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CIPRNet

Critical Infrastructure Preparedness and Resilience Research Network

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D9.1 Training Plan

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Università Campus Bio-Medico di Roma (UCBM)

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Dissemination Level		
PU	Public	**X**
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Author(s)	Roberto Setola (UCBM) Claudio Romani (UCBM) Maria Carla De Maggio (UCBM)
Contributor(s)	Eric Luiijf (TNO) Michal Choras (UTP) Vittorio Rosato (ENEA) Annette Zijderveld (DELTARES) Jacques Colliard (UIC) Mohamed Eid CEA) Nikolas Flourentzou, Elias Kyriakides (UCY) Erich Rome (Fraunhofer)

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TABLE OF CONTENTS

1 Introduction

Internal and external training activities represent a mandatory cornerstone for the creation of a European community able to support the realization of EISAC (European Infrastructures Simulation & Analysis Centre) and to exploit its functionalities. CIPRNet will arrange specific training activities aiming to provide basic and advanced knowledge about Critical Infrastructure MS&A (Modelling, Simulation and Analysis) targeted at a broad range of personnel related to CI (including, but not limited to, local administrations, utilities personnel, emergency operators and managers, security & safety operators and managers, CIP researchers, CIP policy makers, etc.).

This deliverable describes in details the CIPRNet training activities, aims, and time scheduling.

CIPRNet trainees will benefit of high-level lectures given by the European top experts in CIP (Critical Infrastructure Protection) field. The lectures will address different aspects related with the MS&A of CI.

The training activities will consist of three training episodes scheduled for 2014 in Paris, for 2015 in Rome and for 2016 in Bonn. These episodes will be pre-run at the rehearsal internal editions (Edition 0 in 2014 in Delft and two 1-day events for the following Editions).

The training episodes will consist of a fixed part, devoted to teaching basic aspects of MS&A (repeated at each edition), followed by a more advanced part that will focuses, at each edition, on a different topic, specifically:

- ✓ Edition 1: Federated Simulation and Open MI platform
- ✓ Edition 2: Decision Support System (DSS)
- ✓ Edition 3: What-if Analysis

During the training events, the attendees will have also the chance to practice with the tools developed within the CIPRNet project.

The structure of this document is as follows: Section II explains the scope of the training and specifies the audience and the program, Section III focuses on the organization of the training activities and Section IV provides an overview of the procedures to create the training material. Finally, in Section V the scheduling of the training activities is presented. More details regarding the program of the different Editions of training can be found in Appendix A.

1.1 Acronyms

Acronym	Explanation
CI	Critical Infrastructure
CIP	Critical Infrastructure Protection
CIPMA	Critical Infrastructure Protection Modelling and Analysis
CIPRNet	Critical Infrastructure Preparedness and Resilience Research Network
CISIA	Critical Infrastructure Simulation by Interdependent Agents
DB	Database
DIESIS	Design of an Interoperable European Federated Simulation Network for CI
DSS	Decision Support System
EISAC	European Infrastructures Simulation & Analysis Centre
EU	European Union
FP	Framework Programme
FR	Functional Requirement
GIS	Geographic Information System
GPS	Global Positioning System
I2SIM	Infrastructure Interdependencies Simulator
IIM	Input Output Inoperability Model
MS&A	Modelling, Simulation and Analysis
NFR	Not Functional Requirement
NISAC	National Infrastructure Simulation and Analysis Center
OpenMI	Open Modelling Interface
PA	Public Authority
QoS	Quality of Service
RAFI	Risk Assessment Forecast Interval
S&A	Simulation and Analysis
VCCC	Virtual Centre of Competence and expertise in CIP
V&V	Verification and Validation

2 Scope of the training

The scope of the training activities is the introduction of the use of the MS&A tools to better understand the behaviour of CIs in anomalous situations, with the aim to support the Public Authorities and the CI Operators in assessing CI vulnerabilities so as to improve the capability to manage crisis situations. Because some of these tools will be developed and will evolve during the CIPRNet project, the training program will evolve over the years as well.

As detailed later, there will be three Editions of the training in 2014, 2015 and 2016. These editions will be preceded by internal training activities used to improve the training materials.

The training sessions are arranged in two parts. The first part, that will be substantially the same during all the editions, will focus on basic topics. The second part will focus on more advanced and technical subjects. Specifically, the first part of the training will provide an introduction to MS&A methodologies for CIP, strategic tools, instruments, problems, and V&V methods.

The second part will focus on advanced topics that will be different at each edition. Selected topics will be (a) federated simulation and OpenMI, (b) methods and technologies to realize DSS and (c) methods for What-if Analysis. It is foreseen to complement the theoretical training on such topics with practical training allowing the attendees to "get the hang of" the different tools.

The main expected outcome of these training activities is to contribute into the creation of a CIP-community able to develop and exploit the MS&A tools. In this line, these training activities will facilitate the integration and the sharing of knowledge and expertise of CIP and CI MS&A, and also further stimulate cooperation amongst the CIPRNet partners.

2.1 Audience

The targeted audience of the CIPRNet training is mainly:

- **CIPRNet Consortium**. The training event represents a cornerstone to consolidate common vocabulary and background among all the partners. Moreover, it will contribute, especially for young researchers, to improve their knowledge on CI MS&A, allowing them to better exploit the instruments that will be developed during CIPRNet project. Internal editions will be organised for the CIPRNet Consortium members before being released in "public" editions in order to realise a critical verification of the effectiveness of the training,

- **Technicians /Researchers on CIP.** The training events are designed for researchers and technicians from different research communities both inside and outside Europe in order to expand the CIP experts' community, strengthen links between different research institutions and to create common views. Edition 1 in particular, will be mainly addressed to researchers,

- **CI Stakeholders and Public Authorities.** CIPRNet will also address the issue of creating a solid community and useful common framework with CI stakeholders and Public Authorities. Editions 2 and 3 will specially focus on addressing the interests of stakeholders and Public Authorities.

