6. Practical tools and guidance on integrating culture in DRR

In this final section of the Handbook we bring to the table practical tools- games, social network analysis and collaborative learning – that may support DRR professionals to better appraise relevant cultural aspects in their own 'community of practice' as well as in the environment where they intervene.

We aim to support the disaster community (experts, policy makers, researchers, stakeholders) with a selection of serious games that can be used in the field of disaster preparedness. The games may help you to understand the cultural factors behind decisions of community members, and will enable the experts to test their assumptions in a safe environment before working with actual communities. Moreover, certain games can be used to train your colleagues or groups you work with to enhance their disaster preparedness. The tools and games introduced in this chapter can be adapted to address diverse attitudes, perceptions, behaviour and cultural values and beliefs within the various communities.

We also reflect on our experiences replicating case study approaches in other cities, and the establishment of Communities of Practice (CoP). By encouraging, enabling and sustaining multi-stakeholder dialogue through which academics, practitioners and communities can actively engage and share knowledge, expertise and experience, their capabilities will be strengthened, but most importantly, it will allow both formal and informal risk managers and planners and spatial planners emergency responders in cities to be better informed and guided.

An example of an intervention that employs a policy exercise is the simulation that was run during the EDUCEN project with local stakeholders in Lorca, Spain. The main objectives of that exercise include:

- exploring how cultural factors affect different phases of disaster risk management;

- demonstrating the benefits of ex ante DRR and preparedness and motivating the players to put them into practice;

- improving understanding and communication of disaster risk in a cross-cultural environment ;

- improving disaster-related communication flow among all relevant organisations and individuals, before and during an emergency situation;

- ability to deal with evacuation in an urban area inhabited by multilingual and multicultural community

6.1. Using games to connect culture and disaster

Authors: Michalina Kulakowska, Aleksandra Solinska, Michal Pajak,
Lukasz Jarzabek, Piotr Magnuszewski

Successful attempts at DRR are hardly possible without engaging endangered communities into informational and educational activities. Such commitment is vital as it strengthens risk reduction efforts and enables actors to express and share their opinions with others.

In disaster risk contexts, games, when used properly, can give access to tacit and informal knowledge of endangered communities. What is more, by sharing information, opinions, and concerns, the players are engaged into solution-finding process. This spurs new ideas and makes participants more willing not only to accept solutions but also to take part in their implementation.

Katie Salen and Eric Zimmerman (2008) propose a definition of a game as "a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome". This is a broad definition that includes different types of games: board games, video games, role-playing games and many others. Most of them are played mainly for entertainment and the term "game" is usually associated with such activities. A specific subset of games are games designed for purposes other than entertainment, e.g. training, education, or social change (Ratan and Ritterfeld, 2009). Such activities are called "serious games", game-based learning, simulations or educational simulations (Aldrich, 2009).

Serious gaming developed from other fields, including game theory, drama theories and systems analysis. In such games, participants affect each other and the outcome of their actions results from individual and/or collective decisions. Each member of a system is equipped with only partial knowledge and limited access to resources required for a solution. Also their views on the issue differ. The expected result of a serious game is thus to improve understanding of a complex issue. The success depends on how players deal with the rules, how they interact and how they use their power and resources (Duke, 1974).

Games can be used to understand the complexity of many issues. This complexity may arise from social-cultural, economic or ecological factors and depends on the number of actors involved. Moreover, the actors may represent diverse goals and groups of interest and offer different solutions. Depending on their purpose, games may thus resemble real-life situations. For example, games used to help create
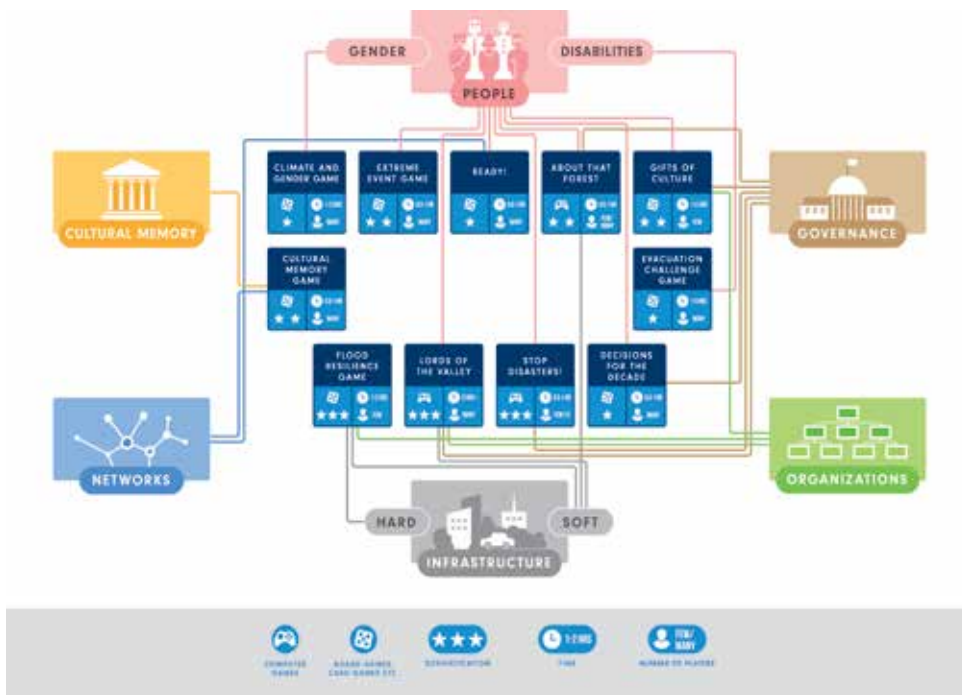
Figure 6.1.1 Infographic: What game(s) should I use?

policy require detailed information about the system it is embedded in and life-like feedback which helps verify the feasibility of the created policy. Educational games may be more abstract and allow participants to take on roles which are different from those they play in their real-life. In this way, players are able to grasp the complexity of a problem and understand the interdependencies between actors. Such games have also been successfully used to communicate the trade-offs between climate change mitigation and adaptation in an urban environment (Juhola et al., 2013), to explore social aspects of river floodplain management (Stefanska et al., 2011) and to study land-use related issues (Krolikowska et al., 2007).

Policy exercises and serious games can be applied especially in disaster response planning and in training activities before the real crisis occurs (Walker, 1995). Yamori (2009) proposes games as tools for effective risk communication that support the shift from one-way knowledge transfer (from experts to local citizens) to collaborative risk assessment and management that includes a diverse set of stakeholders. Visman (2014) describes Ready and Telephone participatory games that were used in urban risk reduction in Nairobi, Kenya. The Ready game helps

to identify the actions that can be taken by local communities in response to a flood risk in their neighbourhood. The Telephone game allows improving the communication flow in early warning systems. Both games have helped enhance humanitarian programming and decision-making, highlighting the role of provincial administration in risk reduction programming and engaging the meteorological service in early warning system development together with local Red Cross. Such games were designed in cooperation with community representatives and thus reflect the cultural setting of a specific community. As a result, they can be used by disaster responders to test their assumptions and methods before actual intervention in that community. Policy exercises and games can also help experts understand cultural factors behind decisions of community members. Moreover, they can also be used in disaster preparedness trainings and may be adapted to address diverse attitudes, perceptions, behaviour and cultural values and beliefs within the various communities (Mendler de Suarez et al., 2012).

6.1.1. What game(s) should I use?

We prepared an infographic that will help you to determine which game matches your needs best.

Overview of games developed and tested in the EDUCEN project that can be used to improve disaster preparedness and response actions:

Gifts of Culture game

The Gifts of Culture is a board game entailing a simulation of a culturally diverse community through role playing. Players become the representatives of various groups living in a flood-prone valley. Though they represent various views and ideals, they all have the same goal – for their group to have a better life. How will they achieve that with the constant threat of flood looming above their heads? Each action players can undertake has its advantages and disadvantages. Information sharing and collaboration can greatly improve their outcomes, however, diverse cultural backgrounds of the players make it very difficult. The Gift of Culture game allows players to experience how cultural differences can lead to challenges but at the same time shows how they can also be helpful. Play and use the "gift of culture" to improve community flood resilience.

