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:

D3.3: Scenario Design Toobox

Version: final

Due date of deliverable: 08.2018   **Actual submission date: 08.2018**

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)	

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Abstract

A scenario-based serious game, known within the ESPREssO project as the Risk Assessment Model Simulation for Emergency Training Exercises (RAMSETE) tool, was developed as part of Work Package 3. RAMSETE has the function of encouraging information elicitation about a specific issue from the participants or 'players'. The players are assigned roles, and within this capacity they must deal with a presented scenario, which will be centered on the development of policies related to a specific topic. For each of the three ESPREssO challenges, namely 1) integrating climate change adaptation and disaster risk reduction in Europe, 2) bridging the science-policy gap, and 3) effective management of trans-boundary crises, a separate exercise was developed and undertaken during the ESPREssO Think Tanks. The main value of RAMSETE is that it allows the participants to interact with other stakeholders in a manner they would otherwise not usually be able to do.

The purpose of this deliverable is to outline some of the generalities of the RAMSETE series of exercises, and then to provide recommendations that will advise the reader on how to develop and execute such an exercise. It needs to be emphasized that the exercises presented are simply examples of how to go about the information elicitation process, and the recommendations are presented in as general manner as possible. It also needs to be underscored that the exercises developed during ESPREssO were not meant for operational training, although such an approach may be followed if the exercise developer desires.

1 Introduction

The aim of Work Package 3 (WP3) 'Development of hazard-specific scenarios for Risk Management Solutions (RMS)' is to create a scenario-training tool for information elicitation from representatives of the Disaster Risk Management (DRM) and Climate Change Adaption (CCA) communities. The intention was for the resulting exercises, or as they are sometimes termed in the literature, 'serious games', where a serious game is a game where education rather than entertainment is the primary goal (e.g., Michael and Chen 2006), to be undertaken during the ESPREssO Think Tanks (see Table 1).

These exercises, known within the ESPREssO project as the Risk Assessment Model Simulation for Emergency Training Exercises (RAMSETE), are a series of three exercises tailored to each of the challenges dealt with in the project, namely: (1) the improved integration of DRM and CCA policies at the local, national, and European levels, (2) bridging the gap between science and legal/policy aspects of DRM, and (3) improving the effectiveness of response to transboundary disastrous events. The assumption was that by bringing together stakeholders from across the full spectrum of DRM and CCA stakeholders, and by them taking part in the exercises, certain aspects of the challenges may be understood by the participants engaging in what Chermack (2004) termed 'strategic conversations'. This understanding would arise from: (1) the decisions the participants make during the exercises, (2) examining the motivation behind these decisions, (3) the interactions between the participants during the exercises (e.g., negotiations), and (4) any other discussions that may arise. For the latter point, while these discussions may not necessarily be directly relevant to the game play itself, they will still contribute to understanding the issues under consideration. The debriefing sessions following the exercises during the Think Tanks also provided (possibly more so) opportunities for the issues surrounding the challenges to be discussed, and for other points not covered by the exercises to be raised.

While there are serious games developed for the purpose of training crisis managers (e.g., Moats et al., 2008) and natural risk management (e.g., Taillandier and Adam, 2018), the most important point to make about the RAMSETE series is that they are not designed for operational training. The purpose of these exercises as emphasized in the previous deliverables of this work package (i.e., D3.1 'Reference scenarios according to the project

challenges' and D3.2 'Report on existing methodologies for scenario development and stakeholder knowledge elicitation') is information elicitation. Therefore, it is the motivation behind the decisions, not necessarily the decisions themselves, that is of concern. The specific purposes of each exercise in relation to these challenges is listed in Table 1.

Table 1: Some details of the three ESPREssO challenges and the scenario training exercises employed to elicit information from stakeholders regarding them.

