



Driving Innovation in Crisis Management
for European Resilience



D934.122 – EXPERIMENT 43A DESIGN AND REPORT

SP93 - SOLUTIONS

DECEMBER 2017 (M44)



This project has received funding from the European Union's 7th Framework Programme for Research, Technological Development and Demonstration under Grant Agreement (GA) N° #607798

Project information

Project Acronym:	DRIVER+
Project Full Title:	Driving Innovation in Crisis Management for European Resilience
Grant Agreement:	607798
Project Duration:	59 months (Sept. 2013 - April 2020)
Project Technical Coordinator:	TNO
Contact:	coordination@projectdriver.eu

Deliverable information

Deliverable Status:	Final
Deliverable Title:	D934.122 – EXPERIMENT 43a Design and Report
Deliverable Nature:	Report (R)
Dissemination Level:	Public (PU)
Due Date:	December 2017 (M44)
Submission Date:	08/03/2018
Sub-Project (SP):	SP93 - Solutions
Work Package (WP):	WP934
Deliverable Leader:	ARMINES
Reviewers:	Michael Middelhoff, WWU
File Name:	DRIVER+_D934.122_EXP43a Design and Report.docx

DISCLAIMER

The opinion stated in this report reflects the opinion of the authors and not the opinion of the European Commission.

All intellectual property rights are owned by the DRIVER+ consortium members and are protected by the applicable laws. Except where otherwise specified, all document contents are: “©DRIVER+ Project - All rights reserved”. Reproduction is not authorised without prior written agreement.

The commercial use of any information contained in this document may require a license from the owner of that information.

All DRIVER+ consortium members are also committed to publish accurate and up to date information and take the greatest care to do so. However, the DRIVER+ consortium members cannot accept liability for any inaccuracies or omissions nor do they accept liability for any direct, indirect, special, consequential or other losses or damages of any kind arising out of the use of this information.

Revision Table

Issue	Date	Comment	Author
V0.1	16/10/2018	Initial Draft	SP-leader: Denis Havlik, AIT WP-leader: Laurent Dubost, TCS Task-leader : Laurent Dubost, TCS Main author : Aurélie Montarnal, Armines Contributors: Andreas Horndahl and Robert Forsgren (FOI; partner during first phase of the project), Andrzej Adamczyk, Grzegorz Taberski and Pawel Taberski (ITTI), Antonio Chagas (EDI), Héctor Naranjo and Raúl Valencia (GMV), Krister Arnell and Tanja Stähle (MSB; partner during first phase of the project), Tom van den Berg (TNO).
V0.2	13/11/2018	Refinement and update of the document	Aurelie Montarnal, Armines Michael Middelhoff, WWU
V0.3	20/12/2018	Contribution to all sections Update of Draft taking into account input from ITTI, GMV in Sections 2.2, 2.4, 2.5 and 3. Updated according to the reviewer's comments.	Aurelie Montarnal, Armines Michael Middelhoff, WWU
V0.4	29/01/2018	Contribution to all sections. Update after second revision.	Aurelie Montarnal, Armines
V0.5	03/02/2018	Update after third revision, according to reviewer's comments.	Aurelie Montarnal, Armines Grzegorz Taberski, ITTI Michael Middelhoff, WWU
V0.6	07/02/2018	English proofreading and formatting	Aurelie Montarnal and Aurélie Congès, Armines Michael Middelhoff, WWU
V0.8	16/02/2018	Formatting and overall review	Francisco Gala, ATOS
V0.9	26/02/2018	Update after fourth revision, according to reviewer's comments.	Aurelie Montarnal and Aurélie Congès, Armines Grzegorz Taberski, ITTI
V0.91	07/03/2018	Quality check	Marcel van Berlo, TNO Tim Stelkens-Kobsch, DLR
V0.92	08/03/2018	Formatting and update of the introduction.	Aurelie Montarnal, Armines
V0.93	08/03/2018	Final check and approval for submission	Tim Stelkens-Kobsch, Quality Manager (DLR)

Issue	Date	Comment	Author
V0.93	08/03/2018	Final check and approval for submission	Marcel van Berlo, Technical Director, TNO
V1.0	08/03/2018	Submission to the EC	Francisco Gala, ATOS

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:
 - Develop a common guidance methodology and tool (supporting Trials and the gathering of lessons learnt).
 - Develop an infrastructure to create relevant environments, for enabling the trialling of new solutions and to explore and share Crisis Management capabilities.
 - Run Trials in order to assess the value of solutions addressing specific needs using guidance and infrastructure.
 - Ensure the sustainability of the pan-European Test-bed.
2. Develop a well-balanced comprehensive Portfolio of Crisis Management Solutions:
 - Facilitate the usage of the Portfolio of Solutions.
 - Ensure the sustainability of the Portfolio of Solutions.
3. Facilitate a shared understanding of Crisis Management across Europe:
 - Establish a common background.
 - Cooperate with external partners in joint Trials.
 - Disseminate project results.

In order to achieve these objectives, five sub-projects (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 (from the former SP8 and SP9) 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. **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 standardization.

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, whose most important will be to build and structure a dedicated Community of Practice in Crisis Management, thereby connecting and fostering the exchange on lessons learnt and best practices between Crisis Management practitioners as well as technological solution providers.

Executive summary

Experiment 43, conducted during the initial phase of the project, focused on “Coordinated Tasking and Resource Management”. Due to different usages of the set of solutions, and the fact that the experiment both included the Preparation Phase and Response Phase, it was decided that it would be cut into two parts: Experiment 43a about the Preparation Phase and Experiment 43b about the Response Phase.

The purpose of Experiment 43a was to study three specific gaps: (i) the lack of solutions to support tasking and resources management, (ii) the lack of understanding of the relief effort as a whole and (iii) the difficulty of sharing information among several agencies. Consequently, three main categories of objectives were decided to conduct the experiment:

- The **end-users dimension**, understood as the perspective of the experiment (or platform) owner on the basis of the corresponding end-users’ needs. The corresponding objectives, here, are to have a validation of the scenario and a confirmation of the interest of the end-users to be part of this kind of experiment.
- The **CM dimension**, understood as the operational perspective, related to the CM performance and procedures with a special consideration of the identified gaps (including but not limited to crisis response, but also to the test and evaluation procedures). The corresponding objective focuses on evaluating the limitation of the use of generic contingency plans and to which extent there is a necessity of providing the CM decision-makers with decision support systems, to help them with elaborating and testing specific coordination plans
- The **solutions dimension**, understood as the perspective of the solution providers, and mainly related to the capability of certain solutions to improve or drive innovation (contributing to bridging the gaps) in CM. The corresponding objectives are to assess to which extent the set of selected solutions can actually contribute to the previous CM dimension objective.

The scenario chosen for this experiment was the case of a passenger ship that is wrecked in the Baltic Sea, right in between Sweden and Poland, due to an engine fire. It includes the evacuation of the passengers by both countries’ agencies. In particular, the Experiment 43a focuses on the arrival of first victims at the Polish landing site, how they are taken in charge by the medical staffs and then transported to either medical infrastructures, if medical support is required, or hosting infrastructures, if victims are in a healthy condition.

With regard to the execution of the experiment, the scenario was executed and the end-users were put into situation thanks to a table-top exercise. They could both play the experiment along the scenario and use the solutions in the same time, in order for them to compare how they would deal with the crisis situation in the usual way (i.e. without or with limited dedicated IT solutions) and with the proposed set of selected solutions.

The set of selected solutions included PROCEED, which is a family of tools to train and analyse the consequences of people decisions in simulated situations, and IO-DA, which aims to infer specific crisis response processes (providing inter-agencies collaboration to resolve the crisis).

Once done with the execution, users’ feedback was gathered by different means: questionnaires, debriefing sessions, interviews, notes made by observers, hot-wash observations and first impression sessions. As a result, all answers have been analysed one by one and the feedback was summarized according to the three dimensions. This summary provides not only factual feedback from participants about the experiment, but it is also an opportunity to evaluate the efficiency and efficacy of such an event and find new lessons learned to improve the future Trials.

Table of content

1.	Introduction	10
2.	Experiment design.....	11
2.1	Goals and expected outputs	11
2.1.1	Gaps and research questions	11
2.1.2	Objectives and criteria of success	12
2.2	Scenario.....	13
2.2.1	Scenario description of the whole Experiment 43	13
2.2.2	Place of the Experiment 43a within the scenario	14
2.2.3	Hosting platform	16
2.2.4	Participants and roles.....	16
2.3	Technical set-up	17
2.3.1	Tools involved	17
2.3.2	Technical architecture.....	20
2.4	Legal considerations.....	21
2.5	Evaluation approach and metrics.....	22
2.5.1	State of the art	22
2.5.2	Methodology.....	22
2.5.3	Measurements	23
3.	Experiment execution	24
3.1	Experiment schedule.....	24
3.2	Analysis and evaluation of results.....	27
3.2.1	End-users dimension.....	27
3.2.2	CM dimension	28
3.2.3	Solutions dimension.....	30
3.3	Lessons learned.....	32
4.	Conclusion	35
	References.....	36
	Annexes	37
	Annex 1 – Terminology.....	37
	Annex 2 – Questionnaire	38
	Annex 3 – Answers to the questionnaire	45

List of Figures

Figure 2.1: Event place and SAR responsibility division	14
Figure 2.2: Three main steps of the Experiment 43a scenario.....	16
Figure 2.3: Experiment 43a's functional architecture and interaction between solutions.....	21
Figure 3.1: Average scores for questions QIV.1, QIV.1, and QV.3.....	28
Figure 3.2: Average scores for questions related to the CM dimension.....	30
Figure 3.3. Average scores for questions related to the solutions.....	32

List of Tables

Table 2.1: PROCeed Solution.....	17
Table 2.2: IO-DA Solution	18
Table 3.1: Experiment execution schedule	24
Table 3.2 General scenario of the Polish part of Experiment 43, including timing.....	25

List of Acronyms

Acronym	Definition
ACO	Aircraft Co-ordinator
CM	Crisis Management
CZK	Regional Crisis Management Centre, which cooperates with other services like Fire Service, Police, Non-Governmental Organisations etc.
DRIVER+	Driving Innovation in Crisis Management for European Resilience
Experiment 43a	First part of the Experiment 43. This part is exclusively focused on the preparation phase of the crisis lifecycle.
Experiment 43b	Second part of the Experiment 43. This part is exclusively focused on the response phase of the crisis lifecycle
GUI	Graphical User Interface
ICT	Information and Communication Technology
JRCC	Joint Rescue Coordination Centre (Poland)
LS	Landing Site
LSOC	Landing Site Operational Centre
MRCC	Maritime Rescue Coordination Centre
NGO	Non-Governmental Organization
NOC	National Operational Centre
RCB	Governmental Centre for Security
ROC	Regional Operational Centre
RQ	Research Question
SAR	Search and Rescue
SME	Subject Matter Experts
TRL	Technology Readiness Level
TTX	Table-Top Exercise

1. Introduction

One objective of the DRIVER project is to evaluate the value of innovative solutions to address specific needs of CM. In line with this objective, the Experiment 43 “Coordinated Tasking and Resource Management” specifically studied three main gaps that are considered as thorny problems: (i) the management of the resources and tasks within and across stakeholders, (ii) the information sharing across stakeholders and (iii) the mapping of capabilities and capacities to elaborate contingency plans.

While the first two gaps (i and ii) refer to a run-time (i.e. in crisis response) behaviour, mapping capabilities and capacities can be addressed ahead of crisis occurrence. For this reason, Experiment 43 has been divided into two main parts: one relative to the Preparation Phase (concerning iii) – Experiment 43a, the other to the Response Phase (i and ii) – Experiment 43b. In this deliverable, only Experiment 43a is addressed.

Prior to the execution of the experiment itself, several steps initiated these works and this two-part approach: from a first inventory of solutions that took place in Aix-En-Provence (Nov 2014), to the refinement of the scenario and of the experiment’s expectations (First and Second Design meetings in Warsaw, June 2015 and Madrid, September 2015, Progress Meeting and Workshop in Revinge, Feb 2016 and Progress Meeting in Gdynia, March 2016). Finally, Experiment 43a was executed on April the 27th, 2016, and was held exclusively on the Polish site of the whole cross-border Experiment 43.

Thanks to the use of different media, invaluable information was gathered directly from stakeholders during the scenario, that once processed brings further insights both on the design and execution of the experiment itself, and on the usability and applicability of the proposed IT solutions in such crisis situations.

Thanks to questionnaires filled in by evaluators during the experiment and about both the execution of the experiment itself and the use of the solutions by stakeholders and crisis management actors, it is expected that Experiment 43a will nourish the planned Trials and more broadly benefit to the European crisis management community.

In this sense, this report builds on three sections:

- Section 2 is focused on the design of the experiment and describes, first, its goals and expected outputs. Then the second part describes the scenario that has been built to support these goals and reach the respective outputs. The third part is focused on the elaboration of this scenario with the suitable technical set-up that was achieved. Finally, the evaluation approach is detailed.
- Section 3 follows with the execution of this experiment, including its actual schedule and the analysis of the results obtained from the evaluation and eventually the lessons learned.
- Section 4 provides a conclusion to the two previous sections and to the experiment itself.

2. Experiment design

In a first step, the experiment was designed according to the following methodology:

1. The gaps and research questions were highlighted to pinpoint what needs to be addressed in this experiment.
2. From this, the objectives and respective criteria of success were defined.
3. Then the scenario could be built to answer the previous requirements and questions. At the same time, all questions concerning the hosting platform and participants were addressed.
4. Finally, the solutions were integrated to fit the scenario.
5. Based on the resulting Test-bed set up, the evaluation methodology could eventually be studied and the measurements proposed.

