tablets and smartphones, and global true- colour, cloud-free and artifacts-corrected, database products, grouped under the vieWTerra label. VWORLD has been capitalising on years of research on how to render large real-time procedural 3D scenes and counts clients in the Aeronautics & Space, Defence & Civil Security, Town & Country Planning, Energy, Geosciences and Education.

For more details, see www.vworld.fr

2.2.3.3 Activities during the FD

vieWTerra Evolution was dedicated in the FD to the detailed analysis of the terrain for either the choice of implantation of the Base of Operation, the planning of the deployment of fire hoses and whatever action can benefit from a 3D terrain analysis as displayed in Figure 2.6. vieWTerra Evolution also displayed the reports of the FRT.

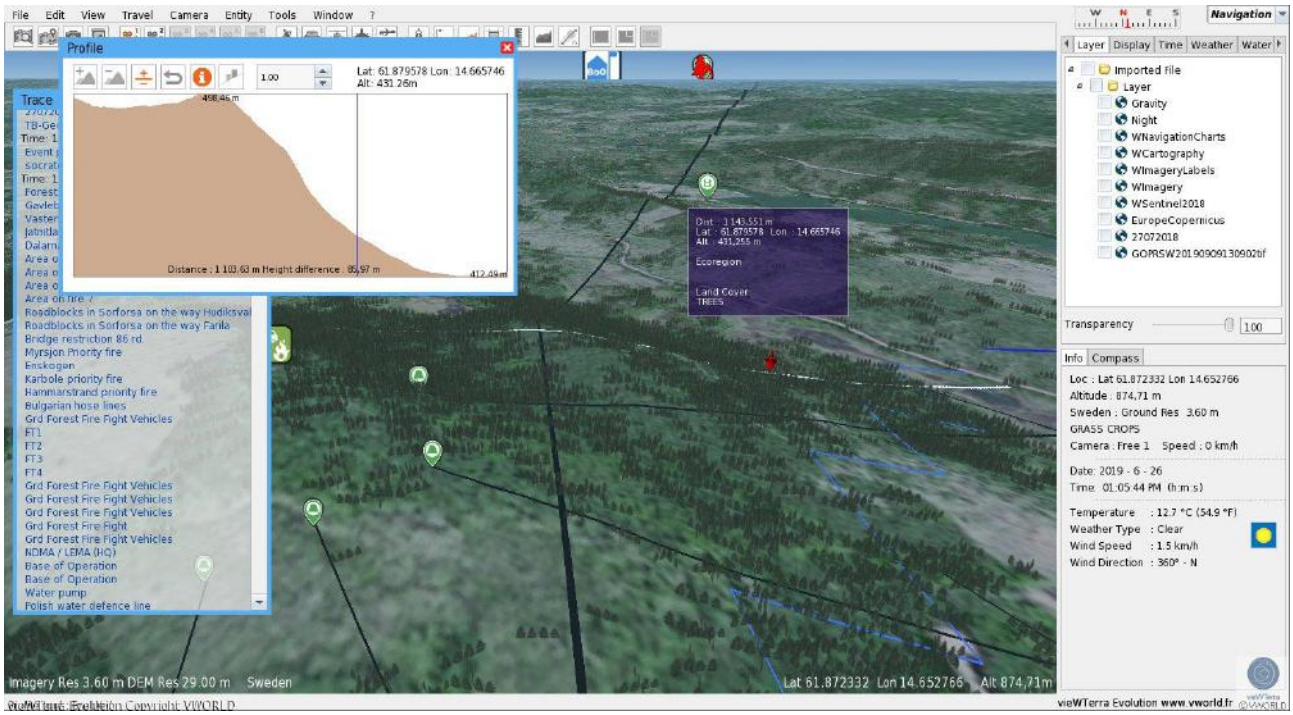

Figure 2.6: 3D Visualisation of area of operation and situation in vieWTerra Evolution

2.2.3.4 Required adaptations

The following adaptations were made on vieWTerra Evolution to comply with the FD requirements:

- Symbology/Connection to icon server.
- 3D map of area.
- Ingestion of DRM data.
- Ingestion of CAP messages (7) from FRT.

2.2.4 Drone Rapid Mapping, Creotech Instruments

This section presents the Drone Rapid Mapping solution from Creotech Instruments S.A. This solution has a Technology Readiness Level (TRL) of 7 which means that a solution prototype was demonstrated in an operational environment.

2.2.4.1 About the solution

Drone Rapid Mapping enables an incident or a crisis area to be mapped quickly using local, network independent computing. A drone operator conducts a flight over an area of interest and acquires imagery (using the on-board camera) in line with the standard operational procedures. Data is then uploaded on the spot to the standalone and autonomous server (only a 230V AC power supply is required, with possible use of a portable generator) and automatically processed and viewed on the spot. The results can be shared locally via wireless LAN or published in another system when Internet connection is available.

Drone Rapid Mapping provides a very fast generation of orthophotomaps based on imagery acquired by any drone (RPAS) available to rescue or crisis management actors. The resulting maps and models can be viewed and analysed locally in the dedicated geoportal or published via Internet in any GIS environment already used by Crisis Management institutions. A 3D terrain model can be viewed in any standard program as shown in Figure 2.7. It provides the practitioners with a better and more intuitive understanding of the area of interest.

Figure 2.7: 3D Visualisation generated by DRM from drone images

The rapid mapping efficiency depends on the rugged server parameters - processors speed, memory size, GPU availability, etc. Figure 2.8 shows a DRM portable rugged processing unit.

With an average hardware configuration, the mapping of 10 ha with 2 cm pixel takes up to 45 minutes. This period covers all activities: mission request, flight preparation, execution of the flight, landing, data retrieval and upload, all calculations with preparation of geoportal content. The generation of the high-quality 3D model requires an additional 20+ minutes.

Figure 2.8: Rugged DRM processing suitcase

2.2.4.2 About the provider

Creotech Instruments S.A. (Poland) is one of the leading Space sector companies in Poland. Headquarters and manufacturing facilities are located in Piaseczno, near Warsaw. Creotech Instrument's activities are currently focused mostly on space hardware and geospatial data processing services. Manufacturing processes are compliant with the certification requirements of space, automotive and medical industries. The company takes an active role in various hardware and IT projects for the European Space Agency – e.g. as prime contractor in CREODIAS (Copernicus DIAS - Data and Information Access Services).

