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TABLE OF CONTENTS

ABBREVIATIONS & DEFINITIONS

Abbreviation / Notion	Explanation
AKNZ	Akademie für Krisenmanagement, Notfallplanung und Zivilschutz (German Academy for Crisis Management, Emergency Planning and Civil Protection),
BBK	Bundesamt für Bevölkerungsschutz und Katastrophenhilfe (Federal Office of Civil Protection and Disaster Assistance Germany)
CA	Consequence Analysis
CI	Critical infrastructure(s)
CIP	Critical Infrastructure Protection
CIR	Critical Infrastructure Resilience
CM	Crisis Management
DSS	Decision Support System (CIPCast)
Dx.y	Deliverable <workpackage#>.<sub#>
EM	Emergency Management
GIS	Geographical Information System
GUI	Graphical User interface
KaVoMa	Katastrophenvorsorge und –management (Disaster precaution and management).
MCRI	Mission, Concepts, Realisation, and Implementation
MS&A	Modelling, simulation & analysis
WIA	What-if analysis
WPn	Work Package n

1 Introduction – Rationale of this document

The main outcome of CIPRNet's work package 6 (WP6) is a new capability, to be provided to CIPRNet's audience by means of a technical system. The new capability allows performing 'what if' analyses in a system environment that makes use of scenario-based modelling and simulation (MS&A) of interconnected Critical Infrastructures (CI). The aim is a significant contribution to better preparedness of and better-informed decisions by end-users of the initial audience and a resulting positive effect regarding CI protection (CIP) and CI resilience (CIR). The initial design deliverable of WP6 [D6.1] explains two decisive design decisions for realising the new capability: first, providing this capability for training purposes, and second, addressing crisis management staff from civil protection at the tactical level. The system realising the new capability has been named 'CIPRTrainer' (cf. [D1.42]).

1.1 Objectives

This combined deliverable D6.6+D6.7 aims to analyse and evaluate the CIPRNet "what-if" component and its wider context CIPRTrainer from the end-user perspective. Several objectives need to be met per the DoW [DoW]:

1. **Create well-designed and balanced questionnaires** for preparing the CIP MS&A based 'what if' analysis knowledge report. Issues to be addressed in this questionnaire include inter alia usefulness, effectiveness, potentials and inhibitors for embedding the technology/tooling in the current preparation and response phases of the incident/emergency response cycle, suggestions for improvements.
2. **Analyse** the returned questionnaires with respect to **lessons identified** from CIPRNet technical demonstrations resulting in a 'what if' analysis knowledge report part of this deliverable. Two groups: end-users (and subgroups) and experiences and observations made by the CIPRNet consortium partners involved in the demonstration(s).
3. The second part of this knowledge report will contain, besides the set of questionnaires for preparing it, the lessons identified and a set of recommendations will be disseminated to the CIPRNet community. The combined report will be submitted in [M42]. As demonstrations would take place much later, an extension of the time frame was requested.

1.2 Scope

Per the DoW [DoW], the use of simulation allows **'what-if' analyses**, that is, the exploration of different courses of action and their different consequences in terms of the chosen cross-cutting criteria. Emergency managers could use such a capability to test the vulnerability of the different system and to plan the most effective use of resources in an emergency and to explore a variety of scenarios, for example:

- which area to evacuate first,
- which infrastructures to reinforce best/first,
- which transport or traffic infrastructures required for a mitigation plan will be affected by a disaster and what contingency planning is required,
- which infrastructures outside a region affected by a disaster need to be operational to supply that region and thus need to be protected too.

As part of CIPRNet's work, this topic has been explored. These aspects shall be reflected at best in the CIPRTrainer that will be evaluated by end-users as well as by CIPRNet consortium members at national and inter-regional exercises and demonstrations.

1.3 Relation to other CIPRNet deliverables

Deliverables D6.1 – D6.5 [D6.1 – D6.5] describe the design, realisation and end-user documentation of the 'what-if' capability, now embedded in the CIPRTrainer and embedded in the Decision Support System (DSS) CIPCast [D7.5+D7.6]. This report focuses on the end-user and CIPRNet partner evaluation of the 'what if' analysis (WIA) functionality of CIPRTrainer by means of structured questionnaires.

The development of CIPRTrainer followed the four-layered MCRI approach (mission, concepts, realisation, and implementation) introduced in deliverable [D6.1]. That deliverable covered the top two layers 'mission' and 'concepts', and parts of 'realisation'. Deliverable D6.4 "Implementation of the integrated CIP MS&A based 'what if' analysis" covers the remainder of 'realisation' and 'implementation'. Deliverable D6.2 [D6.2] describes the example scenarios for the CIPRTrainer. To make the scenarios usable inside the CIPRTrainer, models of these scenarios needed to be created and access to data to be acquired [D6.3]. [D6.5] focuses on using the training engine of the CIPRTrainer. Moreover, an interface to the decision support system CIPCast is under development, as reported in deliverable [D7.5+D7.6].

Originally, the deliverable D8.700 'Demonstration of CIPRNet capabilities at a national or inter-regional emergency management exercise' [D8.7] will reflect on CIPRNet's demonstration of its 'what if' analysis and decision-support capabilities, if possible embedded, but at least in parallel to a national or inter-regional emergency management exercise. Observers will be used to identify lessons and feedback from the stakeholders, e.g. by using an adapted version of the questionnaire. In Section 2.3, an analysis is made on which elements are needed or differ from the other questionnaires to be developed.

However, despite many efforts of the consortium partners to find large (inter)national emergency exercises in which the new CIPRNet capabilities could be – preferably embedded – demonstrated, the consortium has been unsuccessful in taking part in such exercises. As an alternative, demonstrations have been given at various events with critical infrastructure (CI) policy-makers and Emergency Management (EM)/First Responder audiences. This deliverable intended to create a questionnaire for evaluating "big exercises" needed to be adjusted likewise. A choice was made to create a generic type of questionnaire that could be tuned to the specific audiences and events where the CIPRTrainer has been demonstrated. The originally developed questionnaire for such a large event has been withdrawn and replaced by a short template questionnaire for the CIPRTrainer demonstration event during the Master Class number 3 at Sankt Augustin (Germany), November 23-24, 2016.

Moreover, no questionnaire was foreseen in the DoW for demonstrations of the DSS/CIPCast development. It was decided to draft an extra questionnaire as part of this deliverable using a similar framework for the evaluation of CIPCast (Appendix E).

1.4 Structure of this document / guidance to the reader

This report is a combination of the former D6.7 "What-if Analysis (evaluation) report" and its preparation action by the former D6.6 "Questionnaire for preparing the CIP MS&A-based What-if analysis knowledge report".

PART 1.

Chapter 2 sketches the process of constructing the questionnaires and the assessment framework.

PART 2.

Chapter 3 discusses the various exercise, demonstration and educational events at which the new CIPRNet capabilities were shown and/or put to the test as well as the end-user feedback on these capabilities with a focus on the 'what-if analysis' (WIA) functionality in the CIPR-Trainer. Some self-assessment by the CIPRNet partners during these events is included.

Chapter 4 summarises the lessons identified while performing the D6.6+D6.7 task.

The Appendices contain developed generic questionnaires for the various stakeholder groups. For specific events, these drafts need to be adjusted to the target audience and type of event.

2 PART 1: Process

In this section, we present the underlying process elements of the questionnaires and the analysis.

2.1 Demonstration options

The planned schedule for the international demonstration event of the What-if Analysis shifted over time as no feasible large-scale exercise events could be identified. Moreover, the focus of the What-if Analysis shifted from a decision-support aid supporting civil protection exercises with respect to understanding and analysing ('what-if') critical infrastructure (CI) protection related alternatives and their consequences towards a CIPRTrainer.

Therefore, the following demonstrations and hand-on experiences of the CIPRTrainer were left for analysis by the former D6.7 and the preparation actions under the set of former D6.6 activities:

- CIPRNet course inside the Master in Homeland Security Edition 3, Rome, 14–15 July 2016. For this event, the standard course evaluation material was used.
- DOMINO 2 conference, The Netherlands, 21 September, 2016.
- CIPRNet Master Class 3, Sankt Augustin, Germany, 23–24 November, 2016.
- CIPRTrainer demonstration to German stakeholders (BBK, AKNZ, KaVoMa), Sankt Augustin, Germany, 17 January, 2017.
- Demonstration at control room of Areti, Rome, Italy, 8 February, 2017.

2.2 Setting up the questionnaire

Based on inputs from earlier questionnaires to assess capability demonstrations including the earlier EU IRRIIS project, knowledge of the Civil Emergency/Civil Protection domain (e.g. the VITEX exercise), and the documentation of the WIA capability description in CIPRNet's D6.5, an initial set of questions was generated. This set was reviewed by a TNO colleague experienced in using questionnaires as a tool as well as CIPRNet partners. The resulting extended set of questions or "generic questionnaire" can be found in section 2.3.

The main objectives of the questionnaires are:

- feedback on the CIPRTrainer-capability (and WIA) training experiences,
- feedback on its current functions,
- external viewpoints and observations,
- information that helps CIPRNet to improve the training experience, to develop a roadmap for further development of the CIPRTrainer capability, and to get ideas for further applications of the technology within the CIPRTrainer.

As the events in which the capabilities are shown have different audiences, we marked per type of audience (trainer, trainee, internal observer, and external observer) the relevant questions. Derived from this generic question set, Appendices A through D show the draft questionnaire models on CIPRTrainer for trainees, trainers, CIPRNet observers. Appendix E contains the draft questionnaire for the Italian demonstration of CIPCast. The same questions are numbered the same in each of te questionnaires making the potential for analysis across different events and stakeholder groups easier to process. Therefore, a new numbering 10-fold set is used per questionnaire topic.

Just before an event, the final questionnaire to be used need to be tuned and focused (length, set of topics, specific audience) from these drafts to make them in balance with the planned demonstrations of and experiences with the WIA-capability/CIPRTrainer event.

2.3 Aspects to be covered in the various questionnaires

Table 1 List of aspects that may be covered in the various questionnaires
1-5: (1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree), O= open text option; X= applicable

#	Analysis aspects to go to questionnaire	End-user: Trainee	End-user: Trainer	CIPRNet member
	Respondent			
1	○ background (daily job; strategic to technical level)	O	O	O
2	○ role as participant (trainee, trainer, observer, R&D)	O	O	X
	Usefulness of the CIPRTrainer			
3	○ How would you rate the usefulness of the CIPRTrainer for you personally?	1 – 5	1 – 5	1 – 5
4	○ Are satisfied with the number of possible actions?	1 – 5	1 – 5	1 – 5
5	○ Do you have the feeling that your actions had an impact on the course of the storyline?	1 – 5		1 – 5
6	○ Did you gain new insights from the comparison of the results of different course of action branches?	1 – 5		1 – 5
7	○ How do you rate the ability to compare the results of different action branches?	1 – 5		1 – 5
8	○ Did you gain new insights about critical infrastructures, e.g. cascading effects?	1 – 5		1 – 5
9	○ How would you rate the presentation of the events on the screen?	1 – 5		1 – 5
10	○ How would you rate the presentation of the consequence analysis?	1 – 5		1 – 5
11	○ How well does the presented information support taking the following decisions:			
	a. area to evacuate first	1 – 5	1 – 5	1 – 5
	b. which infra to reinforce best and or first	1 – 5	1 – 5	1 – 5
	c. contingency planning	1 – 5	1 – 5	1 – 5
	d. protect CI outside affected area	1 – 5	1 – 5	1 – 5
12	○ What else did you find useful? (Free question)	O	O	O
13	○ What was not useful and why? (Free question)	O	O	O
	○			
14	○ The first version of CIPRTrainer contains only basic functions for trainers. What essential basic functions for trainers do you miss? Please rate.			
	a. more support for creating what-if alternatives		1 – 5	
	b. support for changing events or rules during a training		1 – 5	
	c. additional analysis for trainee evaluation		1 – 5	
	d. other		O	
	Interactive what-if demonstration as web service			
	{OPTIONAL}			
20	○ The web demonstration of CIPRTrainer has limited interactivity. How would you rate the interactivity for the purpose of understanding its possibilities?	1 – 5		1 – 5
21	○ How much did the interactive what-if demonstration of CIPRTrainer at the CIPRNet website raise your interest in using the real CIPRTrainer as a stand-alone system?	1 – 5		1 – 5
	Ease of use (functional)			
30	○ How would you overall rate the ease of use of the CIPRTrainer system?	1 – 5	1 – 5	1 – 5
31	○ How would you rate the introduction part of the CIPRTrainer system?	1 – 5	1 – 5	1 – 5
32	○ User friendliness			
	a. Is the CIPRTrainer user interface intuitive?	1 – 5	1 – 5	1 – 5
	b. Is the presentation of situation information clear?	1 – 5		1 – 5
	c. Is the presentation of action possibilities clear?	1 – 5		1 – 5
	d. Is the control of the CIPRTrainer and the trainees logical and easy?		1 – 5	1 – 5
	e. Is it easy to insert a scenario, possible consequences, and critical infrastructure dependencies?		1 – 5	1 – 5
	f. Is it easy to access the training logs and are they usable?		1 – 5	1 – 5
33	○ How easy is it to understand the consequences?	1 – 5		1 – 5
34	○ How easy is it to perform a rollback of the scenario?	1 – 5		1 – 5
35	○ How easy is to follow a different course of action?	1 – 5		1 – 5
36	○ How easy is it to combine rollback and consequence	1 – 5		1 – 5

#		Analysis aspects to go to questionnaire	End-user: Trainee	End-user: Trainer	CIPRNet member
		analysis for doing a what-if analysis?			
37	○	How easy is it to setup and start the CIPRTrainer system?		1 – 5	1 – 5
38	○	How easy is it to follow a rollback and the exploration of a different course of action as performed by the observed trainees?		1 – 5	1 – 5
39	○	What should be made easier when using CIPRTrainer?	O	O	O
		Usefulness of the scenario(s) for the what-if analysis			
40	○	Was the scenario realistic enough for its purpose?	1 – 5		1 – 5
41	○	How authentic were the storylines?	1 – 5		1 – 5
42	○	How good is the overview of the scenario presented by CIPRTrainer?	1 – 5		1 – 5
43a		a. Are you satisfied with the included Critical Infrastructure sectors in CIPRTrainer?		1 – 5	1 – 5
43b		b. Which other Critical Infrastructure sectors would you like to have included?		1 – 5	1 – 5
43c		c. What information would you exclude?		1 – 5	1 – 5
44	○	How well the scenario-overview does cover the relevant situation information?	1 – 5	1 – 5	1 – 5
45	○	How well the scenario-unfolding does support the effects of the decisions to be taken by the trainees?	1 – 5	1 – 5	1 – 5
46a		a. How well is the environmental information needed for situational realism covered (e.g. terrain, weather, season)?	1 – 5	1 – 5	1 – 5
46b		b. Which environmental information do you miss?	O	O	O
47	○	Is the presentation of information sufficient?			
48a		a. Is the set of possible actions sufficient for implementing a scenario?		1 – 5	1 – 5
48b		b. What else is missing or insufficient from an observer's point of view?		O	O
		Potential embedding of WIA in decision support			
50a	○	Would you use what-if analysis in the preparation phase to explore alternate plans?	1 – 5		
50b		Why?	O		
51a	○	Would you use WIA in hot /response phase?	1 – 5		
51b		Why?	O		
52a	○	Would you use WIA in an incident evaluation phase?	1 – 5		
52b		Why?	O		
53a	○	Would you like to use the tool for training purposes?	1 – 5	1 – 5	
53b		- Why?	O	O	
53c		- Possible inhibitors	O	O	
54	○	What would be the main target groups for CIPRTrainer in your opinion?		O	
		Challenges and lessons identified			
60	○	Which new challenges did you experience?	O		
61	○	How would you rate the usefulness of the new experiences?	1 – 5		
62	○	Which lessons to be used in your daily job did you identify?	O		
63	○	How would you rate the usefulness of the new lessons?	1 – 5		
		Adequacy and performance of CIPRTrainer for training (Trainer view)			
70	○	How well does CIPRTrainer support the evaluation of trainees by the trainer?		1 – 5	1 – 5
71	○	Is it easy for the trainer to follow the actions of all trainees?		1 – 5	1 – 5
72	○	How would you rate the speed and responsiveness of CIPRTrainer?		1 – 5	1 – 5
73	○	What would need to be improved for better performance of CIPRTrainer?		O	O
		Organisation of the demonstration			
80	○	Overall, how well was the demonstration organised?	1 – 5	1 – 5	1 – 5
81	○	How adequate were the schedule, the breaks and the duration for the training purpose?	1 – 5	1 – 5	1 – 5
82	○	Was the training environment adequate for its purpose?	1 – 5	1 – 5	1 – 5
83	○	How would you rate location, rooms, and facility?	1 – 5	1 – 5	1 – 5
		Suggested improvements			
90	○	What could be improved in CIPRTrainer? (please specify)	O	O	O
91	○	Other observations on the CIPRTrainer? (please specify)	O	O	O

2.4 Methodology to analyse the questionnaire results

There are five generic types of questionnaires which may be tailored; one for trainers, one for trainees, one for CIPRNet members, one for observers (and other researchers), and one for CIPCast. Question 1 is about the job duties, job level and the types of daily activity. Question 2 is used for finding out which role the respondent has fulfilled during the event. It can be useful to organise the questionnaire into sampling groups and then use the answers for analysing and comparing the results as clusters of sampling elements.

