FP7 2013 Cooperation Work Programme
Theme 6: Environment (Including Climate Change)

Novel indicators for identifying critical *INFRA*structure at *RISK* from Natural Hazards

Deliverable D9.8

Cross Work Programme Coordination Report

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Project Information

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Call Topic: Env.2013.6.4-4 Towards Stress Testing of Critical Infrastructure Against Natural Hazards-FP7-ENV-2013-two stage.

Project Website: www.infrarisk-fp7.eu

Partners:

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Eidgenössische Technische Hochschule Zürich, Switzerland.

Dragados SA, Spain.

Gavin and Doherty Geosolutions Ltd., Ireland.

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Document Information

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Executive Summary

This report describes the coordination activities with relevant FP7 projects in the Security and Environment (incl. climate change) work programmes that have taken place since the beginning of the INFRARISK project. To date the activities have consisted of introductory meetings whereby coordinators have presented the concepts and progress of the technical work being undertaken in each project. Equally, the sharing of documents that has occurred between the projects is discussed. Potential areas of coordination between the projects are also highlighted..

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1.0 INTRODUCTION

The consequences to society of the impacts of natural hazard and extreme weather events have an international dimension that goes beyond the capacity of a single State to cope alone with such consequences. For that reason, the EU wishes to promote new visions for sustainable and integrated risk assessment and risk management enabling better decision making strategy for disaster risk reduction. This is why new governance schemes in risk management and new tools or assessment methods which contribute to risk reduction need to be developed with new challenging and innovative ideas. This was, amongst others, the goal of the 2012 FP7 calls, both under the Environment and Security themes, which had the objective of improving the resilience of society, and in particular Critical Infrastructures, to catastrophic natural hazards through new risk-management approaches. This continuous effort will be pursued within H2020 and provide support to the next post Hyogo Framework for Action – Managing risks to achieve resilience - to be agreed upon in March 2015 (UNISDR 2015). Invariably, a number of projects are to be funded, which will focus on similar themes or deal with the overall concept of Critical Infrastructure protection. As such the commission has requested a coordination mechanism to take place between related projects. The aim of the coordination mechanism is to establish an effective collaboration between different projects, which are dealing with similar issues (critical protection against natural hazards, extreme low probability High Impact (LP-HI) events and cascading effects in crisis situations).

As defined in the text of the *2013 Security Work Programme: SEC.2013.2.1-2 - Impact of extreme weather on critical infrastructure*, projects selected under this topic shall be linked through a "coordination mechanism" with related projects selected under the *2013 Environment (Incl. Climate Change) Work Programme Environment: ENV.2013.6.4-4 - Towards stress tests for critical infrastructures against natural hazards*.

At European Commission level, during the negotiations of the FP7-SEC-2013, the need to widen this coordination mechanism to other topics dealing with similar issues was identified. The same mechanism is therefore foreseen for projects funded under the topic *SEC-2013.4.1-2 - Better understanding of the cascading effect in crisis situations in order to improve future response and preparedness and contribute to lower damages and other unfortunate consequences*.

Finally, it was also decided to include other projects, whose objectives are strongly linked, two projects from the 2011 ENV and SEC calls, and the Demo Phase II project from the call FP7-SEC-2013. The final list of projects for which coordination activity is required is shown in Table 1.

FP7 call	Projects' acronyms
SEC.2013.2.1-2	INTACT, RAIN
SEC-2013.4.1-2	SnowBall, CascEff, FORTRESS, PREDICT
ENV.2013.6.4-4	INFRARISK, STREST
ENV.2011.1.3.1-1	REAKT
SEC-2013.4.1-1	DRIVER
SEC-2011.4.1-1	CRISMA

Table 1: Coordination

2.0 COORDINATION OVERVIEW

2.1 Objectives of Coordination Mechanism

The aim of the coordination mechanism is to establish an effective collaboration between different projects, which are dealing with similar issues (critical protection against natural hazards, extreme low probability High Impact (LP-HI) events and cascading effects in crisis situations) with a view to;

(i) Avoiding redundancies and potential duplication of efforts;

(ii) Improving the quality of the expected results and boost their impact;

Furthermore, the implementation of this mechanism is considered essential as it contributes to some extent to a better definition of regional, national and European measures or policies in this domain, by providing improved methods, tools, guidelines, best practices, and reliable standards facilitating a European approach and vision for more harmonised safety for critical infrastructures and resilience against natural hazards, extreme weather and cascading effects in crisis situations in Europe.

2.2 Coordination between Specific Projects

While the Commission has identified the eleven projects between which coordination activities should occur (Table 1), not all projects require coordination between each other. In the case of INFRARISK, it has been stipulated that coordination activities take place between INFRARISK, STREST, RAIN and INTACT. A brief description of each project is provided in the following sections. The project factsheets are included in Appendix A.

2.2.1 INFRARISK

INFRARISK - 'Novel Indicators for identifying critical INFRAstructure at RISK from natural hazards' - is funded under the 2013 Cooperation Theme 6: Environment (Including Climate Change), *Env.2013.6.4-4 Towards Stress Testing of Critical Infrastructure Against Natural Hazards.*

The research focus of INFRARISK is centred around developing reliable stress tests on European Critical Infrastructure (CI), using integrated modelling tools for decision-support to establish the resilience of European CI to rare low frequency extreme events and to aid decision making in the long term regarding robust infrastructure development and protection of existing infrastructure. To this end, an operational analysis framework is being developed through robust risk and uncertainty modelling that considers not only the impact of individual hazards on specific infrastructure systems but the coupled interdependencies of critical infrastructure, climate change, cascading hazards, cascading effects and time dependent vulnerability. Practical software tools and benchmark guidelines are being developed that support European infrastructure managers in assessing the probability of occurrence of extreme rare events and assessing the vulnerability of critical infrastructure, arming them with the necessary tools to develop robust mitigation and response strategies.

Further information can be found at www.infrarisk-fp7.eu

2.2.2 RAIN

RAIN - 'Risk Analysis of Infrastructure Networks in Response to Extreme Weather' - is funded under the 2013 Cooperation Theme 10: Security, SEC.2013.2.1-2 *Impact of extreme weather on critical infrastructure.*

In recent years, a variety of extreme weather events, including droughts, rain induced landslides, river floods, winter storms, wildfire, and hurricanes, have threatened and damaged many different regions across Europe and worldwide. These events can have a devastating impact on critical infrastructure systems. The RAIN vision is to develop a systematic risk management framework that explicitly considers the impacts of extreme weather events on critical infrastructure and develops a series of mitigation tools to enhance the security of the pan European infrastructure network.

The RAIN approach is to quantify the complex interactions between weather events and land based infrastructure systems. The output of RAIN will aid decision making in the long term, securing new robust infrastructure development and protection of existing infrastructure against climate change and increasingly more unpredictable weather patterns. Transport, energy and telecommunications infrastructure will be considered and risk mitigation strategies will be developed. This will be achieved through developing an operational analysis framework which considers the impact of individual hazards on specific infrastructure systems and the coupled interdependencies of critical infrastructure through robust risk and uncertainty modelling.

