



This project has received funding from the *European Union's Horizon 2020 research and innovation programme* under grant agreement No 700342.

Topic: DRS-10-2015: Disaster Resilience & Climate Change topic 2: Natural Hazards: Towards risk reduction science and innovation plans at national and European level

Project number: 700342

Project name: *Enhancing Synergies for disaster Prevention in the EurOpean Union*

Project acronym: ESPREssO

Start date: 01/05/2016

Duration: 30 months

Deliverable reference number and title:

D3.1 Reference scenarios according to the project challenges

Version: 1

Due date of deliverable: 31/12/2017 Actual submission date: 31/12/2017

Dissemination Level		
PU	Public	X
CO	Confidential, only for members of the consortium (including the Commission Services)	
EU-RES	Classified Information: RESTREINT UE (Commission Decision 2005/444/EC)	
EU-CON	Classified Information: CONFIDENTIEL UE (Commission Decision 2005/444/EC)	
EU-SEC	Classified Information: SECRET UE (Commission Decision 2005/444/EC)	

Note about contributors

The following organisations contributed to the work described in this deliverable:

Lead partner responsible for the deliverable:

GeoForschungsZentrum Potsdam
Kevin Fleming

WP leader responsible for the deliverable:

Stefano Parolai (till Oct. 2017). Kevin Fleming (current)

Deliverable reviewed by:

Mattia Leone (AMRA)
Annegret Thieken (University of Potsdam)
Lynn Schueller (DKKV)

Authorized by:

Giulio Zuccaro (AMRA)

Other contributors:

Bojana Petrovic and Massimiliano Pittore (GFZ)
Jaime Abad (BRGM)
Lynn Schueller and Sina Marx (DKKV)
Laura Booth and Anna Scolobig (ETHZ)
Giulio Zuccaro and Mattia Leone (AMRA)

Table of Contents

Table of Contents	1
Abstract	3
1 Introduction	4
2 Scenarios and scenario analysis	6
3 Proposed scenarios	8
3.1 Challenge 1: Integrating Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) ..	8
3.2 Challenge 2: Reconciling Science and Legal/Policy issues in DRR	9
3.3 Challenge 3: National regulations for the preparation to trans-boundary crises	10
4. Closing statements.....	12
Acknowledgements.....	13
References.....	14
ANNEX I ESPRESSO Think Tank#1: Bridging DRR and CCA - Feedback Synthesis.....	15
Introduction – general observations from thematic discussion	15
CCA and DRR interface	15
General considerations from national perspectives.....	16
Role of science.....	17
Role of politics.....	17
Role of private sector / Critical Infrastructures.....	17
Role of communities	18
Research gaps and needs to bridge DRR and CCA.....	19



Abstract

The Enhancing Synergies for disaster PRevention in the EurOpean Union (ESPRESSO) project aims to develop a vision for research programs dealing with disaster risk reduction (DRR) and climate change adaptation (CCA). As part of this, the project, within Work Package 3 'Development of hazard-specific scenarios for RMS', is developing a scenario training exercise, named within the project the **Risk Assessment Model Simulation for Emergency Training Exercise (RAMSETE)**. The intended use of RAMSETE is to encourage communication between different stakeholders for the purpose of information elicitation.

This document, D3.1 'Reference scenarios according to the project challenges', will outline the scenarios that will be used when the exercise is carried out during the three Think Tanks. These Think Tanks are being held to collect information on stakeholders' needs, perspectives and priorities, and existing knowledge of legal, policy and science approaches within the context of the three ESPRESSO Challenges: (1) Integrating Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR), (2) Reconciling Science and Legal/Policy issues in DRR, and (3) National regulations for the preparation to trans-boundary crises. Therefore, each scenario set out will be dependent upon the challenge being considered in the respective Think Tank.

The aim of these exercises will be to encourage discussion amongst the participating stakeholders, the results of which will contribute to recommendations for future research activities in the implementation of more effective policies in DRR and CCA, the interaction between scientific and legal frameworks, and the better co-operation between national DRR and CCA authorities across Europe. Therefore, while some of the exercises and scenarios may have an operational element to them, in general, they will be more geared towards planning. In fact, the final outcomes, or the decisions actually made, of the exercises are not considered as important as the actual discussion surrounding the reasons for the decisions. It may therefore be described as a case where 'the journey rather than the destination' is of importance.

1 Introduction

The aim of Work Package (WP) 3 “Development of hazard-specific scenarios for RMS” involves the development of a scenario-based training tool, previously referred to within the project as the Risk Management Simulator (RMS), but has been renamed the Risk Assessment Model Simulation Emergency Training Exercise (RAMSETE). The primary purpose of this tool is for knowledge elicitation about the issues that are of concern to the ESPRESSO project. It needs to be emphasised immediately, therefore, that RAMSETE is not meant to provide “operational” scenario training in order, for example, to test procedures, but rather to identify and examine the motives behind higher-level decision making, as well as gaps and the potential for improvements in policies.

RAMSETE will build upon experience gained from a previous EC FP7 project, SENSUM* (Framework to integrate Space-based and in-situ sENSing for dynamic vUnerability and recovery Monitoring). The purpose of the scenario-training exercise developed within SENSUM was to explore the level of knowledge disaster management personnel from the test case countries (Turkey, Kyrgyzstan and Tajikistan) had about technologies such as remote sensing and GIS in pre-disaster vulnerability assessment and preparation (SENSUM, 2013a) and post-disaster recovery planning and monitoring (SENSUM, 2013b). It therefore provided a means information elicitation, for example, by identifying communications gaps and limitations inherent within their organizational structures (SENSUM, 2013a; 2013b).