	RAMSETE I October, 2017, Berlin, Germany	**RAMSETE II** January, 2018, Zurich, Switzerland	**RAMSETE III** April, 2018, Naples, Italy
Challenge	Propose ways for creating more coherent national and European strategies that treat DRR and CCA in a more integrated manner.	Address issues surrounding the effective management of cross-border crises, while considering the local, national and international (i.e., EU) levels.	The enhancement of DRM capacity by the identification and development of frameworks that allow the bridging of gaps between the scientific and legal/policy spheres with regards to DRM and CCA at the local, national and international levels.
Scenario geographical backdrop	The 'European' island state of Espressoland.	The 'European' cross-border region of Barristia, located between Macchiatania and Lattestan.	The 'European' island state of Espressoland.
Roles for each exercise	5 – Scientific researchers in DRR and CCA, ministries of the Interior and Environment, and local government.	6 – Central and local government representatives for each country, NGO, European Union representative (one of each).	4 – Decision maker (political leader), science advisor, civil protection, government spokesperson.
General scenario narrative	The aim was to maximize the security and well-being of the population of the island nation of Espressoland by integrating DRM and CCA policies.	The aim was to implement the best policies that would allow the optimal response to a cross-border crisis within the cross-border region of Barristia, and to ensure the ongoing capacity of the region's towns and cities.	The aim was to maximize the capacity of the island of Espressoland to respond to an impending disaster in the most effective way, while ensuring the popularity of the government.

WP3 involved the production of three deliverables, of which this document is the third. D3.1 'Reference scenarios according to the project challenges' outlined the scenarios that were to be employed during the exercises. The aim was to select scenarios that were relevant to each challenge. As will be discussed in more detail in the next section, initially past events or situations (e.g., Storm Lothar, the Campi Flegrei caldera in Naples, earthquakes along the northeast Italian border area with Slovenia) were to be used, but this was abandoned in favour of imaginary, but realistic, situations. The exercises that were developed are presented in some detail in D3.2 'Report on existing methodologies for scenario development and stakeholder knowledge elicitation'. The materials used to conduct these exercises are outlined in that document, however, they are currently undergoing some final revision, and will be made publically available via an appropriate repository by the end of the project.

The aim of this document, D3.3 'Scenario design toolbox', is to present a series of recommendations that, first, outline the commonalities between the three exercises developed, and secondly, to advise the reader on what needs to be taken into consideration when developing such exercises. The following section outlines the evolutionary process and some of the key ideas behind the development of RAMSETE. This is followed by the recommendations for the development of similar exercises to meet the needs of the reader who may wish to develop their own serious games for information elicitation (e.g., organizers of workshops covering cross-border or inter-sectorial discussions). The document concludes with some suggestions as to how such exercises can be further expanded to increase our understanding of the needs of DRM and CCA stakeholders.

2 The evolution of RAMSETE

The initial idea behind these exercises was to build upon the work of the SENSUM[1] (Framework to integrate Space-based and in-situ sENSing for dynamic vUlnerability and recovery Monitoring) project. SENSUM developed a scenario-based training exercise for information elicitation about civil protection practitioners' knowledge of remote sensing and GIS technologies. The question was to understand how much these stakeholders knew about these technologies and their potential use in pre-disaster vulnerability assessment and preparation, and post-disaster recovery planning and monitoring, as well as what information they may need or desire to fulfil their duties (Platt et al., 2014a; Platt et al., 2014b).

However, the SENSUM exercise was built around a more operational narrative where the participants were intimately acquainted with their national situation, while the information they may request (or desire) was of a more technical nature. Since in the ESPREssO project policy was the fundamental concern within the three identified challenges, and the expected stakeholders were from across Europe (and beyond), it was decided that the scenarios should involve imaginary geographical regions, with a mixture of realistic policies (i.e., the sorts of policies that are currently implemented in different parts of Europe). It was also initially thought that actual past events and current situations, such as past winter storms or current volcanic or earthquake threats, were to be considered. However, this idea was also abandoned as imagined, but realistic, events and combinations of events, were used. The reasons for following these alternate formats are as follows:

- An imaginary, but still realistic geographical area and selection of policies removes the need for the participants to be familiar with any one country's or countries' situation. Furthermore, having an imagined area removes the value of considering a historical event, although during the exercises, actual events were raised in the discussions within the context of the issues being investigated.