Name	local communities, NGOs, policy makers, public administration, youth
Benefits	Players understand different ways of how cultural factors affect disaster preparedness and the ability to cope with disaster. Players improve collaboration and information sharing skills, especially in regarding collaboration between organisations and individuals representing diverse cultural backgrounds leading to improved disaster resilience Players increase their understanding of disaster risk and become aware of challenges and opportunities of diverse cultural backgrounds.
Created by	Centre for Systems Solutions- CRS
Number of players	8-16
Number of moderators	1
Duration	1-2 hours + 1 hour debriefing
How to obtain this game	giftsofculture.games4sustainability.org

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Evacuation Challenge game

The Evacuation Challenge Game presents challenges connected with disaster response and evacuation during the disaster (in this case – zombie apocalypse!) in a culturally and linguistically diverse environment.

Figure 6.1.3. Playing the serious game on cultural memory of disaster during the EDUCEN final conference in March 2017

Name	youth, museums, schools
Benefits	Players experience problems connected with language barriers during risk situations. Players understand problems encountered by people with disabilities during disasters and risk situations. Players learn about challenges of an evacuation in a multicultural environment. Players realise the importance of preparedness training, and the importance of training on diversity in communities.
Created by	Centre for Systems Solutions – CRS
Number of players	12 – 72
Number of moderators	at least 1
Duration	1-2 hours + 1 hour debriefing
How to obtain this game	To run this game download it from this page: evacuationchallenge.games4sustainability.org

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The Evacuation Challenge Game can be used to increase empathy among civil protection professionals. The game presents challenges of disaster response and evacuation in a culturally and linguistically diversified environment. Participants take on the roles of citizens and rescue team members. Several participants are bound by restricctions (e.g. they can communicate only in their native languages, are blindfolded or unable to hear, etc.). This experience offers reflection on language and cultural barriers during risk situations, and enables players to learn how evacuation actions should be adjusted to meet the needs of people with disabilities.

Cultural Memory game

The Cultural Memory game is a board game that uses the memory of past catastrophic events as an asset in increasing the disaster awareness and preparedness.

The Cultural Memory game takes place nowadays, in a city that experienced a great disaster about 70-100 years ago. However, as there has been no major disaster since then, people feel safe and do not see the need for implementing prevention and preparedness mea-

Name	Aid workers, local communities, NGOs, youth, disaster managers
Benefits	The game helps players understand the role of the memory of past disasters and recognize its signs. Players learn why being prepared is so important and where they can find information about that. The game encourages reflection on previous disasters in the areas of participants
Created by	Centre for Systems Solutions – CRS
Number of players	8-32 (the more players, the bigger room is needed)
Number of moderators	1-2 (depending on the number of players)
Duration	60-90 minutes
How to obtain this game	culturalmemory.games4sustainability.org

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sures. The game verifies these assumptions, as players experience a great disaster of a scale comparable to the previous one. In this way, the game confronts players with the harsh reality of living in a disaster-prone area and encourages them to reflect on how this situation affects their daily choices.

Players' goal is to increase their households' wellbeing level. The fastest way to do that is to spend their resources on consumption. Players can also learn about and invest in disaster prevention and preparedness measures. However, as this investment does not have a direct impact on the wellbeing, the incentive to take up this kind of measures is not very strong. The trend may change if players decide to visit the local museum where the memories of the tragic past are available. At some point of the game, a disaster re-occurs. The players who took the warning seriously and protected their households will be able to minimize damage to their wellbeing. Those unprepared, however, will lose everything.

6.1.2. Examples of other policy exercises, simulations, and games to improve disaster preparedness and response actions

Crossroad: Kobe: is a multi-purpose disaster risk communication tool that was created at the crossroads of the first, second and third modes of risk sense. The game encourages participants to inject their own views in persuading others and negotiating with each other in the scenario reconstructing the Kobe earthquake.

Disaster in my backyard: the game is set in a rainy period; heavy rains of the past days have caused the rivers to burst from their banks. Due to the rising water, residents of the affected area need to be evacuated, some needing assistance (you can change the scenario of a disaster). Authorities are taken by surprise and the participants are called upon to assist in combating the unfolding disaster. They need to manage the information flow, organize the response and assist the affected population. Read more on: http://www.iscram.org/legacy/ISCRAM2013/files/276.pdf

Extreme Event Game: This in-person role-playing game gives participants a taste of what it takes to build community resilience in the face of disaster. Players work together to make decisions and solve problems during an engaging, fast-paced disaster simulation. There are three different scenarios available. Players can play using print outs or tablets and laptops. Read more on: extreme-event.org

Gender Walk: the game was designed in order to explore gender dynamics within community. It is a perfect tool to reflect on how adaptation measures can effectively address gender dynamic.

Ready!: it is a physical game which introduces players to the topic of disaster preparedness and DRR. It shows an innovative approach to focusing attention on those issues. The game is prepared to be set in a real-case scenarios. Read more on: http://climatecentre.org/resources-games/ready

Stop disasters: this disaster simulation game, (from the United Nations and International Strategy for Disaster Reduction enables players to experience 5 natural environmental hazards (wildfires, earthquakes, floods, tsunamis and hurricanes), by understanding their risks and applying effective methods of prevention and mitigation. Read more on: http://www.stopdisastersgame.org/en/

Story-go-round: the main goal of this game is to teach local communities how to be creative about managing disasters with locally available resources. "Story Go Round" uses storytelling as a way of approaching disaster management and process of decision-making.

The Climate and Gender game: the game supports learning and dialogue on the different vulnerabilities of women and men facing climate variability and change, using examples of floods and droughts. Read more on: http://climatecentre.org/resources-games/the-gender-and-climate-game

6.1.3. How to use games and policy exercises

There is no widely accepted code of ethics for simulation and gaming. There are different codes for specific professional groups like APA (American Psychological Association) or STOP (Polish Association of Non-Governmental Trainers). However, whilst running simulations and games, the organizers should consider many ethical issues. Most people treat games as entertainment, yet it does not mean they are prepared or fully aware of what can happen during a game play. There are some topics (e.g. religion, sexual orientation, disabilities) that can make participants feel uncomfortable and discourage them from taking part in the game.

To avoid any negative effects on participants, several principles can be adopted:

- participation in gaming activity should be voluntary,
- use proven group work techniques helps create an atmosphere of openness and trust,
- during activities that affect the emotional sphere, additional time to debrief emotions in a safe environment should be planned into the activities (Crookall, 2010),
- information about the possible emotional consequences of the activities should be provided to participants (APA, 2010),
- a detailed introduction into each activity should be provided, especially regarding the parts with interpersonal interactions,
- high-quality debriefing should be carefully planned and delivered (Kriz, 2013, Kriz et al., 1995).

Workshops that include games demand a lot of preparation. This is why it is important to plan all the activities carefully in advance. There are many guidelines available on how to run a game as a training tool. For preparing DRR-related activities and games, we highly recommend using the Red Cross / Red Crescent Climate Centre's game facilitation guidance document (Red Cross / Red Crescent 2014). It must be remembered, however, that the final shape of the workshop and game depends on various factors, e.g. the number and age of participants, the time schedule, and room availability.

Serious games can sometimes act as standalone learning tools, but most often they are accompanied by a debriefing session after the game. During such sessions players analyse their moves, share their thoughts and emotions with others and reflect on the whole experience (Crookall, 2010). Proper debriefing session allows participants to go through any stressful aspects of the whole experience and transform it into a positive one. Moreover, the review of the simulation results gives the moderator an opportunity to compare these results with real-life conditions and data.