2.1 Goals and expected outputs

2.1.1 Gaps and research questions

The experiments conducted aim at assessing practitioners' needs and specific gaps. These gaps have been highlighted in former deliverables [1] and [2] and each experiment aims at addressing some of them. In the case of Experiment 43a, the following gaps were assessed (cf. numbering and phrasing used in the corresponding deliverables [1] and [2]):

GAP2. Command, Control, and Co-ordination - the lack of solutions for tasking and resource management

- There is no insight into the currently planned tasks allocated to disaster relief units/personnel within and across agencies, or it is too limited.

GAP6. Situation Assessment - Understanding the relief effort as a whole

- There is insufficient situational awareness of the overall status, progress and planned efforts in relief operations.

GAP8. Information Management - Inter-agency information sharing

- Identify appropriate procedures and context-based information sharing schemes.
- Provide technical solutions that support inter-agency information sharing.

To address these gaps, some questions were especially highlighted at the beginning of the experiment with the purpose of getting more insight on specific aspects of the gaps.

RQ1. In the context of a crisis event, what are the means for agencies to share a common picture (including sharing and communicating about the context) and to establish a common strategic plan to solve the crisis and how could this process be facilitated?

Sharing information between agencies before and during a crisis is one of the cornerstones of CM. Not only because it requires a technical interoperability between the heterogeneous information systems of the involved agencies, or the need to use a common vocabulary, but also because of the variety of points of view used (i.e. different expertise for each agency) to observe the same system.

In addition, the interactions between all agencies' resources and tasks have to be taken into account to achieve the common objective in the relief effort. Hence, the three previous main gaps are directly studied in this broad research question.

RQ2. How and to which extent can a set of solutions be used to tackle the previous problem, and what still needs to be improved?

With regards to the RQ1, this second research question aims at observing how integrated IT solutions can be used to help facilitate the overall sharing of information and plans between agencies. As a matter of

fact, the set of solutions was specifically selected and set up in this perspective. In particular, the integration of both solutions was a crucial point, considering their complementarity. It was therefore of utmost interest to specifically assess to which extent being able to formalize a crisis situation context, establish a corresponding inter-agency contingency plan and execute it through an interactive scenario would help decision-makers in both (i) responding the most relevantly to an imminent crisis and (ii) training them to better take inter-agency decisions for future crisis events.

2.1.2 Objectives and criteria of success

Directly connected to the gaps and the questions studied in Experiment 43a, several objectives were set up to orient the design of the experiment, and thus be able to assess how efficient was the experiment itself based on adapted success criteria.

More specifically this can be decomposed into three types of objectives:

- The **end-users dimension**; understood as the perspective of the experiment (or platform) owner on the basis of the corresponding end users' needs.
- The **CM dimension**; understood as the operational perspective, related to the CM performance and procedures with a special consideration of the identified gaps (including but not limited to crisis response, but also to the test and evaluation procedures).
- The **solutions dimension**; understood as the perspective of the solution providers, and mainly related to the capability of a certain solution to improve or drive innovation (contributing to bridging the gaps) in CM.

Regarding the end-users dimension, one objective was defined from the Polish point of view of the whole experiment, and in particular for Experiment 43a:

OBJ1. Validation and test of:

- Validation and test of the evacuation from the vessel to the Landing Sites (special places with dedicated infrastructure for handling the evacuated people and providing medical assistance). Those landing sites could be dedicated for people evacuated by vessels or by helicopters.
- Validation of survivors' assistance plans (handling the evacuated people on land) by the regional crisis management center (CZK) which cooperates with other services like the Fire Service, Police, Non-Governmental Organisations etc.

Regarding the CM dimension, the main objective of Experiment 43a was:

OBJ2. Evaluate the limitation of the use of generic contingency plans and to which extent there is a necessity of providing the CM decision-makers with decision support systems, to help them elaborate and test specific coordination plans

From the solutions dimension, two main objectives were of particular interest:

OBJ3. Assess the usability provided by the integrated solutions, in the near-real context of Experiment 43a.

OBJ4. Assess the usage and added-value of the integrated solutions, in the near-real context of Experiment 43a.

Along with these objectives, a set of success criteria was defined to assess in which way and how far the experiment would have fulfilled these objectives.

Some of these criteria were related to how the experiment was designed and therefore they were used as an internal way to ensure some minimal requirements:

- Design of the experiment:
 - Involve several institutions in an inter-agency scenario.

- Being focused on the preparation phase and provide a scenario that would be relevant for the further Response Phase (Experiment 43b) and involve the solutions to be tested at their best (create the opportunity to show all functionalities);

Other criteria were evaluated via questionnaires that were shared during the experiment to participants. For each criterion, a metric was defined (cf. Annex 2 – Questionnaire). The criteria that were used are:

- Evaluation of the experiment design and execution:
 - Realism of the experiment and involvement of the participants into the scenario.
 - Overall interest of the participants in this experiment and in eventually taking part in further experiments.
- Set-up and execution of the experiment:
 - Level of the contribution of the experiment to the participants (did it raise any awareness).
 - Level of the contribution of the experiment to the CM community (did it raise any awareness).
- Usefulness of the solutions:
 - The operational benefits of the set of solutions to CM decision-makers:
 - To what extent the solutions help them get a better common picture of the crisis event.
 - To what extent do they help them share information among all agencies involved within the contingency plan (manage resources and assigned tasks, and coordinate all stakeholders relevantly).
 - To what extent can they improve and train them to raise their speed, effectiveness, and relevancy of reaction.
- Usability of the solutions:
 - The adequacy of the technical performance of the set of solutions and the needs of the participants:
 - User-friendliness of the solutions.
 - Accuracy of the inputs required from the users and to what extent these inputs can be properly provided.
 - To what extent the outputs generated by the solutions can bridge the aforementioned gaps.

2.2 Scenario

2.2.1 Scenario description of the whole Experiment 43

The assumption of Experiment 43 table-top exercise is to plan and conduct (by Poland and Sweden) mass rescue operation of victims in a sea disaster, with the participation of citizens of different countries, including ones from outside of the Schengen area, which makes this an international exercise. The scenario of the experiment includes both members of Polish CM institutions, at regional and local levels, and foreign rescue units operating at sea. The decisions and actions were taken in a realistic informational environment, based on currently available means, crisis management plans, rescue procedures and good practices that were developed by specific members. The scenario started from a fire event in the engine room of a ship transporting 1,700 passengers. The threat of fire spreading all over the ship resulted in a necessary evacuation of the vessel and the management of the victims once arrived on landing site. Therefore, two elements constituted the core of the whole scenario:

- Sea step: fire extinguishing, evacuation of wounded passengers from the ship, taking care of them, transferring information about sea actions to the agency and decision makers who coordinate the rescue actions on land.
- Land step: setting up an admission site for wounded people and headquarters organization, helping the wounded, giving information to public administration, giving information to media, giving

information to the families of the wounded, enabling communication with teams that are conducting rescue operations at sea.

The initial situation was the following: ***MV Fire Sparrow*** leaves the port in St. Petersburg and starts the journey to Luebeck harbor. **The vessel embeds 1780 passengers, 580 cars and 150 trucks on-board.** The captain receives an **early warning about severe weather conditions** - near gale wind 7 B scale (14 m/s), sea state 6 B scale, sea wave 4-5 m, visibility less than 3 miles in precipitation. 10 hours after the departure of the vessel, one of its cooling system breaks, which leads to an engine overheating. The fire grows in the engine room. The crew of the ship informs the owner about the emergency situation. However, due to the fact that the fire starts to spread to the compartments where flammable resources are stored, the crew has to call for external help.

The Polish Maritime Rescue Co-ordination Centre (MRCC) in Gdynia receives an **“SOS” signal from *MV Fire Sparrow***. Most of the available resources are dispatched on the scene of the possible maritime disaster. Polish and Swedish crisis management centers, at regional and central levels, are immediately alerted. The SAR starts running a contingency plan that leads, for the first time ever, to a Mass Rescue Operation in the Baltic Sea.

Figure 2.1 represents the crisis event taking place on a passenger ship in the middle of the Baltic Sea, between Sweden and Poland.

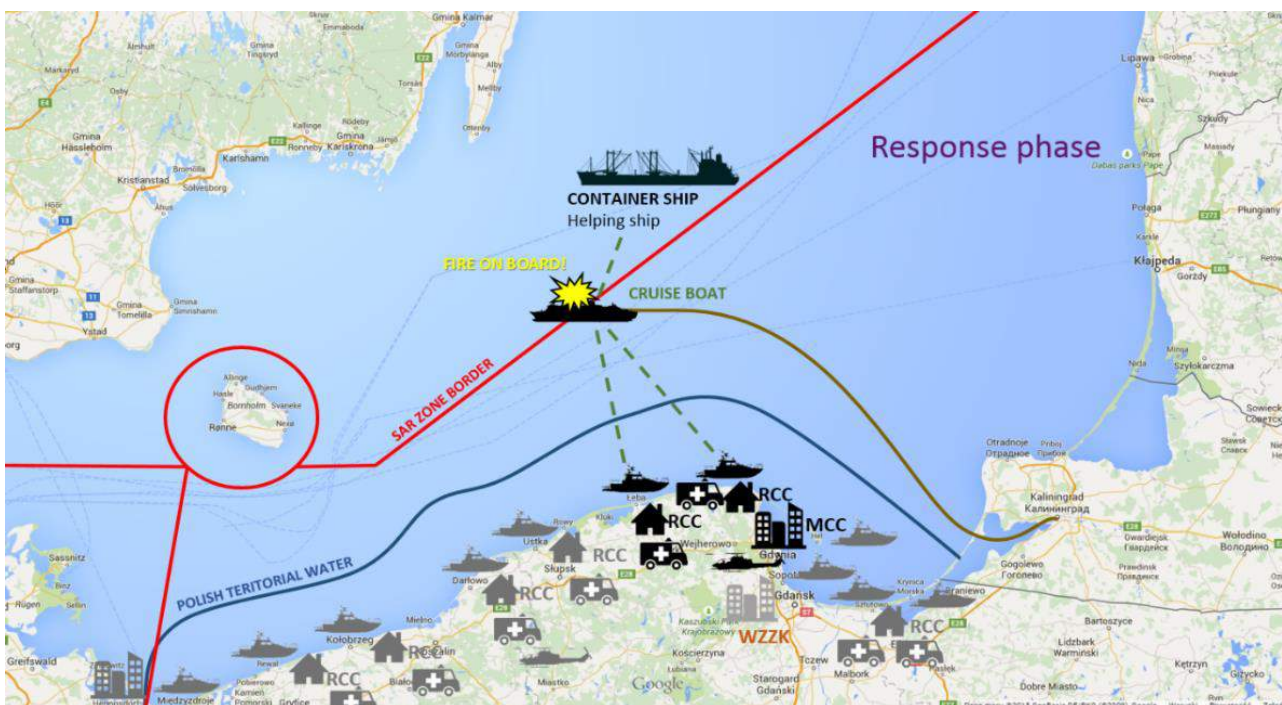


Figure 2.1: Event place and SAR responsibility division

2.2.2 Place of the Experiment 43a within the scenario

Within the whole scenario of the Experiment, Experiment 43a had a very specific location due to the following constraints: (i) it had to be in line with the schedule planned for the crisis response phase in Experiment 43b and in the same time (ii) it could take place in one place, considering that the cross-country and the inherent technical interoperability issues did not need to be proved in this part –since Experiment 43a focused only on the Preparation Phase.

Due to these reasons, and to facilitate the execution of the Experiment 43a, it was decided that it would only take place on the Polish side. Also, one of the two solutions involved was being developed and supported by ITTI who was in charge of the whole hosting platform management in Gdynia.

Additionally, not much time was dedicated to the Preparation Phase in the scenario: (i) considering the time that had to be dedicated to the run-time execution (i.e. Experiment 43b’s solutions could only be

assessed if tested on a rather long-term perspective for the technical architecture to undergo a proper and realistic context), (ii) considering that there were only two solutions that would be deployed during the Preparation Phase, that, as well, did not require a long time to be assessed.

As a result, it was decided that the scenario of Experiment 43a (i) would focus on a precise yet impacting part of the whole scenario, (ii) and only involve the Polish participants who would directly test the set of solutions on-site, in Gdynia.

Scenario of Experiment 43a

With regards to all constraints and decisions aforementioned, it was decided that Experiment 43a would exclusively focus on the steps of the scenario from the arrival of victims on the Polish Landing Site (LS), to their repartition in adapted hosting infrastructure.

Just as illustrated in Figure 2.2, the following steps were decided:

1. First victims arrive on landing site:

The Polish rescue vessels and helicopters arrive with first victims, from the crisis site. The scenario starts when first victims are welcomed on the landing site and the medical support enters the scene of the crisis scenario.

2. Triage of the victims:

As soon as first victims are in the landing site, medical teams take them in charge and associate each of them to a gravity level depending on their health status (i.e. injured, dead, no injuries).

3. Repartition of the victims over the dedicated infrastructures:

a. Medical action needed

All passengers for whom the medical staff on landing site has specific concerns are assigned to corresponding and available hospitals. Their transportation is ensured thanks to the use of ambulances dedicated to responding specifically to the crisis.

b. No medical action needed

Passengers without any medical concerns constitute another flow that has a lower priority. In particular, buses are provided to transport this group of passengers to hosting infrastructures such as hotels, schools, community halls, etc.



Figure 2.2: Three main steps of the Experiment 43a scenario.