In the case of ESPRESSO, RAMSETE is being developed within the context of the three ESPRESSO challenges:

- Challenge 1: Integrating Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR).
- Challenge 2: Reconciling Science and Legal/Policy issues in DRR.
- Challenge 3: National regulations for the preparation to trans-boundary crises.

A range of scenarios are being developed to deal with these challenges. However, as illustrated in Figure 1, this does not mean that a given scenario will be only related to one challenge. For example, a scenario may be proposed for the science vs. legal challenge which deals with the uncertainties associated with CCA and DRR. In this case, certain decisions made surrounding changing storm activity (challenge 1) based on the best available knowledge may not in fact be the correct ones, hence, who bears the responsibility for any negative consequences.

The aim of this document is to present the nature of the scenarios that are proposed, or have already been used in the exercises carried out during the Think Tank workshops, organised between WP1 and WP3. There will be three of these workshops, where a selection of stakeholders (see ESPRESSO deliverable D1.1 “Stakeholder Engagement Plan: Overview of Tools & Activities”) will participate in a RAMSETE exercise. Each Think Tank will deal with one of the challenges (the first, dealing with challenge 1, was held in October, 2017 in Berlin, Germany). The following section outlines some characteristics of scenarios and scenario analysis, including how scenarios may be classified within the context of natural hazards and risk. This is followed by a description of the scenarios themselves. We conclude with a brief description of the RAMSETE, whose final design, after all three workshops, will be reported in deliverable D3.3 “Scenario design toolbox”.

* <http://www.sensum-project.eu/de> SENSUM was supported within the FP7 funding framework of the European Commission.

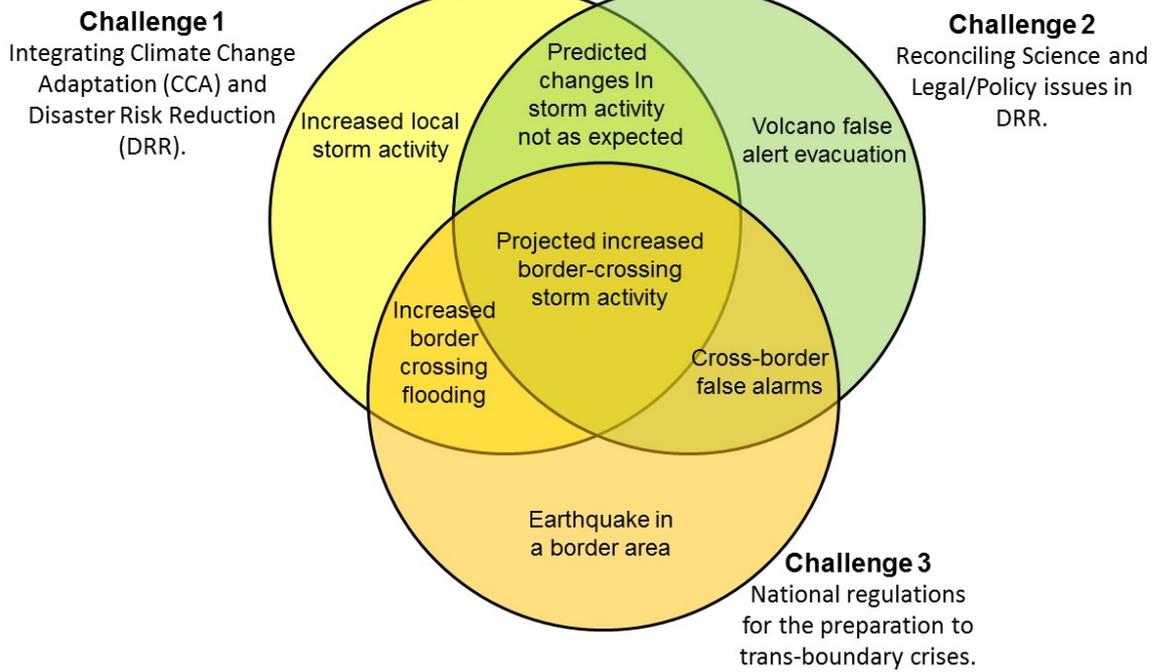


Figure 1. How selected ‘specific’ scenarios may be relevant to more than one of the ESPRESSO challenges. Note the example scenarios given here are purely for illustrative purposes, and may not be used in the RAMSETE exercises undertaken during the Think Tanks.

2 Scenarios and scenario analysis

One of the most important aspects surrounding natural hazard/risk mitigation (disaster risk reduction - DRR) and understanding and preparing for the consequences of climate change (climate change adaptation - CCA) is for the various stakeholders (e.g., civil protection practitioners, land-use planners, the insurance industry, infrastructure operators and ultimately, the general public) to communicate and exchange information with each other. This involves understanding what the main concerns and goals of each group are, and what resources (financial, knowledge, etc.) each stakeholder requires to fulfil their responsibilities. Furthermore, it needs to be considered how each sector can help and complement the others in terms of all parties achieving their aims, as well as where conflicts in their respective goals may arise, calling for the need for trade-offs between the different parties.

The need for such understanding calls for a means of eliciting knowledge from the relevant groups with regards to the issues they find relevant, and creating a forum where such information can be exchanged. One way of achieving this is via the use of **scenario training exercises**. **Scenarios** have been described as 'not a future reality, but rather a means to represent it with the aim of clarifying present actions in light of possible and desirable futures' (Durance and Godet, 2010). The development of such exercises may be divided into **scenario planning** and **scenario building**, where scenario planning refers to the overall process of proposing plausible future environments, and using these environments for learning, examining one's thinking, and testing decisions, while scenario building is the process of building up the 'story' that will form the background to the exercise (Chermak, 2004).

