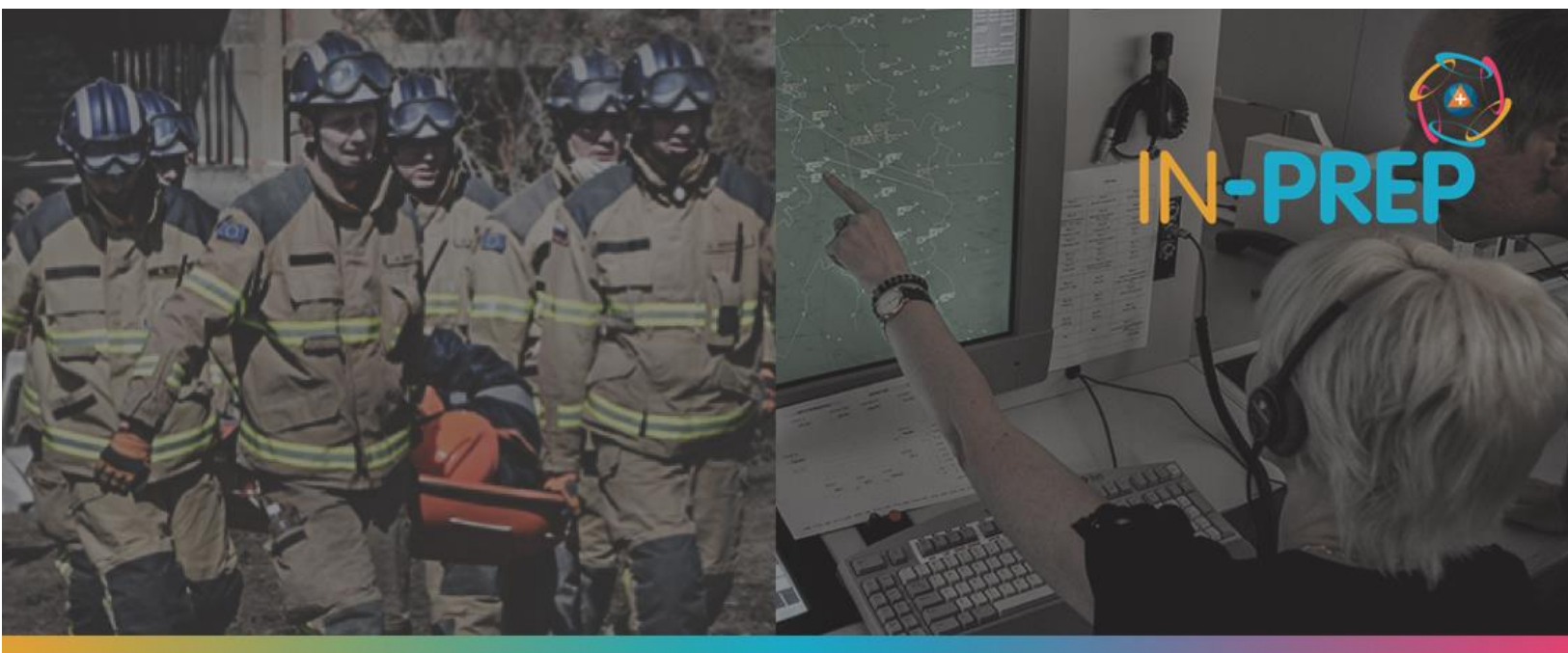# IN-PREP

"An INtegrated next generation PREParedness programme for improving effective inter-organisational response capacity in complex environments of disasters and causes of crises"

D2.7 Use Case definitions

Document Summary Information

Grant Agreement No	740627	Acronym	IN-PREP
Full Title	An Integrated next generation preparedness programme for improving effective interorganisational response capacity in complex environments of disasters and causes of crises		
Start Date	01/09/ 2017	Duration	36 months
Project URL			
Deliverable			
Work Package			
Contractual due date		Actual submission date	
Nature		Dissemination Level	
Lead Beneficiary			
Responsible Author			
Contributions from			