Workshops with games can be built around David Kolb's (1984) experiential learning model. This four-stage cycle consists of the following phases: concrete experience, reflective observation, abstract conceptualization and active experimentation. Gaming workshops following Kolb's cycle start with an experience - a game; then during the first part of debriefing, players reflect upon their moves; conclusions from that part should then be used to develop theories about the real-life problem; and then players should be encouraged to put these theories into action in their daily activities (Daszynska-Zygadlo, Pajak, 2016).

Policy exercises and serious games allow skilled disaster experts to include cultural factors in their activities aimed at effective and efficient risk reduction, disaster preparedness and response actions. The list of benefits connected with applying games into DRR activities is very long, and the examples provided within this text and the handbook should be treated as an inspiration only. It is worth remembering that most games are open for modification and experimentation thus we encourage every DRR professional not only to include games in their actions but also to actively pursue new ways of its application.

6.2. Mapping and analysing the network of interactions during an emergency

Authors: Alessandro Pagano, Raffaele Giordano

Enhancing the coordination effectiveness in case of emergency among the different responders, when a fast and efficient response is required, is the main scope of several studies aimed at overcoming the main organisational factors hindering the cooperation. Up to now, much more research has been carried out with respect to what happens within the same organisation under stress, while knowledge on what happens when multiple organisations need to coordinate in unison to make the best of their capacity in a highly stressful environment is still limited. Most of the efforts carried out for enhancing coordination effectiveness were meant to innovate the information technology for internal and external communication, information production and sharing.

Empirical evidence demonstrates the need to shift from innovating information production and management technologies towards enhancing the interaction processes among the different actors in emergency management. Interaction represents the mechanism allowing the different actors to interpret their environment, to achieve a satisfactory shared understanding of the situation, and to cope with the organisational and individual improvisation needed to deal with extreme events. Moreover, interactions allow to mitigate the conflicting interpretation of information about emergency due to differences in knowledge, beliefs, customs and assumptions.

In order to better comprehend the complex network of interactions activated during the different DRR phases, analytical methods are required that are capable of conceptualizing not only the attributes of these entities, but also the set of relations and ties among them. The Meta-matrix conceptual framework could be implemented to this aim. This approach conceives the organisation as composed by: social network, knowledge network, resources network, assignment network, information network, resources requirement and knowledge requirement.

6.2.1. Mapping the network of interactions

Most of the methodologies aiming at mapping the network of interactions among people limit their analysis to the social network, that

	Agent	Knowledge	Tasks
Agent	Social network: map of the interactions among the different institutional actors in the different DRR phase	Knowledge network: identifies the relationships among actors and information (Who does manage which information? Who does own which expertise?)	Assignment network: defines the role played by each actor in the DRR phases
Knowledge		Information network: map the connections among different pieces of knowledge	Knowledge requirements network: identifies the information used, or needed, to perform a certain task in the DRR
Tasks			Dependencies network: identifies the work flow. (Which tasks are related to which)

Table 6.2.1 Meta matrix showing the connections among the key entities of the social network
(adapted from Carley, 2005)

is, to map "who talks to, works with, and reports to whom". According to the common formulation, social networks are developed in terms of ties among persons. The improvement of emergency management requires the adoption of an organisational perspective for what concerns the information sharing processes and the cooperative task allocation and performance. Specifically, temporary multi-organisations are created for improving the coordination efforts during the emergency management. This composite agent has to be considered as a network whose behaviour is a function of complex processes for combining and generating collective outcomes.

The adopted methodology for mapping the interactions during an emergency is based on the conceptualization of an organisation as a set of interlocked networks connecting entities such as people, knowledge resources, tasks and groups. This meta-network representation effectively combines the knowledge level perspective, the social network perspective and the coordination management perspective.

The following table shows the meta-matrix approach.

The details of the methodology for mapping the interaction among the main entities – i.e. agent, knowledge and tasks – as described in the following.

	A_1	A_2	A_3	...	A_n
A_1	0	W_12	W_12	...	W_1n
A_3	W_21	0	W_23	...	W_1n
A_3	W_31	W_32	0	...	W_2n
...	...	...	...	0	...
A_n	W_n1	W_n2	W_n3	...	0

Table 6.2.2 Agent x Agent matrix

The first entity to be analysed is the Agent x Agent matrix, at the basis of the social network. Table 6.2.2 shoes an example of the social network.

In the previous matrix, W_{ij} represents the importance of the interaction between agent A_i and agent A_j as perceived by agent
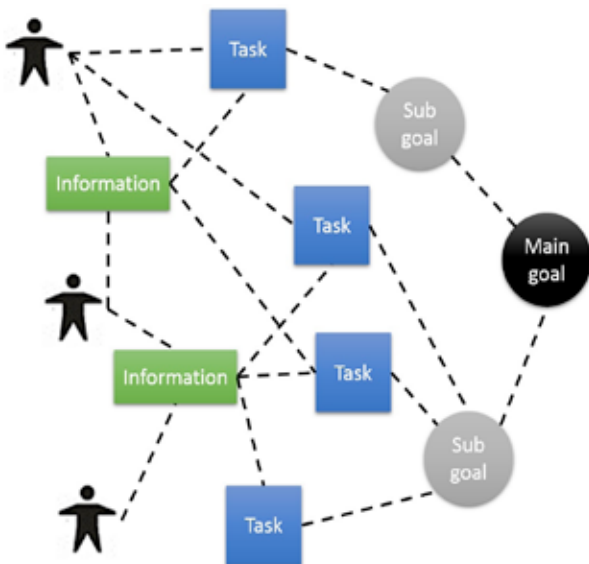

Figure 6.2.1. Fuzzy Cognitive Map describing the individual's understanding of the connections between goal-task-information-agents

	I1	I2	I3	...	In
A_1	K^i11	K^i12	K^i13	...	K^i1n
A_3	K^i21	K^i22	K^i23	...	K^i2n
A_3	K^i31	K^i32	K^i33	...	K^i3n
...	...	...	...	...	...
A_n	K^in	K^in	K^in	...	K^inn

Table 6.2.3 Knowledge network matrix for the i-th agent

A_i. Similarly, the value of W_ji refers to the strength of the interaction between agent A_i and agent A_j as perceived by agent A_j. The weights can be assessed accounting for the experts opinion. In this work, we use the term "experts" to indicate policy-makers and official responders involved in the emergency management. The experts' knowledge was elicited through a series of individual semi-structured interviews. A storyline approach (SA) was implemented. Referring to a specific episode of emergency management, participants were required to describe the sequence of actions implemented in order to achieve their goals in the emergency management, the information used and the other agents with whom they interacted.

The first issue to be addressed concerned the selection of the experts to be involved in this phase. In order to minimise the selection bias and the marginalization of stakeholders a top-down stakeholder identification practice, which is referred to as "snowballing" or "referral sampling", was implemented (Harrison & Qureshi, 2000; Prell et al., 2008). The selection process started with the actors mentioned in the official protocols of intervention. The preliminary interviews carried out with these agents allowed us to widen the set of stakeholders to be involved.

The results of the interviews were structured in individual Fuzzy Cognitive Maps (FCM). The structuring phase allowed us to translate the narratives into useful inputs for the Social Network Analysis (SNA) phase.

The interactions with the other agents can be activated through both

the sharing of information and the cooperation to perform specific tasks. Each link in the FCM is characterized by a weight, which describes the stakeholders' perception of the importance of that connection. The weight of the link agent-information describes the interviewee's perception about how crucial the agent is in obtaining the needed information. Similarly, the weight of the link information-task represents the role played by the information in facilitating the implementation of that specific task.

The individual FCMs were also used to define the other matrices. For instance, the individual i-th Agent x Knowledge matrix was obtained considering the weights assigned by the i-th actor to the different agent-information connections. The Agent x Knowledge matrix for the i-th agent is represented in Table 6.2.3.