Scenario planning has found many uses, such as (Bradfield et al., 2005):

- crisis management, where scenarios are used as simulations to test and design responses;
- scientific communication of the complexity of scientific models, theories and results;
- public policy makers, where multiple stakeholders are brought together to ensure their involvement in policy decisions,
- professional futurist institutes that work towards analysing and disseminating results about critical trends;
- educational institutes that engage in research and development of future studies theories and methods;
- businesses, which use this as a long-term planning tool.

Considering scenario building, such exercises require a suitable 'story', i.e., a scenario to be built, that is realistic, engaging, and flexible enough to allow the participants to explore the issues being considered as openly as possible, yet with some constraints so as focus on the issue at hand. It is therefore the scenario building that will form the bulk of this document.

Of the above listed uses, public policy, scientific communication and crises management are the most relevant to the work being carried out in ESPRESSO. As we are concerned with knowledge elicitation, it may be said that ***it is not the actual decisions made during the exercise, nor the outcomes themselves, that are of interest, but rather the issues and circumstances influencing the decision-making process, as well as the fact that interactions and discussions are taking place***. One may therefore describe these exercises as cases where *'the journey is more important than the destination'*. The value of a scenario is therefore not that it can accurately describe future events or situations, but that it allows those taking part to learn and adapt to changes (Laws and McLeod, 2000).

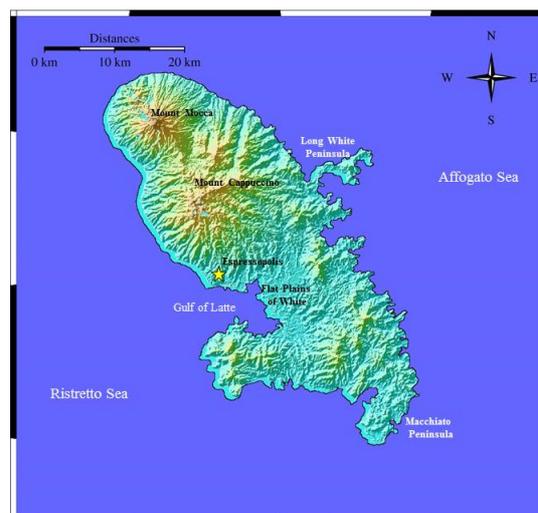
The scenarios employed in the previously mentioned SENSUM exercise had an operational element to them, specifically, a predefined seismic event, with associated secondary effects and predicted consequences, to which the participants had to respond. However, it was, as described above, ‘the journey’ that was of interest. A similar attitude forms the basis of the ESPRESSO training exercise. In this case, rather than the exercises necessarily being ‘operational’, they are **more concerned with communication between different stakeholders at ‘higher’ levels of the decision making and response hierarchy**. Communication is therefore the primary interest of the ESPRESSO exercise (outlined in detail in the following sections), where the themes of interest are in response to the issues surrounding the three ESPRESSO challenges.

3 Proposed scenarios

3.1 Challenge 1: Integrating Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR)

Challenge 1 is concerned with how there are perceived to be gaps in CCA and DRR efforts at the levels of institutions, concepts and research. When considering the scenarios for this training exercise, what had to be kept in mind was that the issue here was centred on planning, and not ‘operational’ concerns. Therefore, when this exercise was carried out at the 1st ESPRESSO Think Tank (held in Berlin on 12th October 2017), the decision was made to ‘create’ a fictitious, but realistic, island nation, the Grand Duchy of Espressoland, where the objective was to increase the well-being and social cohesion of its citizens. This must be achieved by making the best use of an allocated budget for increasing the CCA and DRR capacity of the island, which in turn required government representatives of ministries dealing with DRR (interior) and CCA (environment), as well as local government (who dealt with both) to communicate and negotiate with each other, while being advised by DRR and CCA scientists (treated separately, but with interaction encouraged). Such interactions required an investment, but the hope was that the more effective outcomes would justify such expense.

The *Grand Duchy of Espressoland* (Figure 2) is an island with a diverse geography, including coastal areas, mountains, a volcano and rivers. It is subject to multiple natural hazards, including earthquakes, volcanos, landslides, floods, and storms. While natural hazards such as earthquakes are stationary[†], the intensity and frequency of hydro-meteorological hazards (storms, floods, and, indirectly, sometimes landslides) will change over time as a result of climate change, as well as the general climate of the island. The population of this nation live in different types of buildings, mostly located in the capital Espressopolis, while there are extensive transport infrastructure (roads and bridges), basic utilities (water and power), and critical assets (hospitals, schools, fire stations). The economy of Espressoland mostly revolves around agriculture and fishing, and its currency is the Bean. It is the goal of the participants to consider DRR and CCA strategies that will lead to the (from their perspective) best outcome, meaning minimizing the negative impacts of various natural disasters while increasing social welfare and environmental conditions.



[†] Note, by stationary, we mean the probability of an earthquake of a given magnitude is independent of time.

Figure 2: The Grand Duchy of Espressoland. Note the actual scenario exercise was not meant to be ‘operational’ but was focused on ‘planning’.