For more information, see http://creotech.pl

2.2.4.3 Activities during the FD

The role of DRM during the FD was the fast processing of images taken from the area of operation by drones or Remotely Piloted Aircraft to provide high quality orthophoto products and/or 3 models.

- Orthophoto maps produced by DRM could be seen on Socrates OC and vieWTerra Evolution,
- 3D models produced by DRM can be displayed on vieWTerra Evolution and thus participate to the 3D terrain analysis performed in vieWTerra.

2.2.4.4 Required adaptations

The following adaptations were made on Drone Rapid Mapping to comply with the FD requirements:

- Adjustment of data description for interoperability with vieWTerra Evolution.
- Preparation of the data compatible with the scenario's area of operations.

2.2.5 Field Reporting Tool, European Commission – Joint Research Centre

This section presents the Field Reporting Tool solution from the Joint Research Centre of the European Commission. This solution has a Technology Readiness Level (TRL) of 7 which means that a solution prototype was demonstrated in an operational environment.

After a prototype aimed at Windows Operating Systems, the solution is being ported to iOS and Android. It has completed the first round of tests on the initial set of features present in the prototype and the second set is now being completed and tested. It is planned to be operational in 2020.

2.2.5.1 About the solution

The Field Reporting Tool (FRT) was developed in order to provide first responders with the capability to share information from the field easily and promptly with two major key points:

- The information must be georeferenced. Not only has this allowed a more effective visualisation, it also improves the management of the resources deployed on the field, without requiring a specific activity, but naturally included in the operations performed by the operators.
- The information must carry a valuable payload in terms of multimedia contents, which provides remotely a better understanding of the situation.

2.2.5.2 About the provider

The Joint Research Centre (JRC) helps to strengthen the EU's resilience to crises and disasters through its research in crisis management technologies, satellite image processing and analysis, disaster risk management and internet surveillance systems.

Linked to JRC, the European Crisis Management Laboratory (ECML) was created in 2010 and inaugurated in 2013 by the former EC President Manuel Barroso. The ECML studies innovative technological solutions applied to the Crisis Management. Within these activities, the ECML established collaboration with the Italian Ministero dell'Interno, Dipartimento dei Vigili del Fuoco (National Fire Corps - CNVVF).

For more information see https://ec.europa.eu/jrc

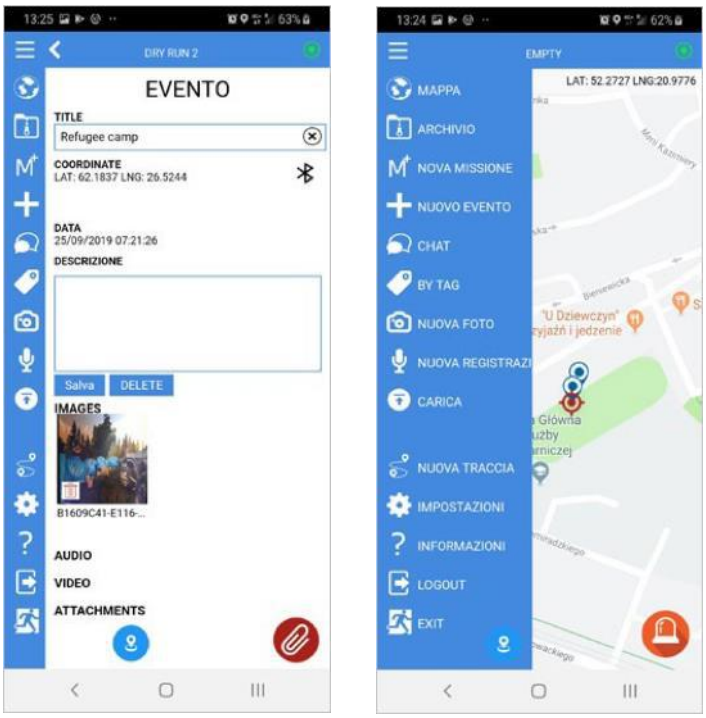

Figure 2.9: Field Reporting Tool app interface

2.2.5.3 Activities during the FD

With a simple tweak, the operator can operate FRT remotely with a mobile phone. The data generated is then uploaded to the platform, which distributes them to the interested partners, allowing them to be incorporated in visualisation and data management interfaces.

Although its products are ingested and used by other solutions (FRT reports are displayed in vieWTerra Evolution and CrisisSuite), FRT was used by the EXCON team to create the field reports from the team that discovered the refugee camp, which was used as an inject.

2.2.5.4 Required adaptation

The following adaptations were made on FRT to comply with the FD requirements:

- Sending of agreed CAP message (7) format for exchange with vieWTerra Evolution and CrisisSuite.

2.3 Preparation phase

To coordinate the preparations for the FD, weekly telephone conferences were held and coordinated by the technical team (Solution Coordinator and Test-bed Technical Infrastructure coordinator). These telephone conferences were attended by the solution providers as well as by representatives of the Trial owner's team and occasionally the DRIVER+ Technical Coordinator.

During each meeting, the test-plan served as a guideline. Information exchange between solutions was clarified. Minutes of the meetings were prepared, circulated and stored on the project collaborative work-space for everyone to read, correct and comment, and the test-plan was updated, and circulated.

In addition to the regular telephone conferences, three online test sessions were organised, bringing together all solution providers for tests before Dry Run 1, before Dry Run 2 and between Dry Run 2 and the FD. These test sessions made most problems and needs for adaptations visible and served as additional preparations for the face-to-face meetings.

Table 2.4 presents the main milestones of the FD's preparation.

Table 2.4: FD main milestones

Meeting / Milestone	Date
Solution selection discussion	01/03/2019
Trial Integration Meeting	26-28/03/2019
Dry Run 1	24-28/06/2019
Dry Run 2	23-27/09/2019
Dry Run 2½	28/10/2019
Trial Execution	25-29/11/2019

2.3.1 Technical integration

The technical integration and testing of the solutions is described in (9). According to this procedure, the standalone solutions needed first to be integrated into the reference implementation of the Test-bed Technical Infrastructure. This was followed by a FD specific integration and testing against FD-specific requirements. Finally, multiple solutions got tested in the FD set-up.