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[1] http://www.sensum-project.eu/de SENSUM was supported within the FP7 funding framework of the European Commission.

- Considering an imagined geography, policy regime and event history would inspire discussions about what the actual situation was within the participants' own countries.

- The use of the imagined situations would provide a more open environment for the participants to experiment with policies and their decisions with reduced bias.

Therefore, the scenarios as outlined in Table 1 were created and played with stakeholders. The following section will outline some commonalities of the three exercises, and provide some recommendations that should be kept in mind if one were to employ or develop their own scenario-based serious games for their own investigations.

3 Recommendations for RAMSETE style serious games for DRM and CCA.

3.1 Commonalities between the three RAMSETE exercises

The following are some commonalities between each of the developed exercises. Details can be found in deliverable D3.2.

- The participants of each exercise were assigned a 'role', which represented a particular aspect of the scenario being dealt with. Such a role may cover political or community leadership at any number of levels, and will include civil protection responders, scientific advisors, NGOs, etc.

- A table sheet (A0 size) was designed for each exercise to serve as both a visual reference, and to assist in recording the decisions and motivations behind the decisions made during the progress of the exercise, and keeping track of the various metrics employed.

- Different forms of flash cards were designed that informed the participants as to what actions or policies were permissible, and that provided information about events or the scenario's status. There were also various tokens for keeping track of the metrics, or to add to maps to show where some events had occurred.

- Each exercise was divided into a number of 'rounds' which represented a period of time (for example, a set number of years, an unspecified period of time, or an election cycle), during which the decisions were made.

- Each exercise employed metrics that allowed the participants to have some measure of how well (or poorly) they were proceeding.

- Each exercise had several members of the ESPREssO consortium assisting as facilitators and recorders. Their role was to ensure the smooth running of the exercise, and to record the proceedings, which included noting what the decisions were, the rationale behind them, and the surrounding discussion.

3.2 Recommendations

Figure 1 provides a general outline of the process of the development, execution, and assessment of the exercises. These points are expanded upon in the following to assist the reader when they are using or extending the developed RAMSETE examples or developing their own. It should be emphasised that these recommendations are rather general, as there is no set standard means of creating scenario-exercises. However, these points are meant to ensure the designed exercises are as comprehensive and useful as possible (again, understanding limitations in any available resources). A point, however, that needs to be kept in mind is that any scenario developed will need to be, as Durance and Godet (2010) put it, pertinent, coherent, likely, important and transparent.
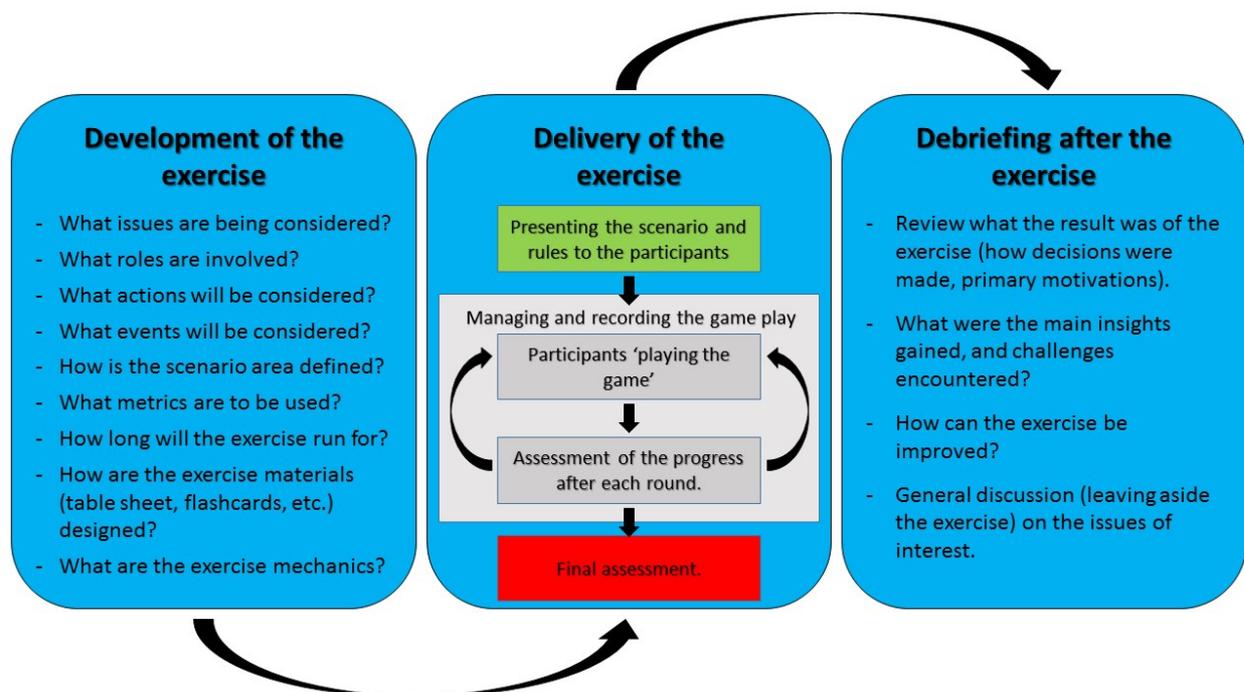