The questionnaires are formed by two types of questions:

- Rating questions (closed questions using the scale from 1 to 5).
- Open-ended questions (some of them are double).

Table 2: Number of generic questions per questionnaire type

Groups / Q type	Trainee	Trainer	CIPRNet	Observer
Rating	44	36	49	11
Open	13	14	10	3
Total	57	50	59	14

The questionnaires in practice may be targeted to the specific event and audience.

The stratified sampling method that is consistent across multiple events (although some questions may be skipped) will evaluate all types of asked questions for each target group for more precise analyses. However, the probability sampling method to draw the statistical conclusions will be analysed based only on the rating question type.

The answers to the rating questions will be used to evaluate the total satisfaction rate of the CIPRTrainer respectively CIPCast. The descriptive statistics will be used for this analysis to indicate the general tendencies in the data and/or the spread of scores. The first group of rating questions, under the title “Usefulness of the CIPRTrainer” (and “Usefulness of the CIPCast”), will be used to evaluate the total satisfaction rate along with the general sufficiency of the tools.

The total number of the open-ended questions is 40. The answers of these questions will be separate for each target group. Questions 90 and 91 (entitled as “Suggested improvements”) represent the ideas of the participants to contribute on the development of the tools. The satisfaction rate will be evaluated on specific questions of the CIPRTrainer respectively CIPCast. For this analysis, we will use descriptive statistics for comparing the score relation of at least two variables to the target groups. On specific questions that require attention, we will pay special emphasis on the text of the open-ended questions. The suggestions of all groups are essential for the improvement of both CIPRTrainer and CIPCast.

3 PART 2: End-User Feedback on the WIA Capability

3.1 WP5 Integration Activities 3: End-user support

As stated in the DoW, the objectives of CIPRNet WP5 Integration Activities 3: "end-user support and the knowledge elicitation process through questionnaires" are: 1) to collect end-users / stakeholders requirements and expectations, 2) to design end-user support services and activities, 3) to cooperate with the other WP for preparing the planned demonstration of the new capabilities (i.e. CIPRTrainer and CIPCast), and 4) to support the secure design of the so-called Next Generation Infrastructure (e.g., smart grids).

Regarding the first objective "collection of end-user and other stakeholder requirements/needs" has been conducted through an informal elicitation process. The informal elicitation process relies on prototypal implementations of CIPRNet new capabilities (e.g. the Italian CIPCast instance) allowing end-users (mainly critical infrastructure operators and civil protection organisations) to play with the tool and to discuss about possible improvements. The results of this informal elicitation process have been described in the document "Report on the end user aspects to be considered in demonstration" [D5.4]. The main objective of the requirements elicitation process for both CIPCast and CIPRTrainer has been to provide the prototype of tools as much compliant as possible to their operational needs.

The synergy between the WP5 Integration Activities 3 will support the realisation of the knowledge report:

- The results of JA5.4 will integrate the various elements of the knowledge report. The continuous knowledge elicitation process performed through informal meetings with CI operators and civil protection organisations constitutes a complementary source of information that will complete the knowledge report that will result from the analysis of the questionnaires;
- The questionnaires proposed in this document will constitute the formal templates for the management of subsequent meetings with CI operators and civil protection organisations to be held in the future.

As discussed in chapter 2, lacking the large international exercise to preferably embed and test the new CIPRNet capabilities, our plan B was to use the same approach at the various smaller events at which the new CIPRNet capabilities were shown or put to the test with hand-on experiences. That plan did not work out well, the third Master Class and the BBK & KaVoMa events exempted. However, during these events a lot of very valuable end-user feedback was received which has been used to improve the capabilities or which will be used in future enhancements of the capabilities and or related EISAC services (see D4.9 – VCCC status and D4.7 – EISAC plans). In the next sections follow - per event - a short description of the event, the CIPRNet capability shown and a highlight of the end-user / stakeholder feedback.

3.2 EU-wide exercise VITEX 2016

On the 11th and 12th of May 2016, the EU-wide exercise VITEX 2016 was held in Amersfoort, in the Netherlands. Its aim was to join the Working Party on Civil Protection (PROCIV) community, national CI policy-makers and national power operators. VITEX 2016 focused on a disruption of the energy sector: 'After a long, dry winter, Europe is now experiencing a period of extreme hot and dry weather. Because of this, the production of energy fails, and countries have to organise planned rotating blackouts.'

Participants were from a government and an energy sector background. The participants with a government background could be either policy makers involved in managing the security of the Critical Infrastructure in general, or specifically involved in energy/electricity. European Member countries were invited to join the exercise with a country team, consisting of three to a maximum of five players.

The VITEX exercise set-up consists of four dependent and interlinked elements: (1) scenario-based group discussions, (2) blind spot identification, (3) lexicon development, and (4) knowledge market. As part of the latter, a CIPRTrainer movie was shown (as well as CIPedia© and a CIPCast demonstration). Figure 1 shows how these four elements are integrated in the exercise set-up. Together, these elements stimulate meaningful interaction between the participants during the exercise, to build networks and increase knowledge about networks and procedures.

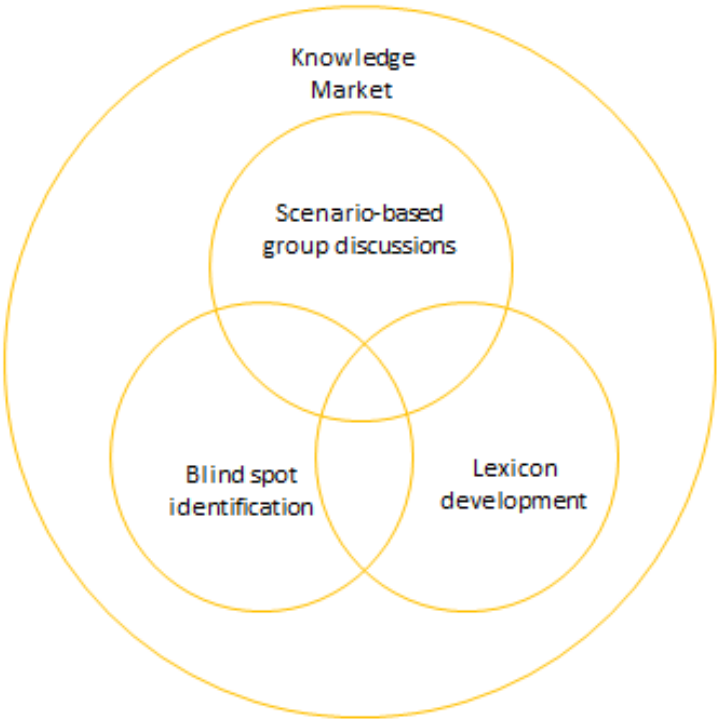

Figure 1 Four elements of the VITEX exercise set-up

As the knowledge market comprised demonstrations and information from various EU and Dutch national projects, no specific CIPRNet evaluation form could be created. We can only refer to the VITEX evaluation report [VITEX 2016a]: "With an average score of 6.3 from the participants, the knowledge market was appreciated the least [ed.: of all exercise activities]. The knowledge market was available during the breaks in the program. Observations showed that only some participants used this opportunity. During breaks, participants wanted to relax, eat and build their networks." and "The participants who did visit the knowledge market, were enthusiastic about it."

Relevant recommendations from [VITEX 2016b]: (a) Have the EU organisations/networks present themselves on day 1 of the exercise to stimulate the participants to visit the knowledge market later, (b) Make sure there is dedicated time in the program to visit the knowledge market. It is best to have this on the first day of the exercise.

3.3 CIPRNet course inside the Master in Homeland Security Edition 3

Rome, 14-15 July 2016

For this event, the standard course evaluation material was used.

In January 2016, the fully functional first prototype of the CIPRTrainer was demonstrated at the CIPRNet review meeting in Sankt Augustin. The implementation of the requirements and recommendations received between January and June 2016 led to the creation of the second version of the CIPRTrainer prototype (a multi-trainee version). CIPRTrainer v2 was employed for conducting a training event with hands-on experience during the third CIPRNet course for students of the postgraduate Master in Homeland Security at UCBM in Rome, Italy, on July 15, 2016. Eight students (two groups of four students each) conducted a full training session each with CIPRTrainer v2. Both the observation of the students using CIPRTrainer and their feedback led to another set of new requirements and feature suggestions.

3.4 DOMINO 2 conference

The Netherlands, September 20-22, 2016

At this conference Fraunhofer, TNO and Deltares have participated in a demonstration session in which end-users could see CIPRTrainer and the latest added flood scenario. The organisation of the event did not allow a hands-on experience of the present end-users. However, it was considered a good opportunity to attract Dutch end-users to the CIPRNet Master Class 3. The organisation used a general questionnaire; a specific CIPRTrainer questionnaire could not be distributed. However, the questions and comments after the CIPRTrainer presentation at the workshop were recorded. Three rounds of questions and answers took place:

First round

- Q: The focus of CIPRTrainer is on CI. How can the information be reliable?
  A: CI operators are hesitant about sharing data; acquiring detailed CI data is a long process. Now CIPRTrainer uses a fictive model to show what is possible. It is a simulation and is based on assumptions. In the future, actual data from CIs may be used. Now it is based on expert's knowledge that makes the models.
- Q: CIPRTrainer is a training tool, but what type of training goals?
  A: It is about achievements concerning learning about what actions have what consequences. It is about raising awareness on different actions and their consequences.
- Q: CIPRTrainer is not a decision trainer?
  A: No, CIPRTrainer is for What-if Analyses (WIA) and consequence analysis. By training in CIPRTrainer, the effects of different decisions can be demonstrated and thus it is about awareness building.
- Q: CIPRTrainer is about dealing with cascading effects and shows different views of CIs. Do trainees collaborate via this CIPRTrainer system at the same time?
  A: Yes, trainees can work together. There are different roles that have different responsibilities and actions. People performing these different roles can all work together.
- Q: The timeline is very nice. Is it also possible to do different actions at the same time? And does it differ if you choose specific actions over others or before each other?
  A: Yes, by going back with the rollback feature you can see what different actions, singular or multiple, bring forth what consequences. There is also a difference between the actual simulated time of the scenario and the time of the simulation as trainees can pause to

perform different actions, communicate with their team or collaborate with the other trainees. The CIPRTrainer can be plugged in different types of simulators, sort of like a library of models.

- Q: How realistic are the actions in the scenario?
  A: The presenter talked to different end users and from that the roles and actions have been developed. There are also parameters that can also be set by the trainee while being in the simulation.
- Q: Did you validate these actions with other practitioners?
  A: Yes of course, but CIPRTrainer is still under development and that is why days like today help to meet up with end users and get feedback.

Round two

- Q: Are there organisations using CIPRTrainer now?
  A: No, not yet. Within CIPRNet in Rome there is actual data used that can predict electrical power outage due to a certain threat. That was developed in collaboration with actual CIs. This is what they want in the future.
- Q: Do you have other scenarios?
  A: Yes, a cross-border flood scenario. Due to technical issues, we could not present it here. (the presenters invited everyone to CIPRNet Master Class 3 in November 2016)
- Q: It is difficult with CIs to point out the cascading effects, how does it work?
  A: It is difficult, but the more data the better the program can predict the cascading effects. That is why working on as much data is so important.

Third round

- Q: What roles are there? Who decides to send the fire brigade? (for our information, the Dutch fire brigade asked this and pointed out that if there is a fire, the fire brigade is always send).
- A: Explanation of the three different roles in CIPRTrainer. The presenter pointed out that for every training goal there can be different roles with different responsibilities and actions.
- Q: Can you include some gaming?
  A: Well, CIPRTrainer is a game.
  The following discussion led to a new insight that it would be nice if the consequence analyses would not only be about the whole result, but could be linked to the individual trainees and their performance / actions. However, this would be a difficult task.

3.5 CIPRNet Master Class 3

Sankt Augustin, Germany, 23-24 November, 2016

The CIPRNet Master Class 3 on "Modelling, Simulation and Analysis of Critical Infrastructures" is the final event in a series of training events organised within CIPRNet. The aim of the Master Classes is to perform training and demonstration activities to the Critical Infrastructures Protection and Civil Protection communities, to strengthen links between different institutions and to create common views. Its third edition was delivered following a "module" approach.

The first module introduced notions and theories regarding CI MS&A. This module aimed at researchers and any professional needing a general introduction to and overview of the topic. Module 2 introduced the new 'what if'-analysis (WIA) capability with consequence analysis for exploring different courses of action in simulated crisis scenarios, together with a description of the training tool CIPRTrainer. This module aimed at for any type of audience, including CI operators and Civil Protection. In module 3, participants performed hands-on exercises with CIPRTrainer in two small crisis management teams. This module was particularly aimed at professionals in crisis management at tactical level in Civil Protection.

At the end of the module 3 training, participants filled the evaluation forms provided in this deliverable. In total, we received eleven questionnaires by trainees (based on the questionnaire of Appendix A: Questionnaire for Trainees) and seven by CIPRNet members who served as observers in the event (based on the questionnaire of Appendix C: Questionnaire for CIPRNet members). Moreover, an external observer, Dr. Elke Spielmanns-Rome (Institut für Qualitätssicherung & Internationalisierung) provided her observations. The *detailed* evaluation results are presented in Appendix F: Evaluation results on the 3rd Master Class.

The main evaluation results are:

- In general, the Master Class gathered positive evaluations from the trainees of the Master Class.
- Positive evaluations were received also with respect to the usefulness of the CIPRTrainer tool. Some impressive features were identified, such as the role-based capabilities of the tool, the different courses of actions, how the tool facilitated teamwork, the modelling and simulation capabilities, the depictions of cascading effects or dependencies, the easy, intuitive, comprehensive or clean interface and the map layer capabilities and the options for visualisation (e.g., of vehicles).
- With respect to user friendliness, overall positive comments were received, especially with respect to the rollback capability. Improvements were suggested again on the usability of important functionality per each role, on the capability to compare maps, on the visual presentation or highlight of key features, and on the timeline of the events for easier visibility.
- The observers highlighted Healthcare, Transport as sectors that need to be depicted more clearly, as well as the dependencies between key sectors. Most of the attendant identified "Weather conditions" as the key missing information that needs to be added to the tool, while a few recommended 3D-visualisation for the scenario used.
- The trainees all agreed that WIA can be added in Decision Support for the preparation, evaluation phases but not for the hot phase, because of legal, institutional, and mainly time restrictions.
- Key inhibitors or challenges for adopting the tool were time, the need for validation, availability of licensed simulators, the need for integration with other tools, the need for additional capabilities to edit scenarios and models,
- The observers also evaluated positively the adequacy and performance of CIPRTrainer for training.
- In terms of elements that could be improved, several recommendations referred to:
  - the inclusion or clearer depiction of additional elements to be used for decision support, such as: environmental and weather conditions, dynamic demographic data, types and availability of resources, traffic conditions, various time compression options, consequence analysis of CI elements (more directly displayed), route planning of forces to allow for an estimate for the time of arrival, and multi-language support.

  - more simulations, and improvements on how the tool can be integrated with other simulators or tools.
  - depiction of icons (use of standard and more intuitive icons),
  - more realism with respect to the timing of actions, decisions and consequences, and more testing to support this, and
  - use of scenarios that have a more prominent role for CI elements.
- In terms of organisation, the course received overall very positive evaluations. The trainees contributed suggestions for improvement, which include improvements on the timing of the course, on the presentations and on the organisation of the course.

3.6 Demonstration/Presentations at AKNZ and KaVoMa @IAIS

Sank Augustin, Fraunhofer – Germany, 17 January, 2017

Near the Fraunhofer campus in Sankt Augustin, there are two more opportunities for demonstration and evaluation. First, there is the Aus- und Fortbildungseinrichtung des Bundes im Bevölkerungsschutz (AKNZ) in Bad Neuenahr-Ahrweiler, Germany's national training centre for crisis managers in civil protection. The academy is part of the BBK, the German Federal Office of Civil Protection and Disaster Assistance. Second, there is a study at the University of Bonn, called "Katastrophenvorsorge und –management" (KaVoMa; Disaster precaution and management). It is a post-graduate study for security professionals and is conducted in cooperation with AKNZ. Both institutions have been asked for participating in a demonstration event, and both have signalled principle agreement.

To meet this objective, a demonstration event took place on the 17th of January 2017 in Fraunhofer premises, with participants from BBK, KaVoMa (degree course at University of Bonn), AKNZ and from Federal Network Agency. The profile of the participants was mainly of Emergency Management and Critical Infrastructure operations background, while three had policy-making roles and three experience as trainers. Their job concerned either strategic or operational level. Feedback was collected using the evaluation forms of this deliverable (See Appendix A: Questionnaire for Trainees). In total, we received 14 questionnaires by trainees (based on the questionnaire of Appendix A). The *detailed* evaluation results are presented in Appendix G: Evaluation results on the demonstration to German stakeholders.

The main evaluation results are:

- In general, the demonstration gathered above average evaluations from the trainees.
- Mostly adequate evaluations were received also with respect to the usefulness of the CIPRTrainer tool. Some highlights include the rollback capability and how information is managed in the tool, the design of the interface (maps, layers, use of tactical icons) and the timeline of events.
- However, some features of the tool received lower evaluations. The main comments received referred to the types of actions and how they can be performed during the training. The trainees suggested improvements on the information flow, such as receiving feedback after an action is performed, information on available or missing forces, position of forces, delay between command and action, and more. Moreover, one attendant commented that the information should be distributed better according to the role. Finally, other comments included concerns about the possibility to dispatch/perform any number of actions at once, the number of options for - for CM actions and about the automatic start of software/system.