Figure 2.10 depicts the final data exchange diagram for the FD. It shows all solutions to be used during the FD and which output they give to participants and how these participants interact with them. It also provides the data flows of these solutions to/from the Test-bed Technical Infrastructure (TTI), which components of the TTI are used, and which simulators/simulations are used to provide input to these solutions and to the participants.

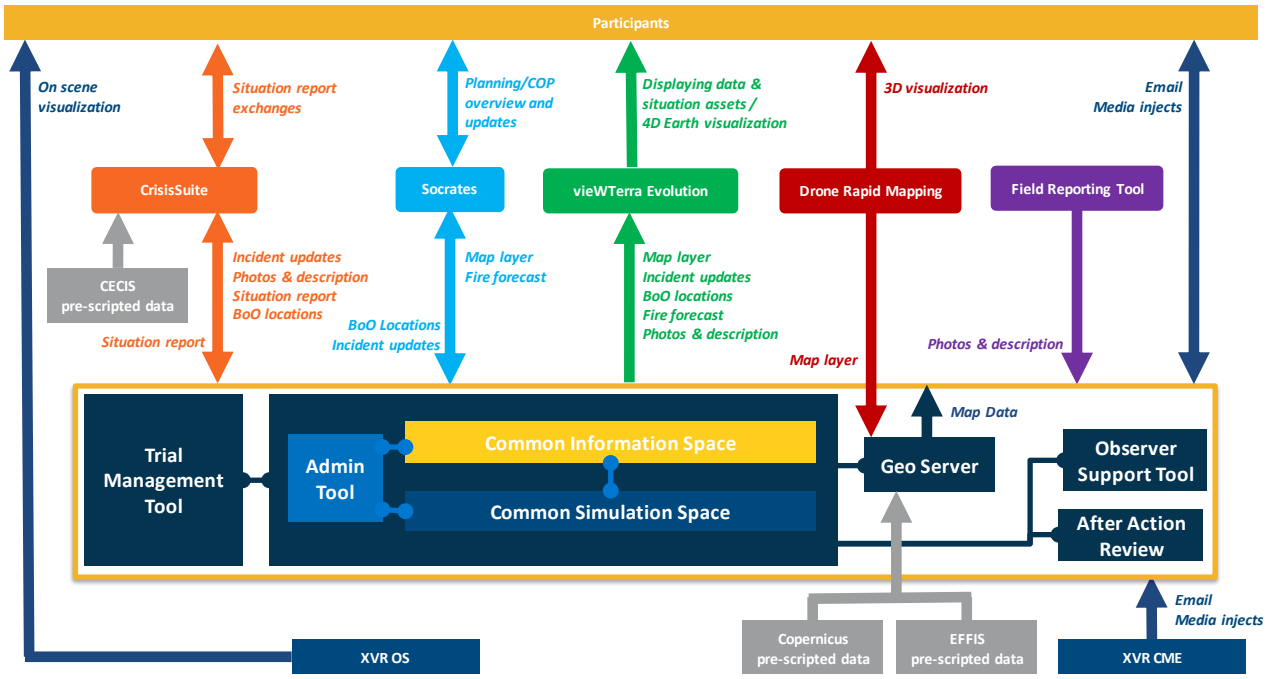

Figure 2.10: Data exchange diagram for the FD

2.3.2 Trial Integration Meeting (26-28/03/2019)

As all solutions selected for the FD were already integrated in the TTI (since they had participated in previous Trials), the FD Trial Committee and the solution providers already knew each-others products and the kind of adapters to use best.

The TIM focused on the understanding by solution providers of the scenario, the EU Civil Protection Mechanism (which is at the heart of the FD), the ERCC expectations and the focus which should be given to the Final Demo in order to take these expectations into account.

Solutions' potential deployments (which organisation will be using which solution) and usage (for what purpose) were discussed, and the first discussion on data exchange took place. The way to organize the work before Dry Run 1 was decided.

Several important decisions regarding the application of solutions resulted from the TIM:

- The decision to use only one COP tool when actually two of them were originally selected (Socrates OC and Life-X COP). This stemmed the idea that NDMA was not going to be played and consequently did not need a COP. In accordance with the solution providers, the Trial Committee came to the decision to use only Socrates OC).
- The decision to use CAP messages (7) as main vehicle for information exchange between solutions.

Beside these technical matters, the TIM proved to be a good ice breaker which facilitated the preparation work to be done before Dry Run 1.

2.3.3 Dry Run 1 (24-28/06/2019)

Before Dry Run 1, a test-plan was developed and circulated among solution providers and regular on-line meetings were organised to discuss technical integration. During Dry Run 1, the Test-bed Technical Infrastructure and the solutions were deployed according to the FD set-up and the test-plan. The results of the testing led to two thirds of the tests passed.

Solutions providers and the FD technical team agreed on important aspects such as:

- Ways to convey characteristics of linear/surface symbology.
- List of Test-bed "topics" (i.e. channels) to be implemented to support the distribution of information.

Some adjustments were made on the test-plan after Dry Run 1, and the planning of additional on-line testing sessions (during the summer period) was agreed.

On the requirement side, it was decided to initiate the specification (by TCS and SGSP) of map entities data model (which objects to represent on the map) and associated symbology (how to graphically represent them).

2.3.4 Dry Run 2 (23-27/09/2019)

Between Dry Run 1 and Dry Run 2, the specification of the map entities data model and associated symbology took place. The defined symbology was defined to serve the need of the FD's scenario and concerns the EUCPM Modules (e.g. Forest Fire Fighting with Ground Vehicle), forest fire related entities (e.g. fire engine), and humanitarian entities (e.g. Refugee Camp). It includes 44 icons and 7 area/line entities. The symbology was based on existing symbology, such as the EUCPM symbols for Modules and the UN OCHA symbology (10). More details about the adopted symbology can be found in Annex 2.

On-line testing sessions also occurred, showing much progress in the development of information exchange.