2.2.3 Hosting platform

The experiment was hosted in the premises of the Polish Naval Academy, which is located in Gdynia (Poland).

An assembly hall for approximately 200 observers/partners was used and organized as follows: three control rooms for about 10 people each and two technical ones (for IT/experiment support) were set up. The control rooms were equipped with solutions provided by the project internal solution-providers. The site was equipped with wideband internet connection and the appropriate technical infrastructure including wired and wireless connection capability. Furthermore, the assembly hall was equipped with microphones, speakers, a projector, two screens and one audio mixing console.

The experiment on the Polish side was organized as a table-top exercise, which means that only the decision-makers were involved in the process, whereas project internal solution-providers acted as support for the use of the solutions and observers. The rest of the situation, including assets and their actions, were simulated and prepared by either specific solutions or groups of trained people and on the basis of the experiment’s scenario.

2.2.4 Participants and roles

The execution of Experiment 43a gathered 36 stakeholders from the following organizations:

- National level
 - Government Centre for Security
 - Crisis Information Centre (division of Space Research Centre)
- Regional level
 - Sea Rescue Service (SAR)
 - Sea Search and Rescue Service from Gdynia
 - Regional administration

- Warmińsko-Mazurskie Voivodship Office in Olsztyn
 - Police
 - Voivodship Police Headquarters Post in Olsztyn
 - Police Headquarters in Olsztyn
 - State Fire Service
 - Voivodship Fire Service Headquarters Post in Olsztyn
 - Poviát Fire Service Headquarters Post in Elbląg
 - Municipal Fire Service Post in Gdańsk
 - Municipal Fire Service Post in Olsztyn
 - Medical Service
 - Voivodship Emergency Medical Services Post in Olsztyn
 - Helicopter Emergency Medical Service
 - Military
 - Military Police Elbląg Division
- Non-governmental Organisations
 - Polish Red Cross
 - Great Orchestra of Christmas Charity
 - Polish Scouting and Guiding Association
- Observers
 - National Defence University
 - Polish Naval Academy

They were subsequently grouped into three groups representing National Operational Center (NOC), Regional Operational Center (ROC) and Landing Site Operational Center (LSOC). The NOC has been represented by the Government Center for Security. The ROC was represented by the Regional administration (Voivodship office) and representatives from Police and Firefighters. The biggest team was the LSOC, which involved people from Regional level (Medical Services, Firefighters, Police, Military, and administration) and NGOs. There was also a group responsible for contacts with the Swedish side, which has involved people from SAR, Administration, project partners and platform members (ITTI and Crisis Information Centre).

2.3 Technical set-up

In order to play this scenario, a set of solutions was selected for its suitable features with regard to the scenario’s needs. In particular, two solutions were addressing the needs: PROCEED (ITTI) and IO-DA (ARMINES). The first part here provides an insight into the solutions’ features and then the second part details how the solutions were technically integrated to support the whole scenario.

2.3.1 Tools involved

This section describes the solutions that have been integrated together for Experiment 43a.

Table 2.1: PROCEED Solution

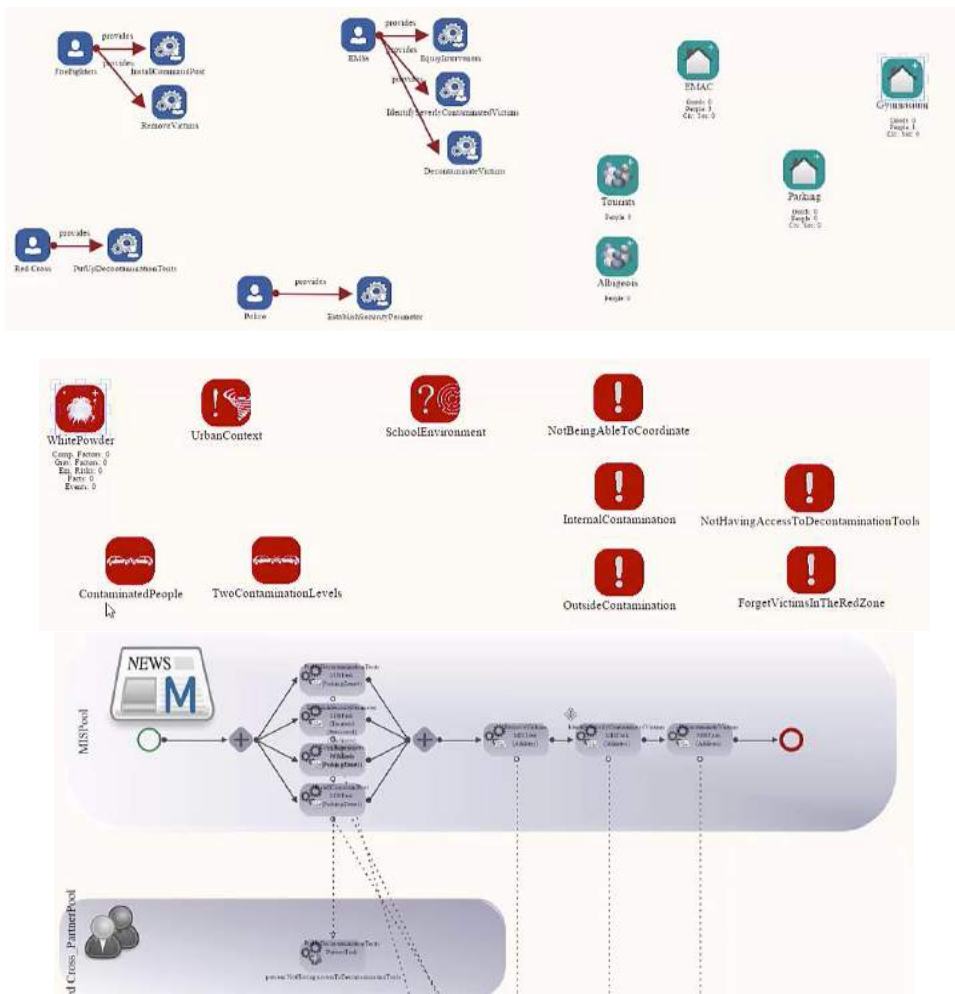
PROCEED	ITTI
PROCEED is a family of tools to train and analyze the consequences of people’s decisions in the simulated situations. A certain situation is generated based on the predetermined model containing certain crisis scenario with many alternatives as well as the mechanism of interaction with users (by structured questions). PROCEED is mainly used for providing decision games. It consists of PROCEED Engine to provide decision games via a computer network and PROCEED Designer to design and	

PROCeed		ITTI
develop new decision games. PROCeed incorporates a GIS-based part of GUI.		
General characteristics		
Usage in CM domain	<p>PROCeed could be used in the following context:</p> <p><u>Educational Tools (decision games)</u> in: decisions; out: consequences e.g.: Trains (by supporting decisions) how to react to crisis situation Allows optimization by analysis of possible courses of the situation</p> <p><u>Interactive Guide/Manual</u> in: what you see; out: a proper recipe e.g.: Provides know-how to repair a generic car</p> <p><u>Case/object Classifiers</u> in: description/properties; out: a proper category e.g.: Provides situation awareness (and forecast of future events) Identify a plant using a PROCeed as a key for plant identification</p>	
Main capabilities	<p>PROCeed has the following capabilities:</p> <p>Situation analysis facilitator which enables modeling of alternatives and visualization of the story, Production of COP (Common Operational Picture) enabling presentation of story of user’s perspective and supporting multiuser cooperation, Situation context generator enabled by complex scenario manipulation, including massive data structure and event chains operations.</p>	
Maturity	TRL 8/9	
Role in EXPE 43a		
Role description	Used by participants of the experiment in Use Case 1 (Capability mapping) for visualization of scenario and its alternatives.	
Actors using the solution	Polish Crisis management services	
Expected feedback	<p>An assessment whether the use of the solution providing a variation of the scenario and list of actions that could be used to validate and improve crisis management plans and capacity building activities.</p> <p>Use of the solution for harmonization of scenario execution – evaluation of new perspective for PROCeed application in Crisis Management sector.</p> <p>Collection of user feedback about system interface.</p>	

Table 2.2: IO-DA Solution

IO-DA	ARMINES
<p>IO-DA enables to deduce inter-organizational business processes, as a proposition to respond the crisis, from the modeling of the crisis situation, the potential stakeholders' capabilities, and the specific objectives to be fulfilled in the frame of the crisis. Figures, in the order: partners model, crisis situation model, objectives model and CM collaborative business process deduced by the solution.</p>	

IO-DA **ARMINES**



General characteristics	
Usage in CM domain	The solution supports activities of <i>preparation and planning</i> at the <i>strategic</i> and <i>tactical</i> levels. It is expected to be deployed at the international-level operation center, and potentially at the national-level operation centers.
Main capabilities	Modelling of the stakeholders and their capabilities Modelling of the objectives of the collaboration Modelling of the crisis situation (impacted human and material environment) Based on the three models: deduction of relevant processes as proposition to respond the crisis
Maturity	TRL 4: the different components of the solution have been integrated all together. The solution is still a research prototype, so it is not yet perfectly user-friendly.
Role in EXPE 43	
Role description	The solution allows describing the crisis situation (its environment, its stakeholders, and its objectives) through its three associated modellers. Then a relevant algorithm is used to deduce a potential collaborative process that will come as a proposition to respond the crisis. This process is

IO-DA		ARMINES
	formalized with the BPMN 2.0 notation, which can then be orchestrated in response phase, to invoke the stakeholders’ capabilities in the right order. To conclude, this solution aims at ensuring the business-level interoperability of the crisis response system, during which the deduced business process will be orchestrated.	
Actors using the solution	The solution was used by the decision makers involved either in Poland or Sweden side.	
Expected feedback	Feedback on functionality, usability, and efficiency is expected from end-users/actors using the solution during the execution of EXPE 43. In particular, their impression of the following aspects would be appreciated: Usability; understood as the capability to provide comprehensible interfaces, especially critical for the provided modellers. Suitability; understood as the capability of the solution to provide an appropriate knowledge base (relevant and suitable to the specific scenario) Relevance; understood as the capability of the solution to deduce realistic and good results (relevance of the obtained business processes confronted with plans manually defined) Time behaviour; understood as the capability of the solution to provide appropriate response and processing times (adapted to a real situation)	

2.3.2 Technical architecture

Most of the architecture has been decided with regards to two main aspects: (i) the consistency with the scenario and (ii) show at best how the solutions are integrated and work together to enhance the Preparation Phase.

The gaps to bridge were not focused on technical challenges but rather on a business and functional level. This is the way in which the functional architecture is depicted here.

As a first step, a preliminary model of the crisis situation was described following PROCEED’s rules, allowing to obtain two elements in parallel: (i) a crisis situation model for IO-DA (after a model transformation from a PROCEED model to a IO-DA model, which can be technically transposed in a simple XSL transformation from one XSD structure to another) and (ii) a “game board” for PROCEED (i.e. the context in which the alternative scenarios can be implemented).

From these inputs, both solutions could be used in a complementary utilization: users can refine the crisis related models in IO-DA, and generate the adapted contingency plans, which are then tested as alternative scenarios that had been implemented within PROCEED.

To sum up, both approaches were based on the initial crisis situation model corresponding to the scenario. In a first step, IO-DA takes the crisis situation model as input (which includes the whole context of the crisis, along with the threats and inherent stakes that have to be handled), and generates a corresponding multi-agency process to solve the crisis. During this step, the decision-makers can put a priority to each of the threats and stakes of the crisis situation: the higher the priority, the sooner it will be handled in the final generated process (i.e. the generated process can be different according to the priorities set up by the users).

From those processes, PROCEED offers a playground to the decision makers to simulate the different alternatives and find out the positive or negative impacts of their decisions.

Figure 2.3 illustrates this interaction between both solutions.

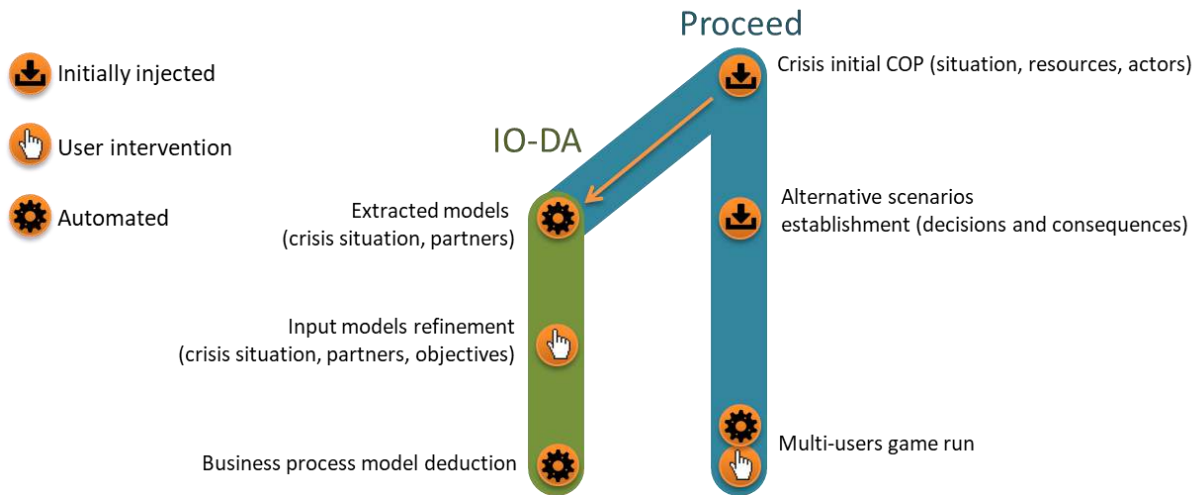


Figure 2.3: Experiment 43a's functional architecture and interaction between solutions.