Revision history (including peer reviewing & quality control)

Version	Issue Date	Stage	Changes	Contributor(s)	Comments
0.1	30/10/2018	draft			
0.2	19/11/2018	Final draft	Incorporated results of the consortium review	DLR, DHPOL, STWS	

Executive Summary

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Glossary of terms and abbreviations used

Abbreviation / Term	Description
COP	Common Operational Picture
GA	Grant Agreement
MRPP	Mixed Reality Preparedness Platform
TBC	Transboundary crises

1   Introduction

IN-PREP is a project that will help emergency managers to prepare, plan and train for transboundary crises (TBCs). One of the main objectives of IN-PREP is to design and develop a Mixed Reality Preparedness Platform (MRPP). This innovative IT tool will allow practitioners to train and prepare for TBCs, using new and existing scenarios, in a virtual environment.

Consultations with practitioners have been instrumental in developing the user requirements (D2.6), which will guide the technical development process of the MRPP. To facilitate that process, this document puts the user requirements into context by describing how different combinations of functionalities can be used by actors to achieve different goals. These usage scenarios constitute valuable input for the IN-PREP system design and architecture (WP3).

1.1   Addressing the IN-PREP Description of Action

This document is the result of Task 2.5 Definition of use cases. The details of this tasks and how they are addressed is outlined in the table below.

IN-PREP GA requirements	Section(s) of present deliverable addressing IN-PREP GA	Description
The goal of T2.5 is "to describe a representative number of potential uses of the system following a multi-hazard approach (emphasis to be given on the IN-PREP WP7 Exercises and DEMOs but also beyond)."	Chapter 2 and Chapter 3	Chapter 2 outlines who and what for they would use the IN-PREP system. Chapter 3 describes how different goals may be achieved.
"Building on the user requirements, use cases will explain user interactions with the system and the information to be exchanged among them and with the preparedness tool in order to achieve specific goals."	Chapter 3	The use cases included in Chapter 3 outline sequences of interactions between the main actors and the system in order to achieve the main goals. Each user action is mirrored by a description of the system's response. The use cases also outline the user requirements they cover.

Table 1 - Deliverable's adherence to IN-PREP objectives and Work Plan

1.2   Document outline

Chapter 2 briefly introduces the use case methodology and how it was used in IN-PREP.

Chapter 3 is comprised of the IN-PREP use cases.

2   The Use Case Methodology

In short, use cases are detailed examples of how users interact with the system to achieve specific goals. A use case describes, step-by-step, the process a user goes through towards the completion of the desired goal. It captures the user's interaction with the system as well as the system's response.

Developed in the late 1980s by Ivar Jacobsen, a Swedish computer scientist and software engineer, what became known as use cases were soon recognized in the programming community as filling an important gap in the requirement process. [1]

Generally employed in the requirements analysis phase of a project, use cases are utilized to contribute to the testing of plans and user guides whilst also used for the creation and validation of proposed designs. [2]

Users employ a system for different purposes, depending on their goals. Without aiming to be an exhaustive collection of the ways in which the system can be used, next chapter presents a core set of use cases of the IN-PREP platform. Built on the main functionalities of the MRPP, the use cases organize the user requirements in a number of usage scenarios depending on the types of actor and the goals for which they may employ the MRPP (Table 2). Figure 1 depicts the actors involved in the different use cases.

