6.5.Network analysis in L'Aquila CS

Network analysis in L'Aquila CS

A series of interviews with the key responders were carried out in order to map the interactions activated among the different responders during the 2009 earthquake emergency. The analysis of the map allowed to detect the crucial role of the local emergency management team in facilitating the information sharing process.

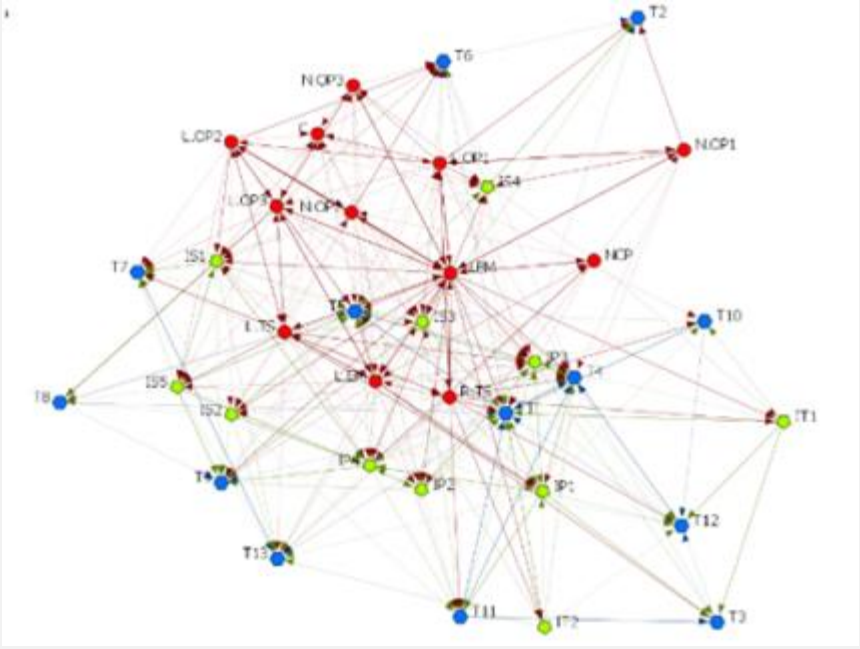


Figure 70.

Network analysis in Lorca CS

The map of the interaction network in Lorca CS refers to the San Venceslao flood episode occurred in 2012. Institutional and non-institutional responders were involved in the analysis. The map highlights the crucial role played by the leaders of the community. Suggestions were made in order to better integrate community in the information sharing process.

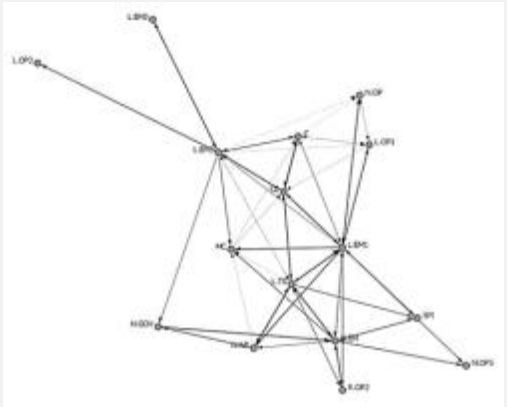


Figure 71

SECTION 5:REPLICABILITY, EMPATHY, LEARNING AND REFLECTION

1.REPLICABILITY: Understanding the role of culture as an asset for DRR

1.1.The Case Study-based approach

Cultural factors play a key role in determining the way people respond to events, engage in crisis management and engage with disaster relief in an emergency situation. In addition, cultural backgrounds influence disaster preparedness, response and after-crisis recovery for both individuals and the society people belong to. Under this frame, a series of specific activities were implemented in six Case Study areas to help incorporate an understanding, sensitivity and develop competencies in relation to the role of culture as an asset in the full disaster risk reduction cycle. The activities have focused on cities with very different social and urban characteristics, cultural identities and with different kinds of exposure to disasters, i.e. **Istanbul, L'Aquila, Lorca, Milan**, cities in **Umbria** region and **Volos**, with a final aim to develop more resilient cities and improved disaster preparedness.

The case studies incorporate four so called frontrunner cities (**Istanbul, L'Aquila, Lorca, Milan**, and **Volos**), one region (**Umbria**) and two replicator cities (**Valladolid** and **Dordrecht**), which have different social and urban characteristics, cultural identities and with different kinds of exposure to disasters. These case studies vary in a number of elements, which has enriched the project by documenting and giving room to the characteristics and peculiarities of cities and their contexts, as well as their choices in terms of tools and methods tested, in a more "a la carte style", which provides a useful lesson in terms of future replication. That is, how it is important to facilitate an "adapt to adopt" approach to replicating tools and methods to help cities adopt those that are better suited to their conditions and that match their needs. This was the successful experience in the replicator cities (Dordrecht and Valladolid) which chose those tools and methods that better matched their interests and needs.