Further information can be found at rain-project.eu

2.2.3 STREST

STREST - 'Harmonised Approach to stress tests for critical infrastructures against natural hazards' - is funded under the 2013 Cooperation Theme 6: Environment (Including Climate Change), *Env.2013.6.4-4 Towards Stress Testing of Critical Infrastructure Against Natural Hazards.*

Moving toward a safer and more resilient society requires improved and standardized tools for hazard and risk assessment of low probability-high consequence (LP-HC) events, and their systematic application to whole classes of CIs, targeting integrated risk mitigation strategies. Among the most important assessment tools are the stress tests, designed to test the vulnerability and resilience of individual CIs and infrastructure systems. The objectives of STREST are to establish a common and consistent taxonomy of non-nuclear CIs; Develop a rigorous, consistent modelling approach to hazard, vulnerability, risk and resilience assessment of LP-HC events; Design a stress test framework and specific applications to address the vulnerability, resilience and interdependencies of CIs; and enable the implementation of European policies for the systematic implementation of stress tests.

Further information can be found at www.strest-eu.org

2.2.4 INTACT

INTACT - 'On the Impact of Extreme Weather on Critical Infrastructures' - is funded under the 2013 Cooperation Theme 10: Security, SEC.2013.2.1-2 *Impact of extreme weather on critical infrastructure.*

The goal of the INTACT project is to gather information on the effect of EWE on critical infrastructure and on solutions and measures that can be taken. This information will be incorporated in a reference guide to help create more durable and lasting infrastructure.

The INTACT project helps to boost the resilience of critical infrastructure to the effects of extreme weather events. In recent years the frequency and intensity of EWE increased, posing demanding problems to both governments and societies alike. Critical infrastructure and their role within a society makes them vulnerable to the effects of extreme weather. As such action is needed to better protect Europe's critical infrastructure. The effects of EWE across Europe are not uniform. Different regions have varying levels of population density, infrastructure development, geographical characteristics and climates. In practical terms the INTACT project draws together existing knowledge on extreme weather events, climate change and critical infrastructure in Europe. The project investigates possible solutions and measures to alleviate the effects of extreme weather. The ultimate objective is to create a set of guidelines, the INTACT Reference Guide, to aid policy makers, decision makers and other stakeholders in setting up durable and lasting infrastructure. The project comprises different steps, which ultimately lead to the INTACT reference guide.

Further Information can be found at www.intact-project.eu

3.0 COORDINATION MEETINGS

3.1 Introduction

The meetings described in this section consider the meetings that have taken place to date, where two or more of the four projects are represented. A brief summary is provided on potential coordination activities which were discussed at the meeting.

3.2 Meetings

3.2.1 Clustering Meeting

Date: 25th June 2014

Location: Research Executive Agency, COV2 Building, Room 19-SDR1, Place Rogier, 16, B-1210 - Saint-Josse-Ten-Noode, Belgium

Overview:

This first clustering meeting was held to provide an overview of the expected coordination activities to occur between the selected FP7 projects related to critical infrastructure protection against natural hazards, extreme weather and cascading effects in crisis situations. All eleven projects (Table 1) were represented along with various members of the REA, DG office and JRC. A full participant list is provided in Appendix B. The meeting was the starting point of a top-down initiative, directly deriving from the 2013 FP7 Security and Environment Work Programmes, to get deeper knowledge on research activities in similar areas and to the launch of a coordination mechanism that will foster synergies between all invited projects. Its main purpose was to define the frame for future work to ensure a win-win approach for all projects involved.

The aim of this meeting was twofold:

1. To obtain a first knowledge and understanding of the objectives of all the projects concerned;
2. To set up the roots of this coordination mechanism and to discuss its operationalization during the following years.

Introductory presentations on Expectations and Policy Framework were made by members of the D&G offices and each coordinator gave a short presentation on the specific objectives of their respective projects focusing in particular on:

1. The definition of the key concepts of the project and their relation with the work programme topic;
2. The objectives of the project, its expected outcomes and impact;
3. The conceptual framework and methodology, highlighting the main activities (e.g. demonstration events, prototype development etc.);
4. Suggesting possible area of synergy, complementarities with other projects and explain how it could be done.

The Policy DGs from the European Commission represented in the meeting recalled that such cooperation was highly welcome as legislation and policy need to be supported by scientific evidence. Furthermore, there was an overall consensus that the coordination between projects should follow a bottom-up, iterative and flexible process.

Coordination Opportunities:

Following the suggestions from the projects as well as from the project officers, three categories of possible actions were identified:

(1) Collaboration during the development of concepts, methodologies, tools:

-Establishment of a shared understanding on terminology/taxonomy;

-Creation of a repository for data and information exchange between projects;

-Discussions on complementarities between different methodologies (e.g. on topics such as multi-risk assessment, uncertainty and time-dependency, human behaviour);

-Optimise cooperation through common partners;

-Explore the possibility of linkages between different tools (e.g. coupled modules built upon open source systems);

-Define synergies according to types of infrastructure/hazard (e.g. case studies on nuclear plants).

(2) Validation of models and tools:

-Explore the possibility of parallel or joint case studies/ demonstration events, with a large scale/cross border perspective;

-Discussions on issues such as interaction/compatibility with legacy systems and interoperability of data (INSPIRE);

-Foster networking among the different advisory boards and end user communities.

(3) Dissemination of results:

-Joint workshops with stakeholders;

-Joint articles and publications;

-Creation of a web portal dedicated to the dissemination of results;

-Organisation of joint final conferences and other awareness-raising activities;

-Exchanges on best practices, guidelines and policy recommendations;

-A report compiling key project outcomes that could be published by the European Commission.

In addition to this list of indicative actions, the table presented in Appendix B recaps the priorities put forward by each project during the meeting.

The project officers underlined that sharing efforts in terms of bibliographical analysis, state-of-the-art definition and policy output is a first and concrete example of possible collaboration which could save resources and enhance the projects' impact at the same time. It was also noted that the initiative was on the side of the project coordinators.

3.2.2 INFRARISK Presentation at RAIN Project General Assembly Meeting

Date: 2nd October 2014

Location: Finnish Meteorological Institute, Helsinki, Finland

Overview:

ROD presented the INFRARISK project to the RAIN consortium at the RAIN General Assembly meeting held at the Finnish Meteorological Institute in Helsinki. The purpose of the meeting was to introduce the project to the RAIN partners to facilitate discussions on potential areas of coordination between the projects. The presentation gave an overview of the INFRARISK project and progress, the objectives, the methodologies being developed, the expected output, the expected impact and areas of potential coordination.

Coordination Opportunities:
Various 'items' split into 'general' and 'technical' items were proposed for which coordination activities could be possible. These items were as follows;

(1) General Items:
- Sharing of Proposals;
- Sharing of relevant deliverables (with due consideration of any 'security' issues);
- Sharing of Data (i.e. information on CI failures....);
- Coordination page on the project website where other related projects and coordination activities undertaken are described;
- Attendance at each other's project team meetings;
- Joint dissemination activities.