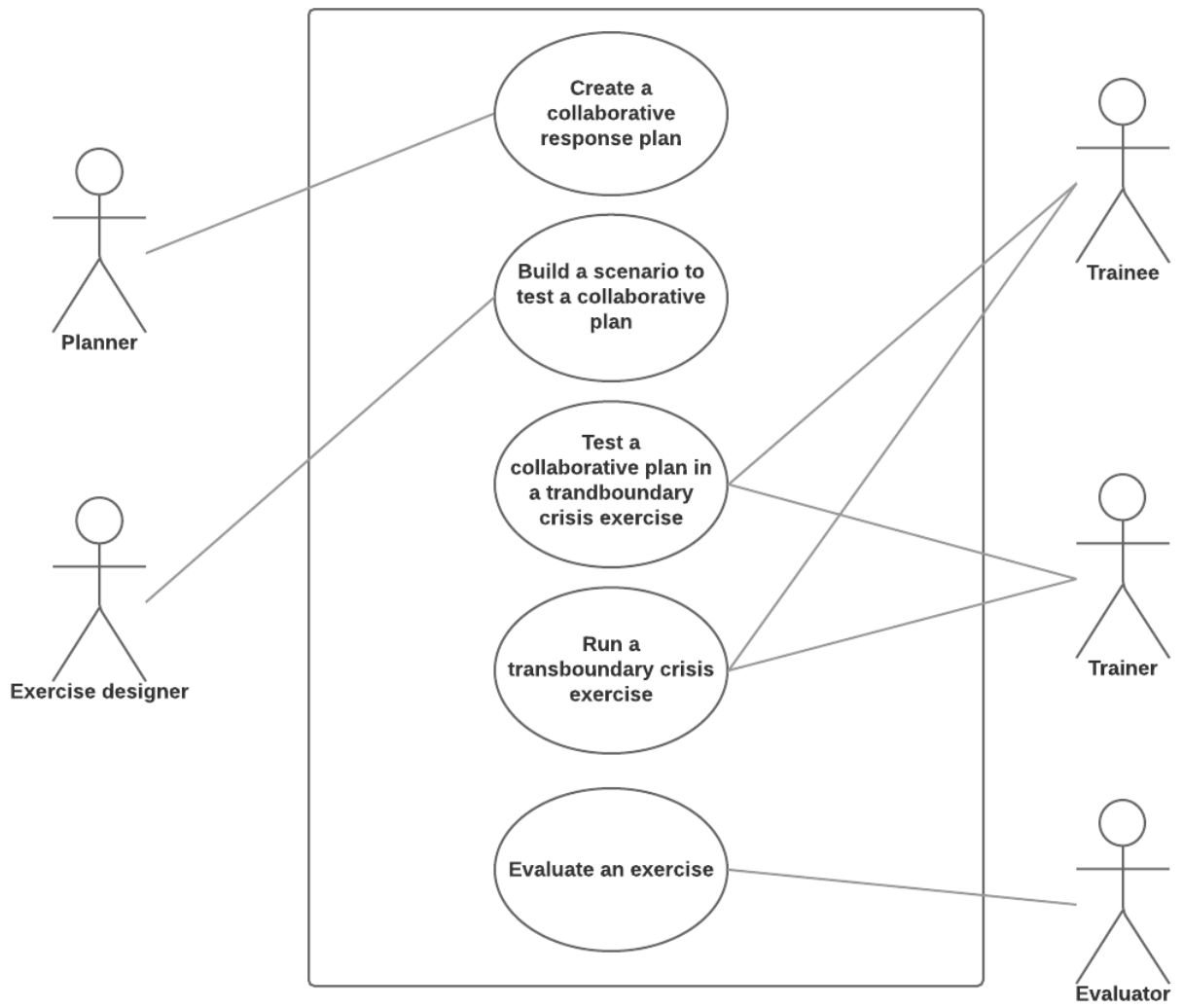| Actors	Goals
Planner	Create a collaborative response plan for a transboundary crisis
Exercise designer	Build a scenario to test a collaborative plan
Trainee	Test a collaborative plan in a transboundary crisis scenario
Trainer	Run a transboundary crisis exercise
Evaluator	Evaluate an exercise

Table 2 - IN-PREP actors and goals

Figure 1: IN-PREP use cases and actors involved

3   Use Cases

The IN-PREP use cases are comprised of the following categories of information:

- <u>Name</u>: A clear title that communicates the scope of the use case (the user's goal);
- <u>Main actor</u>: The user interacting with the system to achieve the goal;
- <u>Diagram</u>: A visual representation of the actors and modules involved;
- <u>Brief description</u>: A brief explanation of the use case;
- <u>Pre-conditions</u>: What is required in order for the use case to be executed;
- <u>Post-conditions</u>: The state of the system when the use case ends;
- <u>Basic flow</u>:
  - <u>Actor action</u>: The set of steps the actor takes to accomplish the goal;
  - <u>System response</u>: A clear description of what the system does in response to each user action;
  - <u>Notes</u>: Any clarifications on the actor action or system response;
  - <u>Supplemental requirements</u>: Any necessary additional requirements, not foreseen in the user requirements;
- <u>Alternative flows</u>: Alternative steps to those described in the basic flow;
- <u>User requirements coverage</u>: The IDs of the functionalities involved, as described in the user requirements (D2.6).

Use Case 1: Create a collaborative response plan for a transboundary crisis

Main actor	Planner
Diagram	
Brief description	Civil protection organisations can use the IN-PREP system to prepare a response plan for transboundary crises. The planner may use the IN-PREP system to make plans for different threat scenarios.
Pre-conditions	The Planning Module of the MRPP is available to the planner.
Post conditions	The plans created or edited are available in a Collaborative Plan Library and can be accessed by all users or a restricted group (depending on the confidentiality level of each plan).

Basic flow				
Step	Actor Action	System Response	Notes	Supplemental Requirements
1	User logs into the system with a unique ID and password.	Screen takes user to the MRPP Planning Module.	The Planning Module is an intuitive dashboard allowing the user access to the categories mentioned in the steps 2-10.	
2	User selects the Collaborative Plan	System shows:		

3	Library.	1. own plans; 2. collection of plans shared by connected agencies (belonging to and made public by other organisations).		
3	User browses through existing plans, highlights relevant parts and takes notes.	System saves user's annotations in electronic notebook.		An electronic notebook should be accessible at all times (show/hide button) and allow a planner to record highlights from existing plans and take notes. This notebook should also be available to the planner while creating a new plan or editing an existing one.
4	User selects the option to create a collaborative plan.	System asks user to insert the type of threat for which the plan is being prepared.	All details set from this step onwards are specific to this type of threat.	
5	User adds a new threat or choses an existing one.	System saves the plan.		
6	User defines the vision on risk and crisis management.	System asks user to insert a text or graphical description of: 1. risk approach; 2. who should make key decisions.		
7	User assigns relevant actors and roles.	System pulls together the selected actors and asks user to:		If necessary actors are missing from the

		1. attach basic role description for each; 2. set authority level (local, regional, national, international).		database, the user adds new actors that are saved in the master database.
8	User defines information-sharing arrangements.	System asks user to describe how information is meant to be shared on: 1. incident characteristics 2. initiated measures 3. shortcomings in response		
9	User establishes coordination rules.	System prompts user: 1. identify shareable assets/capacities that are available (in the Asset Registry); 2. instruct on how to determine if external capacities are needed.		If necessary assets are missing from the Asset Registry, the user adds new ones.
10	User identifies strategic decisions.	System asks user to: 1. name the envisaged strategic decisions; 2. specify for each of the strategic decisions: - the actor who possesses the required decision-making power; - the required assets; - the timeframe within which the decision needs to be made; - the type of information required to pursue the envisaged decisions.	All required fields from a plan have been filled out.	

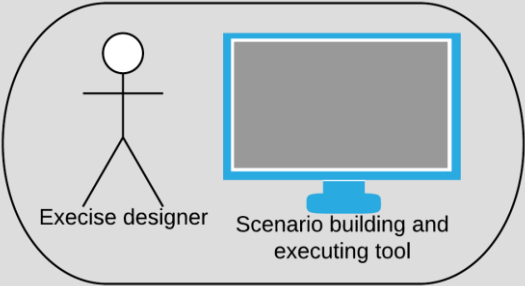|			
11	User proceeds to finalize the collaborative plan.	System gathers the features inserted by the user and generates a printable document of the threat-specific plan.	
12	User reviews and saves the collaborative plan.	System saves the collaborative plan in the Collaborative Plan Library.	