2.4 Legal considerations

The Polish side of Experiment 43 was organized by the project's Eastern European Platform. Its coordinator established relations with various end-user organizations on the basis of the exchange of letters defining respective roles and obligations.

Two legal issues impacted the organization of this experiment as follows.

Firstly, as the matters related to Mass Rescue Operation at sea are not covered in details by the Polish regulations, it was decided that the general rules governing emergency operations would be used for the activity, particularly national and regional-level crisis management plans and internal regulations of participating emergency services.

Secondly, to avoid issues related to the protection of sensitive information, it was agreed that the exercise would be conducted with the use of non-classified information only.

2.5 Evaluation approach and metrics

2.5.1 State of the art

The evaluation approach in a Table-Top Exercises (TTXs) is based on two sources of data: one is the data gathered during the experiment, and the second is the data gathered from the debriefing of participants' feedback.

The methodology concerns how the whole experiment was perceived by the participants in terms of applicability to their respective works, and whether it had given them new skills. In such a case, a “hot-wash” session is usually performed the last day of the experiment, and all participants have an opportunity to share their individual and joint observations. It gives them the opportunity to gather a relatively “fresh information” on how the scenario was played from their perspective in terms of advantages, disadvantages and neutral observations (remarks on issues, which should and could be improved). This process is supporting another one, which is also a preferable way by CM stakeholders.

The “hot-wash” evaluation is followed by a “first impression session” (preferably 3-7 days after the exercise). Participants of this event could use this opportunity to improve the feedback collected during “hot-wash” session.

The time between the formal finalization of the exercise and “first impression session” allows participants to re-think their observations, request, comment and raise other research findings. Usually, after that time, another data collection event is run as a plenary meeting divided into individual and joint sessions. Observations collected during the discussion are used as an input for the exercise report. Those evaluation methods enable CM stakeholders to transform their findings into exercise goals. Therefore, the participation of subject matter experts or possibly external consultants in the process of evaluation is highly recommended. The first solution, involving SME experts, is commonly used in public administrative institutions as part of internal resources management (e.g. participation of representatives not-involved in actual exercise from other departments, units or sub-divisions is highly welcomed). Its strong advantage is to involve “internal resources”, which is quite reasonable in the perspectives of cost savings and human resources management. However, its limitations could be seen in terms of the neutrality and practicality (not only theoretical) experience of the evaluators.

TTX are well known in military institutions as part or as a way of crosschecking armed forces or state fire service capabilities in defined areas of responsibility. This vast methodology has been developed for many years, reaching its high-level performance for Allied or EU-led initiatives involving national agencies and institutions. Its goal is to preserve a good performance of pre-defined exercise goals as part of the validation of contingency plans/concept of operations or standard operating procedures, which mostly deals with the deployment of a real “forces on the ground”.

Only one part of nationally or regionally led initiatives deals with the validation of high-TRL ICT technologies. Those initiatives are connected to cyberspace security issues e.g. so-called “technological exercises” run or held by banking sector or state-of-the-art technologies validation as part of crisis scenario case in e.g. EU FP7 security R&D programs.

In terms of applicability, the evaluation should concern how the outcomes of the experiment could be used in real situations as guidelines or lessons learned experiences. On the other hand, it should also be assessed whether the participants have gained some knowledge. In the case of Experiment 43, the scenario was quite realistic. Furthermore, crisis services participated that are usually involved in such events.

2.5.2 Methodology

Experiment 43a was executed as workshops during which users could directly use the solutions and interact together (e.g. via a multi-partner tool). Being integrated, even though asynchronously (as there is no need of real-time integration in Preparation Phase), the solutions of Experiment 43a allowed to first deduce a collaborative behavior that could then be trained and assessed through an immersive game simulation.

The solutions were already presented to some of the observers (Polish CM organizations representative) during a Workshop in Gdynia in March 2016. In parallel, during Experiment 43b phases (Experiment 43a focuses on a specific part of the whole Experiment 43 scenario), an observation of the current approach to preparing a specific crisis response was observable and allowed a comparison with the potential contributions of the proposed project internal solutions.

During Experiment 43a execution itself, the evaluation of the solutions was done through:

- 1) Questionnaires filled in by the participants,
- 2) Personal interviews with participants documented using camera,
- 3) Notes made by observers,
- 4) Hot-wash observations gathered during the last day of the experiment,
- 5) First-impression session, a couple of days following the experiment.

The questionnaires were bilingual (Polish and English) and allowed to gather valuable information from stakeholders thanks to their answers and additional comments. The main objective of gathering this feedback was to answer the previously developed research questions, and validate both the applicability and the quality of the proposed solutions (PROCEED and IO-DA) in such a context.

2.5.3 Measurements

An evaluation framework was established across four main areas: the usability of the assessed set of solutions, its usefulness, the set-up of the experiment and the proposed use-case and the perspectives.

In addition to the questionnaires and previously cited feedback gathering means, the whole event had been documented with video footage gathered by eight CCTV cameras. The setup of those cameras gave an insight on how the experiment was prepared and conducted from the observer's point of view. More than 200 observations were gathered. A detailed analysis will be provided in the next section.

3. Experiment execution

3.1 Experiment schedule

In June 2015, Experiment 43 First Design meeting was held in Warsaw involving platform owners (ITTI and MSB) and the experiment leader (GMV) for the definition of the objectives and the scenario of the experiment. In September 2015, Experiment 43 Second Design meeting was held in Madrid including also the solutions providers for the definition of the experiment approach and the technical set up. In February 2016, Experiment 43 Progress meeting and Workshop was held in Revinge for the definition of the evaluation framework and to have a first direct contact with end users and practitioners for the validation of the scenario. In March 2016, Experiment 43 Progress Meeting and Workshop was held in Gdynia for the validation of the last taken steps and to have a second direct contact with end users. As part of Experiment 43, Experiment 43a also went through a rehearsal in MSB Revinge from 11th-14th of April 2016 including:

- Deployment of the Equipment (11th-14th April).
- Technical Testing and Rehearsal of the solutions (12th-14th April).
- End Users Training and Rehearsal (14th April).
- Wrap-up (14th April).

A detailed schedule of the experiment execution is provided in Table 3.1:

Table 3.1: Experiment execution schedule

Time	26 th April	27 th April	28 th April
8:00		Registration	DISTAFF PL briefing
9:00		Play phase 2 “Evacuation & Planning of the land operation”	Play phase 4 “Transportation & Accommodation”
9:30			
11:30		Recap Telco Poland-Sweden	Recap Telco Poland-Sweden
12:00	Readiness confirmation	Hot wash up	Hot wash up
	Lunch	Lunch	Lunch
13:30	Play phase 1 “Alert Reception & Preliminary Assessment”	Play phase 3 “On-Shore Assistance”	End users’ evaluation (questionnaires)
14:00			Wrap-up
14:30			
15:00			
15:30		Recap Telco Poland-Sweden	
16:00	Recap Telco Poland-Sweden	Recap Telco Poland-Sweden	
16:30	Debriefing	Debriefing	
17:00			
18:00		Cultural programme in Poland.	
18:30		Visiting MRCC in Gdynia.	
19:00			

The Polish side of the scenario, which can be seen as a very detailed schedule of the execution of the experiment, is presented in the following Table 3.2.

Table 3.2 General scenario of the Polish part of Experiment 43, including timing.

No.	Time	Action
1	H	MV FIRE SPARROW captain reports to MRCC Gdynia that he has fire on board
2	H + 5m	MRCC confirms that he obtained MAYDAY report
3	H + 5m	Initiation of SAR procedure: alarming, gathering additional information, planning, tasking rescue units
4	H + 10m	Referral for SAR units support from Sweden, Denmark, Germany
5	H + 10m	In agreement with JRCC Sweden, all action coordination is conducted by MRCC Gdynia
6	H + 15m	Captain of the nearest container vessel "Marie X" sends his coordinates to MRCC and MV Fire Sparrow captain and declares his readiness for action. By SMCs decision he remains in assistance until release
7	H + 15m	Creating communication channel with MV Fire Sparrow owner
8	H + 15m	MRCC Gdynia informs Voivodship Crisis Management Centre, Maritime Office, Ministry of Foreign Affairs and Ministry of Maritime Economy
9	H + 15m	9 polish rescue ships are getting into the action
10	H + 20m	Start of first polish rescue helicopter
11	H + 20m	Evacuation of passengers and part of the crew from the ship with/by MES and FRB
12	H + 30m	Start of first Swedish rescue helicopter
13	H + 30m	Providing MRCC MV Fire Sparrow's crew and passenger list
14	H + 30m	Providing the list to Voivodship Crisis Management Centre
15	H + 30m	SAR informs media about the incident
16	H + 30m	MRO announcement
17	H + 35m	Convening Voivodship Crisis Management Team session
18	H + 35m	MRCC Gdynia informs VCMT about status and number of casualties
19	H + 35m	First Danish SAR ships are getting into action
20	H + 50m	Start of taking wounded on the board of newly arrived on rescue site helicopter
21	H + 1h	Start of Danish rescue helicopter
22	H + 1h	Start of Polish Aircraft Co-ordinator (ACO)
23	H + 1h	SAR Crisis Management Team starts its work
24	H + 1h30m	Taking 9 people on board of SAR helicopter
25	H + 1h 30m	In agreement with Director of Maritime Office, Voivodship Crisis Management Centre, SAR Maritime Coordinator; ODOR and Maritime Border Guard, LS is designated
26	H + 1h 30m	LS Organization: assignation of LS operation center potholders, separation of action zones, LS infrastructure organization

No.	Time	Action
27	H + 1h 30m	Establishing that Swedish and Danish helicopters will return with rescued to Sweden, the same for Swedish rescue ships
28	H +1h 35m	Press conference
29	H +1h 40m	Query to Swedish and Danish embassy about status and number of casualties from their countries
30	H + 2h 00m	Start of first German helicopter
31	H + 2h 00m	First situational report in CAR reporting system
32	H + 2h 00m	Sending first representatives from embassies to the LS
33	H + 2h 10m	First SAR helicopter forwards wounded on LS (9)
34	H + 2h 10m	Start of registration/identification and medical assistance process on LS
35	H + 2h 20m	Border Control initiates UE, non-UE identification/verification procedures on LS
36	H + 3h 10m	Net group of wounded are delivered on LS by helicopter
37	H + 3h 30m	Start of German air coordinator plane
38	H + 3h 35m	Wounded families arrive on LS
39	H + 4h 30m	Danish and Swedish embassy representatives arrive on LS
40	H + 4h 40m	Forwarding casualties from German helicopter to LS (8)
41	H + 4h 50m	The first ship is forwarding wounded to LS (70)
42	H + 5h 00m	Additional rescue helicopters starts from Poland
43	H + 5h 00m	Another rescue ships forwards wounded to LS (70+50)
44	H + 5h 30m	Ships after disembarking and forwarding wounded to LS, are returning to action
45	H + 5h 30m	Another wounded are delivered on LS by helicopter and by ship (140+8)
46	H + 5h 50m	Application for teleconference with Swedish side in order to coordinate MRO
47	H + 6h	Start of Danish ACO plane
48	H + 6h - 7h	Other ships are forwarding wounded to LS (70+150)
49	H + 7h	Convening the meeting of Crisis Management Team of ministry of Internal Affairs and Administration
50	H + 7h 30m	Videoconference with Swedish side concerning MRO coordination
51	H + 10h	End of aerial activities
52	H + 11h	Information from OSC - end of evacuation, there are 50 crew members left alongside with MIRG team, fire is extinguished, vessel is unable to swim on its own, three SALVAGE company tugboats, contracted by ship-owner, arrive on site, they will tow the ship to the harbour and deal with empty rafts and rescue boats
53	H + 11h 20m - 14 h	SAR ships and helicopters forwards wounded to LS (586+90)
54	H + 14h	End of martial activities for MRO

3.2 Analysis and evaluation of results

Thanks to all the means used, and in particular the questionnaires, relevant feedback could be gathered during the experiment. This part sums up the feedback and scores obtained to each question, either relative to the scenario or the experiment or to the solutions themselves. All gathered answers to the questionnaires are in Annex 3 – Answers to the questionnaire (NB: the grades are evaluated on a [0-4] scale).

It has to be noted that because of language issues (all participants were Polish and most of the time almost not able to speak or understand English), the questions were not always completely understood. As a consequence, the answers sometimes diverted from the original question. For this reason, while answers are given to all three categories of objectives (End-users, CM and Solutions dimensions), the questions had to be re-assigned to the categories corresponding to the answers – which could be confusing when reading the question. For this reason, in this part, all questions are re-dispatched through all three categories and the scores and comments are studied. Hence, sometimes one question can belong to several categories, depending on the theme evoked by the answers.

NB: The numbering used to relate to each question of the questionnaire is the one used in Annex 3 (e.g. “QIV.1” relates to the first question of the Part IV of the questionnaire).

3.2.1 End-users dimension

OBJ1. Validation and test of:

- Validation and test of the evacuation from the vessel to the Landing Sites (special places with dedicated infrastructure for handling the evacuated people and providing medical assistance). Those landing sites could be dedicated for people evacuated by vessels or by helicopters.
- Validation of survivor’s assistance plans (handling the evacuated people on land) by the regional crisis management center (CZK) which cooperates with other services like Fire Service, Police, Non-Governmental Organisations etc.

To evaluate this dimension, several questions of the questionnaire are taken into account, namely:

- **QIV.1:** Did you learn/discover something during this experiment? [0-4]

On average, the participants were highly satisfied to have participated in this experiment. Mainly, they were interested in how the scenario was built, sometimes because they had never participated in any exercise at such a big scale, involving inter-agency and cross-border events.