- With respect to user friendliness, overall positive comments were received, except for the presentation of the consequences, where the attendants requested the consequences to be explained better and to be depicted in real time (e.g. injured people).
- The trainees evaluated positively the selected scenario, but most of the attendants identified "Weather conditions" as the key missing information that needs to be incorporated to the tool. Due to the selected scenario (gas cloud and fire), several attendants identified "wind" or "wind direction" as the most important weather condition, combined with weather forecast data. One of the attendants would like to receive CI service information, such as information on the gas supply.
- The trainees all agreed that WIA can be added in Decision Support for the preparation, evaluation phases but not for the hot phase.
    - Reasons for performing WIA in the preparation phase included: the ability to test and explore alternate paths, to inform the personnel, to observe and clarify consequences and to analyse the impact of decisions, to evaluate or/and prove the effectiveness of measures. The conditions for adopting such a tool are related to the quality of the results, the model and the time needed to test it.
    - Reasons for not performing WIA in the hot phase included: the lack of sufficient realism, time limitations and pressures, existing practises (standard operating procedures) that would require modification, the fact that an actual scenario may not be predefined fully in the tool (ability to customise quickly). A few trainees considered that if such limitations are overcome, it could give good feedback and could assist in weighing alternatives.
    - Reasons for performing WIA in the evaluation phase included: the ability to prove alternative coping strategies or tactics and to weigh alternatives. However, some trainees expressed reservations on whether the model is precise enough for a real scenario.
    - Similar, to the use of WIA in the preparation phase, most trainees think that WIA could be used for training purposes. Their reasoning (Question 53b) includes the following: the ability to explore different courses of action or to test coping strategies. Participants highlighted the fact the tool is very oriented to the trainees/participants, it is easy to use, depends on concrete learning goals, and, if the time for exercise is sufficient, it can be or it would be worth to try it for training purposes.
- The trainees discussed also potential inhibitors, such as the effort/cost and availability of the tool or of the simulators, the constraints that may limit a realistic training, the static nature of the scenario which does not allow enough room for improvisation, the problem of missing data or the need to define in a clearer way which are the target groups of such a training.
- The trainees identified as challenges the lack of feedback from ground forces, how exercises can be performed, the communication flow, the previous knowledge of the scenario, the limitations on simulation.
- The trainees also gave an average (adequate) rating to the usefulness of new experiences and lessons learned from the course.
- In terms of improvements and overall observations of CIPRTrainer, the participants offered lots of recommendations (Questions 90, 91 and 92). These are listed below:
    - the need for better information flow,
    - the need to include additional elements, such as medical units, disaster management resources, the reactions of the population, highlights (e.g. an "attention" tag in the log file),
    - the need for a different (lower) speed of execution for the scenario,

  - the need for more scenarios,
  - the need to depict more clearly the simulation and the interdependencies,
  - the need to add constraints, such as not to be able to send out an MTF before the accident happens,
  - better and real-time display of consequences, and
  - the ability to choose more than one action at a time.
- Overall, several participants gave positive remarks to the tool ("very good"). A few participants expressed some reservations and highlight the need for further testing, especially with operational staff to ensure that all elements are realistic and not erroneous for specific groups of staff (e.g. fire fighters).
- In terms of organisation, the demonstration received overall very positive evaluations, with only some deviations with respect to the schedule and the timing of the demonstration.

3.7 Demonstration/Presentation at INHESJ

Like AKNZ in Germany, INHESJ educates and trains the French civil protection crisis managers. INHESJ, the Institute for Advanced Studies in Security and Justice located in Paris is a member of CIPRNet's International Advisory Board. A similar demonstration as for the German side is planned, but just for the trainers. An enquiry has been sent to the advisory board member Mrs. Adeline Damicis. However, Mrs. Damicis signalled earlier in the year that due to the terror attacks in France demand for the services of INHESJ has risen far above normal level and that she would not be able to participate in Advisory Board tasks for the time being. Therefore, it is impossible to arrange a demonstration before CIPRNet ends, as originally planned. However, CEA will continue to interact with INHESJ in the future and will propose that the demonstration is arranged later during one of the next INHESJ training session; in this case the D6.6 evaluation questionnaires will be used for getting feedback.

It should also be noted that Mrs. Damicis has attended the CIPRNet Master Class 3 and has provided her evaluation. Her responses were included in the results described in Section 3.5.

3.8 Demonstration/Presentation at Areti

Rome, ARETI Control Room - Italy, 8 February, 2017

ENEA organised an emergency management exercise to show the CIPCast functionalities and features to different emergency manager actors (D5.4, D8.7) at the Areti (formerly ACEA) Control Room on 8th of February 2017:

- ACEA Distribuzione S.p.a (now Areti S.p.a) for the electrical distribution grid,
- ACEA ATO2 S.p.a. for the water drinking and sewage systems,
- TELECOM for the telecommunication network,

The demonstration event has been divided in two sessions:

- CIPCast Operational Mode session. In this session, the attendee will see the data flow between CIPCast platform and the ACEA information system. The CIPCast GIS web application interface will help the attendee in understanding the different data exchanged and how these data can be used for a rapid assessment of the expected consequences of a possible crisis scenario
- CIPCast Off-line Mode session. In this session, the ENEA team will show synthetic crisis scenario to the attendees. This session will be very important to understand the requirements and needs of the different actors.

At the end of the sessions, the attendees were asked to fill a specific demonstration evaluation questionnaire to elicit feedbacks and suggestions about possible future developments and improvements. The demonstration event questionnaire has been based on the questionnaire template proposed in this document. Anyway, the questionnaire has been designed in a way such that to reflect the specific features of the CIPCast platform and the peculiarities of Italian demonstration event to maximise the quality of the attendee answers.

The overall reaction has been very favourable. The presented test case was the bi-centennial flooding of the Tevere river, which is expected to hit the north part of the city (Ponte Milvio area). This test case has been specifically suggested either by Areti that by the Civil Protection of Roma Capitale as it is a large event which has a sizeable probability of occurring in these years.

The Areti Head of the Control Room Operations for the network control has appreciated the CIPCast feature providing an optimisation of the recovery sequence made based on their own KPI (the resulting kilominutes of the outage, expressed in terms of the number of citizens involved times the period of outage experienced by each or them).

From previous interactions with Areti, it has been decided to send vulnerability data for the single elements through the site-to-site private connection between ENEA's CIPCast and Areti systems. In fact, it has been agreed that damage predictions should be made on the basis of a common "vulnerability" metrics of the assets, to avoid excess of false positive and false negative in the alerting system.

The "misalignment" of the CI vulnerability properties of the CIPCast database with those of the Areti database has originated a large number of false positives and false negative during the three months test of the CIPCast alerting system (see D7.7+7.8 for a more complete treatment of this topic). This has been identified as a major problem needed to be solved. Many of the CI elements which were identified as "critical" by CIPCast from the analysis of the historical fault data log have been effectively improved (substitution of old elements, new technologies set in place). That information was not available to ENEA in the CIPCast vulnerability data base. For this reason, CIPCast triggered, in the test period, many unjustified alerts also due to the lack of coherence between its own and Areti vulnerability data set. It has thus been decided that the Vulnerability Data would have to be exchanged through the hourly data exchange mechanism together with data on the operating network topology.

The CIPCast set in off-line operational mode has allowed performing a number of simulation consisting in varying a number of CI operator related parameters enabling the operator to more efficiently solve the crisis. The CI operator could leverage on two different set of parameters:

(a) the availability of more technical crews on the field, with the possible reduction of typical times to displace assets and crews in the city
(b) the possibility of appropriately reconfiguring the network (by displacing the electrical switches along the Medium Voltage lines primarily affected by the outages) in a way to configure a more resilient network topology in the damaged area.

Simulation results have shown that, through the appropriate variation of the allowed parameters in the (a) and (b) sets, the crisis development could be brought to become more and more acceptable in terms of consequences on the city areas hit by the effect.

Fig.2 reports the consequences experienced in the specific area hit by the flooding through the estimate of the "continuity of service" parameter (*Kmin*) estimated as the product of the outage duration in a given area (due to the loss of one or more electrical cabins) and the number of customers involved in the outage.

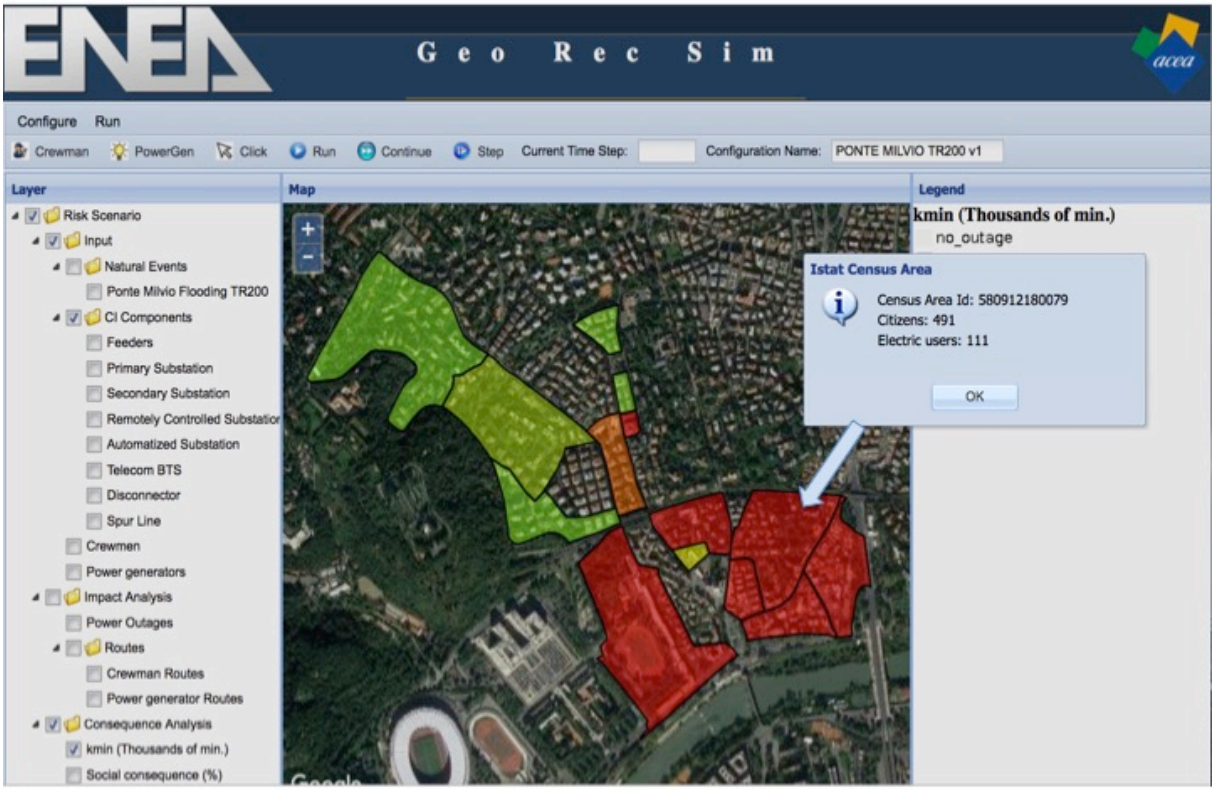

Figure 2: Consequence analysis in one of the simulated flooding scenario of the Tevere river (*artificial data shown in the pop-up)*. Consequences expressed in *Kmin* (see text for explanation). The colour code indicates the larger or smaller *Kmin* value estimated for the different areas.

4 PART 2: Lessons Identified and Conclusion

4.1 Generic lessons Identified

The following lessons were identified:

Lesson 1: During the project, the high aim of being embedded or part of an international exercise where CIPRNet's new capabilities could be put to the test turned out to be infeasible. Therefore, in hindsight, the preparation of generic questionnaires for different audiences (D6.6/Part 1) has been largely superfluous. On the other hand, Part 1 of this deliverable shows how to construct in a structured way a questionnaire framework for large events with different types of attendees (end users, trainers and observers). Subsets of the sets of questions were used for part of the demonstrations.

Lesson 2: The plan to use these generic questionnaires for the different target groups at the various specific CIPRNet capability demonstration events did not work, the third Master Class and BBK & AKNZ events exempted. The size and type of audience was not that large that it favoured structured and detailed questionnaires. The questionnaires were aimed at events with a large number of end-users/stakeholders being asked by CIPRNet to fill in questionnaires with many questions that could be analysed using the methodology described in section 2.4 with a full-fledged statistical analysis made no sense. For some events, this made no sense due to the limited number of attendees. However, at the events with a limited number, but high-ranking attendees, the attendees expressed their very valuable views in direct interaction with the CIPRNet partners that provided demonstrations and hands-on experiences.

Lesson 3: For a tool that is still a prototype, the most useful form of feedback was received in free format in direct interaction with the trainees. These free format comments really show the points where the attendees expect the most added value for the new capability, and which areas of improvement were needed to obtain that added value. Here again, the numbers for a statistical analysis do seem less important in that stage than dedicated, detailed feedback from a limited number of high level attendees.

Lesson 4: At various events, some concrete areas of improvement were identified. These include, e.g., tips on the set-up of the course (e.g. inclusion of an online tutorial, include additional time during the training to familiarise) and requests on the functionality of the tool (e.g. capability to compare maps, highlight available resources). These identified lessons could help to improve courses and capability demonstrations in future.

Lesson 5: For both CIPCast and CIPRTrainer, attendees stressed the importance of interoperability with existing tools and systems. This should receive specific attention in further development of these new capabilities.

4.2 Lessons Identified for the specific CIPRNet capabilities

4.2.1 CIPedia©

Lesson 6 CIPedia© was used as a general lexicon at a cross-European civil protection and CIP exercise. The general feedback on the functionality was positive but the tool was used less by the attendees than initially expected. Despite flyers and a knowledge market, end-users were first shy to use the keyboard and ac-

cess CIPedia©. A short demo of its use as well as a demo of how easy and fast an additional term could be entered could have made CIPedia© even faster attractive to the European civil protection communities.

4.2.2 CIPRTrainer

Lesson 7 The overall impression of the trainees of the What-if Analysis (WIA) functionality was positive. A majority found it useful to include the WIA functionality in Decision Support for the preparation and evaluation phases, The WIA-functionality was deemed less useful for the hot phase. CIPRTrainer, however, was considered a useful tool for training and education purposes.

Lesson 8: Training sessions with "hands on" exercises should have a limited audience. If only few of the participants can practice at the computer systems, then the other participants would need to be kept busy with something else – like discussing features of the tool with the developers/programmers. At the Master Class 3, only four participants could train with the CIPRTrainer system simultaneously, while about a dozen participants remained idle. In total eight participants interacted with the system, while the remainder of the participants observed.
At the special German stakeholder event for the BBK and KaVoMa, the capacity was doubled: eight out of sixteen participants could practice simultaneously, which was felt as an improvement.

Lesson 9: The mixture of basic MS&A presentations, CIPRTrainer methods and realisation, and preparation for the "hands on" was a good mixture for the heterogeneous audience of the Master Class 3 and received very good marks. Although the audiences of the CIPRNet Course 3 in Rome and the German stakeholder event for the BBK and KaVoMa had similar audiences (young professionals and practitioners in civil security), the CIPRNet Course 3 received ratings that were on average almost a full mark better than those of the German event. The reasons for that difference remain unknown.

Lesson 10: At the German stakeholder event for the BBK and KaVoMa, one participant of the AKNZ (German academy for crisis management training) emphasised that he specifically liked that CIPRNet was designed for supporting a generic crisis management team. He stressed that tailoring such a system to match the situation, actors, and procedures in a specific state or country would limit the general applicability of CIPRTrainer. The current approach would also be well suited for making exercises in which the trainees could assume other roles than in real life—for example, a responder could act as a decision-taker—, which would foster a better mutual understanding, which in turn would be beneficial in real crisis situations. This is a benefit that the CIPRNet team had not considered yet.

Lesson 11: Participants of the training events have proposed or asked for several technical improvements and additional feature requests of CIPRTrainer. Some of them have already been implemented, some are easily doable, and others require significant efforts. At all three training events of CIPRTrainer, the trainees could quickly grasp how to operate the system. Most asked for requests concerned improvements of situation information (by adding information on wind speed and direction), feedback on action execution (with appropriate time delay, with the option to succeed or fail), enhancing the functions of the trainer, and on-the-fly consequence analysis.

Lesson 12: One of the most-asked questions was that of the effort of modelling. Some end-users fear that the effort would be prohibitive for employing simulation-based

systems like CIPRTrainer. Although there is a significant initial modelling effort, the approach in CIPRTrainer is such that altering some scenario elements (like changing events in a storyline or adding actions) is comparatively easy to achieve. We believe that the earlier idea developed during the DIESIS project, namely to build up repositories of scenarios, is still a valid business element of an EISAC node. Further methods for automating or facilitating the creation of new storylines or scenario parts would be a RTD topic for a new project.

Lesson 14: The professional use of CIPRTrainer and of its new WIA capability could benefit from developing a curriculum with didactical objectives in mind. This would also facilitate "training the trainer", a prerequisite for a wider use of CIPRTrainer.