(2) Technical Items:
- Compare methodologies for determining extreme flooding events;
- Applicability of INFRARISK methods to energy and Telecoms networks;
- Assess the similarities/differences between the RAIN WP5 Risk Framework and the INFRARISK WP4 Overarching Methodology;
- Identify Case study synergies/differences;
- RAIN WP7 Mitigation Strategies –Could they be integrated into INFRARISK methodology?;
- INFRARISK WP7 IDST – How could it be integrated into RAIN?;

3.2.3 User requirements for safety assessment and stress tests of non-nuclear CIs against natural hazards STREST Workshop

Date: 29th - 31st October 2014
Location: Joint Research Centre, Ispra (VA), Italy

Overview:
In order to enforce cooperation between related FP7 projects, ROD attended the one-year workshop of the STREST project which took place in the European Joint Research Centre (JRC) in Ispra, Italy between the 29th and 31st of October 2014. Entitled 'User requirements for safety assessment and stress tests of non-nuclear CIs against natural hazards', at the Joint Research Center in Ispra, Italy. Full details of the workshop can be found in Taucer & Mignan (2014).

As part of the workshop, an extensive overview of the STREST project was given with a focus on specific work packages relating to stress test design and hazard and consequence assessment. Various FP7 projects were presented at the workshop, followed by a discussion of possible synergies.

The projects presented and the name of the presenter is given in Table 2.

Project	Presenter	Organisation
ASTARTE	J. Selva,	INGV
INDUSE2	O. Bursi,	University of Trento
INFRARISK	L. Connolly	ROD
INTACT	P. Petiet	TNO
PREDICT	D. Serafin	CEA
RAIN	A. O'Connor	TCD

Table 2: FP7 Projects Presented

During the organization of the workshop the JRC dedicated considerable effort to invite Critical Infrastructure Operators and Regulators. In all, the JRC sent out more than 40 invitations covering electricity, gas, petrochemical / oil pipeline, distributed infrastructures, dams and ports CIs. Of these, very few (only two) accepted the invitation to attend the workshop.

The reasons for the low acceptance are two-fold: first, the project was not yet mature enough to provide results that would attract the interest of operators and regulators, and second, many of the operators are from the private industry, who may not want to be exposed, and openly discuss possible deficiencies in their capacity of addressing stress tests (note that one of the conditions for their participation was to collect and integrate the user requirements concerning safety assessment and stress tests of CIs).

The list of addresses used for approaching operators and regulators will be retained for the Final Workshop. At this time it is foreseen that users will have a stake in participating, as concrete results, including guidelines for stress test methodologies, will be presented, and users will see this as an advantage to them. Users should not be asked to expose their current state or approach to stress tests in their infrastructures

Coordination Opportunities:
Through the discussion which took place, a number of areas were identified where common work would be beneficial across the projects;

- Common approach to uncertainty estimation;
- Review of “good practice” in risk analysis;
- Harmonization of hazard indicators and risk metrics;
- Wider involvement of stakeholders.

It was suggested that a panel of experts (selected from the participating projects) could assist in ensuring that the methodologies developed across the different projects are compatible (e.g., similar hazard indicators and risk metrics) and consider the possibility of applying those methodologies to other projects for tests on additional exploratory applications (e.g., same risk analyses in different test sites being part of a same critical infrastructure taxonomy). It was also suggested that, if it is found that the results/methodologies derived from different projects look different, this panel could investigate why this is the case.

While interactions between the different projects are planned to continue, it has been concluded that a coordinated support action from the European Commission would be needed for an inter-project level result, such as a harmonized taxonomy of critical infrastructures across projects (e.g., combining energy networks and transportation networks) or a common method for cascade modelling (e.g., applying to both geological and hydrological hazards).

3.2.4 FP7 Synergy Meeting - INFRARISK, STREST, RAIN, INTACT, SNOWBALL

Date: 22nd May 2015
Location: Roughan & O’ Donovan, Dublin, Ireland

Overview:
ROD organised a coordination meeting at their offices in Dublin in order to progress discussions on potential coordination activities. The meeting was attended by representatives from RAIN (in person), INTACT (via teleconference facilities) and SNOWBALL. While SNOWBALL isn’t a designated coordination project, TNO, the coordinators of INTACT recognised that there were interesting

opportunities for coordinating with that project, and as such representatives from SNOWBALL were invited to attend. Presentations were made on each project, and although representatives from STREST were not in attendance, deliverables from the SREST project which address some aspects of coordination were tabled for discussion. (Note - the SNOWBALL factsheet is also included in Appendix A).

Coordination Opportunities:

The minutes from the meeting are included in Appendix B. A particular issue raised in relation to coordination was the manner in which IP issues would be addressed. It was agreed that any IP issues would be dealt with on a case by case basis.

Further discussion took place on the idea of formally proposing a Coordinated Support Action (CSA) to the commission in order to integrate the findings of the projects. It was suggested that the goal of such a project should be to develop "Best practice Guidelines for Hazard models, Risk methodology, Cascade modelling, Stress testing and Mitigation strategies."

It was agreed that information would be shared between projects, as detailed in the minutes.

It was agreed that joint attendance at workshops/seminars would be beneficial. As such, the RAIN coordinators will invite other project representatives to participate in their workshop on modelling on November 9th & 10th in Dublin.

The possibility of having a joint final event (if final conferences/workshops are planned) was also discussed. The RAIN project coordinators have agreed to coordinate the idea of a joint dissemination event for projects that are interested. The INFRARISK project has a final conference organised but due to the staggered start dates of the various projects this may not coincide with the completion of the other projects.

4.0 COORDINATION ACTIVITY TO DATE

In addition to the various meetings that have taken place the following is a list of some of the coordination activity that has taken place or which has been agreed upon.

4.1 Sharing of Information

Information to be exchanged includes;

- Snowball and INFRARISK have agreed to exchange information on their approaches to hazard mapping;
- RAIN will share information on their approach to hazard modelling with the other projects;
- The INFRARISK deliverable on stress testing has been made available on request;
- INTACT and RAIN agreed to exchange deliverables on mitigation strategies when they become available (INTACT Del 3.4 and RAIN Del 7.1);
- All projects have shared their work package and deliverable descriptions;
- RAIN Del 2.2 will be shared with INTACT. This may provide quite useful content to INTACT Del 3.1 database;
- Snowball and RAIN will interact to leverage the information required for their respective Finnish case studies (which may have overlap). This will start with an exchange of emails and may be followed up with a meeting in Finland;
- Snowball and RAIN agreed to share their lists of stakeholders;
- INTACT deliverable D1.1 (concerning state of the art, gaps, and taxonomy and guidance parameters) has been shared with INFRARISK;
- INFRARISK and RAIN have collaborated on their approaches to risk modelling. This approach will be provided to the other projects on request;
- Each project website contains links to the other project websites.
- INFRARISK has provided RAIN with its terminology document.

A Dropbox folder has been established to facilitate exchange of information.

4.2 Joint Conference/Workshops

- RAIN coordinators invited other project representatives to participate in their workshop on modelling on November 9th & 10th in Dublin.