The overall Agent x Knowledge matrix was obtained as the sum of the individual matrices. Similar processes were implemented to develop the Agent x Tasks, Knowledge x Knowledge, Knowledge x Tasks and Tasks x Task matrices.

In order to facilitate the elicitation of the participants' opinions about the importance degree, fuzzy linguistic variables can be defined. This method requires the identification of the linguistic labels used by
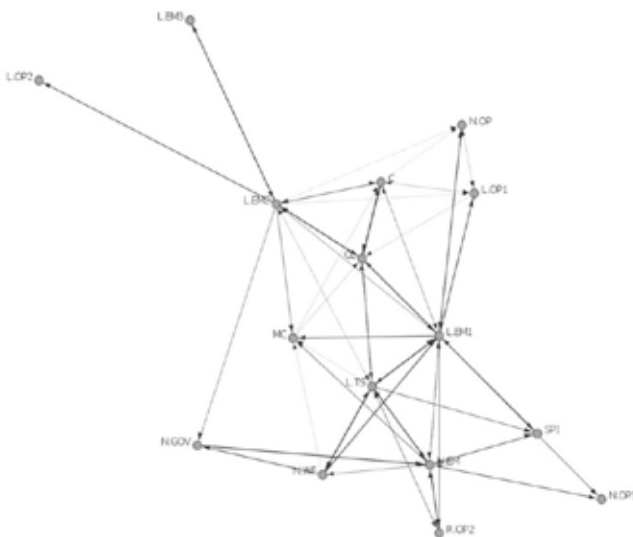

Figure 6.2.2. Map of the Agent x Agent interactions taking place during the flash flood emergency management in Lorca
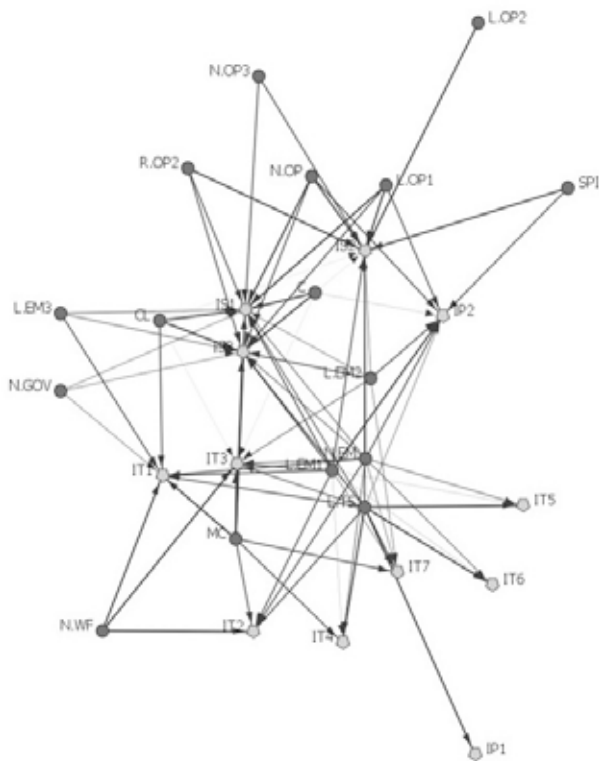
Figure 6.2.3 Map of the Agent x Knowledge network

the interviewees to describe the importance of the connections.

The weights in the matrixes are used to develop the network. They represents the strength of the ties between two entities. The following figures, respectively, the social network and the knowledge network were developed for the Lorca case study.

The direction of the links indicate which agent mentioned the interaction. For instance, the link between L.EM2 and L.OP2 shows that L.EM2 perceived itself interacting with L.OP2, but not vice-versa. The thickness of the links represent the weights assigned by the different actors during the knowledge elicitation phase.

Figure 6.2.3 shows the knowledge network for the Lorca Case Study.

The map demonstrates that there is no exclusivity in the agent-knowledge interactions, namely there is no actor exclusively owning pieces of knowledge. Therefore, cooperation among the different actors is
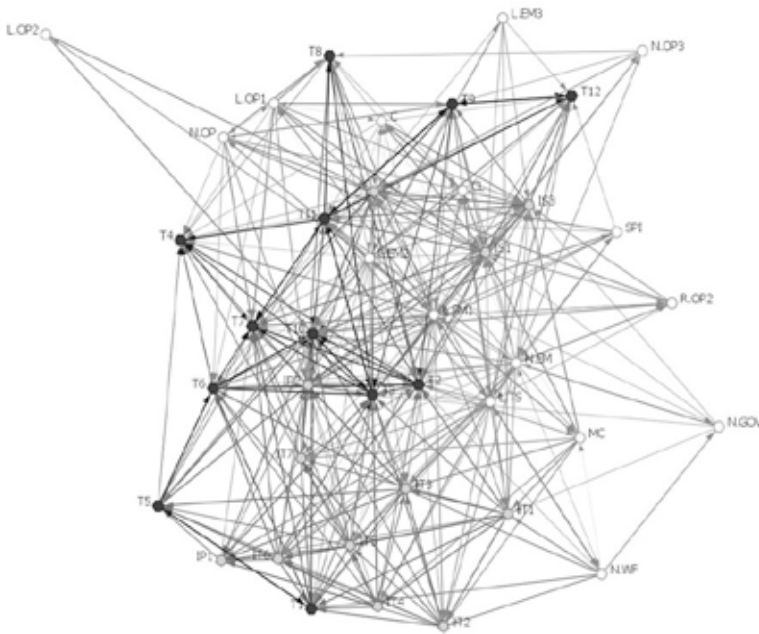
Figure 6.2.4 Network of interaction among Agents, Knowledge and Task according to both experts and local knowledge

crucial to overcome the fractured nature of the information system.

The combination of the different networks allowed to map the complex interactions among the main elements activated during the flood emergency, i.e. agents, knowledge and tasks (figure 6.2.4).

The results of the analysis can support emergency managers in different ways. Firstly, SNA allows to identify the actors that, because of their role in the network, could play a central role in speeding up the information sharing process. These actors should have easy access to the required information. Secondly, the SNA allows identifying the reasons of potential conflicts hampering the cooperative emergency management - i.e. information that should be shared between two different actors in order to facilitate the task implementation, but it is currently owned by one actor with limited capability/willingness to share. Thirdly, the SNA allows assessing the congruence between the information needed for performing certain tasks and the information actually accessible to the actors performing those tasks.

Concluding, the SNA results could provide useful information for im-

proving the protocol of intervention in case of emergency.

6.2.2. Analysing the map of interactions

Different kinds of analysis can be carried out through the implementation of graph network theory to the network of interactions. The results of the analysis can be used to enhance the effectiveness of the emergency management network, through the identification of key elements – i.e. key actors, key knowledge and key tasks – and main vulnerabilities, that is, the characteristics of the network that could lead to the failure of the emergency network.

	Network measure	Assessment	Meaning in DRR
Agent x Agent	Total degree Centrality	Those who are ranked high on this metrics have more connections to others in the same network.	Individuals or organisations who are 'in the know' are those who are linked to many others and so, by virtue of their position have access to the ideas, thoughts, beliefs of many others.
	Betweenness centrality	The betweenness centrality of node v in a network is defined as: across all node pairs that have a shortest path containing v, the percentage that pass through v.	Individuals or organisations that are potentially influential are positioned to broker connections between groups and to bring to bear the influence of one group on another or serve as a gatekeeper between groups.
Agent x Knowledge	Most knowledge	Assess the number of links between a certain agent and the different pieces of knowledge in the network.	An agent with a high value of most knowledge has access to a great variety of knowledge to be used in case of disaster.
Agent x Task	Most task	Assess the number of links between a certain agent and the different task that need to be carried out in case of emergency.	An agent with a high degree of most task plays a crucial role in the network due to her/his capability in performing different tasks.
Knowledge x Knowledge	Total degree of centrality	It calculates the importance of a certain piece of information according to the number of connected links.	The most central pieces of knowledge are those whose availability is crucial to make the other pieces of knowledge accessible.
	Closeness centrality	Closeness is the inverse of the sum of distances in the network from a node to all other nodes.	The closeness centrality measure allows us to identify the information that could facilitate the process of information sharing.
Knowledge x Task	Most task	Assess the number of links between a certain piece of knowledge and the different task that need to be carried out in case of emergency.	The pieces of knowledge with a high value for this measure are fundamental for the effectiveness of the network, since without them a high number of tasks will be not carried out.
Task x Task	Total degree of centrality	It analyses the complexity of the connections within the task X task network.	Tasks with high degree of centrality are those that have to be carried out in order to allow the executions of the other tasks.