Lesson 15: Trainees who used CIPRTrainer quickly grasped how to use rollback and how to explore different courses of action. Trainees expressed differentiated opinions regarding consequence analysis (CA). Some trainees asked for a better explanation of the display of CA results, some asked for a better explanation of how to interpret the results, and one participant did not like the use of CA at all. The lesson learnt here is to include more practical examples in the presentation of the CA method and explain what they mean.

4.2.3 CIPCast

Lesson 16: The What-if Analysis (WIA) paradigm has been a key factor for all products realised within CIPRNet. The WIA approach in the CIPCast Decision Support System (DSS) can be used to establish the best possible strategy to recover from an expected crisis by leveraging on (almost) all the degrees of freedom that could be handled by the CI Operator (network configuration, number of technical crew etc.). This option has been particularly appreciated by CI operators and will be further exploited and refined in the next versions of the CIPCast tool (in particular that related to the rapid change of the network topology to allow operators to modify switches position along the Medium Voltage lines) to configure the network in a more resilient configuration.

Lesson 17: The CIPCast tool can suggest an optimised sequence of actions to restore the cascading outages after some damage by using different properties, as optimisation target function: service continuity parameters, "wealth reduction" of citizens, industrial economic losses associated to the outages etc. To date, CI operators are more prone to accept to use their own optimisation functions (i.e. service continuity values) as they are committed to keep these indicators above a given threshold on a yearly basis. They have thus asked for the use of these parameters as the ones to be optimised. However, CI operators have also admitted the relevance of other indicators such as social and economic consequences to be produced in the analysis, despite the fact that they are committed to optimise with respect to service continuity indicators.

Lesson 18: Several infrastructure operators have required the possibility of using the CIPCast interface to integrate other data coming from their own data analysis (made on data which cannot be disclosed and/or are too complex to be transferred into the CIPCast DSS to be processed). To this end, ENEA set up a communication layer (site-to-site VPN from CI Operator Control Room and the CIPCast Database) allowing the flow of further type of results which could be either visualised and correlated to other data present in the CIPCast Database.

Lesson 19: Infrastructure Operators have also been attracted by the possibility of using CIPCast as a tool for accessing other sensors (i.e. their own sensors) and to insert into the system data coming from measurement campaigns performed in the critical areas of their assets (i.e. area prone to geodynamical effects which could be monitored using among others, remote sensing capabilities). This option (i.e. integrating and processing remote sensing data in the CIPCast workflow) has been placed as a priority in the development in the next version of CIPCast.

5 References

[CA] Consortium Agreement of CIPRNet

[D1.42] EU FP7 Project CIPRNet Project, Fraunhofer, Deliverable "D1.42 Project Periodic Report". Sankt Augustin, Germany, 2015

[D4.5] EU FP7 Project CIPRNet Project, Fraunhofer, Deliverable "D4.5 Implementation of the WIA services for the CIPRNet web portal". Sankt Augustin, Germany, 2016.

[D6.1] EU FP7 Project CIPRNet, CEA, Deliverable "D6.1 Conceptual design of a federated and distributed cross-sector and threat simulator". Sankt Augustin, Germany, 2014.

[D6.2] EU FP7 Project CIPRNet, CEA, Deliverable "D6.2 Application Scenario", Gramat, France, 2014.

[D6.3] EU FP7 Project CIPRNet, Fraunhofer, Deliverable "D6.3 Federate CI Models". Sankt Augustin, Germany, 2015.

[D6.4] EU FP7 CIPRNet, Fraunhofer, Deliverable "D6.4 – Implementation and integration of the federated and distributed cross-sector and threat simulator", Sankt Augustin, 2016

[D6.5] EU FP7 CIPRNet, Fraunhofer, Deliverable "D6.5 – Documentation and user manual of the CIP MS&A based 'what if' analysis demonstrator", Sankt Augustin, 2016

[D7.5+D7.6] EU FP7 CIPRNet, ENEA, Deliverable "D7.5+D7.6 – Integration of meteo-climatological simulators, flood forecasts, earthquakes data and analysis tool and Interface to the technical demonstrator for federated CIP MS&A", Casaccia, 2016

[D8.7] EU FP7 Project CIPRNet, TNO, Deliverable "D8.700 Demonstration of CIPRNet capabilities at a national or inter-regional emergency management exercise" (forthcoming). The Hague, The Netherlands, 2016.

[D9.83] EU FP7 Project CIPRNet, UCBM, Deliverable "D9.83 Courses inside the Homeland Security Master". Rome, Italy, 2016.

[DoW] Annex I – Description of Work (Annex to the Grant Agreement of CIPRNet).

[GA] European Commission, represented by REA: Grant Agreement FP7-312450-CIPRNet.

[VITEX 2016a] R. van Rijk, H.E. Stubbé, VITEX 2016: Evaluation of learning objectives and exercise set-up, TNO report, 2016.

[VITEX 2016b] Ministry of Security and Justice, VITEX Exercise Guide, The Hague, The Netherlands, 2016.

Appendix A: Questionnaire for Trainees

The results of this questionnaire will be analysed anonymously.

If you however would like to have contact with the CIPRNet researchers about the questionnaire or your remarks, it is possible to leave your contact information at the end of this questionnaire. In that case the researchers will contact you. Your contact information, however, will not be used during the analysis and reporting.

Definition

- Critical Infrastructure comprise an asset, system or part thereof which is essential for the maintenance of vital societal functions, health, safety, security, economic or social well-being of people, and the disruption or destruction of which would have a significant impact in a region or nation as a result of the failure to maintain those functions.

Question 1

In what type of activity are you involved in your daily job regarding critical infrastructures (CI) and emergency management?

Please select one or more options.

- ☐ Emergency management (government/authority)
- ☐ Critical Infrastructure operations
- ☐ Operational decision support
- ☐ Policymaking (government/authority)
- ☐ Training
- ☐ Research
- ☐ Other (explain): .....

My job concerns the

- ☐ Strategic level
- ☐ Tactical level
- ☐ Operational level
- ☐ Technical support or research

Question 2

You took part in this event as:

- Trainee

Usefulness of the CIPRTrainer from trainee point of view						
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
3	How would you rate the usefulness of the CIPRTrainer for your professional activity?	O	O	O	O	O
4	Are you satisfied with the number of possible actions?	O	O	O	O	O
5	Did you have the feeling that your actions had an impact on the course of the storyline?	O	O	O	O	O
6	Did you gain new insights from the comparison of the results of different course of action branches?	O	O	O	O	O
7	How would you rate the ability to compare the results of different action branches?	O	O	O	O	O
8	Did you gain new insights about critical infrastructures, e.g. cascading effects?	O	O	O	O	O
9	How do you rate the presentation of the **events** on the screen?	O	O	O	O	O
10	How do you rate the presentation of the **consequence analysis**?	O	O	O	O	O
11	How well does the presented information support taking the following decisions?					
a	Which area to evacuate first?	O	O	O	O	O
b	Which infrastructures to reinforce best and or first?	O	O	O	O	O
c	Which transport infrastructures are required for mitigation of the situation?	O	O	O	O	O
d	Contingency planning?	O	O	O	O	O
e	Which (critical) infrastructures outside the directly hit area need to be protected too?	O	O	O	O	O
12	What did you appreciated the most in the CIPRTrainer and why. (top 3)	_____ _____				
13	What did you find not useful in CIPRTrainer? Why?	_____ _____				

OPTIONAL/ALTERNATE – in case the what-if interactive demonstration is used.

Interactive what-if demonstration of CIPRTrainer as webservice						
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
20	The web demonstration of CIPRTrainer has limited interactivity. How would you rate the interactivity for the purpose of understanding its possibilities?	O	O	O	O	O
21	How much did the interactive what-if demonstration of CIPRTrainer at the CIPRNet website raise your interest in using the real CIPRTrainer as a stand-alone system?	O	O	O	O	O

Ease of use of CIPRTrainer's functions						
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
30	How would you overall rate the ease of use of the CIPR-Trainer system?	O	O	O	O	O
31	How would you rate the introduction part of the CIPR-Trainer system?	O	O	O	O	O
32	User friendliness					
32a	- Is the CIPRTrainer's user interface intuitive?	O	O	O	O	O
32b	- Is the presentation of situation information clear?	O	O	O	O	O
32c	- Is the presentation of action possibilities clear?	O	O	O	O	O
33	How easy is it to understand the consequences?	O	O	O	O	O
34	How easy is it to perform a rollback of the scenario?	O	O	O	O	O
35	How easy is to follow a different course of action?	O	O	O	O	O
36	How easy is it to combine rollback and consequence analysis for doing a what-if analysis?	O	O	O	O	O
39	What should be made easier when using CIPRTrainer? _____ _____					

Usefulness of the offered scenario(s) for what-if analysis						
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
40	Was the scenario realistic enough for its purpose?	O	O	O	O	O
41	How authentic were the storylines?	O	O	O	O	O
42	How good is the overview of the scenario presented by CIPRTrainer?	O	O	O	O	O
44	How well does the scenario overview covers the relevant situation information?	O	O	O	O	O
45	How well does the scenario unfolding supports the effects of the decisions?	O	O	O	O	O
46a	How well is the environmental information needed for situational realism covered (e.g. terrain, weather, season)?	O	O	O	O	O
46b	Which environmental information do you miss? _____ _____					

Potential embedding of what-if analysis in decision support						
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
50a	Would you use what-if analysis in the **preparation phase** to explore alternate plans?	O	O	O	O	O
50b	Why? _____ _____					
51a	Would you use what-if analysis in **hot /response phase**?	O	O	O	O	O
51b	Why? _____ _____					
52a	Would you use what-if analysis in an incident **evaluation phase**?	O	O	O	O	O
52b	Why? _____ _____					
53a	Would you like to use **the tool for** training purposes?	O	O	O	O	O
53b	Why? _____ _____					
53c	Possible inhibitors? _____ _____					

Challenges and lessons identified						
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
60	Which new challenges did you experience? _____ _____					
61	How would you rate the usefulness of the new experiences?	O	O	O	O	O
62	Which lessons to be used in your daily job did you identify? _____ _____					
63	How would you rate the usefulness of the new lessons?	O	O	O	O	O

Organisation of the demonstration						
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
80	Overall, how well was the demonstration organised?	O	O	O	O	O
81	How adequate were the schedule, the breaks and the duration for the training purpose?					
81a	Schedule	O	O	O	O	O
81b	Breaks	O	O	O	O	O
81c	Duration	O	O	O	O	O
82	Was the training environment adequate for its purpose?	O	O	O	O	O
83	How would you rate location, rooms, and facility?					
83a	Location	O	O	O	O	O
83b	Rooms	O	O	O	O	O
83c	Facility	O	O	O	O	O

Suggested improvements	
90. What could be improved in CIPRTrainer? (please specify)	_____ _____ _____ _____
91. Other observations on the CIPRTrainer? (please specify)	_____ _____ _____ _____

In case you want to contact the CIPRNet community, please leave your contact details here:

- Your name/title: .....
- Your organisation/department: ….....
- Address: …….
- ……..
  ZIP: …… City: .....
  Country: …….....
- Telephone: +…….-….....
- E-mail: …….....

Appendix B: Questionnaire for Trainers

The results of this questionnaire will be analysed anonymously.

If you however would like to have contact with the CIPRNet researchers about the questionnaire or your remarks, it is possible to leave your contact information at the end of this questionnaire. In that case the researchers will contact you. Your contact information, however, will not be used during the analysis and reporting.

Definition

- Critical Infrastructure comprise an asset, system or part thereof which is essential for the maintenance of vital societal functions, health, safety, security, economic or social well-being of people, and the disruption or destruction of which would have a significant impact in a region or nation as a result of the failure to maintain those functions.

Question 1

In what type of activity are you involved in your daily job regarding critical infrastructures (CI) and emergency management?

Please select one or more options.

- ☐ Emergency management (government/authority)
- ☐ Critical Infrastructure operations
- ☐ Operational decision support
- ☐ Policymaking (government/authority)
- ☐ Training
- ☐ Research
- ☐ Other (explain): .....

My job concerns the

- ☐ Strategic level
- ☐ Tactical level
- ☐ Operational level
- ☐ Technical support or research

Question 2

You took part in this event as:

- Trainer

Usefulness of the CIPRTrainer from a trainer point of view						
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
3	How would you rate the usefulness of the CIPRTrainer for your professional activity?	O	O	O	O	O
4	Are you satisfied with the number of possible actions?	O	O	O	O	O
11	How well does the presented information support taking the following decisions from a trainer point of view?					
11a	Which area to evacuate first?	O	O	O	O	O
11b	Which infrastructures to reinforce best and or first?	O	O	O	O	O
11c	Which transport infrastructures are required for mitigation of the situation?	O	O	O	O	O
11d	Contingency planning?	O	O	O	O	O
11e	Which (critical) infrastructures outside the directly hit area need to be protected too?	O	O	O	O	O
12	What did you appreciated the most in the CIPRTrainer and why. (top 3) _____ _____					
13	What did you find not useful in CIPRTrainer? Why? _____ _____					
14	The first version of CIPRTrainer contains only basic functions for trainers. What essential basic functions for trainers do you miss? Please rate.					
14a	More support for creating what-if alternatives for the trainees	O	O	O	O	O
14b	Support for changing events or rules during a training	O	O	O	O	O
14d	Additional analysis functions for evaluating the performance of the trainees	O	O	O	O	O
14d	Other (please specify) _____ _____					

Ease of use of CIPRTrainer's functions						
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
30	How would you overall rate the ease of use of the CIPRTrainer system by a Trainer?	O	O	O	O	O
31	How would you rate the introduction part of the CIPRTrainer system?	O	O	O	O	O
32	User friendliness for Trainers					
32a	- Is the CIPRTrainer's user interface intuitive?	O	O	O	O	O
32d	- Is the control of the CIPRTrainer and the trainees logical and easy?	O	O	O	O	O
32e	- Is it easy to insert a scenario, possible consequences,	O	O	O	O	O

	and critical infrastructure dependencies?					
32f	- Is it easy to access the training logs and are they usable?	O	O	O	O	O
37	How easy is it to setup and start the CIPRTrainer system?	O	O	O	O	O
38	How easy is it to follow a rollback and the exploration of a different course of action as performed by the observed trainees?	O	O	O	O	O
39	What should be made easier when using CIPRTrainer? _____ _____					

Completeness of situation information (Trainer view)						
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
43a	Are you satisfied with the included Critical Infrastructure sectors in CIPRTrainer?	O	O	O	O	O
43b	Which other Critical Infrastructure sectors would you like to have included? _____ _____					
43c	What information would you exclude? _____ _____					
44	How well CIPRTrainer does cover the relevant situation information?	O	O	O	O	O
45	How well the scenario-unfolding does support the effects of the decisions to be taken by the trainees?	O	O	O	O	O
46a	How well is environmental information needed for situational realism supported (e.g. terrain, weather, season)?	O	O	O	O	O
46b	Which environmental information support do you miss? _____ _____					
47	Is the presentation of information sufficient?	O	O	O	O	O
48a	Is the set of possible actions sufficient for implementing a scenario?	O	O	O	O	O
48b	What else is missing or insufficient from a trainer's point of view? _____ _____					

Adequacy and performance of CIPRTrainer for training (Trainer view)							
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
70	How well does CIPRTrainer support the evaluation of trainees by the trainer?	O	O	O	O	O
71	Is it easy for the trainer to follow the actions of all trainees?	O	O	O	O	O
72	How would you rate the speed and responsiveness of CIPRTrainer?	O	O	O	O	O
73	What would need to be improved for better performance of CIRTrainer?	_____				

Potential embedding of CIPRTrainer in decision support							
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
53a	I would use the tool for the tool for training purposes	O	O	O	O	O
53b	Why?	_____				
53c	Possible inhibitors?	_____				
54	What would be the main target groups for CIPRTrainer in your opinion?	_____				

Organisation of the demonstration						
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
80	Overall, how well was the demonstration organised?	O	O	O	O	O
81	How adequate were the schedule, the breaks and the duration for the training purpose?					
81a	Schedule	O	O	O	O	O
81b	Breaks	O	O	O	O	O
81c	Duration	O	O	O	O	O
82	Was the training environment adequate for its purpose?	O	O	O	O	O
83	How would you rate location, rooms, and facility?					
83a	Location	O	O	O	O	O
83b	Rooms	O	O	O	O	O
83c	Facility	O	O	O	O	O

Suggested improvements	
90. What could be improved in CIPRTrainer? (please specify)	_____ _____ _____ _____
91. Other observations on the CIPRTrainer? (please specify)	_____ _____ _____ _____

In case you want to contact the CIPRNet community, please leave your contact details here:

- Your name/title: .....
- Your organisation/department: ….....
- Address: ……
- ……..
  ZIP: …… City: .....
  Country: …….....
- Telephone: +…….-….....
- E-mail: …….....

Appendix C: Questionnaire for CIPRNet members

Definition

- Critical Infrastructure comprise an asset, system or part thereof which is essential for the maintenance of vital societal functions, health, safety, security, economic or social well-being of people, and the disruption or destruction of which would have a significant impact in a region or nation as a result of the failure to maintain those functions.

Question 1

In what type of activity are you involved in your daily job regarding critical infrastructures (CI) and emergency management?

Please select one or more options.

- ☐ Emergency management (government/authority)
- ☐ Critical Infrastructure operations
- ☐ Operational decision support
- ☐ Policymaking (government/authority)
- ☐ Training
- ▪ Research
- ☐ Other (explain): .....