- **QV.1:** Do you find this an interesting way forward [to hold two other following experiments – i.e. former Joint Experiments]? [0-4]

With no comments but a very high score, it can be concluded that holding further experiments based on this one is definitely an interesting perspective from the end-users point of view.

- **QV.3:** Would you be interested in being involved in these future experiments? [0-4]
- There is a unanimous willing of being part of further experiments. Partly because the scenario led the end-users to learn new things, and detect new gaps that need to be worked further on. **QV.4:** Who else would you recommend as a participant? [Open Question]

The participants recommend the contribution of other agencies such as the Ministry of Foreign Affairs, the Ministry of National Defence, the Ministry of the Interior and Administration, the EMS Coordinator, the Ground System Distributor, the social and cleaning services from the LS area.

Presented in a raw manner, the average scores to each question can be found in Figure 3.1

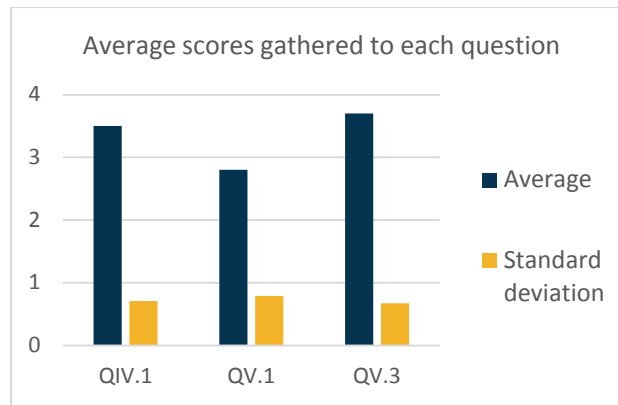


Figure 3.1: Average scores for questions QIV.1, QV.1, and QV.3.

The answers show that the two objectives were successfully reached since the scenario was interesting enough to involve the participants and realistic enough to satisfy their expert's point of view. While the setup of the experiment (only one room for all participants and the means of sharing the information not exactly adapted) could be discussed, it is clear that the inter-agency cooperation planned by the scenario was a real key success factor. Taking resources into account in a better way is very scenario-specific, and thus does not necessarily provide a valuable information for further experiments, unless the question of resources takes again a huge importance in the storytelling part of the experiment.

The scenario proposed for the experiment was unanimously one of the most satisfying points of the event. This leads to the realization that not only the solutions must be highlighted, used and assessed by the end-users thanks to a scenario, but, definitely, the scenario itself is a big element to involve at best the participants.

3.2.2 CM dimension

OBJ2. Evaluate the limitation of the use of generic contingency plans and to which extent there is a necessity of providing the CM decision-makers with decision support systems, to help them with elaborating and testing specific coordination plans.

To evaluate this dimension, several questions to the questionnaire are taken into account, namely:

- **QI.1:** The purpose of the preparation phase of a crisis is to establish crisis management plans in order to allow crisis teams to react faster and to make more effective decisions when facing a real crisis situation. In your opinion do the experimented solutions provide a relevant way to support a preparation phase? [0-4]

The participants insisted mainly on two facts. The first is that the experiment helped them draw important lessons valuable for future crisis events, about the way they could handle such situation. In particular, it is highlighted that in the case of mass events, no contingency plans may be applied. Which leads to the second point: the experiment made them realize or at least focus on the fact that in order to monitor all agencies involved in the crisis management, there is a need to use dedicated solutions.

- **QI.3:** Do you think that the establishment of high-level collaborative processes as strategic plans are useful to react faster to emerging crisis situations? [0-4]

There was a deep interest of the participants in answering at several levels to this question, which shows that it is important to make the difference between the low-level (operational) actors and the higher level concerning decision-makers in CM. In particular, the participants highlighted that at a lower level the entities already know their procedures and can apply them. However, at a higher level, there is definitely a need for clear visibility on the whole situation to take a relevant decision and in particular support the inter-agency coordination.

In parallel to this operational/decisional dimension, it is also stated that each event is different, which makes the response activities different from one to another. The participants mentioned that two levels

have to be taken into account. On the one hand, response processes cannot be the same from an event to another, and thus have to be adapted; on the other hand, some elements are recurrent and could be used as pre-built activities or sets of activities to be re-used in several response processes.

- **QI.4:** Do you think that the establishment of high-level collaborative processes as strategic plans is useful to make more effective decisions during emerging crisis situations? [0-4]

Most of the participants agree with the fact that having high-level collaborative as strategic plans to solve crisis events would make the decision-making process more efficient. They, however, add the fact that the corresponding resources to be used and tasks to be performed have to be in adequacy.

- **QI.5:** Do you think having such type of the collaborative process high-level granularity is useful to get a better global vision of the crisis situation (shared high-level vision not only from one partner's point of view)? [Open Question]

Besides the average rate that seems a bit low, comments are however clear on the fact that there is a necessity to share a common picture of the crisis situation between partners, and that missing this shared vision of the reality could result as an obstacle to the crisis response.

- **QI.6:** Do you think having such type of collaborative process can help tracking the advancement of a crisis response (activities finished, pending or to do) [Open Question]

There seems indeed to be a need of solutions helping end-users to track and monitor the activities of the response process for several reasons: manage the resources and know at each time which ones are available or not and help them plan ahead in a more flexible way.

- **QI.7:** Do you think that being able to play interactive crisis scenario is useful to react faster to emerging crisis situations? [0-4]

Most of the participants agreed on the fact that the use of interactive scenario that can be played on is definitely useful for training decision makers and coordination centers.

- **QI.8:** Do you think that being able to play interactive crisis scenario is useful to make more effective decisions during emerging crisis situations? [0-4]

From the experiment point of view, the participants reported that being able to play an interactive scenario can allow them to go through various solutions, which may help them choose the best ones to be more effective in the case of an event. Mostly, the rates show a strong interest in this approach, provided that the realism of the scenario is adequate.

- **QI.9:** Do you think that being able to play interactive crisis scenario allows having a good assessment of the relevancy and efficiency of contingency plans? [0-4]

Participants said that interactive plans are indeed valuable in testing different solution alternatives to choose the best one, which would, in turn, help to have a vision of the relevancy and efficiency of each alternative. In this sense, it seems that this question is mostly validated by participants.

- **QI.11:** Do you think that being able to play interactive crisis scenario helps to improve the decision accuracy in a real crisis situation, by augmenting the situation awareness? [0-4]
- **QI.12:** Do you think that being able to play interactive crisis scenario helps to have a shared vision across involved partners, on the consequences of each decision taken (variant scenario as result of consequences)? [0-4]

The point of view is a bit more mixed here, as the participants answered that it was mostly the opportunity offered by mixing agencies and levels of operation that would help them raise the situation awareness, and share common views and consequences of the decisions among the partners.

- **QII.3:** Do you think that the multi-partners interactive scenario is immersive enough to bring a positive leverage on further real situations? [0-4]

Even though a bit misunderstood, since this question was rather answered towards the experiment point of view and its scenario in particular, the participants agreed that it was a success that had given good opportunities to positively leverage future real actions in CM.

- **QIV.2:** Do you think that this experimentation will benefit the crisis management community? [0-4]

The participants were almost unanimous on the fact that the experiment was a real success in this sense: they saw that the scenario itself, supported by IT solutions, highlighted that, in a close-to-reality context, IT solutions are necessary to enhance the way crises are still managed.

- **QIV.3:** Are there any comments you wish to make regarding the experimentation? [Open question]

Only two comments were provided here. One dealt with just a very specific execution-related point (how additional time was handled during execution), the other was very optimistic and declared that this was the “*best exercise in an interesting and non-obvious area of crisis management, I have ever had the opportunity to participate*”. This is a very comforting feedback on the way the experiment was handled and to which extent CM experts and end-users see an interest in this to leverage the future of CM.

Presented in a raw manner, the average scores to each question can be found in Figure 3.2.

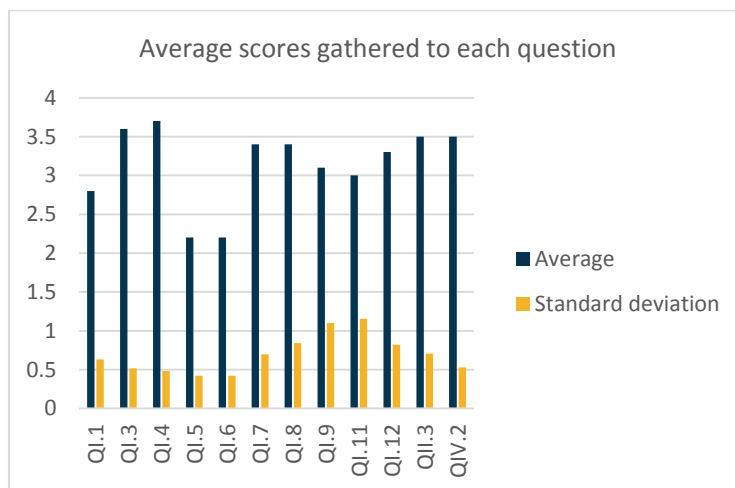


Figure 3.2: Average scores for questions related to the CM dimension.

As a conclusion about this CM-oriented dimension, participants are generally very optimistic and the objectives can be considered as reached for the following reasons:

- High-level collaborative processes are necessary as each event is different from the others, and requires a specific response.
- In particular these collaborative processes have to be further thought on two granularities: the ‘hierarchical’ level (from operation with low visibility to decision with a need of a higher visibility) – vertical granularity - and the sharing of lower-granularity activities (or sets of activities) that can be used to specify several processes responding different crisis – horizontal granularity of tasking.
- Interactive scenarios are definitely brought as a necessity to be able to assess different alternatives of the process and choose the best one.
- Finally, at a broader level, the participants comfort the fact that these are two crucial objectives that need to be addressed in CM, and that the need of IT solutions for this is preponderant – which need is also one of the main lessons learned by participants during the experiment.

3.2.3 Solutions dimension

OBJ3. Assess the usability provided by the integrated solutions, in the near-real context of the Experiment 43a.

OBJ4. Assess the usage and added-value of the integrated solutions, in the near-real context of the Experiment 43a.

At first sight, it can be noted that the results seem slightly lower than for the two precedent dimensions. The following details about for each question aims at studying this.

- **QI.2:** Do you find the information presented in the experimented solutions comprehensive and understandable? [0-4]

Many points are raised by the participants, here. In particular: (i) they deplore that the interface of the solutions hindered the experiment and (ii) with regard to the functionalities of the solutions, it would have been beneficial to figure out the functionalities of the solutions from the start of the experiment, which would have made these more usable.

- **QI.4:** Do you think that the establishment of high-level collaborative processes as strategic plans is useful to make more effective decisions during emerging crisis situations? [0-4]

Focusing on the solutions used during the experiment, the participants express the fact if each agency uses its own solutions to enhance their own decision-making process, a solution to get insight into all other solutions to produce a higher-level decision-making process is indeed brought as a raising solution.

- **QI.9:** Do you think that being able to play interactive crisis scenario allows having a good assessment of the relevancy and efficiency of contingency plans? [0-4]

As previously mentioned, participants confirmed that using interactive scenarios did help them testing several alternatives.

- **QI.10:** Do you think that experimented solutions are ready to be used or demand further adaptation (functional customization, data localization, thorough modification)? [0-4]

There were divided points of view about this question. It is due to the fact that participants said it is hard for them to evaluate to which extent the solutions correspond to the needs, and in which way they are limited so far. This may be reasonably explained by the limited time the users had to directly interact with the solutions and their limited knowledge with regard to all their functionalities.

- **QII.1:** Do you think that the input models are easy to fulfill (granularity, concepts)? [0-4]

The input models expected by the solution to describe the crisis situation are rather criticized for their complexity and the preparation and entries of knowledge they require. In the same time, just as the previous question, it might be hard to tell, which could be explained by the lack of training on the solutions.

- **QII.2:** Do you think that the input models are representative enough to characterize a crisis situation at a global level? [0-4]

The high-level collaborative processes are assessed in two ways: on the one hand, they seem too simplified -i.e. exaggerated-; on the other hand, it provides the advantage of dealing with the lower risks.

- **QII.3:** Do you think that the multi-partners interactive scenario is immersive enough to bring a positive leverage on further real situations? [0-4]
- **QII.5:** What do you like and what would you improve on these solutions? [Open Question]

The answers given here seem to be rather oriented towards the solutions used during the response phase – i.e. Experiment 43b. It seems they are not relevant to assess the ProCEED and IO-DA solutions.

- **QIII.1:** Do you think that the set-up of this experiment is well adapted to the objectives? [0-4]

Both the average score and standard deviation show that the participants have a mixed point of view about the way the experiment was set up. In particular, they deplore that they were not trained enough on the solutions, and that it was too much of a gap to use the solutions in live during the experiment.

- **QIII.2:** What improvement in the set-up would you suggest? [Open question]

The participants have given many advices for further improvements. Among them, as previously mentioned, it is crucial to them to have more time to work with the solutions prior to the experiment. About the set-up of the experiment, they wish all teams/agencies were physically separated, which would have given a more realistic situation (e.g. not all agencies should have been given the same information).

One more aspect was how resources were managed: only identified during the experiment and not at the beginning.

- **QV.2:** What other perspectives do you recommend [about the experiment]? [Open Question]

With no comments but a very high score, it can be concluded that holding further experiments based on this one is definitely an interesting perspective from the end-users' point of view.

Presented in a raw manner, the average scores to each question can be found in Figure 3.3.