Three groups, referred to as teams, played the exercise simultaneously. Each team consisted of five participants, each with their own role, namely *interior ministry*, *environmental ministry*, *local government*, and two *research*, with one each for *DRR* and *CCA*. Each role has their own *responsibilities* (a simplified representation of a stakeholder group) and *duties* (their operative capacities). During the course of the exercise, the participants were required to negotiate with each other, with the science roles advising the government officials as to the preferred actions to be made (pre-defined via a series of so-called “action cards”).

As mentioned, the object is to improve the well-being and social cohesion of Espressoland. This is measured using three metrics: *shields*, which reflect DRR capacity, *leaves*, indicating CCA capacity, and *handshakes*, indicating the social well-being and strength and whose maximizing is the final aim of the exercise. Each action will contribute (or cause a decrease) in the numbers of each metric, which will be again adjusted at the end of each round when the events of the previous round and the resulting numbers of shields, leaves or handshakes lost are determined, dependent upon the actions actually taken.

The exercise was designed to consist of the following (general) periods:

- A description was provided of a “virtual” 5 year period prior to the starting point of the exercise, where the state of Espressoland was outlined.
- This was followed by six 5-year periods[‡] (or *rounds*) of approximately 30 minutes, which were (approximately) subdivided as follows.
 - Role-dependent information was provided to the science participants and general information to the entire team (in the form of “information cards”). The budget and action cards appropriate for that round were distributed, with some time allocated to allow the participants to familiarize themselves with all cards. Then, approximately 20 minutes was spent in discussing which cards were to be used. Budget was the only limit on how many cards could be used[§]. Naturally, the budget will not permit all possible actions to be undertaken, hence, this is where the interactions between the different roles is critical.
 - At the end of the round, the cards to be used are presented and the resulting numbers of shields, leaves and handshakes determined. Then, the events that occurred during that round are presented (a series of natural disasters/extreme events outlined in “event cards”) and the numbers of shields, leaves and handshakes adjusted according to the losses endured. The remaining time was spent on the participants discussing their reasoning behind their decisions and the consequences of any actions taken within the context also of the events of that round. This segment of the exercise will be amongst the most important of the entire exercise.

Details of this version of the RAMSETE exercise will be provided in deliverable D3.3.

3.2 Challenge 2: Reconciling Science and Legal/Policy issues in DRR

Challenge 2 will be the focus of the 3rd Think Tank (expected to take place in May, 2018, in Naples, Italy). In this case, the proposed scenario (the nature of which is still being developed) will again involve

[‡] Note, during the 1st TT, only 4 rounds were played due to discussions over stepping the originally allocated times. However, this was not felt to be a problem by the ESPRESSO team as the discussions themselves were the objective of the exercise, which appeared to progress very well.

[§] There was a sequence involved in which cards could be used, with some cards requiring earlier ones to be applied.

Espressoland, but this time the scenario will involve an expected eruption of Mount Mocca (Figure 2) and the potential negative consequences. This scenario has been inspired in part by the possibility of the eruption of the Campi Flegrei caldera, within and around which the city of Naples, Italy, is built, and which has garnered a great deal of attention recently owing to several episodes of uplift since the 1950, leading to conditions that may be favourable to an eruption (Kilburn et al., 2017).

The issues that will be considered during this scenario are:

- Possibility of an eruption of Mount Mocca, potentially endangering the lives and livelihoods of the population of Espressoland.
- Will the decision be made to evacuate the area? Will it be an order, or suggestion? How will this be made?
- How much information will be issued to the public?
- How will uncertainties be catered for?
- Who will be responsible for any consequences of the evacuation (lost industrial production, possible accidents during the evacuations, mental distress, and general inconvenience) if there is no eruption?

As with the challenge 1 scenario, this exercise will not be overly concerned with operational issues (i.e., how the actual evacuation is undertaken, where are people moved to, etc.), but rather it is a case of communication between scientists who are advising the civil protection decision makers, and legal and policy makers who are responsible for dealing with the consequences of any ordered evacuation.

3.3 Challenge 3: National regulations for the preparation to trans-boundary crises

A transboundary threat is one that is characterised by its consequences covering areas that cross national boundaries. Such a crisis can escalate along both geographical and functional dimensions, which, when combined, defines the catastrophic potential (e.g., Boin and Rhinard, 2008), and therefore are of concern to challenge 3, which deals with how governments cope (or otherwise) with such situations in terms of policies and regulations. This challenge will be the background for the scenario exercise to be carried out in Zurich, Switzerland, as part of the 2nd Think Thank, on 24th January, 2018.

The scenarios employed will again be centred on an ‘invented’ landscape that is the fictitious European countries of Macchiatania and Lattestan (Figure 5). These countries share a common border and both are subjected to a range of natural hazards: earthquakes, floods, landslides, storms, as well as there being potential for NaTech events involving serious damage to industries with the resulting extensive dispersal of pollutants (both chemical and radiogenic). The participants of the exercise will therefore be tasked with responding to a series of extreme events of different types, including cascading and NaTech events that require a cross-border response. The ultimate aim is therefore to minimize the consequences of the events that have occurred by carrying out the most effective response. This will see the participants needing to cooperate with each other, their roles including governments (central and local), and NGOs and European actors (the latter in form of the European Civil Protection Mechanism, CPM). The government characters will need to interact with their counterparts in the neighbouring (and also affected) country, while the NGOs and CPM will endeavour to contribute to the situation in whatever way policy allows.

However, the actual events presented are largely irrelevant, as the issues of concern are the policies and regulations that are involved, both internally (for example, centralised versus decentralised systems) and externally (for example, agreements may or may not exist for bilateral assistance in the event of a trans-boundary disaster), as well as interactions that would arise with NGOs and the CPM. Therefore, the

regulations and policies followed by these countries will be predefined, and one of the major activities will be how the participants negotiate any changes in such policy that they believe is necessary.