My job concerns the

- ☐ Strategic level
- ☐ Tactical level
- ☐ Operational level
- ☐ Technical support or research

Question 2

You took part in this event as:

- ☐ Observer
- ☐ Researcher

Usefulness of the CIPRTrainer from observation/R&D point of view						
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
3	How would you rate the usefulness of the CIPRTrainer for trainees?	O	O	O	O	O
4	Are you satisfied with the number of possible actions?	O	O	O	O	O
5	Did you have the feeling that the trainee actions had an impact on the course of the storyline?	O	O	O	O	O
6	Were there new insights from the comparison of the results of different course of action branches?	O	O	O	O	O
7	How would you rate the ability to compare the results of different action branches?	O	O	O	O	O
8	Were there new insights about critical infrastructures, e.g. cascading effects?	O	O	O	O	O
9	How do you rate the presentation of the **events** on the screen?	O	O	O	O	O
10	How do you rate the presentation of the **consequence analysis**?	O	O	O	O	O
11	How well does the presented information support taking the following decisions?					
11a	Which area to evacuate first?	O	O	O	O	O
11b	Which infrastructures to reinforce best and or first?	O	O	O	O	O
11c	Which transport infrastructures are required for mitigation of the situation?	O	O	O	O	O
11d	Contingency planning?	O	O	O	O	O
11e	Which (critical) infrastructures outside the directly hit area need to be protected too?	O	O	O	O	O
12	What did you appreciated the most in the CIPRTrainer and why. (top 3)	_____				
13	What did you find not useful in CIPRTrainer? Why?	_____				

OPTIONAL/ALTERNATE – In case the what-if interactive demonstration is used.

Interactive what-if demonstration of CIPRTrainer as webservice						
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
20	The web demonstration of CIPRTrainer has limited interactivity. How would you rate the interactivity for the purpose of understanding its possibilities?	O	O	O	O	O
21	How much did the interactive what-if demonstration of CIPRTrainer at the CIPRNet website raise your interest in using the real CIPRTrainer as a stand-alone system?	O	O	O	O	O

Ease of use of CIPRTrainer's functions (observer/R&D)						
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
30	How would you overall rate the ease of use of the CIPR-Trainer system?	O	O	O	O	O
31	How would you rate the introduction part of the CIPR-Trainer system?	O	O	O	O	O
32	User friendliness					
32a	- Is the CIPRTrainer's user interface intuitive?	O	O	O	O	O
32b	- Is the presentation of situation information clear?	O	O	O	O	O
32c	- Is the presentation of action possibilities clear?	O	O	O	O	O
32d	- Is the control of the CIPRTrainer and the trainees logical and easy?	O	O	O	O	O
32e	- Is it easy to insert a scenario, possible consequences, and critical infrastructure dependencies?	O	O	O	O	O
32f	- Is it easy to access the training logs and are they usable?	O	O	O	O	O
33	How easy is it to understand the consequences?	O	O	O	O	O
34	How easy is it to perform a rollback of the scenario?	O	O	O	O	O
35	How easy is to follow a different course of action?	O	O	O	O	O
36	How easy is it to combine rollback and consequence analysis for doing a what-if analysis?	O	O	O	O	O
37	How easy is it to setup and start the CIPRTrainer system?	O	O	O	O	O
38	How easy is it to follow a rollback and the exploration of a different course of action as performed by the observed trainees?	O	O	O	O	O
39	What should be made easier when using CIPRTrainer?	_____				

Usefulness of the offered scenario(s) for what-if analysis						
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
40	Was the scenario realistic enough for its purpose?	O	O	O	O	O
41	How authentic were the storylines?	O	O	O	O	O
42	How good is the overview of the scenario presented by CIPRTrainer?	O	O	O	O	O
43a	Are you satisfied with the included Critical Infrastructure sectors in CIPRTrainer?	O	O	O	O	O

43b	Which other Critical Infrastructure sectors would you like to have included?	_____				
43c	What information would you exclude?	_____				
44	How well the scenario-overview does cover the relevant situation information?	O	O	O	O	O
45	How well the scenario-unfolding does support the effects of the decisions?	O	O	O	O	O
46a	How well is the environmental information needed for situational realism covered (e.g. terrain, weather, season)?	O	O	O	O	O
46b	Which environmental information do you miss?	_____				
47	Is the presentation of information sufficient?	O	O	O	O	O
48a	Is the set of possible actions sufficient for implementing a scenario?	O	O	O	O	O
48b	What else is missing or insufficient from an observer's point of view?	_____				

	Adequacy and performance of CIPRTrainer for training (Trainer view)					
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
70	How well does CIPRTrainer support the evaluation of trainees by the trainer?	O	O	O	O	O
71	Is it easy for the trainer to follow the actions of all trainees?	O	O	O	O	O
72	How would you rate the speed and responsiveness of CIPRTrainer?	O	O	O	O	O
73	What would need to be improved for better performance of CIPRTrainer?	_____				

Organisation of the demonstration						
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
80	Overall, how well was the demonstration organised?	O	O	O	O	O
81	How adequate were the schedule, the breaks and the duration for the training purpose?					
81a	Schedule	O	O	O	O	O
81b	Breaks	O	O	O	O	O
81c	Duration	O	O	O	O	O
82	Was the training environment adequate for its purpose?	O	O	O	O	O
83	How would you rate location, rooms, and facility?					
83a	Location	O	O	O	O	O
83b	Rooms	O	O	O	O	O
83c	Facility	O	O	O	O	O

Suggested improvements	
90. What could be improved in CIPRTrainer? (please specify)	_____ _____ _____ _____
91. Other observations on the CIPRTrainer? (please specify)	_____ _____ _____ _____

- Your name/title: .....
- Your organisation/department: …….....

Appendix D: Questionnaire for CIPRTrainer event observers

The results of this questionnaire will be analysed anonymously.

If you however would like to have contact with the CIPRNet researchers about the questionnaire or your remarks, it is possible to leave your contact information at the end of this questionnaire. In that case the researchers will contact you. Your contact information, however, will not be used during the analysis and reporting.

Definition

- Critical Infrastructure comprise an asset, system or part thereof which is essential for the maintenance of vital societal functions, health, safety, security, economic or social well-being of people, and the disruption or destruction of which would have a significant impact in a region or nation as a result of the failure to maintain those functions.

Question 1

In what type of activity are you involved in your daily job regarding critical infrastructures (CI) and emergency management?

Please select one or more options.

- ☐ Emergency management (government/authority)
- ☐ Critical Infrastructure operations
- ☐ Operational decision support
- ☐ Policymaking (government/authority)
- ☐ Training
- ☐ Research
- ☐ Other (explain): .....

My job concerns the

- ☐ Strategic level
- ☐ Tactical level
- ☐ Operational level
- ☐ Technical support or research

Question 2

You took part in this event as:

- ☐ Trainee
- ☐ Trainer
- ☐ Observer
- ☐ Researcher
- ☐ ….

Adequacy and performance of CIPRTrainer for training							
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
70	How well CIPRTrainer does support the evaluation of trainees by the trainer?	O	O	O	O	O
71	Is it easy for the trainer to follow the actions of all trainees?	O	O	O	O	O
72	How would you rate the speed and responsiveness of CIPRTrainer?	O	O	O	O	O
73	What would need to be improved for better performance of CIPRTrainer?	_____				

Organisation of the demonstration						
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
80	Overall, how well was the demonstration organised?	O	O	O	O	O
81	How adequate were the schedule, the breaks and the duration for the training purpose?					
81a	Schedule	O	O	O	O	O
81b	Breaks	O	O	O	O	O
81c	Duration	O	O	O	O	O
82	Was the training environment adequate for its purpose?	O	O	O	O	O
83	How would you rate location, rooms, and facility?					
83a	Location	O	O	O	O	O
83b	Rooms	O	O	O	O	O
83c	Facility	O	O	O	O	O

Suggested improvements	
90. What could be improved in CIPRTrainer? (please specify)	_____ _____ _____ _____
91. Other observations on the CIPRTrainer? (please specify)	_____ _____ _____ _____

In case you want to contact the CIPRNet community, please leave your contact details here:

- Your name/title: .....
- Your organisation/department: ….....
- Address: …….
- ……..
  ZIP: …… City: .....
  Country: …….....
- Telephone: +…….-….....
- E-mail: …….....

Appendix E: Questionnaire for the Italian Demonstration

The results of this questionnaire will be analysed anonymously.

If you however would like to have contact with the CIPRNet researchers about the questionnaire or your remarks, it is possible to leave your contact information at the end of this questionnaire. In that case the researchers will contact you. Your contact information, however, will not be used during the analysis and reporting.

Definition

- Critical Infrastructure comprise an asset, system or part thereof which is essential for the maintenance of vital societal functions, health, safety, security, economic or social well-being of people, and the disruption or destruction of which would have a significant impact in a region or nation as a result of the failure to maintain those functions.

Question 1

In what type of activity are you involved in your daily job regarding critical infrastructures (CI) and emergency management?

Please select one or more options.

- ☐ Emergency management (government/authority)
- ☐ Critical Infrastructure operations
- ☐ Operational decision support
- ☐ Policymaking (government/authority)
- ☐ Training
- ☐ Research
- ☐ Other (explain): .....

My job concerns the

- ☐ Strategic level
- ☐ Tactical level
- ☐ Operational level
- ☐ Technical support or research

Question 2

You took part in this event as:

- ☐ Trainee
- ☐ Trainer
- ☐ Observer
- ☐ Researcher
- ☐ ….

Usefulness of the CIPCast DSS						
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
100	How would you rate the usefulness of the CIPCast for your professional activity?	O	O	O	O	O
101	Do you have the feeling that the CIPCast DSS can have an impact for your activities?	O	O	O	O	O
102	How would you rate the presentation of the events on the screen?	O	O	O	O	O
103	How would you rate the presentation of consequence analysis?	O	O	O	O	O
104	How would you rate the presentation of the critical infrastructures on the screen?	O	O	O	O	O
105	How do you rate the usefulness of the data exchange between CIPCast and the CI information systems of utilities for situational awareness/risk assessment?	O	O	O	O	O
106	Do you think that the connection of your organisation information system to the CIPCast DSS can improve the management of crisis/emergencies?	O	O	O	O	O
106a	Do you think useful to have a customised CIPCast web GIS application for your organisation?	O	O	O	O	O
106b	Please explain _____ _____					
107	What did you appreciated the most in the CIPCast and why. (top 3) _____ _____					
108	What did you find not useful in CIPCast? Why? _____ _____					

Ease of use of CIPCast's functions						
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
110	How would you overall rate the ease of use of the CIPCast system?	O	O	O	O	O
101	How would you rate the CIPCast introduction?	O	O	O	O	O
112	User friendliness					
112a	- Is the CIPCast's user interface intuitive?	O	O	O	O	O
112b	- Is the CIPCast's GIS user interface intuitive?	O	O	O	O	O
112c	- Is the presentation of situation information clear?	O	O	O	O	O
113	How easy is it to understand the consequences?	O	O	O	O	O
119	What should be made easier when using the CIPCast GIS interface? _____ _____					

Completeness of situation information (Trainer view)							
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
43a	Are you satisfied with the included Critical Infrastructure sectors in CIPCast?	O	O	O	O	O
43b	Which other Critical Infrastructure sectors would you like to have included?	_____				
43c	What information would you exclude?	_____				
46a	How well are the necessary environmental information aspects covered (e.g. terrain, weather, season)?	O	O	O	O	O
46b	Which environmental information support do you miss?	_____				
47	Is the presentation of information sufficient?	O	O	O	O	O
120	Is the set of possible actions sufficient for the scenario?	O	O	O	O	O
121	What else is missing or insufficient?	_____				

Organisation of the demonstration						
	(1 = insufficient/disagree; 2 = could have been better; 3 = adequate; 4 = more than adequate; 5 = above all expectations/strong agree)	**1**	**2**	**3**	**4**	**5**
80	Overall, how well was the demonstration organised?	O	O	O	O	O
81	How adequate were the schedule, the breaks and the duration for the training purpose?					
81a	Schedule	O	O	O	O	O
81b	Breaks	O	O	O	O	O
81c	Duration	O	O	O	O	O
82	Was the environment adequate for its purpose?	O	O	O	O	O
83	How would you rate location, rooms, and facility?					
83a	Location	O	O	O	O	O
83b	Rooms	O	O	O	O	O
83c	Facility	O	O	O	O	O

Suggested improvements	
90. What could be improved in CIPCast? (please specify)	_____ _____ _____ _____
91. Other observations on CIPCast? (please specify)	_____ _____ _____ _____

In case you want to contact the CIPRNet community, please leave your contact details here:

- Your name/title: .....
- Your organisation/department: ….....
- Address: …….
- ……..
  ZIP: …… City: .....
  Country: …….....
- Telephone: +…….-….....
- E-mail: …….....

Appendix F: Evaluation results on the 3rd Master Class

In this section, the results of the 3rd Master Class (MC) are analysed. In total, we received 11 questionnaires by trainees (based on the questionnaire of Appendix A) and 7 by CIPRNet members who served as observers in the event (based on the questionnaire of Appendix C). Moreover, an external observer, Dr. Elke Spielmanns-Rome (Institut für Qualitätssicherung & Internationalisierung / Institute for Quality Assurance and Internationalisation) provided her observations.

In general, the Master Class gathered positive evaluations from the trainees of the MC. All of them rated the class with above adequate (3) ratings and found it useful for their professional activity (see Figure 3).

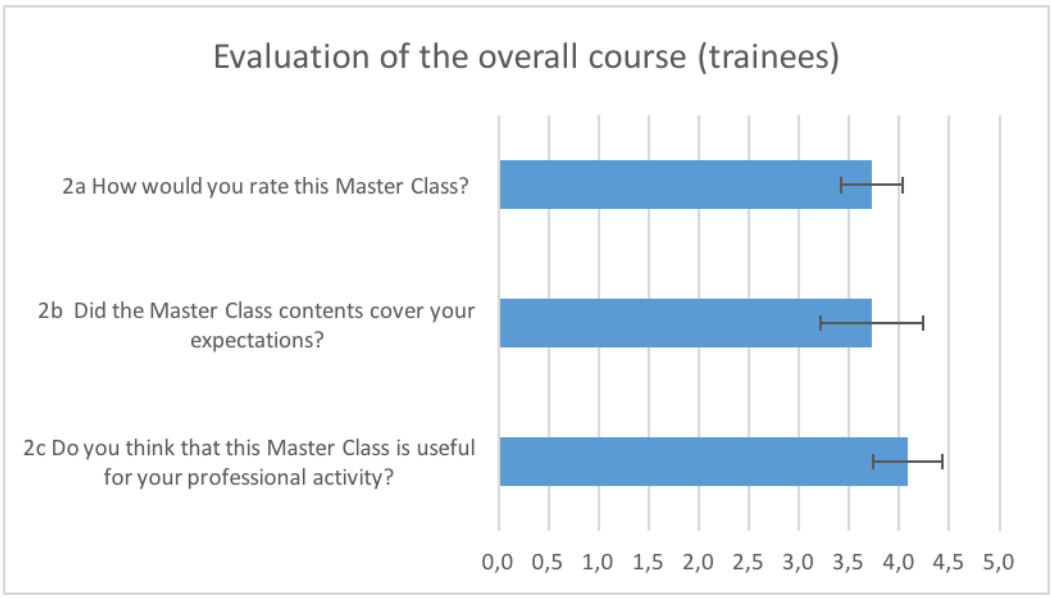

Figure 3: Evaluation of the overall course by MC Trainees

Positive evaluations were received also with respect to the usefulness of the CIPRTrainer tool (see Figure 4 and Figure 5).

With respect to the features that were most impressive to attendants, these varied but some highlights are the following (Question 12):

- Several attendees were impressed by the role-based capabilities of the tool, which allowed several different courses of action to be taken by the users. Also, attendants commented on how the tool facilitated teamwork with one commenting that the tool helped him/her comprehend "*the importance and necessity not only of data and models but also of communication and collaboration*".
- Several attendees praised the easy, intuitive, comprehensive or clean interface and the map layer capabilities and the options for visualisation (e.g., of vehicles).
- Other attendants were more impressed by the modelling and simulation capabilities, which allowed observing cascading effects and functional dependencies.
- Another attendee enjoyed the hands-on exercises and the demo of CIPRTrainer.

Similar comments were received by the observers of CIPRTrainer, including praises for the "serious game" training paradigm, capabilities for visualisation (map, timelines), 'what if' analysis for different roles, multi-language options, and more.