- A request for a special session, attended by the RAIN, INFRARISK, INTACT and SREST was made by ROD to the organisers of the TRA 2016 conference (http://www.traconference.eu/). All projects have had their abstracts accepted but we are still waiting a decision on whether the request has been approved. It is not expected that we will receive notification until November 2015 (Month 26). In parallel with this approach, another avenue is being explored in an attempt to have a special session at the TRA conference through Dragados who are involved in INTACT, RAIN and INFRARISK. Dragados are a member of the programme committee (PA) and the management committee (MC) of TRA 2016.

- TNO (coordinators of INTACT) is looking at the possibility of organizing a special session at the Flood Risk conference (http://floodrisk2016.net/) taking place in Lyon, France in October 2016.

- The FP7 projects that were invited to the 1st STREST Workshop will also be invited to the Final Workshop, with the objective of presenting the results and outcomes of interactions with STREST.

5.0 POTENTIAL COORDINATION ACTIVITY

5.1 Coordinated Support Action

At the initial coordination meeting in Brussels and the coordination meeting in Dublin, further discussion took place on the idea of formally proposing a Coordinated Support Action (CSA) to the commission in order to integrate the findings of the projects and achieve results at inter project level, such as a harmonized taxonomy across projects of critical infrastructures (e.g. combining energy networks and transportation networks) or a common method for cascade modelling (e.g. applied to both geological and hydrological hazards).

It was suggested that the goal of such a project should be to develop “Best practice Guidelines for Hazard models, Risk methodology, Cascade modelling, Stress testing and Mitigation strategies.” STREST Coordinators, ETHZ are planning to issue a letter to the European commission to outline the possible synergies discussed.

5.2 Coordinated Reports

It is planned towards the end of the project to provide common statements and recommendations, from INFRARISK and STREST, relating to the understanding of what CI’s are, what stress tests are and how these can contribute to improved hazard/risk assessment tools;

Equally, as earthquakes and floods are common to both INFRARISK and STREST, it is possible to provide a report outlining the possible lessons learned /guidance that could be highlighted to stakeholders/CI’s managers or operators.

6.0 CONCLUSION

This report provides an overview of the various coordination activities that have taken place between the INFRARISK, RAIN INTACT and SNOWBALL projects. While a variety of areas for coordination has been identified, it is not feasible, within the duration of the projects, to address all potential areas of coordination. This is further complicated by the staggered start times and completion times of the projects and the agreed deliverables, budget and programmes within each project. The most efficient means of coordination is likely to be achieved through project attendance at joint workshops or special sessions, however it could be possible for the INFRARISK and STREST projects to prepare some coordinated reports towards the end of the projects. Equally, a proposal is being prepared to be sent to the commission for a CSA in order to integrate the findings of the projects and achieve results at inter-project level.

7.0 REFERENCES

Taucer, F. & Mignan, A. (2014), "STREST – Report on user requirements from potential stakeholders", Joint Research Center Technical Reports, 2014, doi:10.2788/994346 & STREST Deliverable Report D7.4

The United Nations Office for Disaster Risk Reduction (2015) 'The Sendai Framework for Disaster Risk Reduction 2015-2030', March, 2015

APPENDIX A: PROJECT FACTSHEETS

Natural Hazards

INFRARISK

The challenge

Extreme, low probability, natural hazard events have threatened and damaged many different regions across Europe and worldwide. These events, whilst being extremely rare, can have a devastating impact on critical infrastructure (CI) systems. The INFRARISK vision is to develop reliable stress tests to establish the resilience of European CI to rare low frequency extreme events and to aid decision making in the long term regarding robust infrastructure development and protection of existing infrastructure.

Project Objectives

The core objective of the INFRARISK project is to develop a stress test framework to tackle the coupled impacts of natural hazards on interdependent infrastructure networks through:

-Identifying rare low-frequency natural hazard events, which have the potential to have extreme impacts on critical infrastructure.

-Developing a stress test structure for specific natural hazards on CI networks and a framework for linear infrastructure systems with wider extents and many nodal points (roads, highways and railroads), though it is anticipated the outputs can be applied across a variety of networks (e.g telecom, energy).

-An integrated approach to hazard assessment considering the interdependencies of infrastructure networks, the correlated nature of natural hazards, cascading hazards and cascading effects, and spatial and temporal vulnerability.

-Facilitate implementation through the development of GIS based and web based stress test algorithms for complex infrastructure networks.

-Testing the framework developed through simulation of complex, case studies.

-Exploitation strategies aimed at disseminating the 'knowledge' and not just the results (e.g training courses to industry, academic and media parties).

At a glance

Title:

Novel Indicators for identifying critical INFRAstructure at RISK from natural hazards - INFRARISK

Instrument:

Collaborative project FP7

Total Cost:

3 658 480.80 €

EC Contribution:

2 802 336.35 €

Duration:

36 months

Start Date:

1 October 2013

Consortium:

11 partners from 7 countries

Project Coordinator:

Prof. Eugene O' Brien, ROUGHAN & O'DONOVAN LIMITED Dublin, IRELAND

Project Web Site:

www.infrarisk-fp7.eu

Key Words:

Environment, Earthquake, Flooding, Landslide, Drought, Hazard Identification, High Impact Low Probability Events, Risk Analysis, Uncertainty Modelling, Multi-Hazard/Scenario Risk Assessment, Risk Mitigation, Cascading Effects, Interdependencies, Operational Analysis Framework, Harmonisation, Implementation

Research and Innovation

Methodology

The methodological core of the project is based on the establishment of an ''overarching methodology'', to evaluate the risks associated with multiple infrastructure networks for various hazards with spatial and temporal correlation. Interdependnancy will be formalised and damage will be defined in terms of capacity decrements. This will be the basis for the development of stress tests for multi-risk scenarios and will define the general framework, providing a tool for decision making based on the outcome of the stress test. The overarching methodology will capture and incorporate, into a GIS platform, outputs from an extensive profiling of natural hazards and infrastructure, and analysis of single event risk for multiple hazards and space-time variability of a CI network. An INFRARISK strategic decision support tool will be developed to ensure network models and stress test procedures are integrated and used under specific process workflows and modules. Further application to selected case studies to verify the modelling techniques and procedures developed in INFRARISK will be carried out. Dissemination, as a crucial aspect of the project, will involve several target levels developing focused materials and products to reach the widest audience possible including the formulation of specialised training courses.

Expected Results

-Reliable stress test procedures expanded and adapted to land-based CI leading to resilient infrastructure networks to rare and low probability extreme events.
-Decision making approaches for better protection of existing infrastructure while achieving more robust strategies for the development of new ones.
-Integrated risk mitigation scenarios and strategies using local, national and pan-European infrastructure risk analysis methodologies taking into consideration multiple hazards and risks with cascading impact assessments.
-Robust modelling of spatio-temporal processes with propagated dynamic uncertainties in multiple risk complexity scenarios of Known Unknowns and Unknown Unknowns.
-Operational framework with cascading hazards, impacts and dependent geospatial vulnerabilities and practical software tools and guidelines to provide greater support to the next generation of European infrastructure managers.
-Collaborative integrated platform where risk management professionals access and share data, information and risk scenarios results efficiently and intuitively.