There will be no specific restrictions to the audience attending the different training editions. However, the idea is to assemble an audience for Edition 1 composed primarily by researchers and technical experts, both for the technical nature of the presented topics (i.e. the design and the functionalities of a federated simulator of CI) and to contribute into the creation and the consolidation of a large community of experts committed to the development of the CIPRNet tools. On the other side, Editions 2 and 3 will be more end-user oriented, with a major focus on how to use MS&A tools in the CI framework in order to exploit DSS or to perform a What-if Analysis. Consequently, Editions 2 and 3 will be more oriented to an audience composed mainly by CI stakeholders and PA, with the aim to illustrate the potential benefits from the use of the CIPRNet tools.

2.2 Program

In Figure 1, the general programme for Day 1 and 2 of the training Editions 0 and 1 are outlined.

Regarding Editions 2 and 3, where the main aim will be to show innovative tools such as DSS and sophisticated analysis (What-if Analysis), the program will be enriched with the details about the systems and the tools which are, to date, still in their design and realization phase. For this reason, in the present document, these topics will be only sketched.

In Appendix A, the detailed program of the Editions and the information about the lecturers1 are presented.

The initial program version of the different modules below will be updated on the basis of feedback from the audience as well as the incremental progress of the different CIPRNet tools.

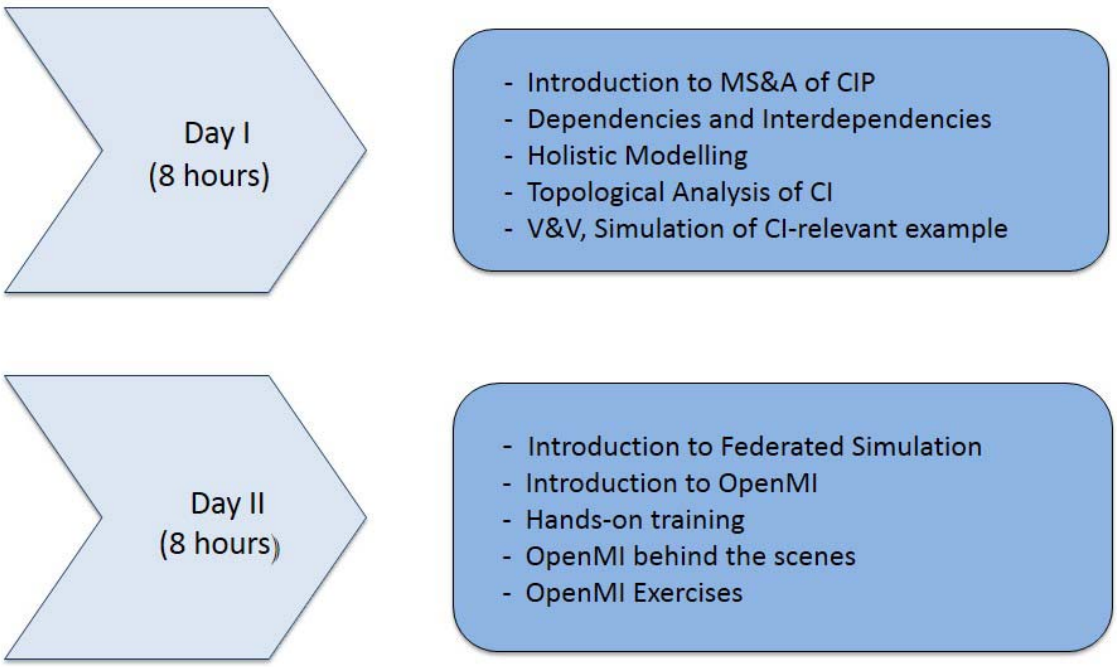


Figure 1: General programme for Day 1 and 2.

1 Currently only for Editions 0 and 1.

In the following, we will use the following indexing. Each Module for the different Days of the different Editions will be labelled by a mark of the following type: Ex-Dy-Mz referring to the z-th Module of the y-th Day of the x-th Edition of the training activities.

If a "many-digits" is used for the Edition quote, it will indicate that the particular Module will be used in all the quoted Editions.

Day I - program (all editions)

This represents a basic training event for MS&A of CI

- **E0123-D1-M1** Introduction to Modelling and Simulation of systems

  Illustration of the concept of model and mathematical modelling. Analytical vs. numerical solutions of a model. Introduction to the peculiarities of systems composed by several and interacting components. Representation of Critical Infrastructures as a collection of heterogeneous interacting components.

  - What simulation of complex systems means
  - Qualitative and quantitative representation of phenomena
  - Models and mathematical models
  - Deterministic & probabilistic models
  - Complex systems and emergent properties
  - Critical Infrastructure as a System-of-Systems

- **E0123-D1-M2** Dependencies and interdependencies

Introduction to the concepts of (inter)dependency and their classification. Elements to qualify and quantify dependencies. How to model some of the most common dependency phenomena?

  - Dependency phenomena
  - Taxonomy of dependencies
  - Model of (inter)dependencies

- **E0123-D1-M3** Holistic modelling

Description of some of the most diffused holistic models illustrating their pros and cons (limits). Specific attention will be given to approaches based on criticality matrix and IIM (Input Output Inoperability Model).

  - Qualitative and semi-quantitative approaches
  - Criticality Matrix
  - Input-Output Inoperability Model

- **E0123-D1-M4** Complex Networks and their relevance in functional and vulnerability assessments of critical infrastructures

Overview of graph theory and graph properties as tool to model interaction among components, operators and infrastructures. Main topological properties. Elements of network dynamic and network coupling.