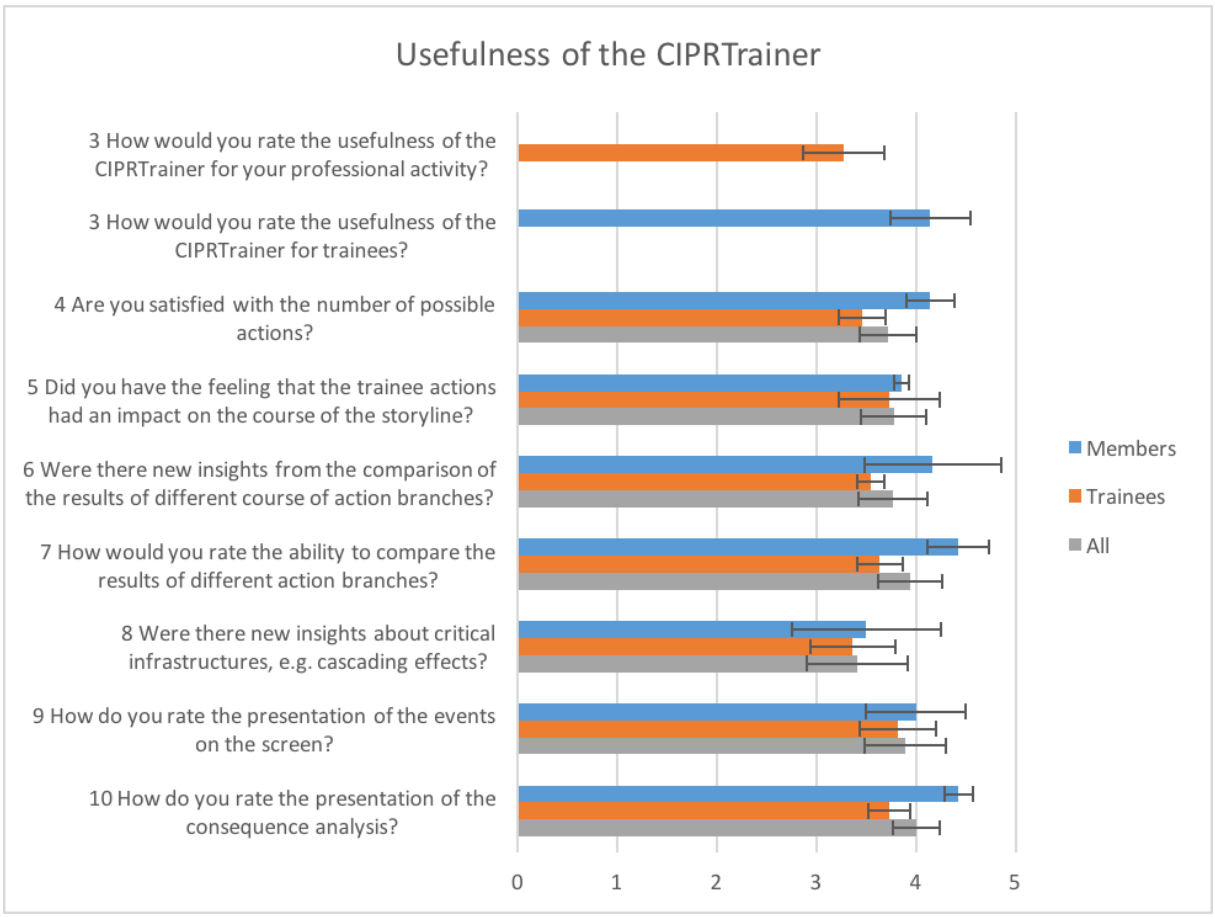

Figure 4: Usefulness of CIPRTrainer

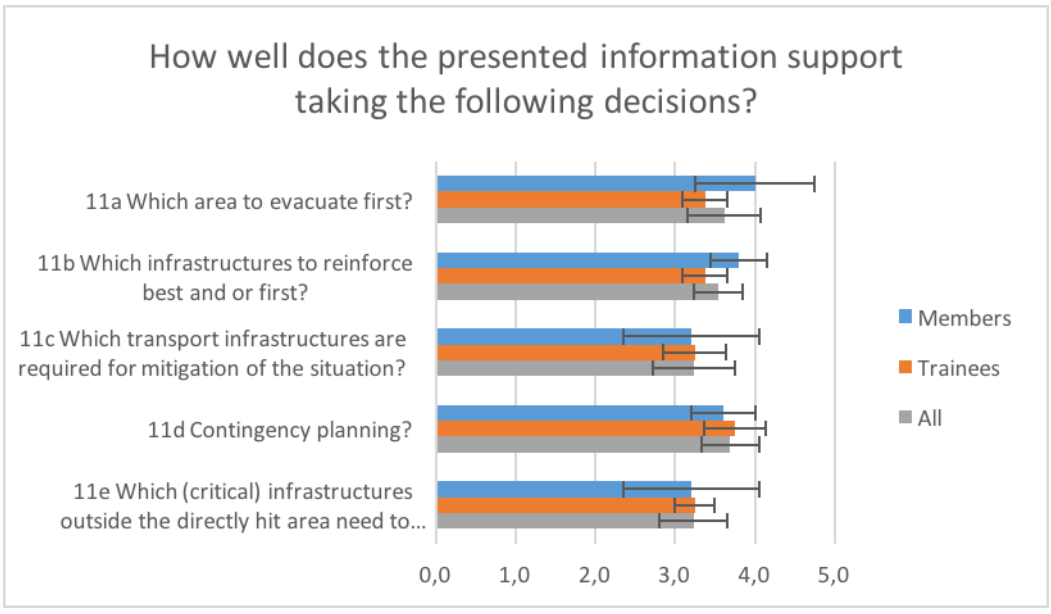

Figure 5: Decision support capabilities

In terms of elements that could be improved (question 13), some trainees identified areas for further improvement in the usability of tool to make important functionality more intuitive to find and to use or with the inclusion of an online tutorial or with additional time given during the training to familiarise. Several attendants commented about the timing of the timeline, which was difficult for them to follow. Difficulties mentioned were the flooding of textual information (not symbols or numbers) as the scenario progressed and the need to pause to catch up, the lack of audio output, the fact that actions were not shown as pending until completed. One attendant also felt that one of the roles (administrator coordinator) was not significant enough and recommended a smaller team setup. A question was also raised with respect to whether the simulators are included. A comment from an observer raised concerns about whether the tool can be used to train on a wider-scale scenario.

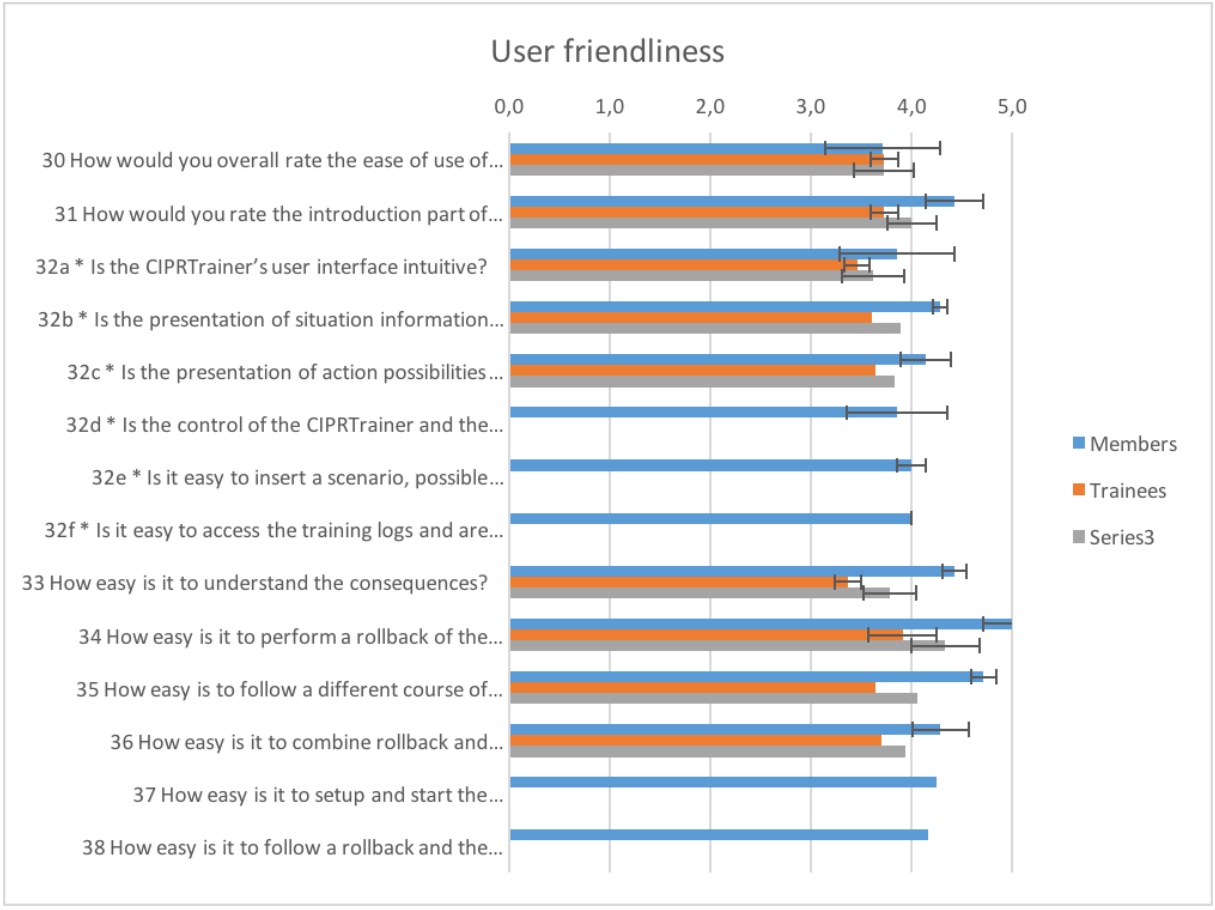

Figure 6: User friendliness of CIPRTrainer

With respect to user friendliness, overall positive comments were received, especially with respect to the rollback capability (score 5.0). The detailed results are depicted in Figure 6. The comments received with respect to potential improvements are very similar to the ones above and include the following (question 39):

- Important functionality for specific roles should be made easier to find and to use, potentially by the availability of online support or training datasets.
- Capability to compare maps (not only consequences) from different runs could be added.
- Available resources should be highlighted.
- Improvements should be made on the timeline of the events for easier visibility and to make the time compression element more comprehensive.

Suggestions for improvements from the observers included the visual depiction (via icons) of the list of actions and resources, but also improvement on the existing visualisation (sounds, icons, etc.), improvements in the time compression and on the interface for performing actions.

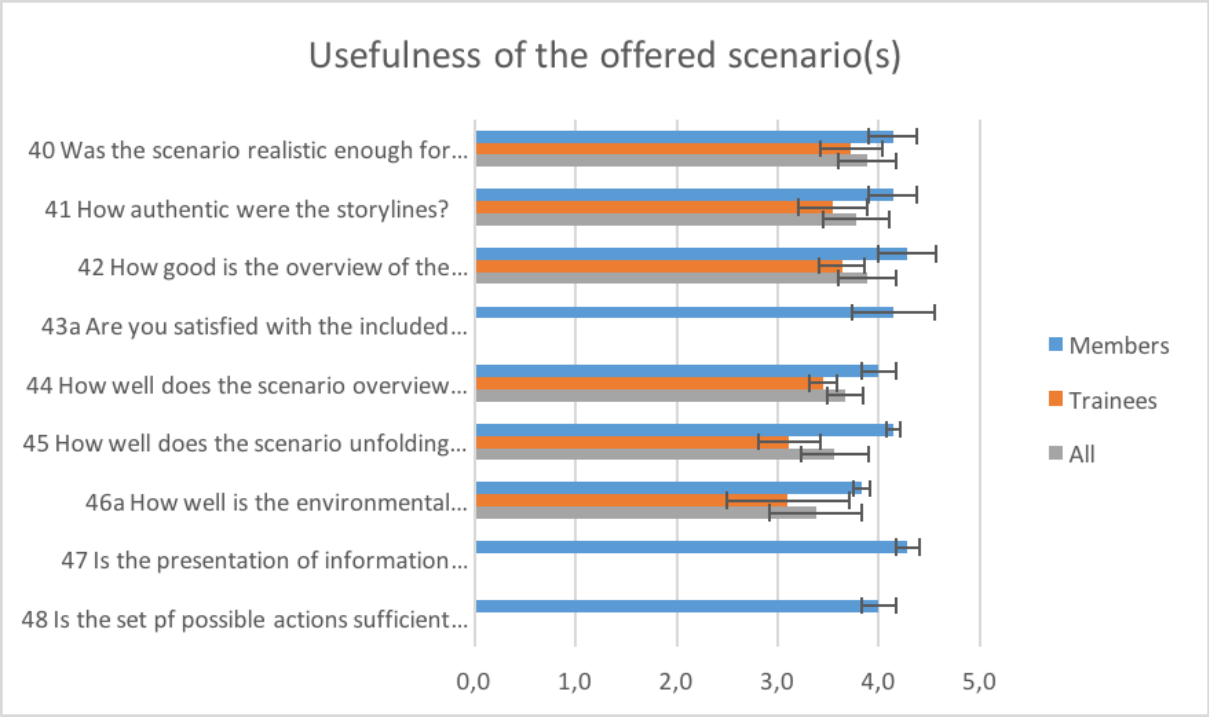

Figure 7: Usefulness of the offered scenario (Train derailment)

Again, both trainees and observers evaluated positively the selected scenario (see Figure 7). The observers highlighted Healthcare (Question 43b) as the missing element that could be added in future releases (hospitals, availability of medical resources such as rooms, staff). The also mentioned Transport infrastructures, such as airports or fuel transport. Another element that could be of importance is the depiction of more wide-scale CI cascades in future scenarios, due to interdependencies with other CI (power, transport, ICT). Another observer commented that maybe the scenario selected was too limited in geographic scale to depict the cascade effects (Question 43c).

Most of the attendant identified "Weather conditions" as the key missing information (Question 46b) that needs to be added to the tool. Due to the selected scenario (gas cloud, fire), several attendants identified "wind" as the most important weather condition. Moreover, they commented that it was not clear such an inclusion (weather or environmental conditions) would affect the simulation. Also, several commented on the lack of information with respect to the toxic cloud features (height, composition, density), while a few recommended 3D-visualisation on the map as a potential solution. Other ideas for improvements on the map layers included the inclusion of the naming of zones and of vulnerable assets. These may also include human-related information, such as traffic conditions, the date of the event, or other parameters that may be configured to depict extreme cases (e.g. specific social events in the area). An information that could also be visualised is the real-time depiction of the number of casualties. Finally, an observer recommended the inclusion of CI-related actions on the tool, as opposed to CM ones, to see how these may affect the simulation. Another observer also commented about whether uncertainty can be introduced for specific parameters, such as unknown position of the gas cloud, of units, and more.

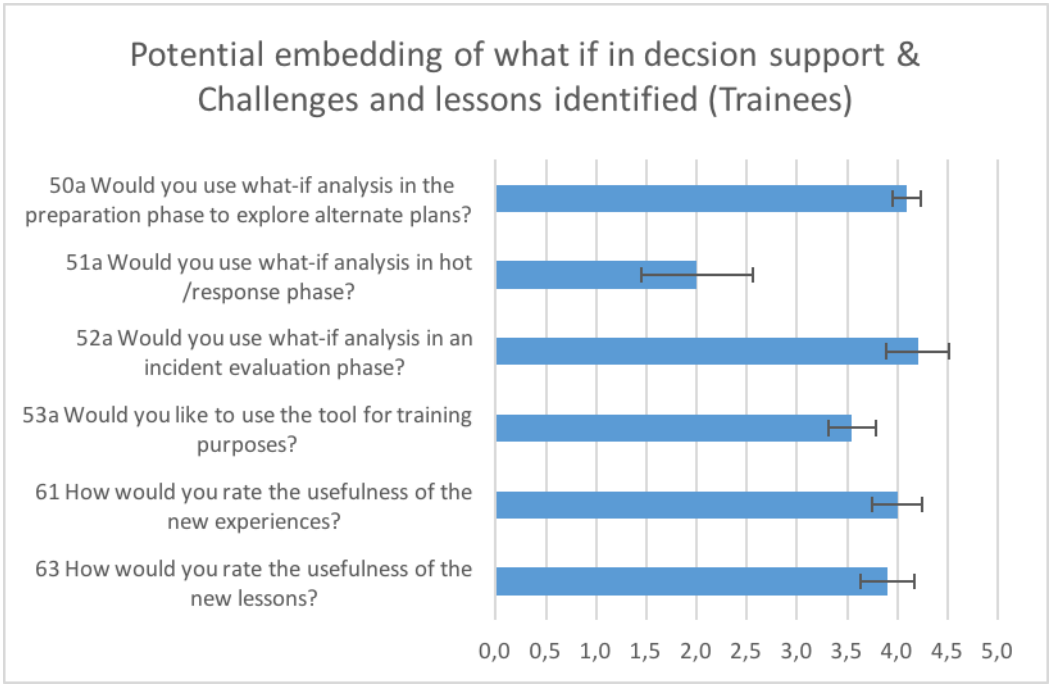

Figure 8: Embedding WIA in Decision Support, Challenges, Lessons identified (Trainees only)

The trainees all agreed that WIA can be added in Decision Support for the preparation, evaluation phases but not for the hot phase (Questions 50a, 51a, 52a).

Reasons for performing WIA in the preparation phase include the following (Question 50b):

- Crises evolve quickly and require quick decisions based on reliable data. Also, communication between the squads is essential. This can be analysed using WIA.
- … to improve preparedness and can allow for optimisation of response.
- … to save more people and to learn before future accidents.
- … to learn and get ideas about preferred actions and their effect, to improve preparedness, to allow for faster response.
- … efficient way to get an overview of the consequences of different actions.
- … as a good indicator for comparison of purposes between different actions and plans.
- … to learn about the effectiveness of actions.
- … good exercise to help the planning and preparedness.
- … to write different scenarios for simulation exercises.