Alternative flows

Step 4: User chooses to edit a collaborative plan.

Step 11: User creates additional categories of information to be added to the collaborative plan.

User requirements coverage

EUR-MP-01	Import existing plans
EUR-MP-02	Create generic, strategic plans
EUR-MP-03	Create detailed plans
EUR-MP-04	Plan library
EUR-MP-05	View and edit plans
EUR-MP-06	Share plans
EUR-MP-07	Checklists for plans
EUR-MP-08	Plan synopsis
EUR-MP-09	Link with actors
EUR-MP-10	Asset registry: available capacities
EUR-MP-11	Asset registry: interoperability
EUR-MP-12	Asset registry: easy to understand
EUR-MP-13	Asset registry: categorization
EUR-MP-14	Asset registry: filtering
EUR-MP-15	Asset registry: sharing
EUR-MP-16	Asset registry: constraints
EUR-MP-17	Asset registry: localization
EUR-MP-18	Asset registry: compatibility

Use Case 2: Build a scenario to test a collaborative plan

Main actor	Exercise designer

Diagram	

Brief description	To further prepare for transboundary crises, actors involved in civil protection can also test the viability of their response plans with the MRPP. To begin with, any designated person from the crisis management department tasked with enhancing crisis preparedness can use the Scenario Building and Executing Tool to create a realistic scenario using real and simulated data (e.g. multiple locations, actors, or incidents) in order to test plans.

Pre-conditions	There is a Scenario Building and Executing Tool available to the exercise designer. The exercise designer can consult the organisation's (e.g. actors' responsibilities or available assets) at any given time.

Post conditions	Scenarios are available in the Scenario Library.

Step	Actor Action	System Response	Notes	Supplemental Requirements
1	User logs into the system with a unique ID and password.	System takes user to the Scenario Building and Executing Tool.	The Scenario Building and Executing Tool is a light dashboard-like menu with the categories described in the steps below.	

2	User chooses to create a new scenario.	System asks user to name the scenario.		
3	User determines training goals.	System asks user to name a goal. System asks user to create one or more evaluation forms for each of the inserted goals.	For example, if the goal is awareness of transboundary issues, exercise designer creates a form for exercise participants in which they record the problems identified.	The training goals set at this stage can be accessed from the Training and Evaluation Modules.
4	User adds the actors involved in the scenario, as well as their role.	System asks user to select the actors participating in the scenario. System asks user to add their role or confirm the ones that appear in the relevant response plan (if any).		The system should allow the user to pull (groups of) actors from threat-specific plans.
5	User chooses a location or an area for the scenario.	System displays the desired location.		The system automatically saves all changes made to the scenario in a draft version, every 10 seconds.
6	User selects the type(s) of hazard the scenario is built for.	System opens a diverse menu of hazards (e.g. fire, flood, terrorism). System also offers the option to add a new hazard.		
7	User inserts a narrative.	System allows user to add a text, as well as images, video and audio files (if necessary) and a link to the map of interest.	The narrative is a description of initial situation or state of affairs that all actors must be aware of in order to	

				take part in the exercise.
8	User creates a sitrep (situation report) for each actor.	System allows user to add a text and a link to the map of interest.		
9	User gives assignments to each actor.	System asks user to type in the actions expected from each actor.		
10	User creates a series of escalation factors.	System asks user to choose from a library of escalation factors (i.e. incidents). System asks user to select a trigger for each of the escalation factors.	Triggers are: 1. time; 2. location (proximity to/of other scenario items).	
11	User selects follow-up incidents.	System asks user to prepare follow-up incidents for each of the escalation factors.		
12	User determines the available assets.	System asks user to select the assets from the existing Asset Registry.		The system should allow the user to pull assets from threat-specific plans.
13	User prepares additional reports.	System asks user to add text, images, video or audio files to inject. System asks user to assign inject to an actor/role.		The exercise designer can easily change the order of reports.
14	User creates media items.	System asks user to select the source of the media item (e.g. Tweets, News). System asks user to select the timing of		The system should have a Media Generator that allows the user to