As the scenario was refined, some injects were defined, although some aspects like the Area of Interest or scenario key points were only received shortly before Dry Run 2. All scenario injects were defined before Dry Run2.

Between Dry Run 1 and Dry Run 2, the planned location of ERCC during the FD (JRC building, Italy) was accidently damaged and became unavailable. This required the FD Committee to look for an alternative option, leading to the decision that ERCC would be located in Warsaw (SRC facilities).

As the ERCC was moved to Poland instead of Italy, REA asked the Trial Committee to find a way to preserve the multi-country dimension of the FD. This question was discussed during DR2, and various options considered. This led to adding a sequence to the scenario (involving a Dutch Medevac Module managed from an authority based in The Hague) with an additional deployment of CrisisSuite.

During Dry Run 2, the FD set-up was deployed at SGSP. Considering that the decision to use SRC premises for the ERCC was not yet definitive, and had been known very shortly, a temporary set-up for the ERCC was done in the SGPSP premises.

The test-plan was passed during Dry Run2, all tests related to data exchange were passed and due to late specification of their requirements, some tests related to solutions' expected functionalities remained unpassed. These were related to the reports to be generated by CrisisSuite which templates were still in discussion with operational experts, until a few days before the FD. CrisisSuite team showed flexibility in accepting this delay and reactivity in implementing these templates for the FD on a very short notice.

The presence of EUCPM experts led to minor changes in the following aspects:

- The types and formatting of expected reports were slightly reconsidered.
- The way to involve technical support from solution providers. It was decided to "use" them as a member of the team, as if they were actual TAST members.

2.3.5 Dry Run 2½ (28/10/2019)

Because some tests remained unpassed after Dry Run 2, an additional on-line testing session called Dry Run 2½ was organized. Between Dry Run 2 and Dry Run 2½, the secured version of the TTI was implemented, and certificates were developed and distributed to solution providers.

2.4 Application during the Trial

This section reports on the execution phase of the FD which took place from the 24th to the 28th of November, 2019. It encompasses all aspects related to the execution, from the deployment, the monitoring of the solutions during the execution, to the actual use of the solutions. From the solutions' point of view, the execution phase of the FD went well, the deployment was done according to the plans and the solutions could exchange information as planned.

2.4.1 Deployment of solutions

This section presents the deployment of FD's innovative solutions among the participating organisations (Figure 2.11).

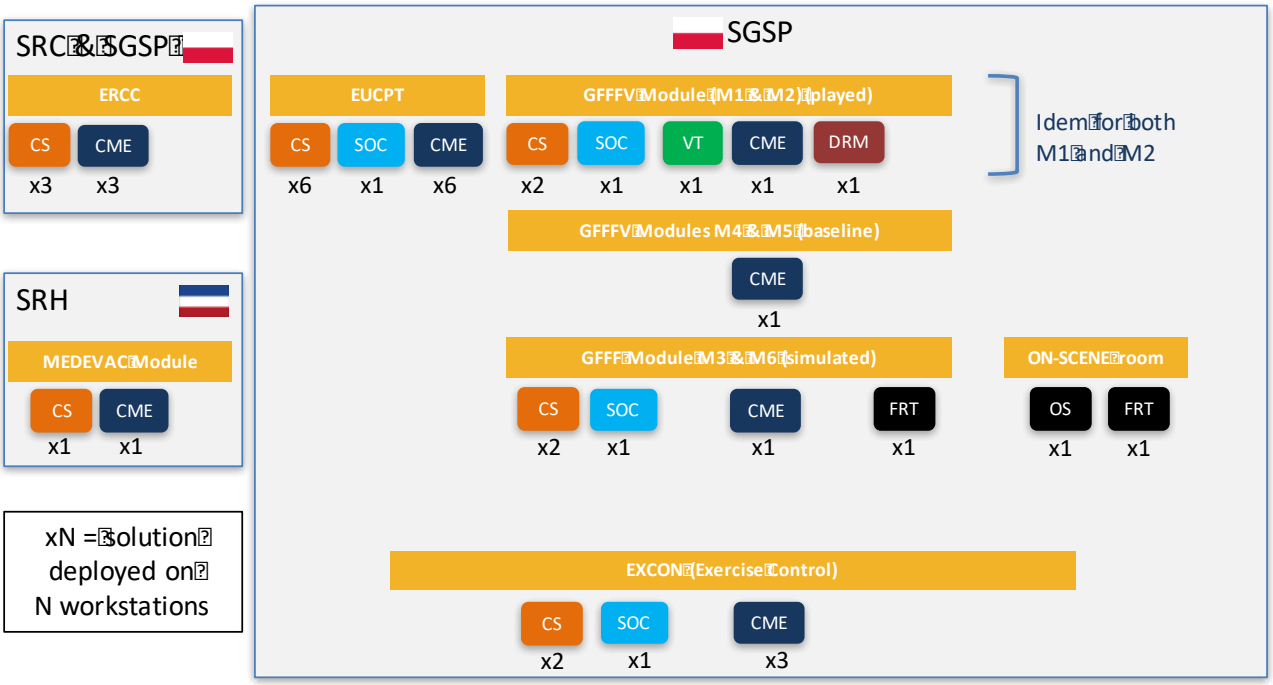

Figure 2.11: Deployment of solutions during the FD

2.4.2 Physical set-up

The FD was conducted as a table top Trial, and located at both SRC and SGSP premises in Warsaw/Poland and Safety Region Haaglanden (SRH) in The Hague/the Netherlands.

The figures below (Figure 2.12, Figure 2.13, Figure 2.14, Figure 2.15) show the location of the various participating organisations on the floorplan of the three locations: SGPSP (Main school of fire service, Warsaw, PL), SRC (Space Research Centre, Warsaw, PL), and SRH (Safety Region The Hague, The Hague, NL)).