Reasons for not performing WIA in the hot phase include the following (Question 51b):

- … because in those cases, decisions are taken by the crisis squad based on the data and information collected by the team members… there is no time for "experiments".
- … legal and institutional restrictions.
- … time pressure and reliability of results.
- … it is probably too late.
- … lack of time.
- … better to act instead of using time on analysis in response phase.

Reason for performing WIA in the evaluation phase include the following (Question 52b):

- … in the evaluation phase one may have to justify why a decision was taken, […] or simply discuss what could have been done better.

- … to maybe define lessons learned and to reconstruct the incident storyline.
- … to learn and to analyse what could have been done better.
- … for lessons learned.
- … to give an indication of actions leading to a certain event.
- … as a KPI of the actions performed.
- … to evaluate the actions.

All trainees think that WIA can be used for training purposes (Question 53a). Their reasoning (Question 53b) includes the following:

- … after adaptation to the specific needs of e.g. a fire brigade school and/or the administrative staff in charge of crisis management.
- … because training and exercises are essential for these things.
- … it can support cooperation/It can improve efficiency of operations.
- … with some more practice I think I could learn a lot.
- … but after improvements and more advances simulations.
- … user-friendly, gives a good understanding of the importance of action.
- … user friendly, combines a lot of scenarios and actions.
- … easy to handle, clear, quite complete.
- … very advanced too!

The trainees discussed a few potential inhibitors (Question 53c):

- Time and Availability: Crisis squads are composed by people who have other responsibilities and only take part in exercises once or twice a year. One would need to convince the stakeholders that they can save time by using a tool such as CIPRTrainer.
- Need for validation.
- Availability of licensed simulators.
- Need for more scenarios and more than 4 roles to make the tool suitable for tactical level managers, as opposed to its current state, which is aimed at strategic level managers.

The trainees identified the following challenges (Question 60):

- … it would be interesting to integrate or use CIPRTrainer with existing tools, simulators, etc. […] to develop “scenario” and “model” editors.
- … hands-on experience on a prototype of the system.
- … limited time to use it thoroughly/… to do everything/…to learn much.
- … cooperation with other disciplines.
- … cascading scenarios, role playing.
- … reinforcement of the impression that training is necessary in crisis management

The trainees identified the following lessons learned (Question 62):

- … whether the principles of CIPRTrainer could be added to own/existing tools.
- … how to test and evaluate cooperative tools.
- … online training opportunity of end users.
- … the fact that communication is necessary.
- … to know about SoTA, [to be used for] new applications
- … cascading effects and dependencies.

- … how to organise a master class, coordinate a team for emergencies using a powerful simulator.
- … the way to explain the introduction of the tool used for simulations needs to be thought in advance.

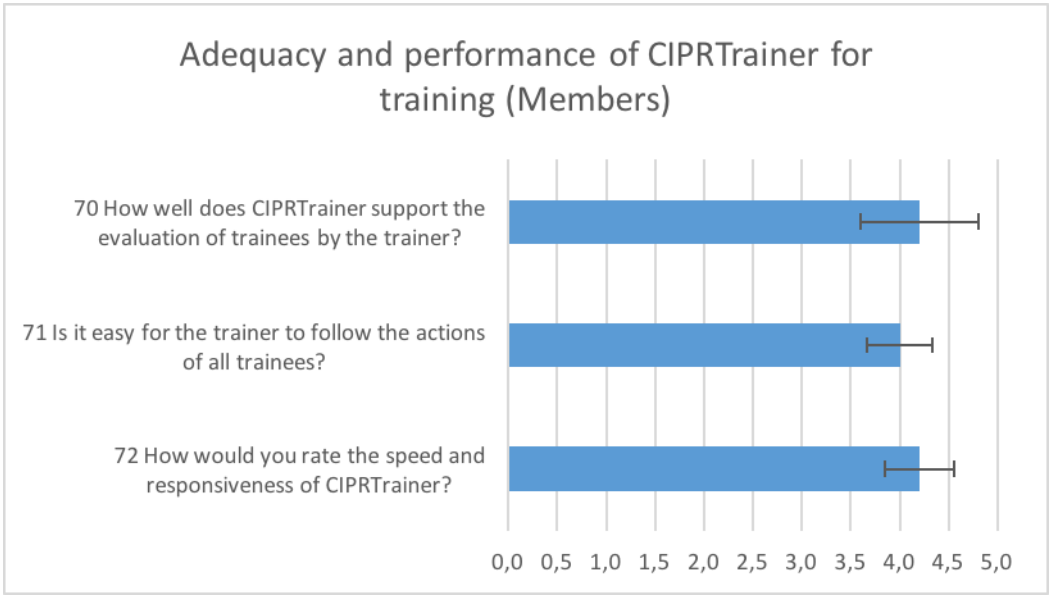

Figure 9: Adequacy and performance of CIPRTrainer for Training (Observers only)

The observers also evaluated positively the adequacy and performance of CIPRTrainer for training (see Figure 9). More specifically, one trainee with experience as a professional trainer commented that the latest developments on the tool were impressive such as the creation of different roles for trainees and the presentation of consequence analysis.

The trainees offered several ideas for improvement of the CIPRTrainer (Questions 90 and 91). Several recommendations referred to the inclusion or clearer depiction of additional elements to be used for decision support, such as:

- environmental and weather conditions,
- demographic data and their changes (e.g. number of affected people),
- types and availability of resources, e.g. time of arrival of forces,
- traffic conditions,
- different time compression options,
- consequence analysis of CI elements (more directly displayed),
- route planning of forces to allow for an estimate for the time of arrival, and
- multi-language support.

The trainees also suggested more simulations, and improvements on how the tool can be integrated with other simulators or tools (e.g. Matlab, CIPCast, GRRASP, etc.). In terms of presentation of the exercise, the trainees emphasised the need for realistic cases and for the importance to refer to the demo (case) during the introductory theoretical presentations.

The observers provided recommendations as well, which included improvement on the depiction of icons (use of standard and more intuitive icons), more realism with respect to the timing of actions, decisions and consequences, the use of scenarios that have a more prominent role for CI elements. They also recommended testing the tool with real response teams, allowing for multiple trials of the system (by trainers and trainees), but also to comprehend whether the actions offered are realistic enough.

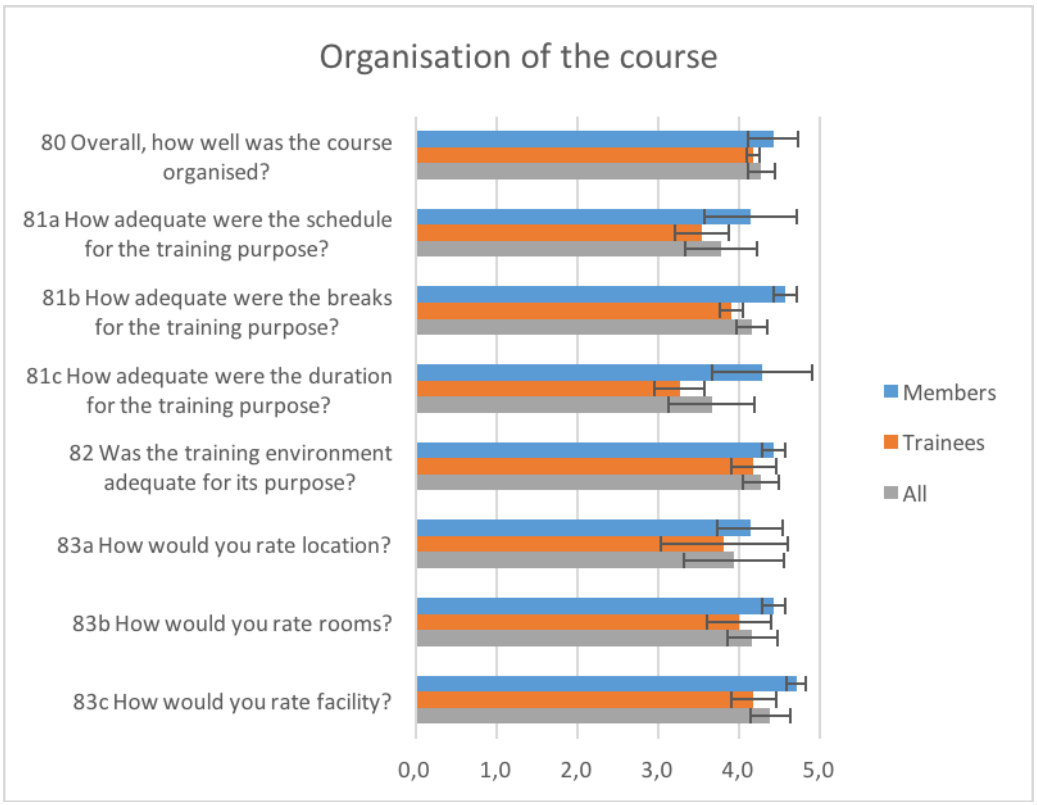

Figure 10: Organisation of the course

In terms of organisation, the course received overall very positive evaluations (see Figure 10), with only some deviations with respect to the schedule and the timing of the course, which was intense. This is also reflected on the comments received by the participants, which were very positive. Some examples include the following comments:

- … Great course, good slides
- … All was perfect as organised […]. Follow up with more relevant events. Thank you
- … Well organised; well prepared speakers
- … Well organised, top tier speakers and participants
- … Very good
- … Very good quality of the presentations

The trainees also contributed suggestions for improvement, which include the following:

- Improvements on the timing of the course:
  - … More time needed to digest so much information.
  - … Too little time with the system.
  - … Very intensive schedule, especially the first day.
  - … Same material could be presented in three days.
  - … A bit too long program on Wednesday. Could put three lectures in a row at the beginning, not at the end.
  - … More time for training, maybe three teams.
- Improvement on the presentations:
  - … Presentations were a bit repetitive.
  - … Presenters could refer to the training scenario more.
  - … Increase time of presentations of the tool.
  - … It would it would be helpful to make [the slides] available earlier.
  - … Explain the rules [of the exercise] more clearly (“you must pause [the simulation], then discuss”)

- Improvements on the organisation, such as the location ("…remote…") and the setup ("…it would have been nice to have tables.").

Finally, an external (to the consortium) observer, Dr. Elke Spielmanns-Rome (Institut für Qualitätssicherung & Internationalisierung) provided her observations with respect to the demonstration:

"*As one can see from the questions raised during the lectures the attendees were mainly interested in the application CIPRTrainer and its functionality, adaptability and interoperability. Talking to people confirmed this impression. Everybody was keen on getting hands on the application. One participant said, that he would have liked to have references to the application in each lecture: to focus on CIPRTrainer and lead the audience step by step to the training session. As the participants were obviously mainly interested in the application, it might be a good idea to allocate more time to the hands-on part and reduce the [time of] lectures. The interaction between the audience and the lecturer/trainer was not very intense and should be enhanced. As most of the participants have valuable knowledge in the field of critical infrastructure protection one could facilitate the exchange of information to improve CIPRTrainer. This could be done by changing the format to a workshop or at least offer a final discussion round after the hands-on session.*"

Appendix G: Evaluation results on the demonstration to German stakeholders

In this section, the results of the demonstration to stakeholders from BBK, KaVoMa and AKNZ are analysed. The demonstration event took place on the 17th of January 2017 in Fraunhofer premises. In total, we received 14 questionnaires by trainees (based on the questionnaire of Appendix A). While not all responders indicated their background, the profile of the participants was mainly of Emergency Management and Critical Infrastructure operations background, while 3 had policy-making roles and 3 experience as trainers. Their job concerned either strategic or operational level.

In general, the demonstration gathered above average evaluations from the trainees (see Figure 11).

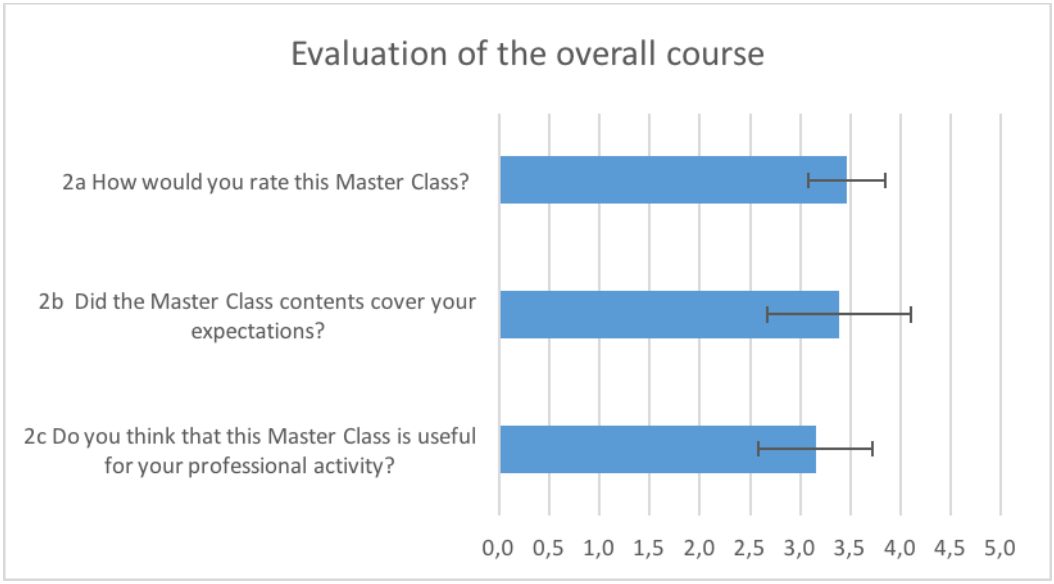

Figure 11: Evaluation of the demonstration

Mostly adequate evaluations were received also with respect to the usefulness of the CIPR-Trainer tool (see Figure 12 and Figure 13).

The trainees were asked which features were most impressive to them (Question 12). The responses varied but some highlights include the rollback capability and how information is managed in the tool, the design of the interface (maps, layers, use of tactical icons) and the timeline of events. One attendant highlighted the potential use of the tool for short trainings of heterogeneous groups.

However, some features of the tool received lower evaluations (see responses to Questions 4-6, 8 in Figure 12 to Questions 11a-11d in Figure 13). The main comments received referred to the types of actions and how they can be performed during the training. The trainees suggested improvements on the information flow, such as receiving feedback after an action is performed, information on available or missing forces, position of forces, delay between command and action, and more. Moreover, one attendant commented that the information should be distributed better according to the role ("*too fast, everybody has all information, some functions can take the same actions*"). Finally, other comments included concerns about the possibility to dispatch/perform any number of actions at once, the number of options for - for CM actions and about the automatic start of software/system.

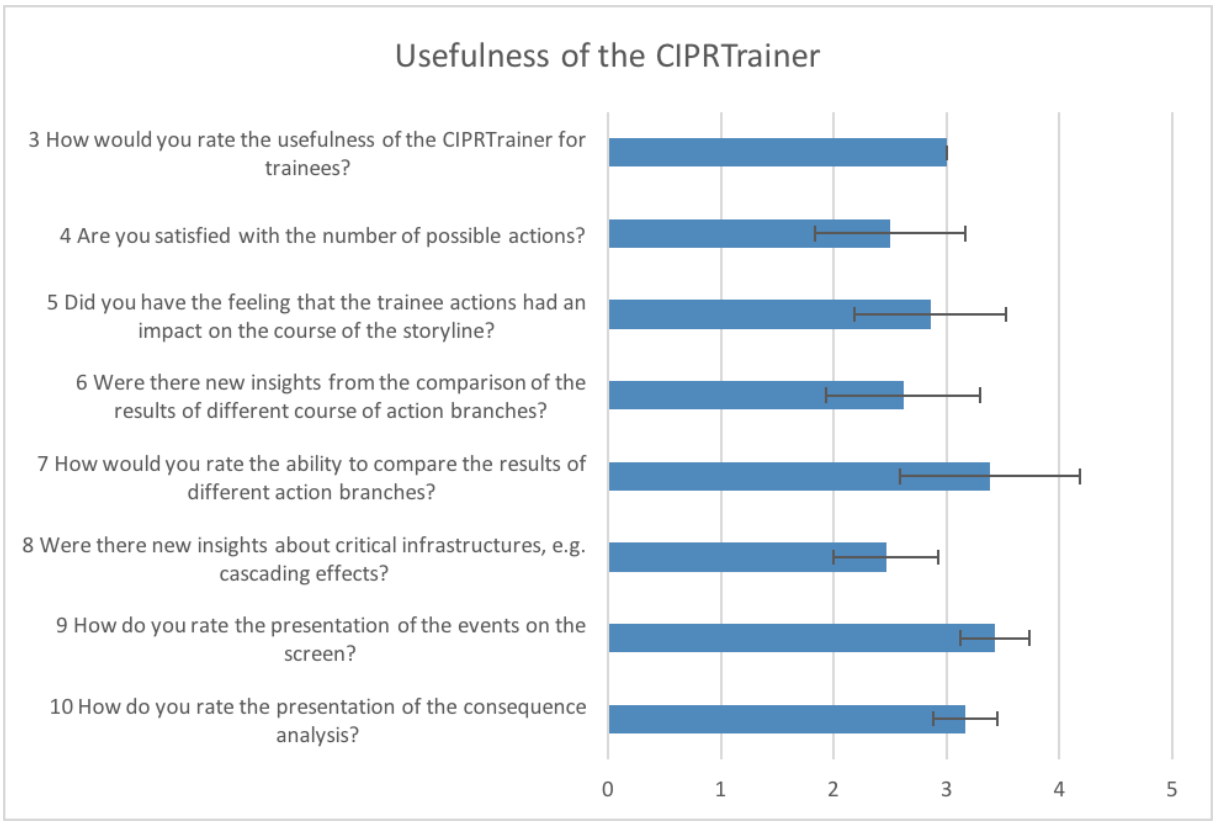

Figure 12: Usefulness of CIPRTrainer

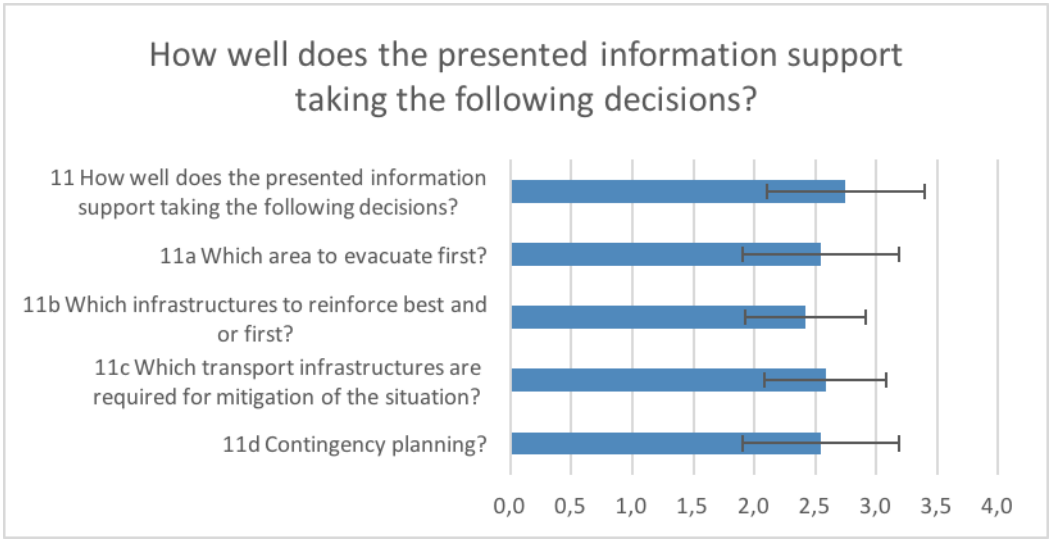

Figure 13: Decision support capabilities

With respect to user friendliness, overall positive comments were received, except for the presentation of the consequences (see Figure 14), where the attendants requested the consequences to be explained better and to be depicted in real time (e.g. injured people). The comments received with respect to potential improvements are very like the ones above and include the following (question 39):