Figure 1: The general model of developing, executing, and then assessing the RAMSETE (modified from Moats et al., 2008).

3.2.1 Development of the exercise

What overarching issues are being dealt with? This is the first aspect of the exercise that must be considered, as obviously it would affect all parts of the exercise. For example, if cross-border issues are of concern, then the geographical area needs to involve a transboundary region. Similarly, if climate change is of interest, then the events considered will be more related to weather and climate.

This would require, naturally, a thorough understanding and study of the field of interest and the issues involved. Much material for this within ESPREssO came from the internal assessment of the three challenges by members of the consortium. The resulting serious game should therefore reflect the conflicts, compromises, barriers and synergies that are apparent (or are assumed) in the issue of interest. It will also require the considered issues being broken down into a few basic conflicts leading to a (relatively) easy set of rules for the game mechanics.

What roles are involved? This question is, of course, related to the first. If the scenario is dealing with a transboundary crisis, then not only national, but also international roles will need to be incorporated. Again, in an exercise where the aim is more policy development, a combination of political representatives and scientific, economic and social advisors will be required.

The number of participants should be kept relatively small (in the case of RAMSETE, this was between 4 and 6), so as to allow free-flowing discussions, the relative ease of recording the exercises' progress, and to reduce the complexity of the exercises' mechanics. While considerable effort should be made to ensure that each participant's role matches as closely as possible with their real-life duties, this may not always be possible. Although this point was initially of some concern to the exercise developers, it was decided that in the event of a participant having a role they were not familiar with, it should be seen as an opportunity to add another perspective to the proceedings (especially considering 'correct answers' were not the aim, but rather what the motivation is behind any decision made). Nonetheless, participants themselves would generally feel more comfortable playing a role they have some knowledge of.

What actions will be considered? The biggest division in answering this question concerns whether the exercise will employ an operational-like narrative (for example, as

followed in RAMSETE II and III), or if it will be more a case of policy development (as in RAMSETE I and also in RAMSETE III). The actions themselves will also depend on the selection of roles, which may then call for a further division between themes such as political leadership, research and development, infrastructure establishment, education, welfare, etc. However, as has been mentioned several times in this document, what is important is to ensure the motivations behind the chosen actions are understood. It is also a question where, in the debriefing session, the participants may have valuable suggestions as to how to modify and improve upon the exercise (i.e., inclusion of other actions).