Although the policies will be predefined, they will be based on realistic situations within the six countries considered within ESPRESSO (Switzerland, Italy, France, Germany, Denmark and the UK). Therefore each set of policies will be a mixture of those followed by actual countries. However, what should be emphasised is that if this exercise were to be conducted for the purpose of truly seeing how policies between two countries may be altered, it would simply be a matter of outlining the actual policies, realistic maps and event scenarios, and conduct the exercise in the same manner as the one described above.

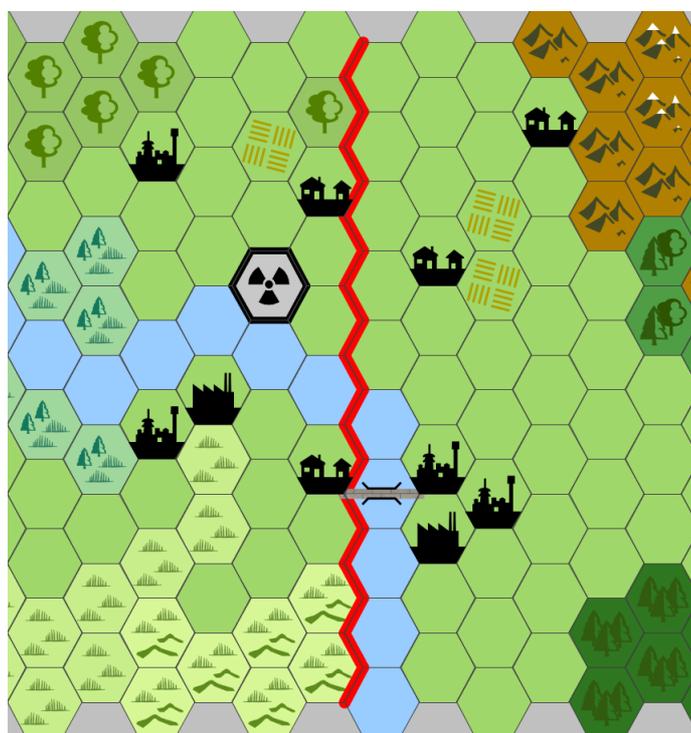


Figure 5 The nations of Macchiatania and Lattestan, as described in the map^{**} to be used in the scenario training exercise table top sheets.

^{**} The map is generated using the tool Hexographer (<http://www.hexographer.com/>)

4. Closing statements

For ESPRESSO, it is the surrounding policy and regulatory framework that is being assessed, as well as identifying the barriers that exist that prevent more effective CCA and DRR activities. As said in the introduction, it is the journey rather than the actual decisions made that are of interest, and which will form valuable input to the guidelines and vision paper which will be major outcomes of the project (deliverables D5.4 'ESPRESSO guidelines', D5.5 'ESPRESSO Vision Paper'). An example of the input provided by TT1 exercise to the ESPRESSO Guidelines and Vision Paper is reported in Annex I.

Acknowledgements

The RAMSETE scenario EXERCISE and associated scenarios have been developed by efforts from across the project, in particular:

- Kevin Fleming, Bojana Petrovic and Massimiliano Pittore (GFZ).
- Jaime Abad (BRGM)
- Lynn Schueller and Sina Marx (DKKV)
- Laura Booth and Anna Scolobig (ETHZ)
- Giulio Zuccaro and Mattia Leone (AMRA)

Additional advice and assistance was provided by Michael Haas and Stefano Parolai of GFZ. We wish to thank the stakeholders who participated in the first Think Tank in Berlin, who contributed much helpful advice as to how the RAMSETE exercise can be improved.

References

Boin, A. and Rhinard, M. (2008) Managing transboundary crises: What role for the European Union, *International Studies Review*, 10, 1-26.

Bradfield, R., Wright, G., Burt, G., Cairns, G. and Van Der Heijden, K. (2005) The origins and evolution of scenario techniques in long range business planning, *Futures*, 37, 795-812, doi: 10.1016/j.futures.2005.01.003.

Chermack, T.J. (2004) Improving decision-making with scenario planning. *Futures*, 36, 295-309, doi: 10.1016/S0016-3287(03)00156-3.

Durance, P. and Godet, M. (2010) Scenario building: Uses and abuses, *Technological Forecasting & Social Change*, 77, 1488-1492, doi: 10.1016/j.techfore.2010.06.007.

Kilburn, C.R.J., De Natale, G. and Carlino, S. (2017) Progressive approach to eruption at Campi Flegrei caldera in southern Italy, *Nature Communications*, 15 May 2017, doi: 10.1038/ncomms15312

Laws, K. and Mcleod, R. (2000) Cultural change in organisations through the use of scenario analysis: some research findings, ICSTM International Conference on Systems Thinking in Management, ed. Altmann, G., Lamp, J., Love, P., Mandal, P., Smith, R., and Warren, M., 8-10 November, 2000, Geelong, Australia, pp. 335-340.

SENSUM (2013a) Deliverable D4.1 End-users assessment, Framework to integrate Space-based and in-situ sENSing for dynamic vUInerability and recovery Monitoring (SENSUM), FP7-SPACE-2012-1, Collaborative project: 312972, 65 pp.

SENSUM (2013b) Deliverable D5.1 Comparison of outcomes with end-user needs, Framework to integrate Space-based and in-situ sENSing for dynamic vUInerability and recovery Monitoring (SENSUM), FP7-SPACE-2012-1, Collaborative project: 312972, 38 pp.