- better depiction of the forces on the map,
- possibility to adjust the time compression,
- better and real-time display of consequences, and
- the ability to choose more than one action at a time.

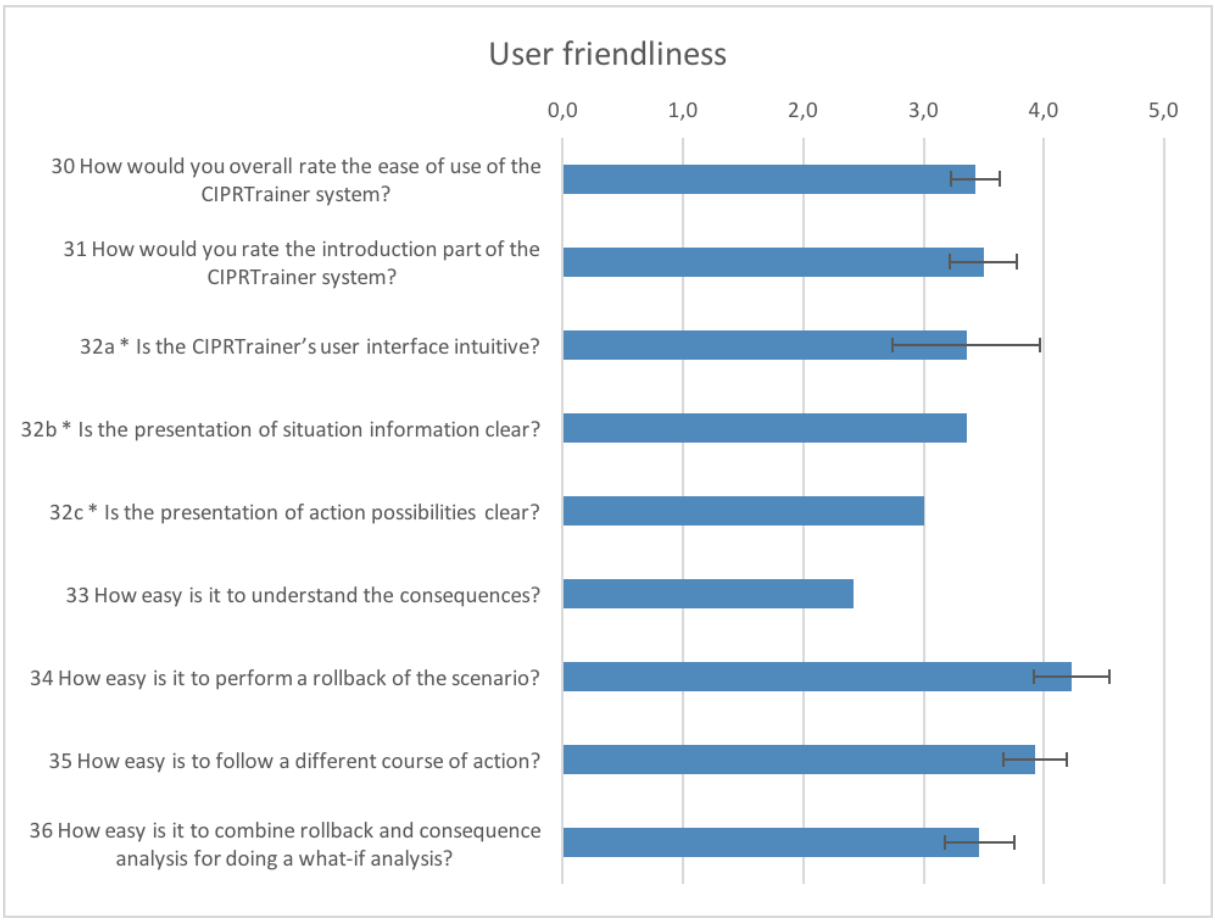

Figure 14: User friendliness of CIPRTrainer

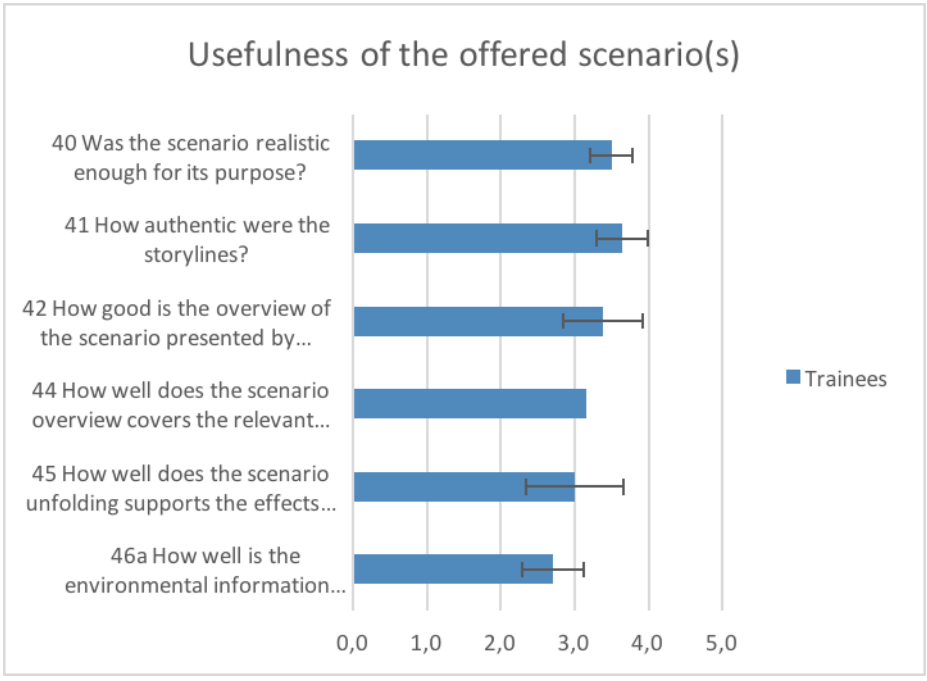

Figure 15: Usefulness of the offered scenario (Train derailment)

The trainees evaluated positively the selected scenario (see Figure 15), but most of the attendants identified "Weather conditions" as the key missing information (Question 46b) that needs to be incorporated to the tool. Due to the selected scenario (gas cloud and fire), several attendants identified "wind" or "wind direction" as the most important weather condition, com-

bined with weather forecast data. One of the attendants would like to receive CI service information, such as information on the gas supply.

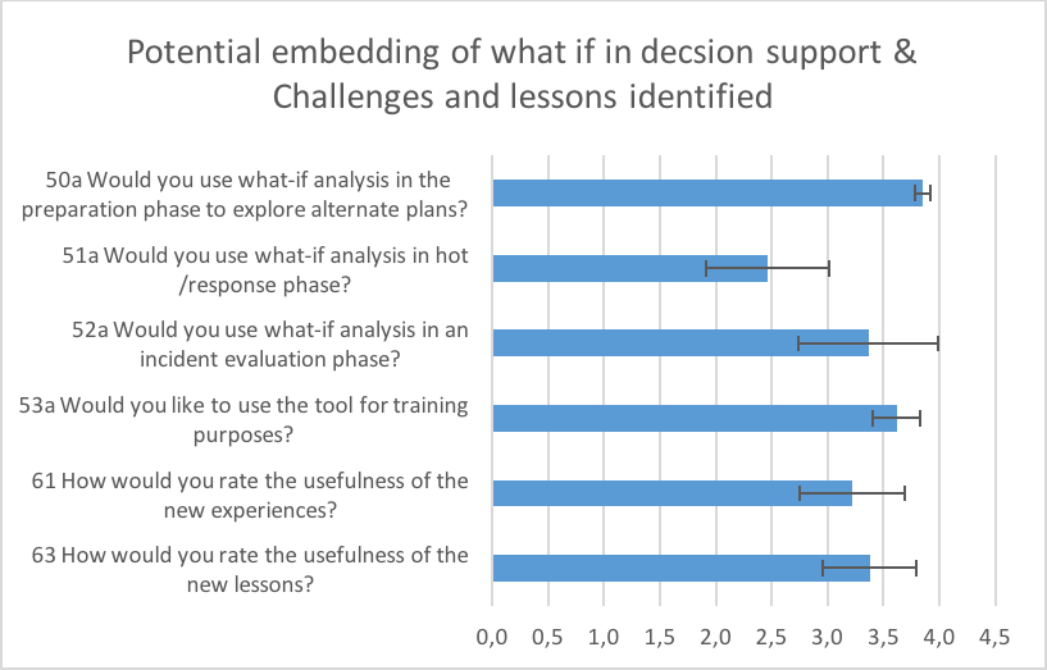

Figure 16: Embedding WIA in Decision Support, Challenges, Lessons identified

The trainees all agreed that WIA can be added in Decision Support for the preparation, evaluation phases but not for the hot phase (Questions 50a, 51a, 52a) (See Figure 16).

Reasons for performing WIA in the preparation phase included (Question 50b): the ability to test and explore alternate paths, to inform the personnel, to observe and clarify consequences and to analyse the impact of decisions, to evaluate or/and prove the effectiveness of measures. The conditions for adopting such a tool are related to the quality of the results, the model and the time needed to test it.

Reasons for not performing WIA in the hot phase included (Question 51b): the lack of sufficient realism, time limitations and pressures, existing practises (standard operating procedures) that would require modification, the fact that an actual scenario may not be predefined fully in the tool (ability to customise quickly). A few trainees considered that if such limitations are overcome, it could give good feedback and could assist in weighing alternatives.

Reasons for performing WIA in the evaluation phase included (Question 52b): the ability to prove alternative coping strategies or tactics and to weigh alternatives. However, some trainees expressed reservations on whether the model is precise enough for a real scenario.

Similar, to the use of WIA in the preparation phase, most trainees think that WIA could be used for training purposes (Question 53a). Their reasoning (Question 53b) includes the following: the ability to explore different courses of action or to test coping strategies. Participants highlighted the fact the tool is very oriented to the trainees/participants, it is easy to use, depends on concrete learning goals, and, if the time for exercise is sufficient, it can be or it would be worth to try it for training purposes.

The trainees discussed a few potential inhibitors (Question 53c), such as the effort/cost and availability of the tool or of the simulators, the constraints that may limit a realistic training, the static nature of the scenario which does not allow enough room for improvisation, the

problem of missing data or the need to define in a clearer way which are the target groups of such a training.

The trainees identified as challenges the following elements (Question 60):

- ... no feedback from forces at the ground.
- ... practical exercises.
- ... communication flow between the police and civil protection to firefighters is insufficient.
- ... knowing the scenario isn't too good.
- ... good simulation approaches, but still at the very beginning.

The trainees also gave an average (adequate) rating to the usefulness of new experiences and lessons learned from the course (Figure 16). While few textual responses were received, the trainees identified as lessons learned (Question 62) the training itself and the consequences of decisions.

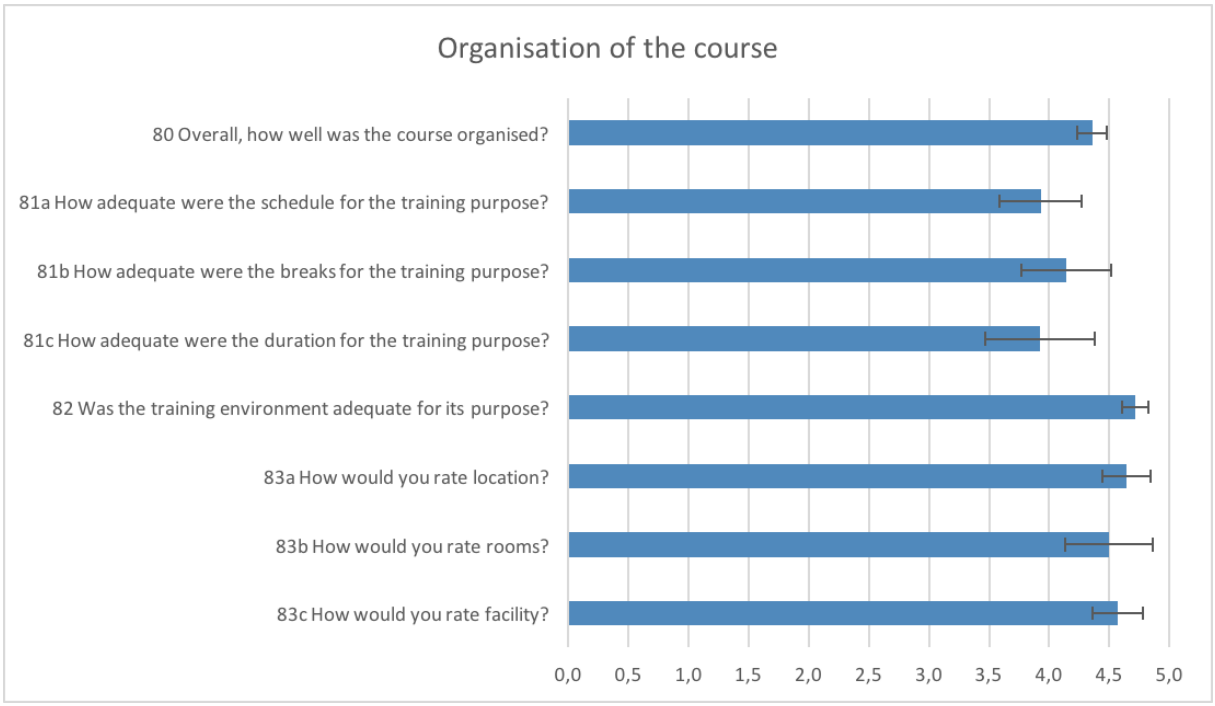

Figure 17: Organisation of the course

In terms of improvements and overall observations of CIPRTrainer, the participants offered lots of recommendations (Questions 90, 91 and 92). These are listed below:

- the need to provide feedback and information to the trainee,
- the need to include additional elements, such as medical units, disaster management resources, the reactions of the population, highlights (e.g. an "attention" tag in the log file),
- the need for a different (lower) speed of execution for the scenario,
- the need for more scenarios,
- different information for different functions,
- the need to depict more clearly the simulation and the interdependencies,
- the need to add constraints, such as not to be able to send out an MTF before the accident happens.

Overall, several participants gave positive remarks to the tool ("very good"). One remarked that he/she would consider it for training, but could not be conclusive yet, as the experience was too recent.

A few participants expressed some reservations and highlight the need for further testing, especially with operational staff to ensure that all elements are realistic and not erroneous for specific groups of staff (e.g. fire fighters).

In terms of organisation, the demonstration received overall very positive evaluations (see Figure 17), with only some deviations with respect to the schedule and the timing of the demonstration, which was brief. This is also reflected on the comments of the participants (Question 92) who requested more hand-on experience and time with the tool itself and less time for presentations and breaks. One trainee, however, would like to have more initial explanations or tome to familiarise with the tool (especially the functions for getting information and the action possibilities).