What events will be considered? This issue is dependent upon the issues being considered. For example, if CCA is being dealt with, then more (hydro-)meteorological or climatological hazards (e.g., heatwaves, wildfires, and droughts) will be employed. However, as in the case of RAMSETE I (see D3.2), where the participants were establishing a policy regime by selecting different mitigation and related activities, individual events will not need to be defined. However, in RAMSETE II and RAMSETE III a more operational setting was employed and consequently specific events were defined. In fact, the response to the expected event in RAMSETE III strongly decided the result of the election that formed part of the exercise's time scale. The point here is to ensure that the events defined are realistic, and appropriate for the setting being used.

How is the scenario area defined? As was outlined in the previous section, RAMSETE made use of invented geographical regions so as not to disadvantage any of the participants who may not be familiar with a specific area if real regions were used. This of course does not exclude the possibility of including real regions, provided the participants are familiar with them. For example, an initial idea for the issues surround transboundary crises (challenge 3, and examined in RAMSETE II) was to consider the tri-border area of Switzerland, Germany and France, but this was rejected for the reasons discussed previously (i.e., not all participants would be from these countries, hence they would be at something of a disadvantage). However, if one wishes to run a RAMSETE-type exercise covering an actual region or area, where the participants were all familiar with the situation being considered, then there is no issue (for example, if a RAMSETE-like exercise is being used by an international body such as the Upper Rhine Conference, Abad et al., 2018).

What metrics are to be used? The main reason for the use of metrics is to examine how well or otherwise the participants undertake the actions required within the exercise. For two of the RAMSETE (I and III), measures covering the level of security of the scenario region, the population's well-being, social coherence, etc. were employed. For RAMSETE II, it was how well (including issues such as building-back-better) the roles restored the cities, towns and infrastructure damaged by the defined transboundary event. Again, it is a question of the issues under investigation that would dictate what metrics are employed (e.g., an exercise may be undertaken where reduction in energy usage/greenhouse gas emission are a metric). Another reason for introducing metrics is to introduce an element of competition (i.e., simply to add some 'fun' into the exercise) into the proceedings, especially if more than one group are taking part. The difficult aspect, however, will be how to evaluate the 'cost' or 'benefit' of each metric. This aspect may be initially estimated by adding up 'scores' that relate the given actions to the metrics, however, these values will need to be assessed via test exercise sessions prior to the formal session.

How long will the exercise be run for? The RAMSETE sessions were run for between 2 to 3 hours. Naturally, a longer session would allow a more comprehensive and complex range of possibilities and issues to be explored. In terms of the number of rounds, it was found that 3 or 4 would be sufficient, otherwise the exercise will become somewhat repetitive. For example, RAMSETE I was originally planned for 6 rounds, but because of the longer than expected execution time being required for each part, the groups managed only 3 or 4. This was still found to be adequate and there was a sense of repetition arising.

How are the exercise materials designed? The actual materials used in the exercise, from the table sheet, flash cards, and tokens representing the metrics, need to have some aesthetic merit simply to add some interest to the session. However, while for the table sheet it is important that it is not only visually interesting (which is probably more a matter of taste), it needs to actually contribute to the exercise itself. For example, while including a map of the scenario area is perhaps obvious (even if it is simply to help the participants visualize the situation), it should allow the participants to maintain a visual record of the exercise's progress, while providing a visual aid to assist in their decision making.

The flash cards covering permissible actions, event descriptions and other information should be designed with simplicity in mind, as too much information would potentially distract the participants, although too little may lead to some confusion.