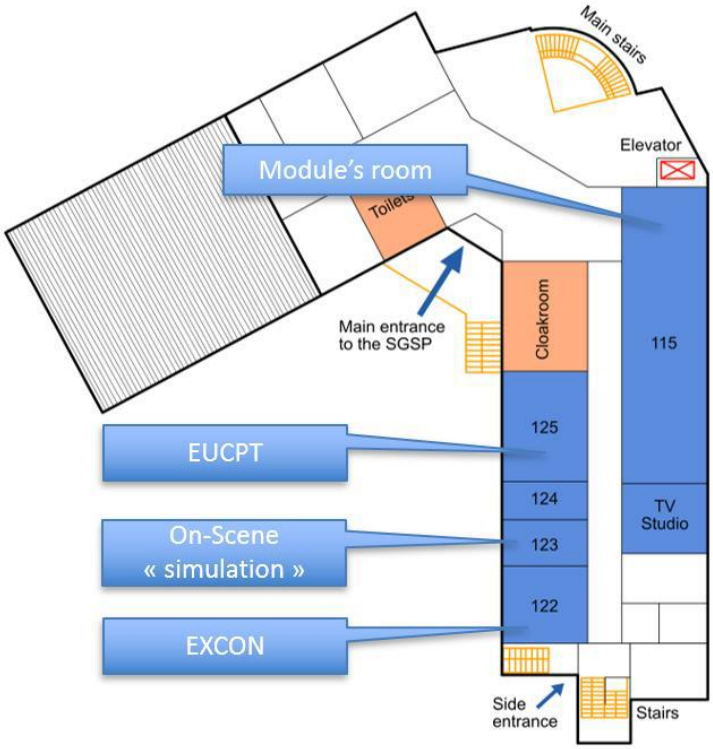

Figure 2.12: SGSP Ground floor physical set-up

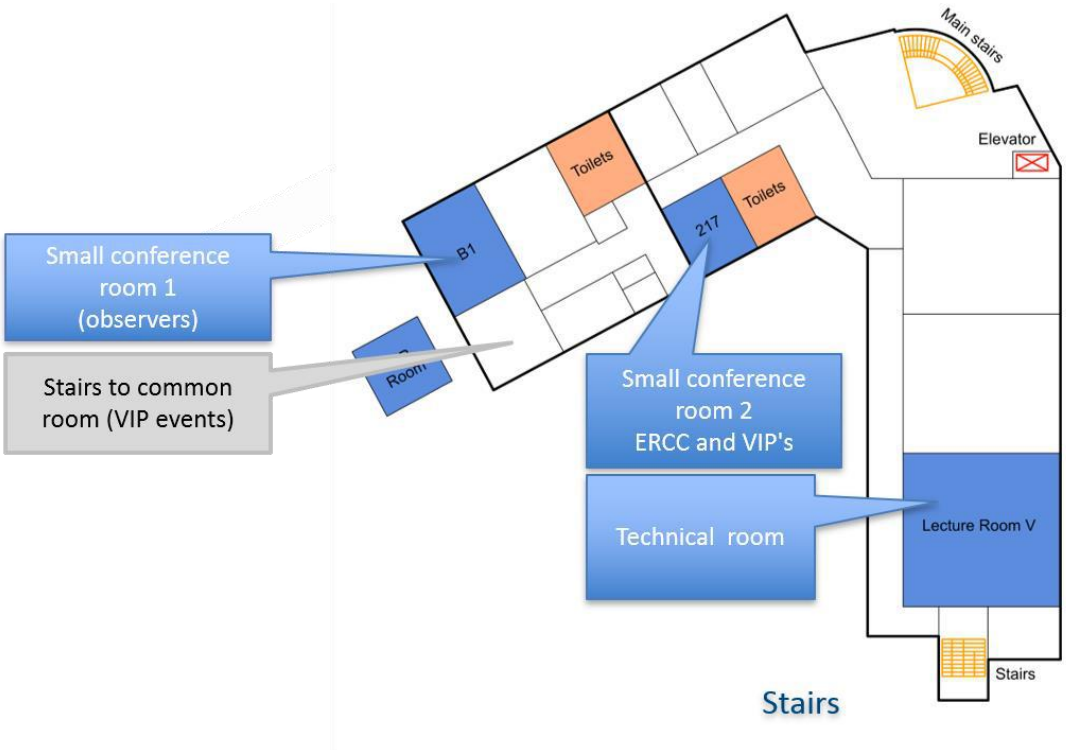

Figure 2.13: SGSP First floor physical set-up

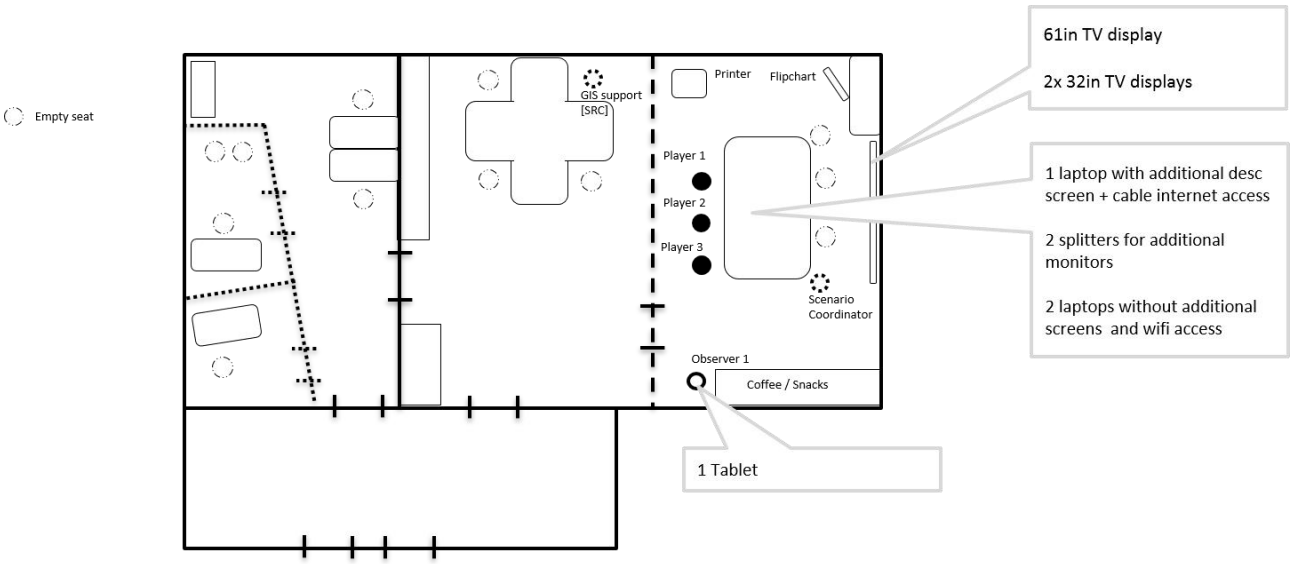

Figure 2.14: SRC floorplan

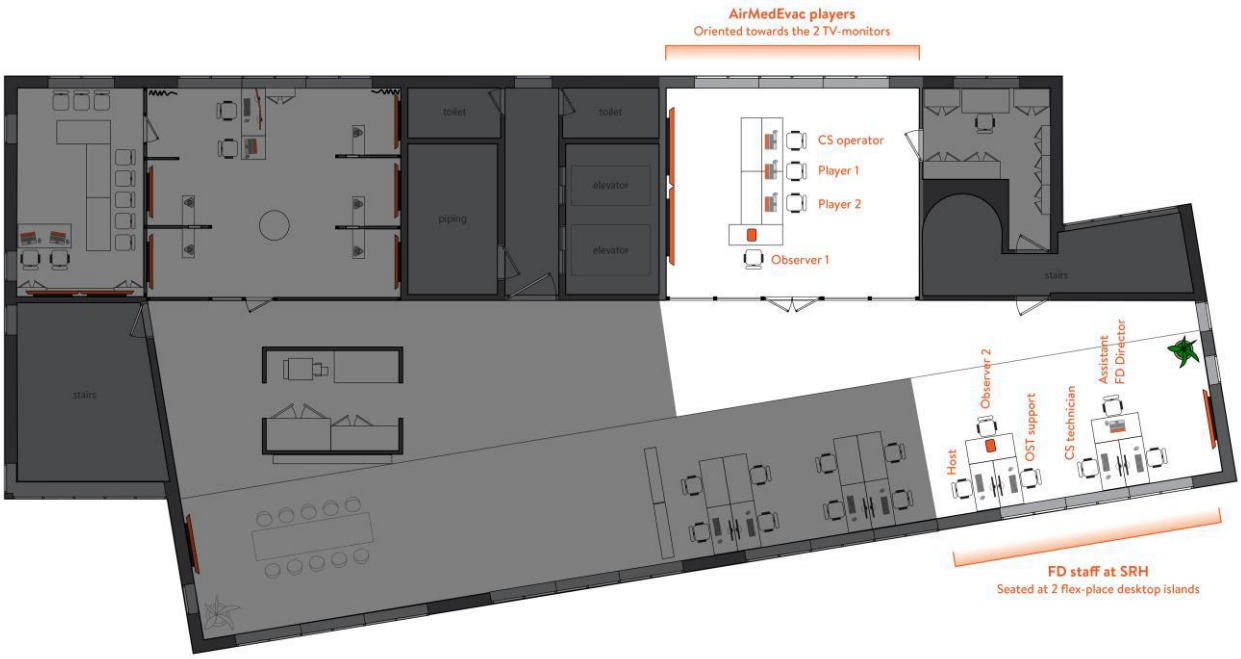

Figure 2.15: SRH floorplan (9th Floor SIM CENTRE)

2.4.3 Technical assistance

Based on the experience of other Trials where some technical support by the solution providers proved to be necessary during the Trial, the decision was made to systematically provide participants with technical support: a person from the solution provider's team who knows the product and orients participants in their way to use it. This decision was even reinforced after DR2 when EUCPM experts expressed the desire to include these technical support people in their team, just as TAST people would be in a real operation. They were, consequently, assigned tasks to perform, for example:

- Enter new information in the map or the logbooks.
- Look for some specific information in the reports which were received.

- Initiate a certain type of report with basic information.
- Present the current status of the map to the teams and explain the symbology.
- Calculate terrain analysis data (e.g.: the surface of an area, the height profile of a certain path where hose lines could be deployed).

During DR2, this proved to facilitate the integration of technical support people into the process in a natural way.

2.4.4 Solution trainings

Day 1 of the FD served as a preparation day for installing the solutions, technical checks and play-through. At the beginning of day 2 of the FD the solution trainings took place. Each of the five solutions gave an introduction followed by a hands-on training; total training duration was on average 40 minutes per solution. The first session of the scenario which occurred during the afternoon of the second day was initially designed as the practical part of the training, during which participants could get familiarized with the solutions with the technical support of solution providers, but a long meeting which occurred during this session actually shortened this time dedicated to appropriation.