Project Partners	Country
ROUGHAN & O'DONOVAN LIMITED	IE
EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZURICH	(Switzerland) CH
DRAGADOS SA	ES
GAVIN AND DOHERTY GEOSOLUTIONS LTD	IE
PROBABILISTIC SOLUTIONS CONSULT AND TRAINING	NL
AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS	ES
UNIVERSITY COLLEGE LONDON	GB
PRAK PETER LEONARD	NL
STIFTELSEN SINTEF	(Norway) NO
RITCHEY CONSULTING AB	SE
UNIVERSITY OF SOUTHAMPTON	GB

Natural Hazards

STREST

At a glance

Title:

Harmonized approach to stress tests for critical infrastructures against natural hazards

Instrument:

FP7 - Collaborative Project

Total Cost:

3,975,006.00 €

EC Contribution:

3,000,000.00 €

Duration:

3 years (2013-2016)

Start Date:

01 October 2013

Consortium:

12 partners from 8 countries

Project Coordinator:

Prof. Domenico Giardini, ETH Zurich, Switzerland

Project Web Site:

http://www.strest-eu.org

Key Words:

Critical infrastructures, natural hazards, low probability high consequence events, disaster risk reduction, mitigation & adaptation, hazard & risk assessment, societal resilience, stress tests

The challenge

Critical Infrastructures (CIs) provide essential goods and services for modern society; they are highly integrated and have growing mutual dependencies. Recent natural events have shown that cascading failures of CIs have the potential for multi-infrastructure collapse and widespread societal and economic consequences. Moving toward a safer and more resilient society requires improved and standardized tools for hazard and risk assessment of low probability-high consequence (LP-HC) events, and their systematic application to whole classes of CIs, targeting integrated risk mitigation strategies. Among the most important assessment tools are the stress tests, designed to test the vulnerability and resilience of individual CIs and infrastructure systems. Following the results of the stress tests recently performed by the EC for the European Nuclear Power Plants, it is urgent to carry out appropriate stress tests for all other classes of CIs.

Project Objectives

- Establish a common and consistent taxonomy of non-nuclear CIs;

- Develop a rigorous, consistent modelling approach to hazard, vulnerability, risk and resilience assessment of LP-HC events;

- Design a stress test framework and specific applications to address the vulnerability, resilience and interdependencies of CIs;

- Enable the implementation of European policies for the systematic implementation of stress tests.

Methodology

STREST focuses on earthquakes, tsunamis, geotechnical effects and floods, and on three principal CI classes: (a) individual, single-site, high risk infrastructures, (b) distributed and/or

geographically extended infrastructures with potentially high economic and environmental impact, and (c) distributed, multiple-site infrastructures with low individual impact but large collective impact or dependencies.
STREST works with key European CIs, to test and apply the developed stress test methodologies to specific CIs, chosen to typify general classes of CIs.

Expected Results

- Methods to harmonize the treatment of uncertainties and the mechanics of hazard assessment, with focus on the quantification of epistemic uncertainties and its effects on LP-HC hazard, the integration of regional versus site-specific hazards and near-source effects;

- Consistent quantification of the occurrence of LP-HC events (extremes, cascading effects) and schemes to introduce them in hazard and risk evaluations;

- Definition of appropriate measures to express aggregated probabilities of exceeding limit values across an extended footprint, taking into account the spatial correlation characteristics;

- Consistent taxonomy of different classes of CIs, to classify them in terms of common characteristics of vulnerability, possible consequences and resilience;

- Probabilistic models for the vulnerability and consequence assessment, designed to enable transferring from hazard to risk and evaluating the consequences of system failures extending much beyond direct damages to equipment and structures, involving cascading effects;

- Improvement of the present understanding and assessment of losses and resilience, at the level of single CI, CI system or society;

- Probabilistic structural and systemic performance models (stress tests) to determine the losses in CIs, and their susceptibility to cascading effects that may amplify these losses, as well as interdependencies among different CIs;

- European Reference Reports concerning the assessment and protection of CIs;

- Interactions with practitioners via the involvement of CI owners and stakeholder workshops.

Project Partners	Country
Eidgenoessische Technische Hochschule Zurich	CH
École Polytechnique Fédérale de Lausanne	CH
Basler & Hofmann AG, Ingenieure Und Planer	CH
Centro Europeo di Formazione e Ricerca in Ingegneria Sismica	IT
AMRA - Analisi e Monitoraggio del Rischio Ambientale SCARL	IT
Istituto Nazionale di Geofisica e Vulcanologia	IT
Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek - TNO	NL
Université Joseph Fourier Grenoble 1	FR
Aristotelio Panepistimio Thessalonikis	GR
Bogazici Universitesi	TR
Univerza v Ljubljani	SI
JRC -Joint Research Centre- European Commission	BE

Security

RAIN

At a glance

Title: Risk Analysis of Infrastructure Networks in Response to Extreme Weather (RAIN)

Instrument: CP [SEC-2103.2.1-2]

Total Cost: €4,771,603

EC Contribution: €3,493,600

Duration: 36 Months

Start Date: 1st May 2014

Consortium:

Project Coordinator: Prof. Alan O'Connor, Trinity College Dublin

Project Partners:

ESSL, UNIZA, TU-Delft, GDG, DAS,FU Berlin, ROD, HI, ISIG, PSJ, FMI, Youris.com, UFD, AIA

Project Web Site: TBA

Key Words: Risk Analysis, Infrastructure, Extreme Weather

The challenge

In recent years, a variety of extreme weather events, including droughts, rain induced landslides, river floods, winter storms, wildfire, and hurricanes, have threatened and damaged many different regions across Europe and worldwide. These events can have a devastating impact on critical infrastructure systems.

Project Objectives

The RAIN objective is to develop a systematic risk management framework that explicitly considers the impacts of extreme weather events on critical infrastructure and develops a series of mitigation tools to enhance the security of the pan-European infrastructure network.

Methodology

The project will quantify the complex interactions between weather events and land based infrastructure systems. Transport, energy and telecommunications infrastructure will all be considered and risk mitigation strategies will be developed.

Expected Results

The outputs of RAIN will aid decision making in the long term, securing new robust infrastructure development and protection of existing infrastructure against changing climates and increasingly more unpredictable weather patterns.

RAIN Concept

The recent extreme weather events in Europe and around the world have thrown the organisation and management of critical infrastructures into chaos. This chaos is a product of uncertainty and a lack of information on how the infrastructures we take for granted in our daily lives, will manage with these extreme events. The existence of chaos and uncertainty in these situations can result in disruptions to transport, power outages and in the most extreme instances loss of life. In the recent past Europe and the rest of the world has seen extreme events often called "100 year events" happening with alarming frequency. We are posed with a significant challenge to meet the changing environments we live in.