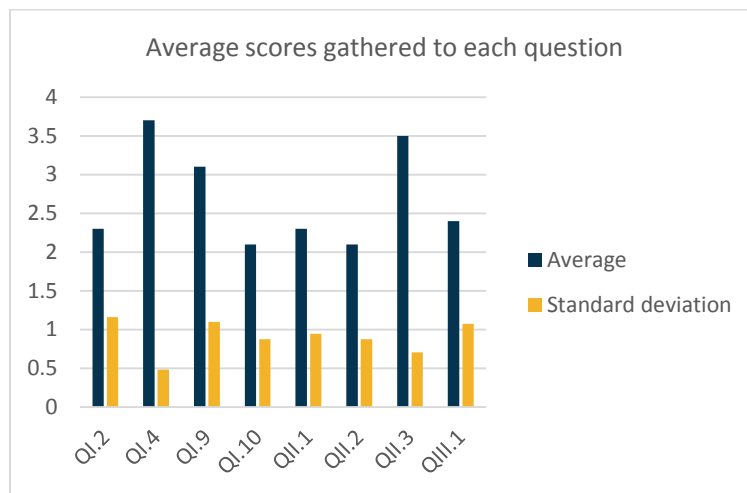


Figure 3.3. Average scores for questions related to the solutions.

The analysis of the results gathered on the solutions dimension brings a two-fold conclusion:

- About the solutions themselves: it seems rather prevalent that the end-users lack too much of a training on the solutions. This made it hard for them to really feel comfortable to assess them. This can be observed at different points of view: first, when using the solutions, the inputs required to use them are sometimes too complex for neophytes to easily create them in real-time; in addition, they sometimes did not see all functionalities or at least did not have the time to integrate them, which results in a huge difficulty to evaluate the current usability and to bring further advice.
- Directly dependent on the lack of knowledge of the end-users about the solutions, the answers show a confusion between the solutions dedicated to Experiment 43a and those to Experiment 43b: this makes the evaluation less accurate and highlight a broader issue about the whole organization of the experiment (one issue that went actually transparent for the participants during the experiment, but that is also all the more obvious to organizers, when reading the gathered feedback).

3.3 Lessons learned

Table-top exercise approach

The part of the experiment organized in Poland was hosted in the premises of Polish Naval Academy in Gdynia. The main place dedicated to it was a large assembly hall which had been divided into parts for the three groups of end-users (National Operation Centre, Regional Operational Centre, and Landing Site Operational Centre). The groups were playing a realistic scenario including the topic of Mass Evacuation, which was new for them. It is worth to note that in Poland the detailed procedures on how to arrange landing site for maritime evacuation had not been established yet. Thus, the experiment in the form of a table-top exercise was very profitable for its participants. The selection of this kind of approach attracted

the interest of end-users usually involved in those activities. It created a good opportunity for project internal solution-providers to arrange a testing of their solutions by practitioners. Stakeholders confirmed during a debriefing that this form was interesting for them and that they had discovered many issues that could emerge during a real crisis situation. This leads to the conclusion that the key to involve the appropriate stakeholders is to offer them not only the possibility to test the solutions but also to test them in conditions close to their operational activity and in a pertinent context. Such kind of approach benefits to both solutions providers and participants.

Support for solutions and proactive approach of a solution provider

One of the key issues was that the solutions had to be supported by a trained team, mostly from the consortium. Indeed, the concept of their use was new for the stakeholders which do not have operational experience in these solutions. Normally, they would have a set of workshops and training before they could evaluate the solution in the operational environment. Unfortunately, this kind of approach was out of scope for a single experiment. The organizers had to solve this issue by introducing some specific people whose role was to support the end-users and look for additional benefits from the solutions during the experiment. This made the introduction of a new solution into a (simulated) operational environment easier because it was focused on the synergy and not on the presentation of potential capabilities which could be irrelevant. This has made the experiment more convenient for the stakeholders and provided a possibility for the consortium to observe how stakeholders react to a crisis incident such as mass evacuation from the vessel.

In further Trials, it will, however, be interesting and of utmost importance to involve the end-users and participants sooner in the process of organizing the Trial, so that they have a better understanding on how the solutions can help them along the scenario that would be executed.

Scope of data available in solutions

The resources that would be available for the scenario had already been integrated into the solutions. However, during the execution of the experiment, the participants need a more flexible set of resources to handle the crisis. Especially, they need more specific information, such as the capacity of a particular hospital with its specialization instead of an overall capacity of all hospitals. Because of that, the common operational solutions were used only to report general status. This was not fully useful for participants because they needed more details to plan their actions. The way of sharing the information on current capacity using the solution proposed was generally considered useful, but it needs to be extended and filled with more detailed data.

On the importance of bringing more IT solutions to CM

One of the most important lessons learned by the end-users during the experiment is that there is definitely a need for more IT solutions to help them handle crisis events. Even if the solutions proposed by the consortium providers did not completely meet their needs, they could see which functionalities they could use. As a result, this is not something that needs to be considered a factor to increase further Trials, but rather, it comforts the purpose of the project, which is to evaluate the added value of (also IT) solutions in CM.

Organization of the whole Experiment 43

While the experiment was generally considered a huge success by participants, mostly because the scenario was incredibly valuable for them on a business level, the feeling can be a bit more mixed from the project point of view. Indeed, the fact that the experiment actually embedded two sub-experiments was confusing for participants. In particular, the time dedicated to both sub-experiments was unbalanced.

While the Response Phase was extremely motivating and long, the Preparation Phase could only involve workshops conducted during only one phase (half a day). In the same time, the users got to better know the solutions along the three phases of Experiment 43b. This unbalanced timing made them more focused on the Response Phase.

A conclusion to this point is that there are a strong interest and a very good reason to ensure the consistency of the whole experiment, in order to conduct both Preparation Phase and Response Phase

together in a higher level of experiment. However, this experiment should also be the opportunity for a better communication about this articulation toward participants, so that they do not get too focused on only one part.

Another organization with permanent workshops dedicated to the Preparation Phase, as a background of the Response Phase execution, could be imagined as well.

Lessons learned connected with scenario and exercise organization

The lessons learned connected with scenario execution and event organization has been presented below in three categories of observations: positive, negative and neutral.

POSITIVE OBSERVATIONS

- A strong advantage of experiment legacy should be that such a first-time-ever TTX was organized by, and for the benefit of real CM stakeholders in Poland.
- The experiment allowed to cross-check new areas of emergency management operations e.g. using non-regular medical service resources or psychosocial aid capabilities.
- Participants were coached to crosscheck for every possible opportunity to gather and manage information related to their situational awareness e. g. available resources.
- An exercise study form allows real CM stakeholders to see how CM actors communicate with the chain of command & control & communication on a crisis situation.
- The attractive issue of Mass Rescue Operations involving sea and land-based assets was notified by CM stakeholders as an interesting issue to consider for exercise baseline.
- Experiments allow CM stakeholders to better understand the importance of various layers of information and a need for a database access to improve the management of a crisis situation.

NEGATIVE OBSERVATIONS

- As for today, no dedicated ICT system for C3 support exists on a level useful enough for MRO.
- The medical command should be treated as part of the C3 process, nor as a separate one.
- It is highly foreseen to envisage a concept of Mass Rescue Operations as a part of the Crisis Management plan functional attachment.

NEUTRAL OBSERVATIONS

- It is highly recommended to consider a better description of casualties when dealing with large efforts on medical assistance.
- Not every baseline LSOC functions were chaired by actors, thus it did not impact their perception of ICT validated.

4. Conclusion

The Experiment 43a aimed to focus on the Preparation Phase of the whole Experiment 43 scenario. In particular, the goal was to see how the solutions could help to generate a high-level collaborative process in order to respond to a specific crisis event. Besides, it was also needed to determine how the use of this process in an interactive scenario would allow taking more effective and efficient decisions.

One of the key points of this experiment was that the end-users definitely got deeply involved thanks to the realism of the scenario. In addition, for some of them, it was the first time they had the opportunity to focus on such a large scale event (i.e. inter-agencies and cross-boarders). Thanks to the general feeling of involvement, the solutions could be used in a close-to-real situation and efficiently assessed by evaluating their current state and the needs they already met or still had to meet for the next steps.

With regard to the objectives that have been stated on three categories (end-users, CM and solutions dimensions), the following could be observed:

About the end-users dimension:

The experiment was a success, and, in particular, the participants were extremely satisfied with the scenario imagined for the experiment. This was all the more obvious that they expressed how much they learned new things. In particular, two elements were at the top of the end-users' interest: the cross-border and inter-agencies aspects of the scenario.

About the CM dimension:

Here again, it seems that the experiment was a success since the participants highlighted their interest of having both solutions to deal with high-level collaborative process specific to crisis events, and interactive scenario to assess the different alternatives that could be used to solve the crisis. It can also be perceived that participants believe the experiment is the right thing to do to evaluate and bridge the gaps existing between the current CM and the advantages the solutions could bring.

About the solution dimension:

This dimension was more of a mixed feedback from the participants. The participants thought that the inputs required by the solutions could be a bit too complex. But they also balanced this statement by the fact that they did not have the opportunity to train on the solutions prior to the experiment, which made it very complex for them to use the solutions 'in live'. The conclusion on this topic is actually more related to the organization of the experiment, and how it was communicated to the participants.

In summary, Experiment 43a was considered satisfactory. It brought a very positive feedback both on the end-users and CM dimensions. While the feedback was not really dissatisfying on the solution dimension, from the organizers point of view, it raised the question of how to better communicate around the future Trials of the DRIVER+ project. One lesson learned here is to better handle the organization and communication so that the end-users not only see the event as an exercise but also as the opportunity to discover solutions and assessed their current lacks. Obviously, this also goes with managing more working sessions prior to the Trials, for the participants to really get the opportunity to better know the solutions.

In future Trials, it will be important to make sure that the solutions to be tested benefit from an optimal exposition of the solutions to the end-users. This means that organizing demonstration workshops ahead of the Trials will be beneficial for both the end-users and the smooth execution of the Trials.

Another important thing will be to ensure the good communication and understanding between the end-users and with the solutions providers. In particular, the language issue must be tackled. Also, the set-up of the Trial will have to allow a good sharing of the information during the Trial (namely, some information have to be shared to specific agencies and not all: the spatial organization has to allow this).

It will be also important to check the relevancy of the construction of the Trial: having two sub-experiments in one event was not successful in terms of the evaluation of the solutions. It has either to be avoided or more balanced between both sub-experiments. Further research questions will have to be raised about how to integrate solutions that are able to both handle capabilities and resources (that were managed apart, by two different solutions in the experiment 43).

References

- [1] D. Stolk and W. Treurniet, "D41.21 - Vision on Response 2025," Deliverable of DRIVER project, 2016.
- [2] D. Stolk and W. Treurniet, "D41.22 - State-of-the-art Response system," Deliverable of DRIVER project, 2016.

Annexes

Annex 1 – Terminology

Table A1: DRIVER+ Terminology

	Keyword	Definition
1	Crisis Management	Holistic management process that identifies potential impacts that threaten an organization and provides a framework for building resilience, with the capability for an effective response that safeguards the interests of the organization's key interested parties, reputation, brand and value creating activities, as well as effectively restoring operational capabilities. Note 1 to entry: Crisis management also involves the management of preparedness, mitigation, response, and continuity or recovery in the event of an incident, as well as management of the overall programme through training, rehearsals and reviews to ensure the preparedness, response and continuity y plans stay current and up-to-date.
2	Experiment	purposive investigation of a system through selective adjustment of controllable conditions and allocation of resources
3	Experiment design	systematic methodology for collecting information to guide improvement of any process
4	Gap	Gaps between the existing capabilities of responders and what was actually needed for effective and timely response
5	Lesson learned	[lessons learning process of distributing the problem information to the whole project and organization as well as other related projects and organizations, warning if similar failure modes or mechanism issues exist and taking preventive actions]
6	Observation	Method of data collection in which the situation of interest is watched and the relevant facts, actions and behaviours are recorded.
7	Observer	Exercise participant who watches selected segments as they unfold while remaining separate from role player activities. Participant who witnesses the exercise while remaining separate from exercise activities Note to entry: Observers may be part of the evaluation process.
8	Response	Actions taken during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected.
9	Scenario	pre-planned storyline that drives an exercise; the stimuli used to achieve exercise objectives
10	Trial	An activity for systematically finding and testing valuable solutions for current and emerging needs in such a way that practitioners can do this in a pragmatic yet systematic way.

Annex 2 – Questionnaire

Name (first and family name)	
Role in the Experiment	<input type="checkbox"/> LSOC <input type="checkbox"/> ROC <input type="checkbox"/> NOC <input type="checkbox"/> DISTAFF <input type="checkbox"/> other
Email Address	
Organisation	
Responsibility at work	<input type="checkbox"/> Researcher in the crisis management domain <input type="checkbox"/> Professional practitioner <input type="checkbox"/> Personally interested <input type="checkbox"/> Politician or administration officer <input type="checkbox"/> Solution provider <input type="checkbox"/> Other stakeholder, what kind: <input type="checkbox"/> No direct relation
Country	

Aims of Experiment 43 UC1:

EXPERIMENT 43a (Use Case 1 of EXPERIMENT 43) consists in the Preparation Phase of the Experiment 43. As such, it aims at defining the resources, their assigned missions and tasks to solve a crisis situation. The expected output of this use-case focuses on two main points: (i) the establishment of a relevant collaboration across the involved partners within a high-level process and (ii) the assessment of the relevancy of such contingency plan through the simulation of corresponding interactive scenario. Both on the strategic and tactical levels.