An online-survey was filled by all participants after the trainings and served as input for the upcoming deliverable (11).

In their feedbacks participants actually mentioned that some trainings were perceived as too short in order to fully familiarize with the solutions. The feedbacks also show a direct relation between the complexity of solutions and the feedback about how confident the practitioners feel to use the solutions in the FD the more complex the solutions are (e.g. Socrates and especially vieWTerra Evolution were perceived as being complex to operate), the less confident the practitioners felt to use them during the FD.

2.4.5 Information flow and interactions of solutions

Table 2.5 describes for what purpose the solutions were used during the FD, what they received as inputs from other solutions or organisation and which solutions or organisations consumed their outputs.

Table 2.5: Use of solutions and their interactions during the FD

Users	Solution	Activity	Input from	Output to
Modules	Socrates OC	Map situation update & assessment		All sharing Socrates OC Map (EUCPT, Modules) and CrisisSuite
Modules	CrisisSuite	Reporting		EUCPT
Modules	CrisisSuite	Log keeping		Own logbook, Modules/EUCPT logbook
Modules	vieWTerra Evolution	3D terrain analysis	Terrain Elevation Model (for example provided by DRM)	
Modules	vieWTerra Evolution		Field Reporting Tool	Visualisation of Field reports

EUCPT	Socrates OC	Situation description & assessment		All sharing Socrates OC Map (EUCPT, Modules) and CrisisSuite
EUCPT	CrisisSuite	Reporting		ERCC
EUCPT	CrisisSuite	Log keeping		Own logbook, Modules/EUCPT logbook, EUCPT/ERCC logbook
EUCPT	CrisisSuite	Information sharing		ERCC and Modules
ERCC	CrisisSuite	Log keeping		Own logbook
ERCC	CrisisSuite	Information sharing		CrisisSuite, EUCPT
ERCC	Socrates OC	Map situation update		All sharing Socrates OC (not initially planned, used after request of ERCC)
MEDEVAC	CrisisSuite	Log keeping		
EXCON	Drone Rapid Mapping	Inject of 3D images		To be viewed in vieWTerra Evolution
EXCON	Field Reporting Tool	Inject of field reports regarding the refugee camp		To be viewed in vieWTerra or CrisisSuite

3. Achievements and lessons learnt

This section reports on the achievements and lessons learnt of the application of the solutions in the FD.