Table 6.2.4 Graph theory measures for key element detection

Two different levels of analysis can be performed, i.e. node-level metric analysis and network-level metric analysis. The former allows for an analysis of the complexity of the network surrounding each node. This kind of analysis is used to identify the key elements in the network. The network-level analysis allows for better comprehension of the complexity of the network and makes it possible to identify key vulnerabilities. The results can be used to support the development of strategies aiming at improving emergency management through network performance. Two different groups of actions can be implemented to this aim. On the one hand, actions can be defined aiming at putting the key elements at the core of the emergency management protocols – e.g. enhancing the sharing of key information, emphasizing the

Network	Network measure	Meaning in emergency management
Agent x Agent Agent x Knowledge	Total centrality degree Most knowledge	An actor with a high degree of centrality and a low most knowledge degree represents a vulnerability because, although she/he a central position in the network, she/he has a limited capability to enable information sharing.
Agent x Agent Agent x Knowledge	Betweennes centrality Most knowledge	An actor with a high degree of most knowledge and a low betweennes degree represents a vulnerability because she/he is not capable to share with the others the pieces of knowledge she/he has access to.
Agent x Agent Agent x Task	Total centrality degree Most task	An actor with a high degree of most task and a low centrality degree represents a vulnerability because, although she/he is required to carry out important tasks, she/he is quite isolated and cannot be supported by the others during an emergency.
Agent x Knowledge Knowledge x Task	Most knowledge Most task	A piece of knowledge poorly shared within the network (low most knowledge) represents a vulnerability if its access is crucial to carry out important task (high most task).
Agent x Knowledge Knowledge x Knowledge	Most knowledge Closeness centrality	A piece of knowledge with a high degree of closeness but poorly shared (low degree of most knowledge) represents a vulnerability since it could hamper the process of information sharing.
Agent x Task Task x Task	Most task Centrality degree	A task with a high centrality degree and with low most task degree represents a vulnerability because, although its importance, there is no, or very limited cooperation to guarantee its effectiveness.
Agent x Agent Agent x Knowledge Agent x Task	Cognitive load	This measure takes into account the number of other agents, knowledge and tasks an agent needs in order to perform its own task. High cognitive load represents a vulnerability.

Table 6.2.5 Measures for the detection and analysis of key vulnerability in the emergency management network

role of key actors, etc. On the other hand, actions can be identified aiming at reducing the key vulnerability – e.g. increasing the speed of information by increasing the capabilities of the central agents to have access to crucial information.

The following tables describe the different measures, their meaning and how to use them to assess the performance of emergency management network.

Similarly, different graph theory measures can be implemented in order to assess the network vulnerability. That is, those elements that could lead to failures of the network, lower performance, reduced adaptability, reduced information gathering, etc. Considering the complexity of the emergency network, in this work the vulnerability elements were identified through a combination of different measures, as described in the table below.

Besides the node-level analysis, the map of interactions can be analysed at network level. Table 6.2.6 describes the measures that can be implemented in order to assess the effectiveness of the network in emergency management.

Network measure	Graph theory	Meaning in emergency management
Communication congruence	Measure to what extents agents communicate when and only when it is needful to complete tasks. Higher congruence occurs when agents don't communicate if the tasks don't require it.	Communication overload could reduce the effectiveness of the emergency management.
Knowledge congruence	Measures the similarity between what knowledge is assigned to tasks via agents, and what knowledge is required to do tasks. Perfect congruence occurs when agents have knowledge when and only when it is needful to complete tasks.	Having access to unnecessary knowledge could create "noises" during the emergency management.
Density	The actual number of network edges versus the maximum possible edges for a network N.	A dense network support the sharing of knowledge and information, leading to the creation of a common understanding.
Hierarchy	The degree to which a square network N exhibits a pure hierarchical structure.	In a hierarchical network, diversity of point of views and ideas is highly improbable. This negatively affect the richness of the knowledge co-production process.
Negotiation Knowledge	The extent to which personnel need to negotiate with each other because they lack the knowledge to do the tasks to which they are assigned.	Long negotiation processes needed to get the required information could reduce the effectiveness of the emergency management.
Speed average	The average communication time between any two agents who can communicate via some path.	Emergency management requires fast communication among the different agents.

Table 6.2.6 Measures that can be implemented to assess the effectiveness of the network in emergency management

6.2.3. Identification of actors

The official protocol of intervention describes only part of the complex network of interactions activated during an emergency. Other actors play a crucial role, although they are not officially integrated in emergency management procedures. Moreover, the results of the EDUCEN activities demonstrate that the importance of particular responders – either institutional or not institutional – is related not only to their official role in the protocol of intervention but also influenced by their capability to spread information within the network of interactions, and to share resources and tasks. The EDUCEN results show that the actors at the centre of the map of interaction are those that can enable the collaborative emergency management. They can increase the speed of communication, facilitating the transfer of pieces of information from one side of the network to the other. i.e. these actors could act as interface between the institutional systems of responders and the community. Due to their wide web of interaction and their access to knowledge and information, these actors represent an effective channel for information sharing. Specifically, EDUCEN results show that these actors can increase the accessibility to institutional information. Often this result is achieved through the activation of in-

Role of the actors	Meaning in the emergency management
Central actor	Individuals or organisations who are 'in the know' are those who are linked to many others and so, by virtue of their position have access to the ideas, thoughts, beliefs of many others. Individuals who are 'in the know' are identified by degree centrality in the relevant social network.
Information hub	Individuals or organisations that act as hubs are sending information to a wide range of others each of whom has many others reporting to them.
Authority	Individuals or organisations that act as authorities are receiving information from a wide range of others each of whom sends information to a large number of others.
Gatekeeper (betweenness centrality)	Individuals or organisations that are potentially influential are positioned to broker connections between groups and to bring to bear the influence of one group on another or serve as a gatekeeper between groups. This agent occurs on many of the shortest paths between other agents.
Agent with most knowledge	Individuals or organisations that have more expertise or are associated with more types of knowledge than are others.
Agent with most tasks	Individuals or organisations that are assigned to more tasks or are associated with more types of tasks than are others.

Table 6.2.7 Roles of different actors in the network

formal interaction channels. Therefore, the SNA has to be based on the collection of narratives about how the different actors actually interacted during the emergency.

The use of specific approaches (e.g. storyline approach) increases the insight in the sequence of events during the emergency management. Particularly, it supports: i) a general description of the system being investigated (e.g. procedures/protocols and key actors involved); ii) definition of a scenario; iii) determination of the sequence of events during a storyline, focusing on actions and responses implemented by each actor, information used and interactions; iv) analysis of the impacts of the external pressure and the effects of actions of local authorities and community members.

Limiting the analysis to the institutionally defined interactions could be misleading. The following table describes the roles that can be played by the different actors in the network.

SIX COLLABORATIVE LEARNING PRINCIPLES (Adapted from Feurt, 2008).

PROCESS of collaborative learning follows these steps: assess, design an action strategy, implement the strategy, evaluate results, and design next action.

RELATIONSHIPS are important and stakeholders are considered equal partners. Differences in knowledge and worldview are respected and treated as resources for collective problem solving.