The RAIN consortium brings together experts from transportation, energy, risk assessment, climate prediction, social sciences, engineering and telecommunications with the goal of predicting how extreme weather events will impact upon critical European infrastructure networks collectively. The consortium also draws from a cross-section of research institutes, universities, small and large companies and utility providers, all of whom are engaged in the delivery of improved research methods and standards for critical infrastructure provision.

One of the key components of the RAIN project will be to consider the citizen. The citizen is the most important consideration in an extreme event. The RAIN approach puts the societal impacts of infrastructure failures in extreme weather events at the heart of the approach and develops the risk mitigation strategies to minimise the risks of loss of life and disruption to quality of life.

The RAIN approach will minimise the risk of chaos in extreme weather events by predicting, using the most advanced statistical methods, how both weather patterns are likely to emerge and then how our infrastructures will react under these events. The RAIN approach will show how reducing uncertainty and considering the impacts of society can yield significant economic, social and humanitarian benefits.

Project Partners	
Trinity College Dublin	PSJ
European Severe Storms Laboratory	Ilmatieteen Laitos
Zilinska Univerzita V Ziline	Youris.com
Technische Universiteit Delft	Union Fenosa Distribucion SA
Gavin Doherty Geotechnics	Aplicaciones en Informatica Avanzada S.L.
Dragados SA	
Freie Universitaet Berlin	
Roughan O'Donovan	
Hellenberg International OY	
Istituto di Sociologia Internazionale di Gorizia	

Security

INTACT

At a glance

Title:

On the Impact of Extreme Weather on Critical Infrastructures

Instrument:

FP7-SEC-2013-1,

Capability project

Total Cost:

€ 4,390,414.07

EC Contribution:

€ 3,445,518.92

Duration:

36 Months

Start Date:

2014-05-01

Consortium:

12 partners:

TNO, CMCC, DELTARES, FAC, DRAGADOS, HRW, PANTEIA, NGI, CSIC, UNU-EHS, ULSTER, VTT

Project Coordinator:

Peter Petiet, TNO

Project Web Site:

not yet available

Key Words:

extreme weather, climate parameters, critical infrastructure, resilience enhancement, risk-based techniques, CI design, cost benefit analysis, crisis response, vulnerability assessment

The challenge

Resilience of Critical Infrastructure (CI) to Extreme Weather Events (EWE) is one of the most demanding challenges for both government and society. CI are especially sensitive to EWE. The economic and societal relevance of the dependability and resilience of CI is obvious: infrastructure malfunctioning and outages can have far reaching consequences and impacts. The increased frequency and intensity of EW can cause events such as flooding, drought, ice formation, wild fires etc. which present a range of complex challenges to the operational resilience of CI. Central is the identification of which components and elements of CI are most critical, and how resilient they are to stochastic and transient EWE and patterns.

Project Objectives

To meet the challenges posed by the Call Topic the objectives of the INTACT project are to:

- assess regionally differentiated risk throughout Europe associated with extreme weather;
- identify and classify on a Europe wide basis CI and to assess the resilience of such CI to the impact of EWE;
- raise awareness of decision-makers and CI operators about the challenges (current and future) EW conditions may pose to their CI; and,
- identify potential measures and technologies to consider and implement, be it for planning, designing and protecting CI or for effectively preparing for crisis response and recover;

INTACT

Methodology

To achieve the objectives the INTACT project will:

- Collect and analyse trends, patterns and tendencies in Extreme Weather: based on recent historical trends and data, extrapolations and future scenarios for various climate/EW types will be evaluated.
- Assess the risk and vulnerability of CI due to extreme weather: based on historical incidents (worldwide) for various CI an assessment will be made of future vulnerabilities due to EWE.
- Develop a methodology and tools for risk management: bring together models and tools to support decision-making for long term planning and design, and/or for crisis management, preparation, crisis response and recovery.
- Collect, assess, augment, and disseminate best practices and measures to reduce risk: based on recent experiences and applications while identifying current innovative and/or new technology.
- Bring together the stakeholders from the various domains: climate researchers, meteorologists, engineers, first responders and crisis response organisations with CI owners and operators convene in workshops and case studies.
- Apply and demonstrate to stakeholders the potential of the INTACT methodology for a selected set of case studies: throughout Europe and for different regional settings and EW conditions.
- Develop the INTACT Reference Guide (IRG), based on generalised/ specific datasets, scenarios and simulations integrated within the different activities of the project.

Expected Results

The INTACT project will make a significant and unique contribution to the understanding of how to protect CI against EWE and improve preparedness for crisis response and recovery operations. In short, INTACT brings value added to:

- (Public and Private) Policy planners: to improve their decision-making when taking measures to protect CI against current and future EWE.
- Critical Infrastructure Operators: to improve their awareness, preventive actions, response and recovery options for future EWE and the potential impact to their CI.
- Academia and Scientists: to stimulate a multidisciplinary approach and to create new methodologies and technologies to reduce the vulnerability of CI and to mitigate EW effects.
- Societal: to improve both the decision-making in where and how to reduce vulnerabilities and so to further safeguard the security of Europe's citizens and Europe's economy.

Project Partners	
The Netherlands Organisation for Applied Scientific Research – TNO (TNO, NLD)	PANTEIA B.V. (PANTEIA, NLD)
Centro Euro-Mediterraneo sui cambiamenti climatici S.c.a.r.l. (CMCC, ITA)	The Norwegian Geotechnical Institute (NGI, NOR)
Stichting DELTARES (DELTARES, NLD) DELTARES	Agencia Estatal Consejo Superior de Investigaciones Cientificas CSIC (CSIC, ESP)
Future Analytics Consulting Limited (FAC, IRE)	United Nations University Institute for Environment and Human Security (UNU-EHS, GER)
DRAGADOS SA (DRAGADOS, ESP)	University of Ulster (ULSTER, UK)
HR Wallingford LTD (HRW, UK)	VTT Technical research centre of Finland (VTT, FIN)

European Commission

Security

Snowball

At a glance

Title: Lower the impact of aggravating factors in crisis situations thanks to adaptative foresight and decision-support tools

Instrument: Small or medium scale focused research actions

Total Cost: 5,205,927 €

EC Contribution: 3,882,462.70 €

Duration: 3 years

Start Date: 1st March 2014

Consortium: 11

Project Coordinator: Gedicom

Project Web Site: www.snowball-project.eu

Key Words: Crisis management; Cascading effects; Human Behavior; Emergency Alert system; Crisis management Dashboard; Agent-based simulation; Multi-hazard assessment; Web 2.0; First responders

The challenge

In the context of hyper-connected societies - where networks of all sorts are intertwined – with population densities growing everyday, it is necessary to better understand the cascading effects at play in a crisis.

Project Objectives

The overall objective of the project is to increase the preparedness of the European Union in respect to hazards that could amplify a large crisis. In the framework of SnowBall project, a dedicated tool will be developed in order to:

1. Apprehend and better predict and simulate the cascading effects that occur in a crisis;
2. Integrate population response and behaviour to the simulation tools;
3. Provide decision support to public authorities and decision makers in the light of cascading effects simulations;
4. Test the efficiency of the tool in the frame of various demonstrations.