  - Networks and their topological properties
  - Dynamical assessment of functional properties based on static (topological) properties
  - Case studies: roads and traffic dynamics, topological properties of electrical networks and their impact on power flow dynamics

- **E0123-D1-M5** Geomatics

The GIS structure as a basic technique to describe interacting scenarios between natural and technological systems

  - Geomatics basics: geodesy and geo-informatics (GPS systems, GIS databases)
  - Basic functions provided by a GIS (Geographic Information System) system.

  - Examples of applications of integration of GIS and computational modules in a complex application: impact and consequence analysis on buildings immediately after an earthquake

- **E0123-D1-M6** Verification and Validation

After a brief introduction to Verification and Validation, an approach to organizing the V&V activities is presented that leads to the choice of which V&V techniques to employ. An overview of the main V&V techniques is presented with a discussion on which of these can be applied in V&V of CI models.

  - What are Verification and Validation (V&V)
  - How to approach V&V
  - Overview of main V&V techniques
  - Techniques for V&V of CI models

- **E0123-D1-M7** Simulations of CI - relevant examples

Overview of the most interesting international activities in MS&A of Critical Infrastructures

  - Overview of the most relevant projects and results of MS&A of CI
  - NISAC (US Sandia Lab)
  - CIPRSim modelling and simulation framework (US INL)
  - CIPMA's CI MS&A activities (Australia)
  - DIESIS framework
  - I2Sim platform
  - CISIA platform

- **ED0123-D1-M8** Modelling and Simulation Techniques for Critical Infrastructure Protection

This presentation focuses on scenario- and purpose-driven design of federated simulation systems in the area of critical infrastructure protection. We start with a brief comparison between integrated and federated modelling and simulation approaches. Then, practical challenges related to design and implementation of large heterogeneous simulation systems will be discussed. Finally, we handle some essential concepts of the DIESIS architectural approach and interoperability middleware that allow to overcome the aforementioned challenges.

  - Role of simulation for critical infrastructure protection
  - Integrated (I2Sim) vs. federated modelling and simulation approaches
  - Scenario-oriented federation design and DIESIS architecture

<u>Day II -programme (Edition 0 and 1 - 2014)</u>

- **E01-D2-M1a** Introduction to Federated Simulation

Introduction to the simulation of complex system using the "federated" approach, i.e. allowing a set of simulators, each tailored to analyse a specific phenomena or component/infrastructure, to share data in order to simulate complex scenarios where those elements have to interact each other.

- **ED01-D2-M1b** Modelling and Simulation Techniques for Critical Infrastructure Protection

This presentation focuses on scenario- and purpose-driven design of federated simulation systems in the area of critical infrastructure protection. We start with a brief comparison between integrated and federated modelling and simulation approaches. Then, practical challenges related to design and implementation of large heterogeneous simulation systems will be discussed. Finally, we handle some essential concepts of the DIESIS architectural approach and interoperability middleware that allow to overcome the aforementioned challenges.

  - Role of simulation for critical infrastructure protection
  - Integrated (I2Sim) vs. federated modelling and simulation approaches
  - Scenario-oriented federation design and DIESIS architecture
- **E01-D2-M2** Introduction to OpenMI

Open Modelling Interface (OpenMI2) is a standard aimed to define an interface that allows time-dependent models to exchange data at run-time. When the standard is implemented, existing models can be run simultaneously and share information at each time step making model integration feasible at the operational level.

  - Coupling flow simulation models
  - What is OpenMI?
  - Example application cases
  - Application range
- **E01-D2-M3** Hands-on training: my first OpenMI composition

How OpenMI work and in which way it allows to share data

  - The OpenMI configuration editor
  - Working with omi-files
  - Setting up an OpenMI composition
  - Coupling mechanisms
  - External coupling one-directional
  - Bi-directional coupling
  - Iterative coupling
  - Analysing the results
- **E01-D2-M4** OpenMI behind the scenes: how to migrate my own code to OpenMI compliance

How to migrate from stand-alone software to a distributed OpenMI compliant architecture

  - How to organise the code
  - Basic OpenMI functions
  - Wrapping native code
- **E01-D2-M5** Training session

Examples of OpenMI applications

Day II - tentative programme (Edition 2 - 2015)

This training will focus on, one of the new CIPRNet capabilities, the Decision Support System (DSS). This system is the result of the complex combination of a number of different technologies (and related tools) ranging from weather forecast and hydrological models to risk assessment and impact/consequences analysis. This will thus constitute a large summary of the technologies relevant for CIP and provide the state-of-the-art of the technologies in differing sectors. The programme will be continuously updated on the basis of the results obtained by the development of the DSS. For this reason, it should be considered as a preliminary draft of the arguments.

- **E2-D2-M1** DSS architectures
  - DSS database
  - GIS middleware and orchestrator
  - CI Simulation engines
  - Database
    - Water distribution networks

2 For more information http://www.openmi.org/

        - Power grids
        - Telco networks
        - Road transport network
        - Gas pipeline
- **E2-D2-M2** Forecast:
    - Weather forecast
    - Nowcasting
    - Hydrological models
- **E2-D2-M3** Harms and physical damages estimation:
    - By earthquakes
    - By landslide
- **E2-D2-M4** CI simulation models
    - Electrical models (load flow)
    - Models of Telecommunication systems
    - Traffic models
    - Water distribution models
- **E2-D2-M5** Consequence analysis
    - GIS tools for correlating geographical data and impacts
    - Air and sea pollutions

Day III - tentative programme (Edition 2 - 2015)

- **E2-D3-M1** Hands on exercises on the DSS platform

Day II - tentative programme (Edition 3 - 2016)

This training event will illustrate one of the new CIPRNet capabilities, federated Modelling and Simulation (MS) based "What-if Analysis". This programme will be detailed later on basis of the results obtained by the development of the VCCC and What-if Analysis tools.