		the media item.		create media items (e.g. news articles, news report, Facebook posts, Twitter messages), and arrange them on a timeline.
15	User finalizes the scenario.	System offers user to a timeline visualization of the scenario.		
16	User saves the scenario.	System saves the scenario in the scenario library.		

Alternative flows

Step 3: User chooses to edit a scenario from the Scenario Library.

Step 4: User can add virtual actors. In the scenario, virtual actors behave like real actors.
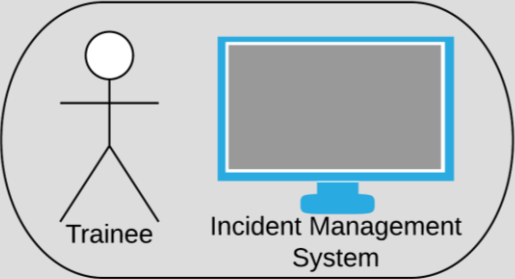
Step 12: User can add virtual assets. In the scenario, virtual assets behave like real assets.

Step 15: User modifies the scenario by dragging additional elements to the timeline, or by changing the existing ones, their order or other details.

User requirements coverage

EUR-CS-01   Scenario Builder: mixed reality
EUR-CS-02   Scenario Builder: 2D/3D map
EUR-CS-03   Scenario Builder: transboundary scenarios
EUR-CS-04   Scenario Builder: various simulated incidents
EUR-CS-05   Scenario Builder: various simulated actions
EUR-CS-06   Scenario Builder: various simulated assets
EUR-CS-07   Scenario Builder: timeline
EUR-CS-08   Scenario Builder: simulation triggers
EUR-CS-09   Scenario Builder: actors
EUR-CS-10   Scenario Builder: various simulated actors
EUR-CS-11   Scenario Builder: actor roles
EUR-CS-12   Actors: link with Scenario Builder
EUR-CS-13   Scenario Builder: scenario library
EUR-CS-14   Scenario Builder: variations on a theme
EUR-CS-15   Scenario Builder: share scenarios

Use Case 3: Test a collaborative plan in a transboundary crisis exercise

Main actor	Trainee
Diagram	Trainee — Incident Management System
Brief description	Through the MRPP, civil protection agents can test the viability of their plans by responding to the dynamics of custom-made scenarios. More specifically, they can visualize, deliberate on and respond to a set of transboundary challenges, according to the responsibilities outlined in the response plans.
Pre-conditions	All C2 systems (Incident Management Systems) are connected to the COP. Trainees have access to response plans at any given time during the exercise.
Post conditions	The trainees' interactions with the system are saved in a training session attached to the relevant scenario

Step	Actor Action	System Response	Notes	Supplemental Requirements
1	User logs into the system with a unique ID and password.	System takes user to the exercise welcome page.		
2	User accesses the exercise notification.	System shows introductory information and location of the scenario. System shows report in the form of		