ANNEX I ESPRESSO Think Tank#1: Bridging DRR and CCA - Feedback Synthesis

Introduction – general observations from thematic discussion

CCA and DRR interface

There are **differences between the two communities**: DRR community deals with crisis management (although effort in prevention and mitigation is promoted by part of DRR scientific community) while CCA are planning the long-term. The solution is to be pragmatic: when dealing e.g. with change in precipitation, you are also dealing with more severe storms and more severe floods. One strategy is to **connect the extreme events to climate change**. So in the wake of events, there might be opportunities to have the two communities to talk to one another.

EU is risky territory, and scientists have to be careful. After an extreme event we cannot only answer with the long term perspective and solutions. It needs to be a **combination of short- and long-term vision**.

CCA is limited to only climate hazards while DRR covers a broader spectrum of hazards. CC community does not have to deal with the effects of CC, the DRR community has to deal with them (in form of increased risks and actual events) BUT keep in mind that the costs of CC cannot only manifest in terms of damage due to hazards but also in terms of changing lives and economic as well as cultural value that communities can generate.

CC touches many different governmental portfolios (water, health etc.) not only DRR, thus determining a complexity in terms of **who is involved** and **what areas are affected** by global environmental change, therefore **transversal, horizontal collaboration needs to be fostered**.

Political, social and cultural issues need to be considered to understand the complexity of synergizing CCA and DRR and the context in which it is evolving, also when looking at the global picture (consumption behavior, migration etc.). This is connected to the local political issues and cultures of the area or country in question. How do political points of view influence how projects and actions are framed?

SHs do not perceive International Frameworks and especially **Sendai** helpful at all for synthesizing DRR and CCA since the statements in the document are **so big and broad that there is no statement at all** so that everything that was done before can simply be put “inside Sendai” without making any changes. However, **Building Back Better is understood as an important issue**, although there is a need to **frame into an integrated approach the pre- (retrofitting) and post-event (reconstruction) actions** aimed at “Building Better”, since these are two key common elements in DRR and CCA.

Silos (in science and policy) create issues in defining actions to take. Barriers to integration include **lack of information, lack of funding and their regulation**. The great emphasis on CCA is bringing DRR community to get involved in the CC domain (at least as “strategy” to get funding: involving a climate institute in a DRR-oriented research to cover the CCA domain).

Climate change issue dominates, there is also ‘too much knowledge’ in that and **there is no clear consensus and no way to navigate all the information that exists on climate change**. At the same time climate change impacts experience is not very long, as there is maybe 1-2 decades of research in that.

The **implementation of CCA strategies is very costly and there is no money behind the strategy or the action plan**. An example comes from the water management sector which has huge funds available. What can be done to implement CCA measurement there, is to **translate the information of the scientists**, put it into the context of water management In order to **implement the needed CCA measurements**.

A “**competition**” between the two communities is visible both on policy and science domains. **Central governance is needed** for integration **instead of departments working independently**. The discontinuous

dialogue should be avoided as well as the competitive side through a continuous dialogue and collaboration.

Areas on a **regional level are often so diverse** and different in geographical terms that it is hard to maintain a national framework/agenda. The **regional level should adapt the national framework/agenda to their needs**. Activities only have longevity if they are promoted by the local government. **Prioritizing funds** is a central issue here, especially differences between national and local levels, and especially **how scientific communities impact that decision making**.

A **balance between “soft” (e.g. awareness) and “hard” (e.g. engineered) DRR and CCA measures is important**. Soft (non-structural) measures, focusing on society are economically preferable, since engineered disaster prevention methods are very expensive.

General considerations from national perspectives

In **Germany**, there is competition between the ministry of research (climate services) and the ministry of infrastructure (weather services) and both have a good relationship to the WMO which results in double structures. There is competition also in who has the competence and the knowledge to advice on the local/regional level and governmental bodies in charge of addressing research and implementing the actions. In Germany this is split into two different bodies. The understanding in Germany is that the **climate change adaptation is a horizontal action, to be dealt a cross-cutting policy rather than a new policy issue**. The German perspective is very much concerned with **governance between the different political levels**. We need a guided national risk assessment procedure. We need alliances between the governmental levels, scientists and emergency response agencies. The **Swiss** model can be a way forward. Very decentralized measures and structures, and decisions need to be viable in such governance approach.

A positive example of integration is the climate service center in **Austria** National risk assessment: shift from flood protection plans to heat wave plans as they were already well prepared against flooding, good example for demonstration of a good collaboration. The Austrian perspective is the same as the European perspective, where **CCA is seen as a coordination effort of the ministry of environment**. CCA is seen as a horizontal issue because the funds are not with the ministry of environment so you need to **mainstream the topic into different sectoral policies** such as e.g. health or water management, but this may create an unbalanced approach to stakeholders engagement, (only one stakeholder out of hundred). **Besides the horizontal coordination** you need, depending on the governance of the country, a **vertical coordination from national level down to local level**. At the local level, a strategy can be developed **fitting in the respective needs according to the framing action plan**.

In a few countries such as **Norway**, CCA is based with the civil protection agency but this is due to historical development.

In **Italy**, the national adaptation plan is being released (end 2017), the government and scientific community have prepared document and assessed the impacts of CC in the four different Italian regions. Here the role of the scientific community was very much to **prioritize assessments of hazards and risks**. The integration is still difficult in Italy: despite the effort with National Adaptation Strategy and Plan, an **organization which is well structured and organized taking care of climate change is still missing** (“Italia Sicura” role still not clear). On the contrary, there is a structured and well organized relationship with universities and public research dealing with natural hazards. DRR scientific community has a certain role in the governance system, but it has only certain areas where they can actively contribute, and CC domain needs to be integrated in such system.