- **E3-D2-M1** Introduction to What-if Analysis,
- **E3-D2-M2** Introduction to CIPRNet tools.

Day III - tentative programme (Edition 3 - 2016)

- **E3-D3-M1** Hands on exercises on VCCC and What-if Analysis

3 Organisation

3.1 Scientific Committee

In order to ensure the quality of the courses and to attract qualified attendees, there is the need, in parallel with the spread of information about the training events, to guarantee a top-level of quality in terms of programs, contents, materials and interaction with the audience. To guarantee such a high standard, a Scientific Committee has been set up with the aim of supporting UCBM in the selection of the topics and the lecturers and in reviewing all the training materials. The Scientific Committee is composed of seven persons with a large experience in research and academic teaching. This represents an important guarantee for the quality of the training events.

The Scientific Committee is composed of:

- **Roberto Setola (UCBM)**

Mr. Setola has held university level courses since 1996 and is currently Director of the Second Level Master in Homeland Security at UCBM. He has been the supervisor of four PhD students and more than 100 MS and BA thesis projects. He has authored 3 textbooks on Modelling and Simulation and more than 100 scientific papers.

- **Vittorio Rosato (ENEA)**

Vittorio Rosato received the Laurea degree in Physics from the University of Pisa (1979) and a Ph.D. in Physics from the University of Nancy (1986). He is currently Head of the ENEA Laboratory of Technological and Computing Infrastructure, President of the Industrial Spin-Off Commission of ENEA. He acts as supervisor and project evaluator for the Italian Ministry of University and Research, and that of Economic Development and in the Scientific Boards of several Italian Regions. He is also the project's referee for the European Union. He has been Coordinator of several national projects and responsible of ENEA's activity in several EU-funded projects. He is co-founder of the Ylichron Srl company. He is author of more than 100 scientific papers on peer reviewed journals; he acts as referee for high-IF journals (Physical Review and Physical Review Letters, Europhysics Letters etc.).

- **Erich Rome (Fraunhofer)**

He is a senior researcher at Fraunhofer and is a Project Manager of the ART department.
In 1983, he received a Diploma in Computer Science (Univ. Bonn).
Thereafter, he worked as a researcher at GMD (merged in 2001 with Fraunhofer), investigating topics in Expert Systems and AI.
In 1995, he received a PhD degree in Engineering Sciences from the University of Bremen.
From 2004–2008, he was the coordinator of the EU project MACS (FP6-004381).
Since 2007, Erich Rome pursues within the ART department several R&D topics, including critical infrastructure protection and multi-sensory systems for surveillance and security. In 2007, he was executive coordinator of the EU project IRRIIS.
Recently, he coordinated the EU project DIESIS (2008–10), a Design Study for an e-Infrastructure for Modelling, Simulation and Analysis in CIP.
He participated in the FP7 Coordination Action euCognition, and he was a member of the ESF-COST Action IC0806 "Intelligent Monitoring, Control, and Security of Critical Infrastructure Systems" (IntelliCIS), and a supporter of the FP7 FET Flagship Pilot FuturICT.
He is a member of the Steering Committee of the workshop series CRITIS (Critical Infor-

mation Infrastructures Security), and he has published numerous peer-reviewed publications and edited several books. Currently, he is the coordinator of CIPRNet.

- **Jacques Colliard (UIC)**

He graduated in economics and statistics, and received diplomas from French Universities of Paris I and Paris VI, and of the French National Institute of Economics and Statistical Information. He joined SNCF in 1976. From 1995 to 2003, he became the SNCF's Deputy Director of Security. Also, he was a member of the French minister's staffs in social topics, police, transportation, and in urban policy.
Since March 2003, Jacques Colliard was the manager of the previous Security Centre of Competence in International Union of Railways (Paris), and is now Head of the Security Division. He is registered as a railway security expert by various international organisations (European Commission, OSCE, UNECE, IWGLTS….). As a major responsibility at UIC, Jacques Colliard leads the work of the UIC security platform as Chairman and Vice-Chairman.

- **Mohamed Eid (CEA)**

Mohamed Eid is a Senior Expert in the French Commissariat of Atomic Energy (CEA) and an Associated Professor in the National Institute of Applied Science (INSA) of Rouen. His research and teaching activities cover fields such as: Probabilistic Risk Analysis, System Reliability and Safety, Monte-Carlo simulation, Multi-States System Reliability, Systems Dependency and Interdependency. He is the author of some 50 scientific papers in the field of systems safety, reliability and stochastic modelling.

- **Bernhard Becker (Deltares)**

Hydraulic Engineer who focuses on water management, model coupling (OpenMI) and real-time control modelling. Holds experience in teaching at the RWTH Aachen University (Germany) and as researcher at Université de Liège, Belgium.

- **Elias Kyriakides (UCY)**

He teaches electric power systems at the University of Cyprus since 2004. He has supervised to completion 2 Ph.D. students, while 6 more are currently working under his supervision. He is the author of over 100 scientific papers.

3.2 Admission rules

3.2.1 Plans and criteria for selecting external audiences

In order to guarantee high interactivity between teaching staff and attendees, each training event will be limited to a maximum of 40 participants (for the activation of the Edition a minimum level of 15 participants is required).

The attendees will be asked to register following a procedure that will be finalised and specified on the web-site of CIPRNet.