What are the exercise mechanics? As commented in the first part of this section, the issue under consideration needs to be broken down into some basic problems that lend themselves to relatively straightforward rules. Therefore, the exercise mechanics or rules should be as simple as possible. While a certain amount of calculation will be inescapable (especially if the metric and limited budget format is followed), it should be simple enough so that excessive time is not spent on this aspect (i.e., adding up metrics or budget usage, etc.). As the RAMSETE exercises were divided into rounds, such a format allows the participants to familiarise themselves with the exercise's process in the early stages.

The mechanics themselves are divided into the following features:

- What actions are permissible (dependent upon the overarching issues being dealt with by the exercise) by which roles?
- What are the relationships between roles? For example, what rules are in place in terms of which role can communicate with who (a major feature of RAMSETE I)? How can resources be shared (a feature of RAMSETE I and II)?
- How are the actual values of the metrics determined? This part will require some iteration when preliminary versions of an exercise are played.
- How is the exercise within the rounds divided, for example, in RAMSETE II there was a policy phase, a response phase, and an assessment phase. While any combination of 'phases' may be employed, it is important that there is some form of subdivision within each round, allowing the different stages of policy development (e.g., consideration, implementation, reconsideration) be dealt with.

3.2.2 Delivery of the exercise

Presenting the scenario and rules to the participants. This is the obvious first part to an exercise session, but also possibly one of the most important. During the ESPREssO Think Tanks, there was always a short presentation by the RAMSETE development team about the exercise mechanics prior to the exercise as part of the program. This information was then repeated at the start of the 'playing' session, and repeated/reinforced as the session proceeded. This was the main task of the facilitator.

Managing and recording the game play. The role of the facilitator is not only to ensure that the participants understand the objectives of the exercise and the rules, but also to find a balance between free-flowing discussions and the actual exercise being carried out. As has been emphasised, the interactions between the roles is how the various issues being investigated will be understood better. Therefore, while if the discussion 'goes off course' for a short time is of little concern as the participants are there to pass on their own personal expertise, a balance needs to be found to allow the whole exercise to be undertaken, which itself will allow the different topics to be explored. The importance of the recorder is therefore to ensure all of the main points, not just of the game play, but other discussions related to the issue of concern, are noted down.

Participants 'playing the game' and assessing the progress after each round. One of the advantages of following a 'round' system in these exercises is that it allows opportunities for an assessment of how the participants are proceeding to be a specific feature of the exercise. During the time when the participants are engaged in the exercise, the facilitator and recorders should try to avoid contributing to their discussions – the aim is to listen to them – unless of course it involves explaining some rules or element of the process. The assessment is also an opportunity for the recorder to note down as much information as possible, while at the same time allowing the participants to potentially reassess their strategies, as well as to pass on some opinions concerning aspects of the exercise.

Final assessment. This part of the exercise is, as the name suggests, where the motivation behind the decisions made are more fully noted down, as well as an opportunity to discuss what alternative schemes could have been followed. This part will therefore form the basis of the report made by a representative of the participants (as was

the case during the ESPREssO Think Tanks) to any gathering where the exercises are being held.

3.2.3 Debriefing after the exercise

The debriefing after such exercises is possibly the most important part of the whole procedure. During the course of the development of RAMSETE, there was some discussion as to whether these exercises were the primary means of obtaining the required information about the challenges, or if they were more a 'warm up' for the discussions to be held in the afternoons of the Think Tanks. In fact, the truth is that these exercises are both, that considerable information can be gained from the discussions within the exercises, but the debriefing is where the issues of concern are dealt with in a more focused and directed manner.

The main points that such a debriefing would cover are:

- If more than one group in a meeting are undertaking the exercise (as was the case in the ESPREssO Think Tanks) then each group should have the opportunity to present the outcomes and general impressions of their exercise session. This report should outline the final outcomes (e.g., what the metric score was, was a certain required tasked achieved, etc.), and make some suggestions for improving the exercise.

- During the course of the debriefing, the main insights into the topics of concern will be discussed and summarised. This is in fact the whole reason behind the undertaking of such exercises and will form the basis for subsequent efforts to deal with the concerns linked to the themes of the exercises by the participants.