Methodology

To develop the platform dedicated to monitoring the crisis and predicting the cascading effects that might occur, Snowball will analyse the needs and the practices of potential end-users (decision makers, goverments...). A extensive study of previous crisis and the events which occurred and which amplified the its impact will also be carried out, to determine a road map for forecasting cascading effects.

On the basis of these two studies, the Snowball project will determine the necessary data to be fed into the tool, the links between crisis events and how they can be predicted.

Expected Results

- A methodology for apprehending cascading effects adaptable to different levels of data availability.
- A platform for assessing a crisis, predicting cascading effects, simulating the evolution, displaying the events and providing a decision support.

Research Executive Agency

Project Partners	
GEDICOM	STE GENERALE DE DISTRIBUTION ET DE COMMUNICATION - GE DI COM
Fraunhofer	FRAUNHOFER-GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V
ISMB	ISTITUTO SUPERIORE MARIO BOELLA SULLE TECNOLOGIE DELL'INFORMAZIONE E DELLE TELECOMUNICAZIONI
LUPT-PLINIVS	UNIVERSITA DEGLI STUDI DI NAPOLI FEDERICO II.
EMAUG	ERNST-MORITZ-ARNDT-UNIVERSITÄT GREIFSWALD
UCL	UNIVERSITE CATHOLIQUE DE LOUVAIN
INEO E&S	INEO ENGINEERING & SYSTEMS SNC
SZKOLA GLOWNA SLUZBY	SZKOLA GLOWNA SLUZBY POZARNICZEJ
SGSP	Pelastusopisto, Emergency Services College
EP	EVROPROJECT OOD
HRC	MAGYAR VOROSKERESZT TARSADALMI SZERVEZET

APPENDIX B: MEETING MINUTES & ASSOCIATED DOCUMENTS

List of participants/Meeting on 25/06/2014, REA, Brussels

Synergies between FP7 projects related to critical infrastructure protection against natural hazards and cascading effects in crisis situations

Name	First name	Organisation	Project	Email address
MARINO	Angelo	REA		Angelo.MARINO@ec.europa.eu
PETER	Denis	DG RTD		Denis.PETER@ec.europa.eu
QUEVAUVILLER	Philippe	DG ENTR		Philippe.QUEVAUVILLER@ec.europa.eu
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VILLETTE	Françoise	DG ENTR		Francoise.VILLETTE@ec.europa.eu
ZEIL	Peter	DG ENTR		Peter.ZEIL@ec.europa.eu
GOULART	Margarida	JRC		Margarida.GOULART@ec.europa.eu
GONCALVES	Mariana	JRC		Mariana.GONCALVES@ec.europa.eu
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BOWER	Andrew	DG ECHO		Andrew.BOWER@ext.ec.europa.eu
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MISSOWEIT	Merle	ATOS	DRIVER	merle.missoweit@int.fraunhofer.de
HEMPEL	Leon	TU Berlin	FORTRESS (COO)	hempel@ztg.tu-berlin.de
O' BRIEN	Eugene	Roughan & O'Donovan	INFRARISK (COO)	eugene.obrien@rod.ie
SCHOEMAKER	Jarl	PANTEIA	INTACT	j.schoemaker@panteia.nl
PETIET	Peter	TNO	INTACT (COO)	peter.petiet@tno.nl
SERAFIN	Dominique	CEA	PREDICT (COO)	dominique.serafin@cea.fr
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DE MAUPEOU	Martin	CEIS	PREDICT	mdemaupeou@ceis-strat.com
O'CONNOR	Alan	Trinity College Dublin	RAIN (COO)	OCONNOAJ@tcd.ie
GASPARINI	Paolo	AMRA	REAKT (COO)	paolo.gasparini@na.infn.it
BRUMA	Jean	GEDICOM	SNOWBALL (COO)	jbruma@gedicom.fr
MARINOVA	Teodora	GEDICOM	SNOWBALL	teodora.marinova@europroject.bg
GIBOUIN	Stéphane	GEDICOM	SNOWBALL	sgibouin@gedicom.fr
MAHDAOUI	Sabri	GEDICOM	SNOWBALL	sabri.mahdaoui@europroject.bg
GIARDINI	Domenico	ETHZ	STREST (COO)	domenico.giardini@erdw.ethz.ch
MIGNAN	Arnaud	ETHZ	STREST	arnaud.mignan@sed.ethz.ch

Synergies between FP7-projects related to critical infrastructure protection against natural hazards and cascading effects in crisis situations

Conclusions

The meeting held at the REA premises on 25 June 2014 was the starting point of a top-down initiative, directly deriving from the 2013 FP7 Security and Environment Work Programmes, to get deeper knowledge on research activities in similar areas and to the launch of a coordination mechanism that will foster synergies between all invited projects. Its main purpose was to define the frame for future work to ensure a win-win approach for all projects involved.

All participants clearly expressed a strong interest and support to the organisation of this initiative. The Policy DGs from the European Commission represented in the meeting recalled that such cooperation was highly welcome as legislation and policy need to be supported by scientific evidence.

Furthermore, there was an overall consensus that the coordination between projects should follow a bottom-up, iterative and flexible process.

Following the suggestions from the projects as well as from the project officers, **three categories of possible actions were identified**:

(1) Collaboration during the development of concepts, methodologies, tools

- Establishment of a shared understanding on terminology/taxonomy
- Creation of a repository for data and information exchange between projects
- Discussions on complementarities between different methodologies (e.g. on topics such as multi-risk assessment, uncertainty and time-dependency, human behaviour)
- Optimise cooperation through common partners
- Explore the possibility of linkages between different tools (e.g. coupled modules built upon open source systems)
- Define synergies according to types of infrastructure/hazard (e.g. case studies on nuclear plants)

(2) Validation of models and tools

- Explore the possibility of parallel or joint case studies/ demonstration events, with a large scale/cross border perspective
- Discussions on issues such as interaction/compatibility with legacy systems and interoperability of data (INSPIRE)
- Foster networking among the different advisory boards and end user communities

(3) Dissemination of results

- Joint workshops with stakeholders
- Joint articles and publications
- Creation of a web portal dedicated to the dissemination of results
- Organisation of joint final conferences and other awareness-raising activities

- Exchanges on best practices, guidelines and policy recommendations
- A report compiling key project outcomes that could be published by the European Commission

In addition to this list of indicative actions, the table presented in Annex recaps the priorities put forward by each project during the meeting.

The project officers underlined that sharing efforts in terms of bibliographical analysis, state-of-the-art definition and policy output is a first and concrete example of possible collaboration which could save resources and enhance the projects' impact at the same time.
A certain degree of flexibility as regards the current Description of Works (DoWs) will be granted in order to accommodate changes deemed necessary in order to implement the coordination mechanism, including possible amendments. The changes to be proposed by the project coordinators should be discussed with their respective project officers in due time.
It was also reminded to the coordinators that the implementation of the coordination between projects will be specifically in the scope of the reviews to ensure a proper monitoring, project by project.