The registration to the training activities will close fifteen days before the training event. At that moment, if the event has not reached the number of 40 attendees, the admission of late registration will be evaluated considering organisational needs in each edition. In all cases the policy first-in-first-served will be applied.

During the registration procedure, the applicant should provide information regarding his/her current position/function and his/her background.

3.2.2 Participation fee

The consortium has deeply analysed whether or not introducing an admission fee for attendees outside the Consortium.

From one side it is evident that a free training event may allow a broad participation, especially from public authorities and universities.

On the other side, the presence of a fee would "guarantee" a committed participation (reduced number of late withdrawals) and a more active participation during the training events.

Moreover, a paying attendance is more critical with respect to the quality of the training event and the training material (positive aspects). However, the management of the fee will introduce further administrative burdens.

With the aim of balancing such conflicting aspects, the Consortium has decided to not introduce a fee for the Edition 1 of the training in order to verify the “appeal” of the event.

For the Editions 2 and 3, the amount of the Attendance Fee (for attendees external to the Consortium) has been preliminary fixed at 300 € in order to cover the attendee costs which are not strictly related to the training itself (additional extensive costs such as coffee breaks, meals, social dinner, etc.).

In this case, each CIPRNet partner will have a free admission ticket to be used to promote CIPRNet among public authorities, CI stakeholders, etc.

All the 27 organisations that supported the CIPRNet proposal via a letter of endorsement (see Appendix of the CIPRNet proposal) will obtain a free admission ticket to be used for the training Edition 2 and 3.

3.2.3 Participation from CIPRNet partners

In order to promote the creation of the CIPRNet community and to boost up cooperation among partners, each partner3 of CIPRNet is invited to attend (minimum of one person) at least two different editions of the training event.

3 Except UBC and ACRIS.

4 Training Material

To support training activities, specific training material will be produced and refined to be included in a textbook (within the Joint Activity 8.3). It is worth stressing that, although there already exists a vast literature about modelling and simulation of any isolated infrastructure (and for their components and parts), there is a lack of educational material concerning modelling and simulation of several and (inter)dependent infrastructures.

The Figure 2 shows a synoptic view of the process that will provide the training event material.

In order to obtain a well-documented material it's necessary that each partner cooperates providing reports, texts, presentations and tables, to be constantly kept updated.

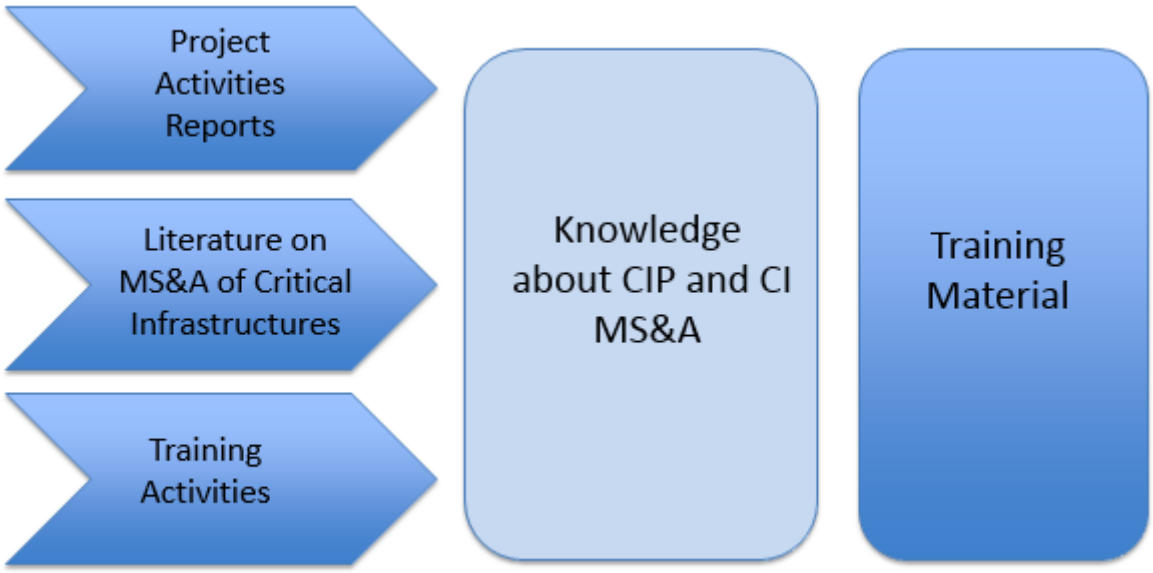


Figure 2: Training material elaboration process.

4.1 Overview of books about MS&A of Critical Infrastructures

As mentioned before, there are very few textbooks about MS&A of CIs. Unfortunately, the main part of available materials about MS&A of CI has been generated inside research projects and is strongly focused on specific aspects (training activities take advantage of the contribution of CIPRNet partners to many of these projects). Moreover, these materials have never reached a sufficient degree of maturity in order to represent a concrete support for training activities (below, we review some of the most relevant materials available, to date, on the market). Moreover, the activities performed inside WP7 will contribute to acquire more information on projects related to MS&A of CI.