3.1 Expression of requirements

The expression of requirements as a textual document started mid-May 2019 by the solution coordinator. However, the feedback expressed by one of the solution providers was that this document was too long making it hard to find the information relevant to them. From this point on, after Dry Run 1, this document was transferred into a test-plan, expressed as an Excel file which proved to be more convenient to all.

In some cases, bilateral discussions of scenario teams with solution providers made it more difficult to keep the test-plan up to date.

Two lessons can be identified:

- First, it is important to discuss with the team, the format and support with which the requirements are going to be expressed.
- Second, it is important to highlight the key role of requirements, the fact that they should be expressed already (at least partially) at the TIM, that they should be updated on a regular basis, and be regarded as the key tool to structure the dialogue between the technical team and the scenario team.

3.2 Technical supervision of the FD execution

The technical supervision of the FD execution was performed by a team coordinated by the TTI coordinator (XVR), and formed by representatives of each solution provider, the partner responsible for integration of the solutions (FRQ), and members of the TTI team responsible for various aspects such as the admin tool (FRQ), AAR tool (FRQ), geo-server (FRQ), OST (ITTI), TMT (TNO) and security (TS).

This team was monitoring and checking the status (connected or disconnected) and parameters (load on processor, memory, etc.) of the solutions involved, as well as the load of the network. During the execution several incidents created an undesired load on the network which either managed to be fixed without creating any impact on participants, or required to ask them to focus for 20 minutes on activities that did not require the solutions. The following incidents were noticed:

- A very large Copernicus file inject (annotated by SRC PAS) was overloading the network; after lowering the resolution of this file, the problem was solved.
- A message containing a long route that was heavier than expected by the message format (it contained a very large amount of line segments, due to its length), created a blocking error; this was solved by adding extra controls on messages (removing any detailed route information inside the sent messages and limiting the drawing of routes to have a lower amount of line segments).
- An overload was created by the clients of Socrates OC requesting large maps from the geo-server more often than actually needed. Some extra controls in the request made by solutions to the geo-server enabled to bring the load on the network back to normal.
- During session 3 of the FD, Crisis Media (providing the mail traffic simulation for all participants) encountered an unknown error, resulting in a reset of this simulator. This caused all participants to reconnect to CM.

Thanks to an early detection and the swift corrective actions which were taken by the technical monitoring team, the impact of these incidents on the FD were minimized, did not compromise the evaluation process and the consequences for the participants were minor.

The difficulties that were faced during this execution could have been detected during a full DR2 session which, due to the delay caused by the late collection of requirements, could not take place. For example, the tests on Socrates OC were only made on one client workstation, when actually six were to be deployed at execution time.

Regarding the data, some of the injected files which caused a problem were only received by the technical team a few working days before the actual FD, leaving too less time to test the size and resolution of those new files.

This confirms a lesson already identified, and included in the methodology: Dry Run 2 must be done with the actual Trial data and the exact number of active workstations deployed (and activated).

3.3 Direction to use innovation solutions

During the first session, Modules had access to both innovative Solutions and legacy Solutions (VOSOCC). No obligation was made for them to only use the innovative solutions. The idea behind this was to leave it up to them to choose and use a solution, as an indication of a preference, which could be taken into account in the evaluation. However, this actually created confusion, and after this first session, participants expressed their doubts on what they should be doing, and requested clarification on this point. The decision was then made to indicate clearly that the use of innovative solutions was expected, as this was the key to the evaluation. To some extend that can also mean deviating from their standard operational procedures.

3.4 Technical support

At the end of DR2 the idea was expressed to include technical support people provided by the solution providers as full members of the operation team, as if they were part of a TAST. This idea was not followed up by the organisation team at execution time, and was consequently applied differently by each team. It was observed during the execution of the FD that the technical support was improving with time. The lesson identified was that introducing the technical support staff to the operational team, and explaining their expected contribution already before the actual start of the FD would have helped reducing this “learning curve”.

On the other side, it was noted in several cases that the technical assistants were not sufficiently aware of the operational context in which the tasks had to be performed with the solutions during the scenario, and consequently were not prepared to provide the participants with targeted advice on how to best operate the particular solution to perform these tasks. This was particularly noted in the ERCC as this team has to deal in a complex political and operational environment.

3.5 Feedback from the solution providers

The solution providers expressed their interest in confronting their solutions to the trialling process again in the FD. Almost all of them (except FRT) had participated in an earlier Trial in the DRIVER+ project. The particularity of the FD, the complexity of the scenario, its focus on the EUCP Mechanism, as well as the participation of the ERCC and of practitioners which were highly experienced in the EUCPM made it particularly challenging. The fact that solutions were actually used and could support this complex operation for two days, without almost any break and almost no technical problems, offering constant quality of service, was in itself a success.

Lots of discussions happened during some sessions between participants and solution providers. It was reported by observers that during the last session in the ERCC, a long discussion happened between players and the CrisisSuite provider, on the usage of the solution and potential improvements.

Apart from the evaluation process, which will be reported in (1), the trialling process applied in the FD helped, as it did in the previous DRIVER+ Trials, solution providers to better understand their potential customer's practices, and needs.

3.6 First impressions by participants

The first impression discussion with the participants after the FD showed that they were satisfied to have participated, because they perceived the trialling process as interesting to them, but also because they had the perception they were more aware of the functionalities which could be offered to them by the solutions. They also mentioned that some trainings were perceived as too short in order to fully familiarize with the solutions, and that further work will be required to adapt the tools to their specific requirements and embed these in their work processes.