COMMUNICATION among stakeholders is honest, sincere, understandable and appropriate. Procedures exist for fostering dialogue that contributes to a shared understanding of areas of agreement and disagreement. Consensus is not required in order to make progress on shared goals.

INCLUSION, to the extent possible, of all groups with a stake in solving the problem should be represented in order to consider diverse aspects of the issue (scientific, political, economic, legal, etc.). Strive to identify and include people who will provide comprehensive perspectives on the problem being addressed and are in a position to take actions that will move toward the desired outcomes.

PARTICIPATION should aim at actively involving stakeholders in the co-creation of knowledge about the nature of the problem to be addressed, development of an action strategy to make progress and selection of tasks that can be accomplished within their sphere of influence. Stakeholders should be willing to commit to these working principles.

FACILITATORS are catalysts for innovation and change. They support stakeholders as they analyse information and develop strategies that make sense in their work environment.

6.3. Collaborative learning for DRR

Author: Karina Barquet

Collaborative Learning is a framework and set of techniques intended for multiparty decision situations. It is a means of designing and implementing a series of events to promote creative thought, constructive debate and the effective implementation of proposals that the stakeholders generate (Daniels and Walker 2001). Collaborative Learning is used to facilitate a shared understanding of complex issues by combining the presentation of information with dialogue amongst a group of stakeholders in order to clarify the scope and definition of problems. The aim is to create an enabling environment in which stakeholders with divergent views are able to engage in constructive dialogue to jointly design strategies or recommendations to a specific problem (Feurt, 2008).

6.3.1. Implementing collaborative learning

EDUCEN adapted the 4 phase collaborative learning cycle as outlined by Feurt (2008). The activities implemented in each of the steps are explained below.

Phase 1 Assessment. A review of secondary material from each of the participant cities as well as data generated by city coordinators in the course of the project was carried out as a first step. Based on this data collection, semi-formal skype interviews were conducted with each of the pilot coordinators guided by a questionnaire designed to identify the cultural aspects of DRR within the cities. This questionnaire was sent to each coordinator a couple of weeks ahead of the interview to give them time to prepare. The interviews with pilot coordinators generated further knowledge about the particular cultural and disaster risk contexts of each of the pilot cities, the methodological issues that each of the coordinators is facing, the stage of the project of each of the cities, and the similarities and differences between cities.

Based on the summary from the secondary data analysis, the data collected, and the information gathered through the interviews, a situation map, in the form of an excel sheet, was developed. This map was used as point of departure for the subsequent stakeholder engagements in the project. The situation map contains information on key issues, such as the hazard in focus (e.g. floods), the main challenges

linked to the hazard, the target group approached in each of the cities, the goal that each pilot city has in EDUCEN, the type of objectives in the project (management, communication/information, physical/infrastructure, or institutional/organisational), the method used to achieve the goals in each of the cities, and whether any of the experiences in one pilot city could potentially be transferred to another city. Hereon, we identified the main opportunities and challenges for change in each of the pilot sites. These were grouped into 5 categories: communication, trust, social exclusion, coordination, and participation.

Session question	Key topics relating to culture and DRR				
	Communication	Trust	Integration	Coordination	Participation
1. WHAT is the issue relating to culture and disaster risk?	What communication and dissemination strategies are used to reach different (vulnerable) individuals or social groups at risk from hazards? What gaps did you identify in the communication and dissemination of information?	What actions are currently taken to ensure transparency and accountability in DRR?	What knowledge, skills and strategies do different social groups and sectors have for preventing, coping with, and recovering from disasters? What factors contribute to the vulnerability or resilience of different individuals and social groups? Which knowledge, skills and strategies relate to the social culture of people at risk? To what extent are these strategies considered in 'formal' DRR measures?	What methods and tools do organisations engaged in DRR have for collaborating with each other to prevent risk before a hazard occurs, to manage risk during an event, and to recover from the effects of a disaster?	What strategies, policies and methods exist for engaging different individuals, social groups and sectors in DRR planning and implementation?
1. WHO causes the issue identified in 1? Who is affected by it and how?	Who communicates and disseminates hazard and DRR information? Who are the receptors of this information? Are different methods used to reach different social groups or sectors? Is the information provided timely, understandable, easily accessible, and culturally appropriate for those at risk?	Which organisations are responsible for DRR? What are their mandates? How are they perceived by other organisations and by people at risk? Are organisations engaged in DRR trusted? If so, why? If not, why not?	Who is particularly vulnerable or resilient to a disaster? What role do social and/or organisational culture play in integrating different sets of knowledge and skills?	Who is in charge of coordinating? What are current challenges in coordinating DRR activities?	Who participates in DRR planning and implementation? Who doesn't? Are there any issues related to social or organisational culture that create barriers for participation?
1. HOW could the issue be addressed?	How can communication and information dissemination be improved in all stages of DRR to reach all individuals, social groups and sectors at risk? How can communication and dissemination make better use of cultural opportunities?	How can transparency and accountability be improved in DRR? What are cultural opportunities for improving trust in DRR organisations?	How can the vulnerability of social groups and sectors be reduced? How can resilience be built? How can the (cultural) knowledge, skills and strategies of different social groups and sectors be better utilized in DRR?	How is coordination between different organisations engaged in DRR organized? How can coordination between organisations be improved? What are cultural opportunities to improve coordination between organisations?	How can the participation of individuals, social groups and sectors be improved? How would you describe the nature of participation? How does the nature of participation affect the vulnerability or resilience of different social groups? What are cultural opportunities to enhance participation?

Table 6.3.1 Questions and key topics relating to culture and DRR

Phase 2 Design the process. This phase was carried out in close co-operation with city coordinators and other local stakeholders from some of the EDUCEN cities. Through a one-time workshop, the problem statements was firstly confirmed, and later further developed based on three strategic questions: WHAT, WHO and HOW, posed in relation to the 5 key issues identified under Phase 1 and highlighted in table 6.3.1.

Phase 3. Implementation of Collaborative Learning. We departed from the experiences of Phase 2 to organize a one-time workshop with local stakeholders within the DRR community from two of EDUCEN pilot cities, L'Aquila (Italy) and Lorca (Spain), and three external cities Dordrecht (Netherlands). The aim with the workshop was to achieve concrete guidelines for policy-makers on more specific DRR issues in a broader geographical scale. The issues in focus were co-defined by city coordinators and facilitators and based on site-specific challenges where there was room for improvement: the role of volunteers in DRR, inclusion of gatekeepers in risk management, and communication and information dissemination to enhance risk awareness and preparedness.[1]

6.4. Replication loops to incorporate culture as an asset in DRR

Authors: Elena Lopez Gunn and Manuel Bea

One of the main aims in developing tools and methods that are supported by knowledge on how to use culture as an asset has been to facilitate - and in many ways test - that these tools and methods are replicable and re-usable for other cities and contexts. Therefore a replication methodology has been developed to facilitate the transfer of knowledge embedded in the tools and methods, and the lessons drawn from their application to real cases.

The method relies on the implementation of pilot activities in different contexts in a cycle of replication loops, aiming to achieve the transferability of methodologies and procedures developed for the adoption by other cities.

The methodology has considered three replication loops for each activity, and the jump from one replication loop into the following loop involves a larger type of interaction, and the transferability of pilot activities undertaken within the case studies.

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1   For the results of the workshop see section V, chapter 5 of this handbook

Loops and replication

EDUCEN has succeeded in replicating a number of tools and methods in different ways to take into account the correct adaptation to a different local context. A sequential approach has been adopted:

- In the second internal replication loop, a single method previously proven in a frontrunner city (first loop) was replicated in another city (Lorca, Dordrecht and London).

- In the third external replication loop, the tools and methods approach was replicated as an integrated process in another city (Valladolid) external to the initial case studies.