	Gopalakrishnan, Kasthurirangan; Peeta, Srinivas (Eds.)"*Sustainable and Resilient Critical Infrastructure Systems: Simulation, Modelling, and Intelligent Engineering*", Springer; 2010
	J. Lopez-Munoz, **R. Setola** and S.D. Wolthusen, (Eds.), *"Advances in Critical Infrastructure Protection: Information Infrastructure Models, Analysis, and Defense"*, Springer-Verlag, 2012
	E. Goetz and S. Shenoi (Eds.), IFIP 11.10 International Conference "*Critical Infrastructure Protection I*", Springer 2007
	M. Papa and S. Shenoi (Eds.), IFIP 11.10 International Conference "*Critical Infrastructure Protection II*", Springer 2008
	C. Palmer and S. Shenoi (Eds.), IFIP 11.10 International Conference "*Critical Infrastructure Protection III*", Springer 2009
	T. Moore and S. Shenoi (Eds.), IFIP 11.10 International Conference "*Critical Infrastructure Protection IV*", Springer 2010
	J. Butts and S. Shenoi (Eds.), IFIP 11.10 International Conference "*Critical Infrastructure Protection V*", Springer 2011
	J. Butts and S. Sujeet (Eds.), IFIP 11.10 International Conference "*Critical Infrastructure Protection VI*", Springer, 2012
	G. D'Agostino and G., A. Scala (Eds), *Network of Networks: the last Frontier of Complexity*, Springer, Cham Heidelberg, ISBN 978-3-319-03517-8, DOI 10.1007/978-3-319-03518-5, 2014
	J. Lopez (Ed.). 1st International Workshop, CRITIS 2006, " *Critical Information Infrastructure Security", 2006*
	J. Lopez and **B. Hämmerli** (Eds.), 2th International Workshop, CRITIS 2007, "*Critical Information Infrastructures Security*", Springer, 2008
	R. Setola and S. Geretshuber (Eds.), 3th International Workshop, CRITIS 2008, "*Critical Information Infrastructure Security*", Springer, 2009
	E. Rome and R. Bloomfield (Eds.), 4th International Workshop, CRITIS 2009, "*Critical Information Infrastructures Security*", Springer, 2010
	C. Xenakis, and S. Wolthusen (Eds.), 5th International Workshop, CRITIS, 2010, "*Critical Information Infrastructure Security*", Springer, 2011
	S. Bologna and S.D. Wolthusen, 6th International Workshop, CRITIS, 2011, "*Critical Information Infrastructure Security*", Springer, (in press)
	B. Hämmerli and J. Lopez-Munoz (Eds.), 7th International Workshop, CRITIS, 2012, "*Critical Information Infrastructure Security*", Springer, (in press)
	E. Luiijf and P. Hartel (Eds), 8th International Workshop, CRITIS, 2013, "*Critical Information Infrastructure Security*", revised papers, Proceedings, Springer, LNCS Vol. 8328, DOI 10.1007/978-3-319-03964-0, Dordrecht, 2013.

Notice that, as mentioned, none of these books is an "effective" textbook because they are collections of topics within specific domains. The first two books listed in the previous table are collection of papers on the topic of CIP, while the others are the most significant papers recently proposed at IFIP and CRITIS conferences.

4.2 Schedule for the preparation of the training material

This is the tentative schedule of the activities related to the training events:

Project month	Real month	Lead	Description
M08	October 2013	UCBM	Scientific Committee approves the detailed programme
M10	December 2013	Deltares	Draft version of the training material on OpenMI
M11	January 2014	speakers	Draft version of training material
M12	February 2014	UCBM	Training material is used for "edition zero"
M13	March 2014	UCBM	Scientific Committee identifies updates to be performed to training material on the base of inputs from attendance
M13	March 2014	Deltares and speakers	Updated version of training material is released
M13	March 2014	UCBM	Scientific Committee approve the training material
M14	April 2014	UIC	Training material is used for the first edition of the training event
M15	May 2014	UCBM	Scientific Committee identify updates to be performed to training material on the base of inputs from attendance
M15	May 2014	UCBM	UCBM identifies publisher for the textbook and subscribe the agreement
M21	November 2014	ENEA	Detailed programme of DSS training event
M22	December 2014	UCBM	Scientific Committee approves the detailed programme of DSS training event
M24	February 2015	UCBM/ TNO	One-day internal event
M25	March 2015	ENEA	Draft version of the training material for DSS training event
M26	April 2015	ENEA	Training material is used for the second edition of the training event

M27	May 2015	UCBM	Scientific Committee identifies updates to be performed to training material on the base of inputs from attendance
M36	February 2016	UCBM/ TNO	One-day internal event
M38	April 2016	Fraunhofer	Detailed programme of training event on federated modelling and simulation based What-if Analysis
M38	April 2016	UCBM	Scientific Committee approves the detailed programme of training event on federated modelling and simulation based What-if Analysis
M39	May 2016	Fraunhofer	Draft version of the material of training event on federated modelling and simulation based What-if Analysis
M41	July 2016	Fraunhofer	Training event on federated modelling and simulation based What-if Analysis

5 Scheduling

During the CIPRNet project, three different training Editions have been scheduled. The three training Editions will be replicated within the UCBM Post-Graduated Program (Italian Second Level Master) in Homeland Security.

Two months before each edition, an internal meeting will be held (generally within a CIPRNet Plenary Meeting), in order to check out teaching materials and methods.

A preliminary action of the Training activities has been held in Rome, at the ENEA Headquarters, just after a project Plenary Meeting (on November 20-21, 2013); the event was concerned with a training session on Geo-SDI, the GIS platform which has been decided upon to be used for its characteristics as the GIS platform of the project. The short course (2 days) was held for updating the Consortium partners, interested in the development of tools requiring the use or the access to the GIS platform, to get accustomed to it by learning its basic principles and utilities. This short course was extremely useful to perceive and agree on the properties of Geo-SDI tool prior to its massive usage in WP7 (DSS development).