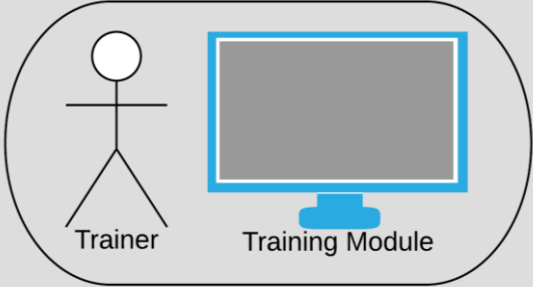|		written, audio and/or video messages.		
3	User accesses assignment list.	System displays the input expected from the user.		
4	User accesses personal message.	System shows incidents/actions unfolding according to the pre-programmed scenario.		
5	User visualizes scenario map.	System shows disaster effects (e.g. forest fires, earthquake, terrorism, floods, industrial accidents) on the map.		
6	User makes annotations to the map.	System saves all modifications made to the map regularly.	Such modifications from different actors are displayed on the COP.	
7	User solicits impact assessment for a certain incident.	System shows impact assessment.		
8	User submits a sitrep.	System sends sitrep to trainer. System saves all sitreps submitted.		
9	User commits assets from the Asset Registry.	System updates the availability of the resources in the Asset Registry accordingly.		
10	User fills out evaluation form.	System saves input in the Evaluation Module.	This is related to the training goals. Details are provided in use case 2, step3.	

Alternative flows
-

User requirements coverage

EUR-PT-01	Common Operational Picture (COP)
EUR-PT-02	COP: mixed reality
EUR-PT-03	COP: disaster effects
EUR-PT-04	COP: impact assessment
EUR-PT-05	COP: actor status and location
EUR-PT-06	COP: asset registry
EUR-PT-07	COP: logistics
EUR-PT-08	COP: ad-hoc modifications
EUR-PT-09	COP: appropriate information for each level of command
EUR-PT-10	COP: situation report template
EUR-PT-11	COP: decision checklist
EUR-PT-12	COP: decision support
EUR-PT-13	COP: mobile device support

Use Case 4: Run a transboundary crisis exercise
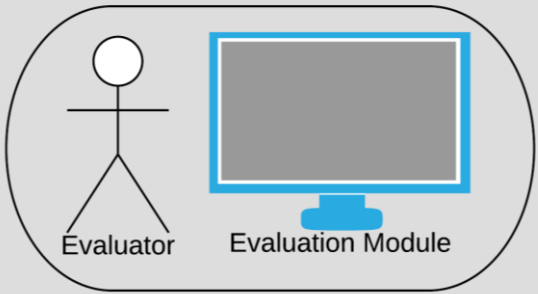
Main actor	Trainer
Diagram	
Brief description	For civil protection agents to test the viability of their plans, a trainer must be present to run the exercise. Even though the Scenario Building and Executing Tool allows an exercise designer to build a dynamic scenario that takes into account many contingencies and alternative course of events, a trainer must also adapt the pre-programmed scenario based on the performance of the team (members) during the exercise. This can be done in the MRPP.
Pre-conditions	A Training Module is available to the trainer to run an exercise. The MRPP Training Module is connected to the MRPP Planning Module so as to allow the trainer to visualize collaborative response plans. The Training Module is connected to the Scenario Building and Executing Tool so as to allow the trainer to access a scenario from the Scenario Library as well as the training goals of the respective scenario.
Post conditions	The trainees' interactions with the system are saved in a training session attached to the relevant scenario.

Step	Actor Action	System Response	Notes	Supplemental Requirements
1	Users log into the system with unique IDs and passwords.	System takes user to the Training Module.		
2	User visualizes training goals.	System displays training goals from the		

3	User goes to the Scenario Library and selects the scenario about to be played.	Evaluation Module.		
		System asks user to confirm the actors and roles planned in the scenario.		System should allow the trainer to modify the involved actors and their roles, depending on the reality of the exercise.
4	User starts the simulation.	System sends an alert to notify trainees about the incident.		
		System sends report (e.g. sitreps, audio/video/text messages) to trainees, as scheduled in the scenario.		Reports can be grouped into rounds. For example, the first round may include only background information.
		System shows incidents/actions unfolding according to the pre-programmed scenario.	Users can visualize disaster effects (e.g. forest fires, earthquake, terrorism, floods, industrial accidents) on the map.	
		System takes user to the map of the scenario (COP).		The COP displays all the annotations made by the trainees onto the map.
5	User sees pending assignments for all actors.	System distinguishes between submitted and overdue assignments.		