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Annexes

Annex 1 – DRIVER+ Terminology

In order to have a common understanding within the DRIVER+ project and beyond and to ensure the use of a common language in all project deliverables and communications, a terminology is developed by making reference to main sources, such as ISO standards and UNISDR. This terminology is presented online as part of the Portfolio of Solutions and it will be continuously reviewed and updated[1]. The terminology is applied throughout the documents produced by DRIVER+. Each deliverable includes an annex as provided here-under, which holds an extract from the comprehensive terminology containing the relevant DRIVER+ terms for this respective document.

Table A1: DRIVER+ Terminology

Terminology	Definition	Source
Crisis management function	"Crisis management functions aim at achieving effects, e.g. coordination, a direction of effort, shared awareness, etc., in a crisis management system-of-systems. The "function" focuses on what is to be achieved, not how or by whom. Several systems, tools, building blocks, etc. may individually or in concert deliver a given function and, conversely, may support several different functions. Crisis management functions are grouped in three functional areas: operational (protection, response, recovery), preparatory (mitigation, capability development, strategic adaptiveness) and common (security management, logistics, C3, comms & Info management)."	Initial DRIVER+ definition.
Dry Run 1	First rehearsal of a Trial, focusing on the technical integration of solutions, reference implementation of the Test-bed, and scenario validation; it also serves as a readiness review to approve the maturity of technical solutions.	Initial DRIVER+ definition.
Dry Run 2	Full scale rehearsal of a Trial without external end-users participation, aimed at detection of technical issues and last second fine-tuning; Dry Run 2 is organised as a complete mirror of the Trial.	Initial DRIVER+ definition.
Gap	Difference between the existing capabilities of responders and what was actually needed for effective and timely response.	Adapted from Project Responder 5, Homeland Security, Science and

[1] The Portfolio of Solutions and the terminology of the DRIVER+ project are accessible on the DRIVER+ public website (https://www.driver-project.eu/). Further information can be received by contacting coordination@projectdriver.eu.

Terminology	Definition	Source
		Technology, August 2017.
Interoperability	The ability of diverse systems and organisations to work together, i.e. to interoperate.	"ISO 22397:2014(en) Societal security — Guidelines for establishing partnering arrangements."
Scenario	Pre-planned storyline that drives an exercise, as well as the stimuli used to achieve exercise project performance objectives. DRIVER+ note 1: In the context of DRIVER+ scenarios are defined for Trials not for exercises.	ISO 22300:2018(en) Security and resilience — Vocabulary. Link: https://www.iso.org/obp/ui/#iso:std:iso:22300:ed-2:v1:en:term:3.217
Solution	A solution is a means that contributes to a Crisis Management function. A solution is either one or more processes or one or more tools with related procedures.	Initial DRIVER+ definition.
Test-bed Technical infrastructure	The software tools and middleware to systematically create an appropriate (life and/or virtual) environment in which the trialing of solutions is carried out. The Test-bed infrastructure can enable existing facilities to connect and exchange data. DRIVER+ Note 1: For a better understanding within the CM community the term "Test-bed Technical Infrastructure" replaces the term "Test-bed Infrastructure". These terms are synonyms.	Initial DRIVER+ definition.
Trial	An event for systematically assessing solutions for current and emerging needs in such a way that practitioners can do this following a pragmatic and systematic approach.	*Initial DRIVER+ definition.*
Trial Guidance Methodology (TGM)	A structured approach from designing a Trial to evaluating the outcomes and identifying lessons learnt.	Initial DRIVER+ definition.

Annex 2 – Final Demo map entities data model and symbology

This Annex describes the set of geographical entity classes which were adopted for the final demo and their associated symbology.

The geographical entities are organised in the following classes:

- Civil Protection Mechanism types of Modules.
- Forest fire fighting entities.
- Humanitarian related entities.
- Hazard related entities.
- Others.

Civil Protection Mechanism types of Modules:

Entity class	Sample / Representation
Aerial Forest Fire Fighting (helicopter)	
Aerial Forest Fire Fighting (plane)	
Emergency Medical Team 1	
Emergency Medical Team 2	
EUCPT	
Ground Forest Fire Fighting	
Ground Forest Fire Fighting with Vehicles	
High Capacity Pumping	

Entity class	Sample / Representation
Medical Aerial Evacuation of disaster victims	
Shelter Capacities	
Technical assistance support teams (TAST)	
Water Purification	

Forest fire fighting related entities

Entity class	Sample / Representation
ATV	
Base of Operation	Surface/polygon (colour black line 0,5mm width; fill colour light grey, fill opacity 50%, label BoO)
Base of Operation	
Bulldozer	
Burn Out area	Red polygon with black edge (transparency 50%)
Firebreak	Green line 2,5mm width
Fire engine	
Fire source	

Entity class	Sample / Representation
Fire tender	
Helipad	
Helicopter (medevac)	
Helicopter (other)	
Hose line (water line)	Blue line 2mm width
Light vehicle	
Reconnaissance Drone	
Water supply point	
Transport vehicle (heavy)	
Transport vehicle (light)	
Water pump	
Water refilling zone for AFFF	Surface/polygon (border colour blue 0,5mm width; fill colour light blue, fill opacity 50%)

Humanitarian related entities

Entity class	Sample / Representation
Checkpoint	
Drinking water supply point	
Hospital	
Hotel	
IDP Camp	
Media	
Military unit	
NDMA / LEMA (HQ)	
Police-station	
School	
Storage of HAZMAT	

Entity class	Sample / Representation
Water purification station	

Hazards related entities

Entity class	Sample / Representation
Burnout area	Surface/polygon (border colour brown 0,5mm width; fill colour brown, fill opacity 50%)
Chemical hazard	
Danger	
Danger zone	Surface/polygon (border colour orange 0,5mm width; fill colour orange, fill opacity 50%)
Explosive hazard	

Other types of entities (or uncertain aspects)

Entity class	Sample / Representation
Entry Point	
Firefighting front	Red line 4 mm width
Module's area of responsibility	Grey polygon transparent 50%, with label of Module
Road barrier