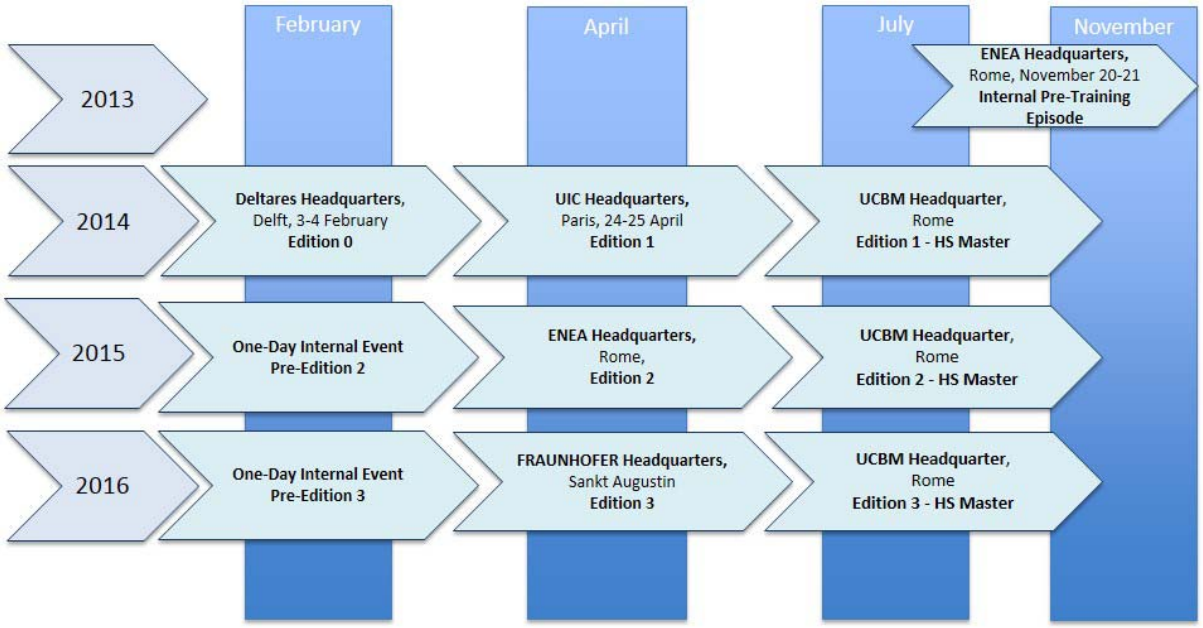


Figure 3: Training timeline.

All the material used for training will be stored on BSCW and made available to the CIPRNet Consortium.

5.1 Edition 0 - February 2014

Date: 3-4 February 2014
Responsibility: Deltares
Location: Deltares Headquarters, Delft (The Netherlands)
Rotterdamseweg 185, 2629 HD Delft
Phone: +31 15 285 8585

This is a pre-edition (Edition 0) of the training event and will be arranged for internal audiences with the aim of testing lesson topics and the accompanying pedagogical material.
Edition 0 will be a two-day training event; the first day will be devoted to introduce basic concepts about S&A (Simulation and Analysis) of CI while the second day will focus on the federated simulation and the use of the Open Modelling Interface (OpenMI).

Notice that before the Edition 0, draft material will be shared among speakers and the Scientific Committee to harmonize the material.

5.2 Edition 1 - April 2014

Date: 24-25 April, 2014
Responsibility: UIC
Location: UIC Headquarters, Paris (France)
16 rue Jean Rey 75015, Paris
Phone: +33 (0) 1 44 49 20 20, Fax: +33 (0) 1 44 49 20 29

This will be the first edition of the training event for an external audience, and similar to the previous edition it will be arranged as a two-day training event. It is planned jointly with the CIPRNet Plenary Meeting.

5.3 Edition 2 - 2015

Date: April 2015

Responsibility: ENEA

Location: ENEA Headquarters, Rome (Italy)
Lungotevere Thaon di Revel, 76 - 00196 Rome
Phone +39 06-36271, Fax +39 06-36272591/2777

This will be a two and a half days training event devoted to introduce basic concepts about S&A on CI, natural hazards, CI dependency models and GIS related topics. Since the design of DSS is just beginning, the programme may be subject to future changes.

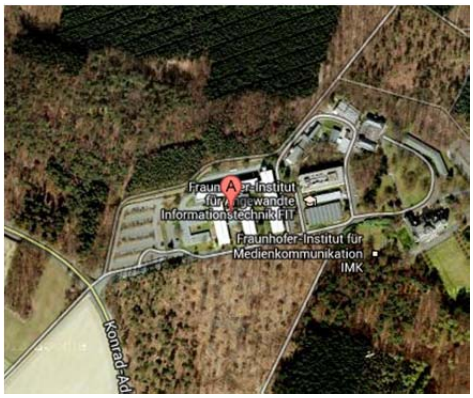
This event may take place in collaboration with other CI and CIP related FP7 projects such as INTACT and PREDICT.

5.4 Edition 3 - 2016

Date: July 2016

Responsibility: Fraunhofer

Location: Fraunhofer at Institute for Intelligent Analysis and Information Systems IAIS, Sankt Augustin (Germany)
Schloss Birlinghoven 53757 Sankt Augustin
Phone +49 2241 14-3000, Fax +49 2241 14-4-3000



This will be a two and a half days training event devoted to illustrate how to model a complex CI dependency scenario and to perform What-if Analysis using the CIPRNet tools. Since the design of CIPRNet tools has just begun, the programme may be subject to future changes. This event may take place in collaboration with other CI and CIP related FP7 projects such as INTACT and PREDICT.

5.5 Italian Post-Graduate Program in Homeland Security

UCBM holds, on a yearly basis, a Post-Graduate Program in Homeland Security4 (according to the Italian naming it is the "Second Level Master in Homeland Security", please note in the following for brevity its indicated as solely as 'Master'), which provides high-level training about systems, methods and tools for security and crisis management.