6	User skips an existing report (or scenario element) or creates a new one.	System updates scenario. System sends report according to the updated scenario.	These reports/scenario elements are displayed on a timeline.	
7	User modifies an upcoming report.	System asks user to select from the pre-determined list of alternative incidents (created in the Scenario Building and Executing Tool).		
8	User solicits impact assessment for a certain incident.	System shows impact assessment.		
9	User modifies the parameters of an incident.	System prompts user to fill out the incident form. System displays the impact of the incident according to the updated parameters.		
10	User gives new assignment to an actor.	System registers the new assignment and updates the assignment list accordingly.		
11	User stops the exercise.	System stops sending out reports (or scenario elements) and ceases to update the map.		

Alternative flows
-

User requirements coverage

EUR-EV-01   Logging function

EUR-EV-04   Scenario timeline and dashboard

EUR-EV-05   Trainer's checklist

EUR-EV-06   COP snapshots

EUR-EV-07   COP video clips

Use Case 5: Evaluate an exercise

Main actor	Evaluator

Diagram	

Brief description	To improve transboundary crisis preparedness, the team testing a particular plan needs to be able to register and receive valuable feedback. A survey instrument (before, during and after the exercise) is of special importance for evaluation purposes.

Pre-conditions	The Evaluation Module is linked with the Training Module, in that it allows the evaluator to access a recently played scenario, including all the data that inform on a team's performance (including participants). The Evaluation Module is linked with the Scenario Building and Executing Tool and allows the evaluator to visualize the training goals attached to a scenario as well as the input received from exercise participants necessary to evaluate the goals.

Post-conditions	The goals of the exercise have been met and there is material that can be used to improve response planning.

Step	Actor Action	System Response	Notes	Supplemental Requirements
1	User visualizes the training goals and confirms or modifies them before an exercise starts.	System updates the training goals.		
2	User visualizes list of trainees.	System displays a list of actors and their		

		roles.		
3	User selects a set of criteria for the statistics to be collected during the exercise.	System records all aspects (actor behaviour, decisions, etc.) relevant for the selected criteria, once the exercise begins.	Default criteria are: - time - assignments submitted - availability of assets	
4	User creates a quick evaluation form and sends it to one or multiple trainees.	System returns the filled out evaluation form to user.		
5	User accesses the quick log to see trainees' actions (that may not be visible on the map).	System displays an updated list of actions pursued by trainees participating in the exercise.		
6	User checks the status of the response on the COP.	System displays, on the map, the latest updates coming from the different trainees.		
7	User requests, at the end of the exercise, the statistics on the criteria established beforehand.	System presents the requested statistics.		
8	User accesses the evaluation forms filled out by trainees.	System displays input from trainees, in categories that correspond to the set training goals and to the quick evaluation forms sent out during the exercise.		
9	User writes an evaluation report.	Systems asks user to attach the report to a training session.		The system allows the user to pull any information available in the database about the respective training session into the

			evaluation report.

Alternative flows

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User requirements coverage

EUR-CT-01   Criteria for scoring

EUR-CT-02   Criteria for scoring

EUR-CT-03   Criteria for scoring: transparency

EUR-CT-04   Criteria for scoring: quantitative

EUR-CT-05   Criteria for scoring: qualitative

EUR-CT-06   Criteria for scoring: database

EUR-EV-01   Logging function

EUR-EV-02   Feedback

EUR-EV-03   Performance indicators

EUR-EV-04   Scenario timeline and dashboard

EUR-EV-05   Trainer's checklist

EUR-EV-06   COP snapshots

EUR-EV-07   COP video clips

EUR-EV-08   Replaying training session

EUR-AD-01   Recommendations

EUR-AD-02   Lessons learned

EUR-AD-03   Sharing lessons

4   References

[1] Cockburn, A. (2001). *Writing Effective Use Cases*. Addison-Wesley Professional.

[2] Schneider, G. and Winters, J. P. (2001) (2nd ed.). *Applying Use Cases – A Practical Guide*. Boston: Addison-Wesley.