The initiative is now on the side of the project coordinators, trusting that relevant links can be established. As a first step, relevant information from the DoWs can already be shared between projects in order to exchange views and determine where convergence or synergy could be fostered. Whenever relevant the Commission services will share new information that can be useful for the projects (always taking into consideration confidentiality matters).

Besides, the colleagues from the Joint Research Center present in the meeting proposed their support (in this case expertise and experience mainly in CBRN) around this initiative. The contact person is: Margarida Goulart (Margarida.GOULART@ec.europa.eu). Other expertise related to critical infrastructures exists as well available at the Joint Research Center (*cf.* the JRC partner in STREST project).

A follow-up meeting will be convened in the first half of 2015, in Brussels. Presentation of key interim results from the projects, e.g. in parallel sessions, can be envisaged.

Annex: Priorities for the next steps

Acronym	Topic	Coordinator	Actions
REAKT	ENV.2011.1.3.1-1	paolo.gasparini@na.infn.it	- Information to be sent to all projects on final project conference - Information on access to project results that can be shared with other projects
CRISMA	SEC-2011.4.1-1	anna-mari.heikkila@vtt.fi	- Emphasis on coordination through common partners
INFRARISK	ENV.2013.6.4-4	eugene.obrien@rod.ie	- Focus on synergies related to the Case Studies
STREST	ENV.2013.6.4-4	domenico.giardini@erdw.ethz.ch	- Joint approach toward stakeholders - Joint approach toward a single taxonomy? - Cooperation favoured with "physically oriented" projects; need of reflexion on future clustering mechanism with more dedicated support.
INTACT	SEC.2013.2.1-2	peter.petiet@tno.nl	- Sharing information from the DoWs - Sharing results such as: templates for critical infrastructure incidents, vulnerability indicators, - Joint approach toward stakeholders
RAIN	SEC.2013.2.1-2	OCONNOAJ@tcd.ie	- Get into more details to avoid duplication of work
SnowBall	SEC-2013.4.1-2	jbruma@gedicom.fr	- Areas for cooperation should be identified, also at the partner level (e.g. Human factors modelling) - Virtual meetings should be set up to allow in-depth discussions
CascEff	SEC-2013.4.1-2	Anders.Lonnermark@sp.se	- Strong interest in a common approach for terminology - Select specific projects for which a closer cooperation will be fostered
FORTRESS	SEC-2013.4.1-2	hempel@ztg.tu-berlin.de	- Areas for closer cooperation and important issues (e.g. INSPIRE, protocols) should be identified
PREDICT	SEC-2013.4.1-2	dominique.serafin@cea.fr	- The coordinator (absent) will check possible ways/areas for cooperation - Possibility to organise joint workshops with end users
DRIVER	SEC-2013.4.1-1	fernando.kraus@atos.net	- Introduction of the concept of "Shared tasks" - A joint "push" for standardisation activities - Sharing information on Advisory Board members/End Users - Organising back-to-back events to spare resources

Issue Date - 26/06/2015

FP7 Synergy Meeting - INFRARISK, STREST, RAIN, INTACT, SNOWBALL	
Date of Meeting:	22nd May, 2015
Location:	Roughan O'Donovan, Dublin, Ireland
Attendance:	**NFRARISK:** Eugene Obrien (EOB), Robert Corbally (RC) **RAIN:** Alan O'Connor (AOC), Maria Nogal (MN), Donya Hajializadeh (DH) **Snowball:** Sabri Mahdaoui (SM) **INTACT:** Albert Nieuwenhuijs (AN) (by Skype), Peter Petiet (PP) (by Skype)
Apologies:	**STREST:** Giardini Domenico (GD), Arnaud Mignan (AM), Mark Tucker (MT)
Prepared by:	Eugene O' Brien (EOB)

Item	Description	ACTION
1.	Presentations were made on the INTACT, RAIN, Snowball and INFRARISK projects. A report on the STREST project was circulated.	
2.	**Intellectual Property:** It was agreed that, as no joint research will be conducted, any IP issues would be dealt with on a case by case basis.	
3	**Proposal for a future Coordination/Support Action (CSA):** It was noted that Giardini Domenico (GD) has volunteered to send a letter to the Commission to formally propose a CSA to integrate the findings of the projects. It was suggested that the goal of such a project should be: • Best practice Guidelines for Hazard models, Risk methodology, Cascade modelling, Stress testing and Mitigation strategies. MT will follow up to determine when the letter will be sent.	**GD** **MT**
4.	Snowball and INFRARISK agreed to exchange information on their approaches to hazard mapping.	
5.	RAIN will invite other project representatives to participate in their workshop on modelling on November 9th & 10th in Dublin	**MN**
6.	RAIN will share information on their approach to hazard modelling with the other projects.	**MN**
7.	INFRARISK and RAIN have collaborated on their approaches to risk modelling. This approach will be provided to the other projects on request.	
8.	The INFRARISK deliverable on stress testing is available on request.	
9.	INTACT and RAIN agreed to exchange deliverables on mitigation strategies when they become available (INTACT Del 3.4 and RAIN Del 7.1).	**AN and AOC**
10.	Agreed to establish a Dropbox folder where information can be easily exchanged. RC will establish it and will include a brief 'readme' file explaining that the data on the site is available to the 5 participating projects (only) and should not be circulated outside the partners of these projects. Note: Dropbox folder has since been set up - https://www.dropbox.com/home/EU%20FP7%20Coordination	**RC**
11.	Agreed that all projects should make available their work package and deliverable descriptions. These should be uploaded to the dropbox folder as in item 10 above	**All**
12.	Snowball and RAIN will interact to leverage the information required for their respective Finnish case studies (which may have overlap). This will start with an exchange of emails and may be followed up with a meeting in Finland.	**AOC, SM**
13.	RAIN Del 2.2 will be shared with INTACT. This may provide quite useful content to INTACT Del 3.1 database.	**MN**

14.	Snowball and RAIN agreed to share their lists of stakeholders.	**SM/ AOC**
15.	As there is no word on the status of the proposed joint session at TRA 2016, it was agreed to propose a joint session at the Flood Risk conference in Lyon in October 2016 (www.floodrisk2016.net). PP will propose the idea to the conference organisers. Post meeting note - TRA 16 decision on special session is pending	**PP**
16.	PP will also prepare an overview paper for this session, outlining the purpose and need for all 5 projects.	**PP**
17.	Youris, dissemination partner in the RAIN project, will follow up to ensure that all project websites have links to all other project websites.	**MN**
18.	Agreed that there would be benefit of having a joint final event (if final conferences/workshops are planned). RAIN will coordinate the idea of a joint dissemination event for projects that are interested in that. INFRARISK has a final conference organised but this may not coincide with other projects due to staggered starts	**AOC**
19	Info on seismic hazard modelling to be shared with CSIC - from Snowball Action on ROD to ask CSIC to share info with SNOWBALL	**ROD**
20	TNO to send INFRARISK the INTACT deliverable D1.1 (concerning state of the art, gaps, taxonomy and guidance parameters). Post meeting note - document received	**TNO**