6.4.1. Transferability Framework: loops methodological framework

In the method developed for replication, the process starts with the identification of a series of "pilot" activities. These activities can be identified and developed in two ways: first, as emerging from the city based on local identified needs to address the specific requirements coming from the community of stakeholders (bottom up), and thus developed by the city itself; or second, based on matching local needs to the tools and methods developed to adopt culture as an asset. For example tools and methods to incorporate cultural aspects like
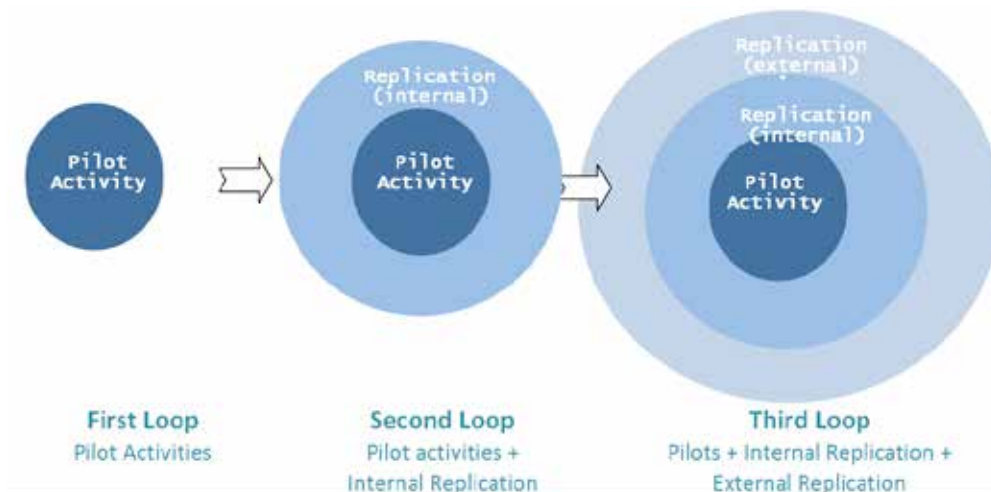

Figure 6.4.1 Replication loops to adapt tools and methods to adopt culture as an asset in DRR

cultural memory; cultural networks; mutual learning; hard and soft infrastructure; and cultural empathy- in the local cities DRR policies (top down).

First Replication loop: design of tools, methods and pilot activities for culture as an asset in DRR

This first loop to develop pilot activities on tools and methods for culture as an asset in all cases require a level of involvement by those responsible for DRR and eventually by the local community of stakeholders, organised and monitored by an organisation acting as activity leaders. The case study leaders acted both as facilitators and pilot activity leaders.

In this first loop, the focus is self-learning on their own role, and mutual learning among the different actors and stakeholders in DRR such as responders, planners and vulnerable groups. In all cases the pilot activity leaders engaged directly with local stakeholders through meetings, workshops, interviews, as organized activities. Thus as is discussed in the section on the Communities of Practice, one of the main outcomes of this approach are the networks created as a result of these activities and which all had a different aspect of culture at its core. That is, in effect a local Community of Practice around Culture in DRR.

The methods and approach are based on a participatory strategy led by a local actor or a facilitator with the consent of key local actors, and stakeholders for the co-development of tools and methods for integrating culture into DRR. A result of the implementation of these pilot activities was the creation of these local cultural networks or "communities of practice".

Thus it is a city demand-led approach establishing links between the possible tools and methods for application to specific sites based on local needs and priorities, which helps to gradually build up a toolkit

First Replication Loop

The first loop focuses on the definition of pilot activities in case studies. Throughout this replication loop, the tools and methods are developed, tested and evaluated for their suitability on the basis on the information and needs provided by city itself. The aim therefore is to co-develop together with city partners and the pilot activity leaders a series of tools and procedures for integration of culture into DRR.

to be adapted, used and validated in a real environment. We found that a necessary condition for this match of tools and methods to city needs (demand) has to be flexible, i.e. an "adapt to adopt approach", which adjusts and tailors the methods to the specific needs and context of the city. Therefore, the choice on the pilot activities to be adopted from the Toolkit lies with the city, who is best placed to identify the relevance of the tools and methods, and the added value and impact that each activity provides after its application. This element of evaluation of local relevance (a reflexive part) is key element for the adoption of tools and methods that can help a city integrate culture as an asset. Since culture itself is heavily grounded on contextual realities, any tools and methods to use culture as an asset have to be culturally relevant and informed by the local context.

Second replication loop: the "adapt to adopt" approach

In the second loop the focus is to transfer pilot activities to other cities after these activities have been tried and tested. A document was prepared on a common "Transfer Design and Assessment framework" to guide the transfer from the initial frontrunner city and its specific context to other adopting replicator city context(s). The framework included adapting the specific pilot activities with a direct involvement of the replicator city.

The aim was to have a "stand alone" set of transferable tools and procedures or broader methodological approaches that can be implemented in the third loop by other cities without much direct support. These tools and methods are integrated into a Toolkit as a key ele-

Figure 6.4.2 Learning loops in EDUCEN. **First Loop:** Identification per cultural theme of methods, tools, procedures and best practices. **Second Loop:** "Adapt to adopt" Transfer to City B. **Third Loop:** Matrushka integrated approach to Transfer tools and methods to cities.

ment in this Digital Handbook. This translates into ensuring that these tools and methods can be adopted by the wider community of practitioners with, or without, the involvement of the pilot activity leader. After this second replication loop, tools and methods become more easily transferable and thus more likely to be "off the shelf".

The reality of the transferability within the second replication loop has been to learn that it is largely demand driven, i.e. the toolkit offers a series of tools, methods or approaches like a palette (i.e. the Toolkit), yet it is the city itself that then chooses those tools and methods that are more suitable to its particular needs, after a necessary process of adjustment and fine-tuning, also led by the replicating city. Furthermore, an interesting aspect learnt though this transferability process has been that the city itself often brings additional tools, methods or approaches the city wants to incorporate. Thus, a process of social innovation.

Third replication loop: "the Matrushka" approach

The third replication loop is important because it offers the potential, not only adapt the tools and methods to the adopting city, but also to integrate different tools and methods in a synergistic blend that incorporates the tools and methods from the "replicating city".

"Adapt to Adopt"- the importance of context for successful replication of tools and methods

The "adapt to adopt" approach recognises the central importance of "context", understood as the specific conditions for which the pilot activities for one specific tool or method are going to be carried out. By incorporating the reality of different contexts we acknowledge that these different contextual factors must be incorporated in the replication frame to be able to produce transferable outcomes. In all cases, all methods had to be adapted to take into account the specific context and conditions of the replicating city. An overarching lesson learnt is the necessary crucial involvement from stakeholders (particularly local authorities) in order to fine-tune the objectives and the elaboration - and if needed, adjustment- of the final materials to be replicated in the sequence: a) re-design, b) implementation, c) validation and d) lessons learnt/reflections. The differences in contexts have proven to be particularly dependent on the level of involvement from local authorities and stakeholders and also, different aims in terms of contributing to the elaboration of the final materials to be produced. Thus, context and local needs and demands are probably much more important than anticipated into ensuring the true value of methodologies, procedures and supporting materials e.g. guidelines or training modules.

One of the innovations in the third replication loop is the so called Matrushka approach. Here the different tools and methods are integrated and/or or slot together bringing a higher level of impact. This was the case of the replication loop for the city of Valladolid .

In the Matrushka approach rather than adopting a single tools or methods, the application of two or three methods are adapted and adopted simultaneously, providing enough flexibility to include tools and procedures (pilot activities) suggested by the replicating/replicating city to make a synergistic blend that can have a much deeper impact. These tools and methods act as lenses that look at different – yet complementary aspects- of integrating culture into DRR and developing a culture of safety and security based on the adoption, appropriation and modification of these tools and methods.

One of the tools developed to understand the role of culture as an asset for DRR to understand the role of formal and informal networks through the use of Social Network Analysis developed by NCR-IRSA. It has been implemented three times; first as a pilot activity in the first loop for the case of the L'Aquila earthquake of 2009, then in a second replication loop for the 2012 Lorca flood in Spain , and then in a third replication loop to the city of Valladolid.