- 1.) First ship with victims on LS 
- 2.) Tasks prioritization.
- 3.) Resource management  
- 4.) Medical transportation 
- 5.) Accommodation 
- 6.) Problematic situation/cooperation
- 7.) Resource management  
- 8.) Accommodation and transportation

Part I. Operational benefits (Usefulness)

1. The purpose of the preparation phase of a crisis is to establish crisis management plans in order to allow crisis teams to react faster and to make more effective decisions when facing real crisis situation. In your opinion do the experimented solutions provide a relevant way to support a preparation phase?

- Not at all
- A little bit
- Somewhat
- Quite a bit
- Completely

Comment:

2. Do you find the information presented in the experimented solutions comprehensive and understandable?

- Not at all
- A little bit
- Somewhat
- Quite a bit
- Completely

Comment:

Collaborative process establishment

3. Do you think that the establishment of high-level collaborative processes as strategic plans are useful to react faster to emerging crisis situations?

- Not at all
- A little bit
- Somewhat
- Quite a bit
- Completely

Comment:

4. Do you think that the establishment of high-level collaborative processes as strategic plans is useful to make more effective decisions during emerging crisis situations?

- Not at all
- A little bit
- Somewhat
- Quite a bit
- Completely

Comment:

5. Do you think having such type of the collaborative process high-level granularity is useful to get a better global vision of the crisis situation (shared high-level vision not only from one partner's point of view)?

Comment:

6. Do you think having such type of collaborative process can help tracking the advancement of a crisis response (activities finished, pending or to do)

Comment:

Interactive scenario

7. Do you think that being able to play interactive crisis scenario is useful to react faster to emerging crisis situations?

- Not at all
- A little bit
- Somewhat
- Quite a bit
- Completely

Comment:

8. Do you think that being able to play interactive crisis scenario is useful to make more effective decisions during emerging crisis situations?

- Not at all
- A little bit
- Somewhat
- Quite a bit
- Completely

Comment:

9. Do you think that being able to play interactive crisis scenario allows having a good assessment of the relevancy and efficiency of contingency plans?

- Not at all
- A little bit
- Somewhat
- Quite a bit
- Completely

Comment:

10. Do you think that experimented solutions are ready to be used or demand further adaptation (functional customisation, data localisation, thorough modification)?

- Not at all
- A little bit
- Somewhat
- Quite a bit
- Completely

Comment:

11. Do you think that being able to play interactive crisis scenario helps improving the decision accuracy in real crisis situation, by augmenting the situation awareness?

- Not at all
- A little bit
- Somewhat
- Quite a bit
- Completely

Comment:

12. Do you think that being able to play interactive crisis scenario helps having a shared vision across involved partners, on the consequences of each decision taken (variant scenario as result of consequences)?

- Not at all
- A little bit
- Somewhat
- Quite a bit
- Completely

Comment:

Part II. Technical performance (usability)

1. Do you think that the input models are easy to fulfil (granularity, concepts)?

- Not at all
- A little bit
- Somewhat
- Quite a bit
- Completely

Comment:

-
-
-

2. Do you think that the input models are representative enough to characterize a crisis situation at a global level?

- Not at all
- A little bit
- Somewhat

- Quite a bit
- Completely

Comment:

-
-
- 3. Do you think that the multi-partners interactive scenario is immersive enough to bring a positive leverage on further real situations?
 - Not at all
 - A little bit
 - Somewhat
 - Quite a bit
 - Completely

Comment:

- 4. Do you think that the question interactions are useful for decision making?
 - Not at all
 - A little bit
 - Somewhat
 - Quite a bit
 - Completely

Comment:

- 5. What do you like and what would you improve in these solutions?

Part III. Set up of use-case

The objective of the experimentation is to assess the benefits of solutions integration for supporting the crisis preparation phases.

- 1. Do you think that the set-up of this experimentation is well adapted to the objective?
 - Not at all
 - A little bit
 - Somewhat
 - Quite a bit
 - Completely

Comment:

- 2. What improvement in the set-up would you suggest ?

Part IV. Experimentation results

1. Did you learn/discover something during this experimentation?

- Not at all
- A little bit
- Somewhat
- Quite a bit
- Completely

Comment:

2. Do you think that this experimentation will benefit the crisis management community?

- Not at all
- A little bit
- Somewhat
- Quite a bit
- Completely

Comment:

3. Are there any other comments you wish to make regarding the experimentation?

Comment:

Part V. Way forward

This experimentation will be followed by two other events incorporating feedback from this experimentation and trying to make the scenario closer to reality increasing the involvement of end users and avoiding some simplifications that were required at this stage:

-
- 1. Do you find this an interesting way forward?
 - Not at all
 - A little bit
 - Somewhat
 - Quite a bit
 - Completely

Comment:

2. What other perspectives would you recommend?

Comment:

3. Would you be interested in being involved in these future experimentations?

- Not at all
- A little bit
- Somewhat
- Quite a bit
- Completely

Comment:

4. Who else would you recommend as a participant?

Comment:

Annex 3 – Answers to the questionnaire

Participants who have answered the questionnaire and their role (in experiment and at work) (alphabetically ordered)

Table A2: List of participants

Name	Role in exp	Organization	Responsibility at work
<i>Tomasz Borkowski</i>	<i>DOSTAFF</i>	<i>Space Research Centre PAS</i>	<i>Pracownik naukowy zajmujący się zarządzaniem kryzysowym [Researcher in the crisis management domain]</i>
<i>Karolina Kuskowska</i>	<i>DOSTAFF</i>	<i>Space Research Centre PAS</i>	<i>Pracownik naukowy zajmujący się zarządzaniem kryzysowym [Researcher in the crisis management domain]</i>
<i>Krzysztof Marciniak</i>	<i>ROC</i>	<i>Urząd Wojewódzki w Olsztynie [Voivod of Warmia and Mazury]</i>	<i>Polityk lub pracownik administracji [Politician or administration officer]</i>
<i>Jarosław Mazurek</i>	<i>ROC</i>	<i>W-M UW [Voivod of Warmia and Mazury]</i>	<i>Polityk lub pracownik administracji [Politician or administration officer]</i>
<i>Marcin Rudnicki</i>	<i>DOSTAFF</i>	<i>Space Research Centre PAS</i>	<i>Pracownik naukowy zajmujący się zarządzaniem kryzysowym [Researcher in the crisis management domain]</i>
<i>Jakub Rydzenko</i>	<i>DOSTAFF</i>	<i>Space Research Centre PAS</i>	<i>Pracownik naukowy zajmujący się zarządzaniem kryzysowym [Researcher in the crisis management domain]</i>
<i>Jacek Stępień</i>	<i>inna [other]</i>	<i>Akademia Obrony Narodowej [National Defence University of Warsaw]</i>	<i>Pracownik naukowy zajmujący się zarządzaniem kryzysowym [Researcher in the crisis management domain]</i>
<i>Arkadiusz Wejnarski</i>	<i>LSOC</i>	<i>SP ZOZ LPR [Polish Medical Air Rescue]</i>	<i>Osoba o praktycznym doświadczeniem w zarządzaniu kryzysowym [Professional practitioner]</i>
<i>Emil Wrzosek</i>	<i>DOSTAFF</i>	<i>Space Research Centre PAS</i>	<i>Pracownik naukowy zajmujący się zarządzaniem kryzysowym [Researcher in the crisis management domain]</i>
<i>Magdalena Zakrzewska</i>	<i>LSOC</i>	<i>Woj. Stacja Pog. Rat. [Regional Ambulance Services]</i>	<i>Osoba o praktycznym doświadczeniem w zarządzaniu kryzysowym [Professional practitioner]</i>

Part I: Operational benefits (Usefulness)

#	Question	Name	Comment	Grades	Average
Q1	<i>The purpose of the preparation phase of a crisis is to establish crisis management plans in order to allow crisis teams to react faster and to make more effective decisions when facing real crisis situation. In your opinion do the experimented solutions provide a relevant way to support a preparation phase?</i>	Person-1	Performing a series of experiments would cause an increase in the degree of reality of the exercise. Lack of continuity causes a slowdown and the need to restart the activity.	4	3,8
		Person-2	I did not observe this action.	3	
		Person-3		3	
		person-4	All the demonstrations enable to draw important lessons, which may be useful during the real actions. Provided solutions within the Experiment 43 show some problems that can occur during the MRO and indicate the need to use the necessary solutions to monitor all the operations of participating services.	5	
		person-5	Performing a series of experiments would cause an increase in the degree of reality of the exercise. Lack of continuity causes a slowdown and the need to restart the activity. Increase the number of institutions that participate in experiments.	4	
		person-6		4	
		person-7	Increase the number of institutions participating in the experiment.	4	
		person-8		4	
		person-9	Crisis management plans usually do not include activities related to mass events.	4	
		person-10		3	
Q2	<i>Do you find the information presented in the experimented solutions comprehensive and understandable?</i>	Person-1	Up to a point, the solution's interface has hindered the exercise. The information was transmitted mainly between moderators.	3	3,3
		Person-2	I did not observe this action.	3	
		Person-3	The concept of using tools to present specific measures to show the whole situation is promising. It makes you feel more conscious as a part of complex	2	

#	Question	Name	Comment	Grades	Average
			mechanism which may have a positive effect on the decisions. Detailed technical implementation leaves a lot of space for improvement in the area of the the flow of information and its presentation.		
		person-4	There was a lot of information, but during the exercises the participants had limited time and possibilities to take a look at them.	4	
		person-5	Up to a point, the tool's interface has hindered the exercise. The information was transmitted mainly between moderators. Functionality of tools and their potential usability should occur at the beginning of the exercise.	3	
		person-6		1	
		person-7		5	
		person-8		4	
		person-9		4	
		person-10		4	
Q3	<i>Do you think that the establishment of high-level collaborative processes as strategic plans are useful to react faster to emerging crisis situations?</i>	Person-1	At the lowest level (executive) service, inspections and enforcement officers and other cooperating entities performing their duties in accordance with the expected procedures. In the present case it can be assumed that the implemented process is useful for decision-making bodies. This is a result of the creation of a clear perception of the problem situation by different decision-making bodies.	4	
		Person-2		5	4,6
		Person-3		5	
		person-4	Every event is different and requires different activities. However, there are common elements for which a general description can be developed that illustrates services at a strategic level, eg. in the form of an algorithm.	4	
		person-	At the lowest level (executive) service,	4	

#	Question	Name	Comment	Grades	Average
		5	inspections and enforcement officers and other cooperating entities performing their duties in accordance with the expected procedures. In the present case it can be assumed that the implemented process is useful for decision-making bodies. This is a result of the creation of a clear perception of the problem situation by different decision-making bodies.		
		person-6		5	
		person-7		5	
		person-8		5	
		person-9	Yes, but the information flow is not quick enough so that relevant services and resources cannot be used immediately.	5	
		person-10		4	
Q4	<i>Do you think that the establishment of high-level collaborative processes as strategic plans is useful to make more effective decisions during emerging crisis situations?</i>	Person-1	Assuming that individual departments have their own tools to enhance decision-making process, insight into their cooperation process may be requested. Implementation of the experiment indicates a significant need in this area.	5	
		Person-2		5	
		Person-3		5	
		person-4	From the description will result appropriate services, which should be involved, and therefore the risk that the task performs not this service, Somebody should or having inadequate powers and resources is smaller, so it can increase the effectiveness of actions. If a common description will be obligatory, the service will prepare for the tasks arising from the document	4	4,7
		person-5	Assuming that individual departments have their own tools to enhance decision-making process, insight into their cooperation process may be requested. Implementation of the experiment indicates a significant need in this area.	5	

#	Question	Name	Comment	Grades	Average
		person-6		5	
		person-7		4	
		person-8		5	
		person-9		5	
		person-10		4	
Q5	<i>Do you think having such type of the collaborative process high-level granularity is useful to get a better global vision of the crisis situation (shared high-level vision not only from one partner's point of view)?</i>	Person-1	A consistent picture of the situation is a requirement for a smooth operation, especially among heterogeneous entities. The different perception of reality can actually impede the course of operation.	3	3,2
		Person-2		4	
		Person-3		4	
		person-4	Definitely. The exercises have shown some differences in defining threats for maritime and land rescue entities.	3	
		person-5	A consistent picture of the situation is a requirement for a smooth operation, especially among heterogeneous entities. The different perception of reality can actually impede the course of operation.	3	
		person-6		3	
		person-7		3	
		person-8	Copy the situation of possible occurrence.	3	
		person-9		3	
		person-10		3	
Q6	<i>Do you think having such type of collaborative process can help tracking the advancement of a crisis response (activities finished, pending or to do)</i>	Person-1	One of the significant problems in the process of implementation of the rescue operation, especially on a large scale, is to monitor their own elements involved in the rescue actions. This provides freedom of action and efficient planning of activities.	3	3,2
		Person-		4	

#	Question	Name	Comment	Grades	Average
		2			
		Person-3		4	
		person-4	A tracking mode would be useful especially for the services to monitor which forces and means have been used and which remain ready for action.	3	
		person-5	One of the significant problems in the process of implementation of the rescue operation, especially on a large scale, is to monitor their own elements involved in the rescue actions. This provides freedom of action and efficient planning of activities.	3	
		person-6		3	
		person-7		3	
		person-8		3	
		person-9		3	
		person-10		3	
Q7	<i>Do you think that being able to play interactive crisis scenario is useful to react faster to emerging crisis situations?</i>	Person-1	Interactive scenario enables testing the already existing procedures both for individual services and joint actions. It seems reasonable to use this kind of technology in the training process especially in the context of decision-making centers and coordination.	4	
		Person-2		5	
		Person-3		5	
		person-4	An interactive scenario enables testing the existing procedures both for individual services, as well as joint actions. It seems reasonable to use this kind of technological solution in the training process especially in the context of decision-making and coordination centres.	4	
		person-5	Interactive scenario enables testing the already existing procedures both for individual services and joint actions. It seems reasonable to use this kind of	5	
					4,4