- The participants will be asked for their suggestions as to how to improve the exercises. The participants during the ESPREssO Think Tanks had a variety of experience with such exercises, including those for whom role-playing games were utterly new. Such suggestions would be expected to range from suggesting what roles should be considered, how the actions proposed can be revised or expanded, how the mechanics of the exercise may be adjusted, to more simple matters such as how to produce the required material.

- The debriefing will also include a general discussion, where the exercise is left out, and other topics related to the issue of interest are covered (this may in turn call

upon other group exercises to encourage discussion and the presentation of different views and ideas).

3.2.4 Potential problems

The following are some issues that may arise (some based on the ESPREssO experience) that may need to be dealt with. Several of these do not necessarily have a solution, and therefore require the personal experience and discretion of the facilitator and participants.

Language barriers. This is an issue that can easily arise during such exercises within an international context. The only solution is simply to ensure that there is sufficient range of language skills that a participant who may have some difficulty in the host language (which during the ESPREssO Think Tanks was English) has someone sufficiently fluent in the host and their language to translate and report.

The exercise goes 'off-course' too often. While, as mentioned above, it is not necessary to be all the time totally focused on the exercise, it must be kept in mind that the exercise is the reason for the meeting and that the discussions need to remain, more or less, focused on the topic at hand. It is therefore the responsibility of the facilitator to ensure the discussions are focused and to 'reign in' the participants if required.

Participants 'not participating'. It may arise, for whatever personal (e.g., shyness, or they are not familiar with the sort of issues their assigned role must deal with) or cultural reasons, that a participant is not as active as would be ideal. Such a situation obviously needs to be dealt with delicately, with the facilitator, in this situation, perhaps engaging the participant with questions. Similarly, if one participant is overly zealous, then the facilitator should perhaps encourage the other participants to voice their opinions.

4. Closing statements

The exercises developed as part of the RAMSETE series are meant to provide a relatively simple means of allowing stakeholders from a variety of professional backgrounds to meet and discuss issues that are related to common concerns. For the participants themselves, such events offer an opportunity to meet with professionals who they may otherwise rarely have the opportunity to interact with. During the Think Tanks, the participants in general reported they found the exercises enjoyable, while appreciating the opportunity to meet with other stakeholders who they may otherwise not often encounter.

Some general ways where the exercises may be improved or expanded upon are listed below:

- A wider range of roles. For example, although recognised as being important, the media were not considered during these RAMSETE sessions.
- Longer sessions. To make the exercises more comprehensive, they could be adapted to be run for longer periods. This would not necessarily involve more rounds, but there are other ways of considering a temporal component. For example, during the SENSUM 'game', the exercises were divided into time periods of 1 day, 1 week, 1 month, 1 year, 2+ years following an event (Platt et al., 2014a).
- More comprehensive range of possible actions, as well as enforcing resource limitations. This could lead to a more complicated exercise, or one that may be undertaken over a longer period. The enforcement of resource limitations would also lead to a more realistic decision process where 'hard' choices would need to be made and priorities set. Together, such changes should allow more realistic scenarios and cases to be investigated.

The issue then is what the next steps following such an exercise will be. While the individuals will at least hopefully leave with a greater appreciation of the complexity of the problems they deal with, as well as understanding better what other stakeholders face, without follow-up actions such as meetings or collaboration, the efforts that go into developing and executing these exercises would come to little value. Follow-up questionnaires by the exercise organisers are one way means by which this could be encouraged (as well as receiving feedback on the exercise itself), however, it simply

comes down to the stakeholders themselves taking some initiative to continue the dialogue.

Acknowledgements

The RAMSETE Development Team of the ESPREssO project would like to thank all of the stakeholders who took part in the Think Tanks during which the RAMSETE exercises were undertaken.

They would also like to thank the individuals at their respective institutes who took part in the practice sessions, which helped greatly to refine many details of the various game mechanics.

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