6.5. Communities of Practice on Culture as an asset in DRR

Authors: Elena Lopez Gunn, Manuel Bea

One of the main aspects in the application of the tools and methods has been the gradual emergence of different communities of practice (CoP), which can provide a key element for mainstreaming culture as an asset to increase resilience in DRR. The EDUCEN case studies have generated examples and support material, where the combined result (e.g. this handbook) can be disseminated to other potentially interested cities for their replication. The idea is that this handbook and material can support the creation of other Communities of Practice to integrate culture into DRR in interested cities. This will support disaster planners, trainers and responders to reflect on the cultural factor, developing procedures to document active and latent knowledge of practitioners and communities in relation to culture in disasters.

What we have witnessed has been the creation of Communities of Practice both inwards and outwards: i.e. as local communities of

practice and as transnational (sometimes thematic) communities of practice that can incorporate different cities sharing common interests to strengthen the use of culture as an asset in DRR.

Collaboration and cross-learning between these multiple urban stakeholders – and the relevant institutional actors is therefore crucial. Therefore, one of the key actions was to help create, extend and strengthen Communities of Practice so that these actors better integrate culture into DRR in each participating city. This offers the support for disaster planners, trainers and responders to reflect on the cultural factor, developing procedures to document active and latent knowledge of practitioners and communities in relation to culture in disasters. These CoPs are the result of encouraging and facilitating the formation of living networks of experts on cultures in disasters encompassing community members and practitioners, drawn together by a common interest in understanding the role culture plays, in mitigating the risks of and accelerating recovery from disasters, i.e. the role of "Communities of Practice based on a well-developed theory for studying how people learn socially from their peers within communities of a certain practice"

The formation of living networks of experts on cultures in disasters encompassing community members and practitioners (Communities of Practice - CoPs) expresses a common interest in understanding the role culture plays, in mitigating the risks of and accelerating recovery from disasters. These local CoPs form a "Culture in Disasters" nascent

Box: Communities of Practice: (extract from Barquet et al., 2016)

A Community of Practice refers to how people learn socially from their peers within communities focused on a particular activity. Definitions vary depending on the particular goals and fields of interest, but Wenger (1998) offers a general point of departure for understanding their importance: "Communities of practice develop around things that matter to people. As a result, their practices reflect members' own understanding of what is important." The community's mission generally includes fostering interaction, identifying and sharing best practices, creating new knowledge, and fostering learning. Within DRR, communities of practice have been defined as "temporary horizontal organisation[s] with varying levels of formality whose primary mission is to identify and solve complex, institutionally cross-cutting problems and whose major characteristics are: (1) a task-focused existence, (2) flexible and evolving membership, (3) openness to a wide input array, (4) shifting loci of leadership, (5) democratic decision-making, and (6) autonomous funding, within a continuous learning environment" (Sarmiento et al. 2012, p.14).

network. The collaborative procedure required building cross-cultural linkages. This made the collaborative procedural work a valuable objective in itself.

6.5.1. Local Communities of Practice in the EDUCEN case study cities

Over the last two years a series of workshops were held in the EDUCEN cities to help build capacity in the recognition of culture (and use of cultural assets) in disaster response. We have seen how active local communities of practice can help a shift understandings and practices on all actors involved. In our workshops the aim was to invite policy makers, urban planners, and risk management actors, NGOs, civil society groups to facilitate collaboration and learning between these groups, approaching culture as an opportunity. This meant the incorporation of different values, assumptions, "language" and terminology the different communities of practice have, by incorporating empirical and tacit knowledge. The box summarises the kind of target actors to be included and below these are exemplified with the real examples from the CoPs from our case studies.

One of the outcomes has been to link actors active in DRR previously not working together into *de facto* Communities of Practice. Here an important role is the identification of end users to help sustain dissemination, networking and learning beyond the project. A main lesson drawn has been the importance of and potential for co-development and testing of a series of tools and procedures for integrating of culture into DRR. This co-design and collaboration meant that the application was relevant to stakeholder priorities and that stakeholders were engaged through a series of workshops built around policy exercises so that the products that make up the final multimedia Handbook are useful and relevant. This process of collaboration and co-design had two outcomes: first, the knowledge itself generated from the design and application of the tool, and second, the process itself which led to the creation of a CoP, an intangible result by itself.

Thus a lesson learnt is the potential to build strong local Communities of Users at city level. This local Community of Users comes with an important added value that we had not identified from the outset but which became obvious once the city meetings and activities were underway: the different stakeholders and end users themselves can tap into their own networks thus helping to be "agents" or "diffusers"

of EDUCEN´s tools and methods, i.e. a process of social innovation. These local CoPs together form a "Culture in Disasters" network that has helped in the preparation and delivery of the local case study manuals. These local CoPs that together form a "Culture in Disasters" network have supported the preparation and delivery of both local digital manuals as well as this Handbook through the testing of the training modules, toolkit and methods, so that these can be adapted and adopted by other cities.

Facilitating the emergence of a local Community of Practice on culture and disasters

The first step is to map those organisations and stakeholders groups with direct responsibilities on DRR, or which could be further benefitted from successful involvement into a network to consider culture as an asset for DRR. Below we have listed the "typology of target groups" to be considered for inclusion in a local CoP. The second step is the process, as a way of "learning by doing", how these communities of practice emerge from an approach that is sensitive and open to use and/or develop and implement cultural sensitive strategies, specific measures and tools.

- Target: the first responders with the objective of securing a higher impact by targeting operational users. The goal for this level is to promote involvement into culture as an asset Communities of Practice network. Civil Protection authorities, with competences in urban areas. River Basin Authorities, in cities which may be severely affected by floods are examples of this type of stakeholders.

- Target: other beneficiaries: urban communities and particularly vulnerable groups, researchers and generic policy makers or urban planners. Here, our focus is on increasing understanding and promoting a wider dialogue. Prioritise representatives of cities and municipalities with significant disaster risk and with competences in DRR planning.

- Target: the General public, which may get informed about pilot activities, tools and methods in line with the aim of raising awareness around the potential of culture as a basis for a better disaster preparedness. Groups of stakeholders representing one sub-culture in cities in particular vulnerable groups (e.g. migrants, inclusively oriented DRR) at local, regional or even national scale, and NGOs/voluntary organisations involved in disaster preparedness and response.

- Target: tap into experts like those active in museums, local universities, archives and the academic community of practice engaged on mainstreaming culture into DRR and research in this area, particularly from the perspective of the science-policy interface. For this purpose the idea is to develop a follow up academic book on the topic.

6.5.2. Transnational communities of practice

Another important element of the communities of practice has been the potential to develop a transnational community of users. These are more difficult to set up due mainly to language barriers and resource constraints. However, the potential to explore thematic Community of Users (CoU) based on key emerging themes could offer great potential for speeding up social innovation and mutual learning. The workshops held during the EDUCEN project have been organised around specific themes such as volunteers, leaders/gatekeepers, climate security and DRR, or around disability inclusive disaster policies. We could see emerging CoUs around e.g. the volunteer groups attending, the media and the public authorities, as well as cross learning with e.g. Swedish public authorities talking to Spanish digital volunteers or Italian red cross engaging with the Spanish regional civil protection.

Another aspect has been upscaling of local Communities of practice. As mentioned earlier, one of the emerging characteristics has been the gradual development of Local Communities of Users and the realisation that this in effect is a network within other networks. Thus in some cases these local CoUs have started to open the door to upscaling and replicating methods to other scales. In the workshop held in Volos on July 2016, one of the main successes of the event was the capacity of the organiser to draw on not just local actors but also regional and national level stakeholders. Equally, in the case of Istanbul, although the application started with the megacity of Istanbul, the CS leader is a national Search & Rescue organisation; thus the materials developed are intended to be adopted to be implemented at national scale.