The experience from **France** is that often **political priorities are too quickly changed in the wake of disasters**. There is a problem with urgent decisions to be taken, which stands in tension with the actual need of thinking long-term for building back better, prevention, protection and adaptation. Which kind of priority does the government have, and how do they rank different priorities? Is human lives more prioritized than economic costs and infrastructure? France now has a **Ministry for social and ecological transition**, and for the first time there is the opportunity to **address these issues from a policy perspective**. A **cross-cutting concern about social and natural sustainability** is emerging, pushing for a governance approach that needs to deal with many areas: health, pollution, agriculture, etc. In terms of **science and policy interface**, it is mandatory to **work with the most up to date data** on any issue related to climate change. The **energy regulation for building** is becoming **centrally planned**, while there is a lot of **CCA work** going on at **the level of cities and local territories**, but less at the national and regional levels.

Release of European report soon with **7 case studies about CCA and DRR integration**.

The action plan of the **African Union** has a very **regional approach** in implementing the Sendai Framework and recognize the importance of integrating sustainable development and the Sendai Framework (does it come from the Green Climate Fund opportunity?).

Role of science

CC science should provide **statistical information on hazards and risks in terms of probability**, quantity etc. for **improved risk and hazards assessments**

We need to **challenge and work with the engineering mindset**. We need to break down silos from an engineering framework: **options and challenges**. There is a strong engineering bias in many organizations dealing with both CCA and DRR.

Science should reduce uncertainties but more importantly communicate uncertainties properly for risk governance. All prevention interventions are very expensive therefore **uncertainties create barriers to investments**.

Uncertainty needs to be tackled also as part of people`s perception (example of hurricanes in the US: communication of (un)certainities vs. perception of risk)

Role of politics

For political actors the timeframe is terms, thus a **low probability for politicians to invest in longer-term issues** although there are many cases of politicians actually finding political capital and **support for long term CCA decisions** as well. A **more complex picture of politics is also visible** (e.g. from European and UN vision).

There is **political will to create synergies between CCA and DRR** but problem of **competing agendas** of ministries, departments, agencies, individuals **on the background of economic interests**.

Political decisions are made by **experts and public officials in combination**, and this frames the decisions that politicians can and cannot decide on.

Role of private sector / Critical Infrastructures

Privatization of utilities and critical infrastructure creates new dilemmas. Often infrastructure is old and starting to fail but there is no money to repair them although the situation is exacerbated through CC.

When utilities are privatized official reports are replaced by consultants` reports then knowledge of municipalities is lost, no synthesis.

There is a disappearing knowledge base, **massive investment needed to re-establish data that was already there**

There is a **problem of devolution: coordination function vs. technical expertise** in municipalities
“if we are a critical infrastructure then the government needs to support us”.

Role of communities

The **community level knowledge** (local knowledge e.g. from local response services and local communities) should not be neglected and should be **integrated in risk assessment maps** (bottom-up and top-down integration).

Local governments’ **investments in society and education** is important as **at a policy level there is too much bureaucracy**. The **culture of a society can be a barrier** to DRR and CCA integration.

Education allows communities to make their own decisions and makes them aware of the dangers (e.g. during evacuations, often people choose not to leave, but education would help to build the knowledge of the community on why evacuation is important).

Communities should be engaged by using existing community structures (e.g. the UK Environment agency try to house in church halls their community flood awareness efforts).

Research gaps and needs to bridge DRR and CCA

Key issues	Gaps/needs	Possible solutions
Common knowledge base	<ol style="list-style-type: none"> 1. Within the European Commission's projects and activities too much space is given to CC as opposed to other non-climate related hazards Better understanding of DR knowledge base from CC community 2. Synergies from different study fields 3. Develop narratives that enhance the collaboration of CCA and DRR 4. Scientists also work in 'silos' 5. Long-term perspective: foresight, what potential futures are we looking at? 6. NGOs are a major player in CCA and DRR 7. Analysis of horizontal and vertical governance: how to facilitate the interfaces? 8. As long as civil protection is at the jurisdiction of the national states or even federal states there cannot be a EU directive and integration with CC is not going to happen 9. Promote synergy between the scientists and respective national ministers 10. Sustainable development is often missing in CCA and DRR discussion. The three agendas (CCA, DRR and sustainable development) aim to integrate the three policies but they don't know how to do this. There is certainly room for innovation (the answer is not there yet) 	<p>1, 2, 3, 4. Horizontal integration within the science community</p> <p>5. ESPREssO Vision paper as a timeline/roadmap</p> <p>6, 7. Promote vertical and horizontal coordination (team-up local and regional/national authorities + community resilience and bottom-up initiatives)</p> <p>8. Consider that may have different agendas to science and government. Transnational plans as best practice. CPM has to adapt to the transnational nature of disasters</p> <p>9a. Ministers taking decisions based closely on the scientists recommendations (science-policy integration).</p> <p>9b. An agency for the integration of DRR and CCA as a possible mechanism to improve CCA and DRR integration and greater communication between responsible governmental authorities (e.g. ministry of the interior and ministry of environment)</p> <p>10a. The three agreements are have to find a way through. They all have indicators (the indicators of the SDGs disaster resilience are the same as for the Sendai Framework)and have to find a way how to monitor the indicators and how to report on progress.</p> <p>10b. Promote a single agreement involving DRR and CC rather than having Sendai and Paris separately (there is CCA people who have not heard about Sendai)</p>
Funding and implementation	<ol style="list-style-type: none"> 1. Increase investments on research 2. Align funding priorities at local and national level (Collaboration & coordination for national to local level) 3. How much the State input, needs continuous discussion with local stakeholders. How much value vs. expenditure? How much resources to commit in "peacetime"? How to build-up reserves or "war chest" for DRR? 	<p>1a. Promote devoted DRR research projects and to integrate with climate change information and studies</p> <p>1b. Promote National risk assessments studies considering CCA developments (more long-term horizon)</p> <p>1c. Investment priorities: a. integrated monitoring, forecasting and early warning systems; b. preventive measures in DRR considering CC components (e.g. flood management plans); c. rescue systems as civil defence, emergency response operators, fire rescue teams etc.; d. public participation in DRR (focusing not only on schools) and non-structural prevention measures based</p>