The current social context emphasizes an escalation of criminal and terrorist phenomena which should cope with an increased expectation of enhanced security by users and citizens. This raises the needs for new professional figures of Security Experts to be able to perform economic, technical and social analyses in given contexts and, more importantly, capable of highlighting possible threats, vulnerabilities and risks for companies and to identify technical-organisational solutions suited to predict and contrast various phenomena.

The Master in Homeland Security is an advanced training course that aims to train technicians and professionals able to support the process of analysis of security requirements, identification of countermeasures and design and development of integrated solutions regarding the implementation, management and operation of security systems and procedures.

In July 2014, 2015 and 2016 the CIPRNet training event will be replicated for the students of the Master in Homeland Security at UCBM in Rome. Such training events will be substantially the same of the corresponding year Edition and will use the same training topics and materials. This will further widen the number of beneficiaries of the CIPRNet technologies.

4 For more information: http://www.masterhomelandsecurity.eu/

6 Appendix A

Training episode: Edition 0
Location: Deltares Headquarters, Delft (The Netherlands)
Date: 3-4 February, 2014

DAY	MODULE	TEACHER	# HOURS
D1	E0-D1-M1	Mohamed Eid (CEA)	2
	E0-D1-M2	Roberto Setola (UCBM)	1
	E0-D1-M3	Roberto Setola (UCBM)	1
	E0-D1-M4	Vittorio Rosato (ENEA)	1
	E0-D1-M5	Maurizio Pollino (ENEA)	1
	E0-D2-M1a*	Wim Huiskamp (TNO)	1
	E0-D1-M1b*	Andrij Usov (Fraunhofer)	1
D2	E0-D1-M6*	Jeroen Voogd (TNO)	1
	E0-D1-M7*	Marieke Klaver (TNO) Eric (H.A.M.) Luiijf (TNO)	1
	E0-D2-M2	Andreas Burzel (Deltares)	0.5
	E0-D2-M3	Bernhard Becker (Deltares)	2
	E0-D2-M4	Bernhard Becker (Deltares)	0.5
	E0-D2-M5	Andreas Burzel (Deltares)	3

* For organizational reasons, only for the Edition 0 the last modules of D1 are moved to the first 2 hours of D2 (and vice-versa).

Training episode: Edition 1
Location: UIC Headquarters, Paris (France)
Date: 24-25 April, 2014 (jointly with a CIPRNet plenary meeting)

DAY	MODULE	TEACHER	# HOURS
D1	E1-D1-M1	Mohamed Eid (CEA)	2
	E1-D1-M2	Roberto Setola (UCBM)	1
	E1-D1-M3	Roberto Setola (UCBM)	1
	E1-D1-M4	Vittorio Rosato (ENEA)	1
	E1-D1-M5	Maurizio Pollino (ENEA)	1
	E1-D1-M6	Jeroen Voogd (TNO)	1
	E1-D1-M7	Marieke Klaver (TNO) Eric (H.A.M.) Luiijf (TNO)	1
D2	E1-D2-M1a	Wim Huiskamp (TNO)	1
	E1-D2-M1b	Andrij Usov (Fraunhofer)	1
	E1-D2-M2	Andreas Burzel (Deltares)	0.5
	E1-D2-M3	Bernhard Becker (Deltares)	2
	E1-D2-M4	Bernhard Becker (Deltares)	0.5
	E1-D2-M5	Andreas Burzel (Deltares)	3

Training episode: Edition 2
Location: ENEA Headquarters, Rome (Italy)
Date: (tentative) April, 2015

This will be a three-day (20 hours) training episode devoted to introduce basic concepts about S&A on CIs, natural hazards, CI dependency models and GIS related topics.

Since the design of DSS is just beginning, the following programme may be subject to future changes both in terms of schedules that of speakers. The programme for the second and third day has yet to be defined.

DAY	MODULE	TEACHER	# HOURS
D1	E2-D1-M1	Mohamed Eid (CEA)	2
	E2-D1-M2	Roberto Setola (UCBM)	1
	E2-D1-M3	Roberto Setola (UCBM)	1
	E2-D1-M4	Vittorio Rosato (ENEA)	1
	E2-D1-M5	Maurizio Pollino (ENEA)	1
	E2-D1-M6	Jeroen Voogd (TNO)	1
	E2-D1-M7	Marieke Klaver (TNO) Eric (H.A.M.) Luiijf (TNO)	1
D2	E2-D2-M1	TBD	8
	E2-D2-M2	TBD	
	……	TBD	
D3	E2-D3-M1	TBD	4
	E2-D3-M2	TBD	
	……	TBD	

Training episode: Edition 3
Location: Fraunhofer Headquarters, Sankt Augustin (Germany)
Date: (tentative) April 2016

Since the design of VCCC has just started, the following three-day training (20 hours) programme may be subject to future changes both in terms of schedules and speakers. The programme for the second and third days has yet to be defined.

DAY	MODULE	TEACHER	# HOURS
D1	E3-D1-M1	Mohamed Eid (CEA)	2
	E3-D1-M2	Roberto Setola (UCBM)	1
	E3-D1-M3	Roberto Setola (UCBM)	1
	E3-D1-M4	Vittorio Rosato (ENEA)	1
	E3-D1-M5	Maurizio Pollino (ENEA)	1
	E3-D1-M6	Jeroen Voogd (TNO)	1
	E3-D1-M7	Marieke Klaver (TNO) Eric (H.A.M.) Luiijf (TNO)	1
D2	E3-D2-M1	TBD	8
	E3-D2-M2	TBD	
	……	TBD	
D3	E3-D3-M1	TBD	4
	E3-D3-M2	TBD	
	……	TBD	