#	Question	Name	Comment	Grades	Average
			technology in the training process especially in the context of decision-making centers and coordination. Provided that the conditions for the declaration of the institution will be reflected in the exercises.		
		person-6		3	
		person-7		4	
		person-8	It introduces an element of realism. It creates the dynamics of change, which have to be manage up to speed.	5	
		person-9		5	
		person-10	Provided that the conditions for the declaration of the institution will be reflected in the exercises.	4	
Q8	<i>Do you think that being able to play interactive crisis scenario is useful to make more effective decisions during emerging crisis situations?</i>	Person-1	Increasing the realism during exercise can improve the efficiency of operations when conducting real action.	5	4,4
		Person-2		5	
		Person-3		4	
		person-4	The interactive exercise enables to test several solutions and choose the best ones, which might prove to be a good practice in case of a real action.	5	
		person-5	Increasing the realism during exercise can improve the efficiency of operations when conducting real action.	5	
		person-6		3	
		person-8		5	
		person-9		5	
		person-7		4	
		person-10		3	
Q9	<i>Do you think that being able to play interactive crisis scenario allows having a good assessment</i>	Person-1	One problem is to check the developed action plans. Interactive scenarios allow testing plans that were not	5	4,1

#	Question	Name	Comment	Grades	Average
	<i>of the relevancy and efficiency of contingency plans?</i>		implemented in reality.		
		Person-2		5	
		Person-3		2	
		person-4	A few times during the exercise a reference to the provisions of the Voivodeship Crisis Management Plan was made.	5	
		person-5	One problem is to check the developed action plans. Interactive scenarios allow testing plans that were not implemented in reality.	5	
		person-6		3	
		person-8		3	
		person-9		5	
		person-7		4	
		person-10		4	
Q10	<i>Do you think that experimented solutions are ready to be used or demand further adaptation (functional customisation, data localisation, thorough modification)?</i>	Person-1	It is important to make a series of experiments and collect the participants' opinions. These solutions can be used in the process of training in the area of crisis management. No conclusion for the modification of the presented solutions can be drawn at this stage.	3	3,1
		Person-2		4	
		Person-3		3	
		person-4	Nothing is perfect and each exercise shows the new elements requiring improvements.	4	
		person-5	It is important to make a series of experiments and collect the participants' opinions. These solutions can be used in the process of training in the area of crisis management. No conclusion for the modification of the presented solutions can be drawn at this stage.	3	
		person-		1	

#	Question	Name	Comment	Grades	Average
		6			
		person-8	Each solution can be developed and improved. At this point, I am not able to point to specific proposals.	3	
		person-9		4	
		person-7		3	
		person-10	Details required.	3	
Q11	<i>Do you think that being able to play interactive crisis scenario helps improving the decision accuracy in real crisis situation, by augmenting the situation awareness?</i>	Person-1	Lack of a common platform results in low level of situational awareness. Subjective venture enables creating situational awareness in participants.	5	4
		Person-2		4	
		Person-3		2	
		person-4	First and foremost the collaboration of different teams, representing various levels, and the opportunity to discuss issues up to speed raises the level of situational awareness.	5	
		person-5	Lack of a common platform results in low level of situational awareness. Subjective venture enables creating situational awareness in participants.	5	
		person-6		2	
		person-8		4	
		person-9		4	
		person-7	Prepares to a new experience. It enables broad approach to the issue of CM.	5	
		person-10		4	
Q12	<i>Do you think that being able to play interactive crisis scenario helps having a shared vision across involved partners, on the consequences of each decision taken (variant scenario as result of consequences)?</i>	Person-1	Lack of a common platform results in low level of situational awareness. Subjective venture enables creating situational awareness in participants.	5	4,3
		Person-2		4	
		Person-3		3	

#	Question	Name	Comment	Grades	Average
		person-4	For sure. The playing services may be familiar with their capabilities during the MRO. Speaking colloquially, this exercise shows what you can expect from this specific service.	5	
		person-5	Lack of a common platform results in low level of situational awareness. Subjective venture enables creating situational awareness in participants.	5	
		person-6		5	
		person-8		4	
		person-9		4	
		person-7		5	
		person-10		3	

Part II: Technical performance (Usability)

#	Question	Name	Comment	Grades	Average
Q1	Do you think that the input models are easy to fulfil (granularity, concepts)?	Person-1		4	3,3
		Person-2		1	
		Person-3		4	
		person-4	They require lots of preparation and knowledge about dedicated activities of the various entities.	3	
		person-5	If we relate to output model of the experiment, I think that the primary objectives have been achieved.	4	
		person-6		3	
		person-8		3	
		person-9		4	
		person-7		4	
		person-10	Difficult to say.	3	
Q2	Do you think that the input models are representative enough to characterize a crisis situation at a global level?	Person-1		4	3,1
		Person-2		1	
		Person-3		4	
		person-4		3	
		person-5	If we relate to output model of the experiment, I think that the primary objectives have been achieved.	4	

#	Question	Name	Comment	Grades	Average
		person-6		3	
		person-8	It seems that the plan was a little exaggerated, but on the other hand it will simplify the process of dealing with the situation of lower risk.	3	
		person-9		3	
		person-7		3	
		person-10		3	
Q3	Do you think that the multi-partners interactive scenario is immersive enough to bring a positive leverage on further real situations?	Person-1		5	4,5
		Person-2		5	
		Person-3		3	
		person-4	Interactive scenario engaged individuals which gives the opportunity to discuss and exchange views (best practices) and therefore may positively affect the effectiveness of future real actions.	5	
		person-5	YES, I believe that the goal has been achieved.	5	
		person-6		5	
		person-8		4	
		person-9		4	
		person-7		5	
		person-10		4	
Q4	Do you think that the question interactions are useful for decision making?	Person-1		4	3,6
		Person-2		1	
		Person-3		4	
		person-4	Questions suggest the answer and simplify the line of thought.	3	
		person-5	YES, I think that it's the right method of problem approach.	5	
		person-6		3	
		person-8	Supposedly, there is no better way to obtain a decision than by putting proper questions.	4	
		person-9		5	
		person-7		4	
		person-10		3	
Q5	What do you like and what would you improve in these tools?	Person-1	[Visualization of the key elements of the exercise, for example damaged		

#	Question	Name	Comment	Grades	Average
			ship, (SAR helicopters and ships), etc. raises the level of training realism.]		
		Person-2	[Present them in an interesting way, the possibility of practical usage, folding tools and the target group of participants exercises]		
		Person-3			
		person-4	[Visualization, the real action's picture from the camera at the scene, voice signaling incoming information]		
		person-5	[Visualization of the key elements of the exercise, for example damaged ship, (SAR helicopters and ships), etc. raises the level of training realism.]		
		person-6			
		person-8	[More positions need to be prepared; communication requires improvement.]		
		person-9			
		person-7			
		person-10			
Q6	Do you think that the set-up of this experimentation is well adapted to the objective?	Person-1		3	3
		Person-2		3	
		Person-3		3	
		person-4	Participants should have been given more time to get acquainted with the tool. There should have been more computers with the tool provided.	3	
		person-5		3	
		person-6		3	
		person-8		3	
		person-9		3	
		person-7		3	
		person-10		3	
Q7	What improvement in the set-up would you suggest?	Person-1	[Real time visualization of objects and physical separation of the participants of the experiment (interaction only via technical means of communication).]		
		Person-2	[Conducting integration visible to the participants.]		
		Person-3	[It is necessary to enable resource management, which are identified		

#	Question	Name	Comment	Grades	Average
			only during exercise (they are unknown at the beginning)		
		person-4	[More opportunities to work with tools, telephone communication, a change in the method of transmitting messages because not all teams should hear messages.]		
		person-5	[Real time visualization of objects and physical separation of the participants of the experiment (interaction only via technical means of communication).]		
		person-6			
		person-8			
		person-9			
		person-7			
		person-10			

Part III: set-up of the use-case

#	Question	Name	Comment	Grade	Average
Q1	<i>Do you think that the set-up of this experimentation is well adapted to the objective?</i>	Person-1		3	3
		Person-2		3	
		Person-3		3	
		person-4	Participants should have been given more time to get acquainted with the tool. There should have been more computers with the tool provided.	3	
		person-5		3	
		person-6		3	
		person-8		3	
		person-9		3	
		person-7		3	
		person-10		3	
Q2	<i>What improvement in the set-up would you suggest?</i>	Person-1	Real time visualization of objects and physical separation of the participants of the experiment (interaction only via technical means of communication).		
		Person-2	Conducting integration visible to the participants.		
		Person-3	It is necessary to enable resource management, which are identified		

#	Question	Name	Comment	Grade	Average
			only during exercise (they are unknown at the beginning)		
		<i>person-4</i>	More opportunities to work with tools, telephone communication, a change in the method of transmitting messages because not all teams should hear messages.		
		<i>person-5</i>	Real time visualization of objects and physical separation of the participants of the experiment (interaction only via technical means of communication).		
		<i>person-6</i>			
		<i>person-8</i>			
		<i>person-9</i>			
		<i>person-7</i>			
		<i>person-10</i>			

Part IV: Experiment results

#	Question	Name	Comment	Grade	Average
Q1	<i>Did you learn/discover something during this experimentation?</i>	<i>Person-1</i>	A broad view on realisation process of the tasks for individuals participating in this type of the action.	3	3
		<i>Person-2</i>		3	
		<i>Person-3</i>		3	
		<i>person-4</i>	It was the first time I have participated in a land - sea cooperation simulation with a mass event on such a scale. Some solutions adopted for dealing with the LS perfectly match the problems that crisis management practitioners have to face every day.	3	
		<i>person-5</i>	A broad view on realisation process of the tasks for individuals participating in this type of the action. A possibility of observations of cross-institutional and cross-sectorial cooperations in crisis situations. A new view on work organisation at operation headquarters.	3	
		<i>person-6</i>		3	

#	Question	Name	Comment	Grade	Average
		person-8		3	
		person-9		3	
		person-7		3	
		person-10		3	
Q2	<i>Do you think that this experimentation will benefit the crisis management community?</i>	Person-1	This will enable articulating the needs in the area of innovative IT solutions.	3	3
		Person-2		3	
		Person-3		3	
		person-4	The experiment proved that the use of IT tools that enable tracking the forces and resources and improve the cooperation between the actors is very necessary.	3	
		person-5	This will enable articulating the needs in the area of innovative IT solutions. This will help developing best practices in exercise organization. This will support actions that will help in interactive participations in computer-enhanced trainings.	3	
		person-6		3	
		person-8		3	
		person-9		3	
		person-7		3	
		person-10		3	
Q3	<i>Are there any other comments you wish to make regarding the experimentation?</i>	Person-1			
		Person-2	The best studio exercise in an interesting and non-obvious area of crisis management, I have ever had the opportunity to participate.		
		Person-3			
		person-4			
		person-5			
		person-6			
		person-8	The introduction of additional time for the game was a slight inconvenience.		
		person-9			
		person-7			
		person-10			

Part V: Way forward

#	Question	Name	Comment	Grade	Average
Q1	<p><i>This experimentation will be followed by two other events incorporating feedback from this experimentation and trying to make the scenario closer to reality increasing the involvement of end users and avoiding some simplifications that were required at this stage: Do you find this an interesting way forward?</i></p>	Person-1		3	3
		Person-2		3	
		Person-3		3	
		person-4		3	
		person-5		3	
		person-6		3	
		person-8		3	
		person-9		3	
		person-7		3	
		person-10		3	
Q2	<p><i>What other perspectives would you recommend?</i></p>	Person-1	The use of other tools which will eliminate application solutions (simulation systems).		
		Person-2	The exercise, at the present level, was quite realistic. Increasing the level of realism would require organising field exercise on a very large scale, which means huge costs. Instead of increasing the realism, I suggest choosing proper tools and integrating them with the theme of the script. It would enable end-users to operate the tools. Moreover, it is necessary to advance training for operators.		
		Person-3			
		person-4	The use of other tools that eliminate application solutions (inf. systems simulation).		
		person-5	The use of other tools which will eliminate application solutions (simulation systems).		
		person-6			
		person-8			
		person-9			
		person-7			
		person-10			
Q3	<p><i>Would you be interested in being involved in these future experimentations?</i></p>	Person-1		3	3
		Person-2		3	
		Person-3		3	
		person-4	Excellent opportunity to establish cooperation between	3	

#	Question	Name	Comment	Grade	Average
			departments, draw conclusions, detect gaps and needs and to exchange knowledge, experiences.		
		person-5	YES, absolutely	3	
		person-6		3	
		person-8	Depending on other duties.	3	
		person-9		3	
		person-7		3	
		person-10		3	
Q4	<i>Who else would you recommend as a participant?</i>	Person-1			
		Person-2			
		Person-3			
		person-4	MSZ, Straż Graniczna		
		person-5	'MSZ, MON, MSWiA, MIB oraz LKRM z UW.		
		person-6			
		person-8	'Np. przedstawiciele pomocy społecznej z terenu Elbląga (MOPS, PCPR). Służby oczyszczania, co dzieje się z odpadami generowanymi w LSOC.		
		person-9			
		person-7	MSZ, MON, MSW, LKRM, Dyspozytor Systemu naziemnego		
		person-10			