	<ol style="list-style-type: none"> 4. Hard measures (infrastructure) are still necessary, together with institutional framework 5. Lack of implementation of risk reduction measures to houses, infrastructures, etc. 6. Lack of knowledge on the impacts of some DRR activities may result in not adequate funding provisions. 	<p>on early warning (low cost, can save many lives); “Double layer” protection: e.g. protection of protection infrastructure; planning the routes of evacuation.</p> <p>2, 3, 4a. Balance local government investments (e.g. education programmes for the local communities) with funding for other activities required (DRR and CCA actions to increase resilience).</p> <p>2, 3, 4b. Support local government in the identification of funding priorities, proper budget assignment and cost-benefit assessment over time (including maintenance)</p> <p>2, 3, 4c. Investments should take into consideration multiple benefits (multi-risk issues), studies should look into these issues and not only regarding CCA and DRR but also regarding other issues that influence daily lives of communities.</p> <p>2, 3, 4d. Promote innovative multi-institutional (national, regional local) funding articulation around the EU and national priorities on DRR and CCA, designed to ensure mutual support and effective implementation (e.g. in Germany the ministry of interior cannot cover for the budget of the local government).</p> <p>2, 3, 4e. Develop CCA strategies at the municipality level/local climate adaptation</p> <p>2, 3, 4f. Cities should play a key role in integrating DRR and CCA, short- and long-term visions (role of cities as facilitators of change)</p> <p>2, 3, 4g. Building the disasters’ database for better planning perspective</p> <p>5. Forced building codes are the best solution</p> <p>6. Training is an area where large amounts of money is invested, very little is invested in measurement of results.</p>
--	--	---

<p>Scientific advancements</p>	<ol style="list-style-type: none"> 1. A full analysis of the hazard is needed together with the evaluation of vulnerability 2. Overcome the limits of large scale risk-assessments and “zoning” approaches 3. Uncertainties of science become a barrier to implementation 4. Go more in depth with the analysis of the common goods, stress what we have in common as a society 5. Design research programmers that contribute to the integration of these two areas 6. Research non local level: how urban planning can integrate climate change? Where are the entry points? 	<ol style="list-style-type: none"> 1a. Promote research to better define hazards and risks considering CC as well 1b. Increase the observation network to know CC effects at local level 1c. Integrated methods for risk assessment 1d. Link climate modeling and impact modeling (DRR knowledge base can support) 1e. Involvement of critical infrastructure operators 2a. Develop fine-tuned risk/impact assessment approaches (better spatial and time resolutions) 2b. Cost-benefit analysis of multi-risk reduction actions (life-cycle perspective, including maintenance and upgrading over time) 3. Work on reducing uncertainty, but also communicating the concept better. 4. Increase studies on : a. socio- and economic constraints (immigration, food security, terrorism, media coverage); b. influence exerted by end-user stakeholders, victims; cultural constraints in decision-making process; disaster law and legislation area in general; climate change, migration & human rights; use of nature-based solutions for CCA and DRR. 6a. Research question(s): What are effective mechanisms for a joint design of DRR/CCA measures in Europe? 6b. Scientific research should be made accessible for practitioners. 6c. A very good knowledge of the local level and the processes is needed in order to promote integration. An entry point need to be identified when it comes to design and projects: e.g. in an infrastructure project another information regarding CCA can be drawn and the project respectively adapted.
---------------------------------------	--	--

<p>Communication and outreach</p>	<ol style="list-style-type: none"> 1. Understanding of the terms used by the two communities 2. Promote mechanisms that facilitate the dialogue between the two communities. Much more information and knowledge management is required. 3. Actions to diffuse scientific culture and the specific hazards of a country must be addressed in schools, local community and administrators. 4. Lack of a standardized way to communicate risk to different kind of public (including media issue) 5. Civil society needs to be active part in implementing DRR and CCA (relevance of non-structural actions) 6. Understand perception of risk within communities and their behavior to risk information and communication 	<p>1, 2a. Increase the opportunity of discussion among the different communities working on the DRR including CC</p> <p>1, 2b. Online portals/platforms that can enhance the integration of CCA & DRR</p> <p>3, 4a. Learn to correctly communicate to population and to create a permanent link between schools, residents, administrators and scientists.</p> <p>3, 4b. Residual risk communication is crucial (risk governance)</p> <p>5. Raise motivation for change acting on culture and lifestyle (relevance of non-structural actions) e.g. transport, food, ...</p> <p>6. Research question(s): How to involve citizens on synthesizing DRR and CCA? How to bottom up DRR and CCA?</p>
--	---	--