Table: Front runners and replicator cities that have participated and main hazard considered

ROLE PLAYED	CITY	SIZE	NUMBER INHABITANTS	HAZARD TARGETED
Frontrunners	Istanbul	Very Large	14,030,000 (2015)	Earthquakes
	L'Aquila	Medium	72.913 (2008)	Earthquakes
	Lorca	Medium	91.759 (2014)	Earthquakes and extreme climatic events
	Milan	Large	1,251,000 (2012)	Emergencies during a mega-event
	Volos	Medium	144.449 (2011)	Floods, earthquakes and economic crisis
	Region of Umbria	Medium	894.762 (2015)	Floods

Replicators	Dordrecht	Medium	118.810 (2011)	Floods
	Valladolid	Medium	306.830 (2014)	Floods
	London	Very Large	8,700,000 (2016)	Emergencies during a mega-event

A series of Digital Local manuals document the exposure and past experience of these cities to hazards and how different tools and methods have been developed to incorporate culture. If you are for example interested in the role of cultural memory in DRR we encourage you to read the Case study manual on Volos , if you are interested in how to deal with emergencies in mega-events as a hotchpotch of culture have a look at the Milan case study,. If on the other hand you want to learn about the role of different actors in DRR we encourage you to read the L'Aquila and Lorca cases). These examples include the lessons learnt/reflections in the selected case studies to highlight the experience gained on how to put in practice culture as an asset. These local manuals provide real examples on how to develop and implement cultural sensitive strategies, specific measures and tools.

These shows how cities can and have engaged in processes aimed to incorporate culture into DRR through different tools and methods, with the aim to support local disaster preparation and response. This becomes part of mainstreaming the importance of culture into DRR by improving the recognition and integration of culture in disaster preparation and response in Europe.

Case studies used to understand the role of culture in DRR

This section focuses on the first learning loop in Case Studies. It provides the original basic information on the case studies for an identification of the context and core pilot activities. The context which forms the basis for the "adapt to adopt" is framed in terms of the description of physical, social and organizational variables relevant to the development of EDUCEN case studies. In addition, the delimitation of the context is supported by the provision of background information on the general characteristics of each case study, the identification of key groups and the specification of objectives and main problems to be tackled. Finally, the rationale behind the selection of each case study for the development and assessment of the specific pilot activities contributes to explain why this analysis is representative and provides a basis to facilitate transference into different contexts.

1.1.1.ISTANBUL CASE STUDY

ISTANBUL- Disability inclusive DRR: tools and methods as main objective from Istanbul

Turkey needs a comprehensive approach to disability and disasters, which would not only include the preparation and response phases but also the recovery phase, covering long-term impacts on victims, not to mention the need to address "normal-time" issues like the socio-economic conditions that generate most of the vulnerability. Such a macro-policy objective is not only beyond AKUT's capacity (even beyond all similar NGOs' capacity combined) but also out of EDUCEN's scope. Istanbul CS addresses only a carefully selected section of a complex problem, in accordance with AKUT's existing capacity, and capability within EDUCEN timeframe. AKUT will take use of one of its most

valuable assets, that is, public disaster preparedness experience; the other being search and rescue capacity.

Istanbul CS's objective is twofold. The first may be considered as "local", since it consists of contributing to the reduction of Istanbul's disabled community's vulnerability to disasters in a sustainable manner. The second objective is "universal" and potentially more significant: to obtain a transferable pilot model or methodology from the Istanbul experience that can be used in other contexts for addressing the same or similar problems.

The core idea here is to empower disabled volunteers with AKUT's disaster knowledge and assist them in empowering other members of the disabled community with the same knowledge. Yet, the "transfer" here is by no means unidirectional: Admitting that disability itself is a "knowledge", disabled participants are required to work to adapt the existing disaster preparedness curriculum, even designing new programs from scratch if necessary, by bringing their own life experience and practical information to the table. This collaborative working scheme will ensure the active participation of disabled individuals to the action and foster mutual learning between disabled and non-disabled disaster volunteers. A series of parallel activities are also planned to further increase exchanges between disabled volunteers and members of Istanbul's "disaster community", whom we expect to facilitate to gain a new perspective on disability.

Introduction to Istanbul and disability inclusive DRR

The study will be conducted within the jurisdiction of Istanbul Metropolitan Municipality. Istanbul is the largest city in Europe hosting a population of around 14 million inhabitants, ranking 5th overall in the world. It may be considered as the cultural and economic centre of Turkey. One peculiarity is its character of trans-continental city, occupying both shores of the Bosphorus strait which geographically imply the existence of a European side and an Asian side. Istanbul has undergone a significant change in parallel to Turkey's socio-economic transformation. Like other Turkish urban centres, it has registered very high rates of immigration after the 1960s and plans to impose control and technical criteria to new urban developments have had limited success. The city is still one of the fastest growing ones in the world, on its way to become a *mega-polis*, with all the associated practical problems that result from this chaotic over-expansion grow steadily. The management of disaster risks is certainly one that rank high in priority among all these issues.

Istanbul has been disaster prone throughout its history. Historical records show that seismicity is without doubt the most important hazard. Notably, after a century of no activity, destructive earthquakes in 1999 reminded Istanbul's dwellers that the risk would remain high in the future. However, other risks such as floods (increased further by human impact on the natural hydrological systems) and landslides should also not be underestimated. In addition to those "natural" hazards, the city is under constant threat from high-risk industrial facilities that are surrounded by residential areas and by the transportation of hazardous material through overcrowded land routes and the Bosphorus strait. Gigantic traffic congestion (usually combined with severe weather) are also increasingly common. Other scenarios can also be mentioned, like a large-scale health or food emergency, of which the potential consequences remained largely undiscussed so far.

As for the physical assets in Istanbul, their vulnerability to disasters is long recognized. A specific problem is that, despite the so-called "transformation of the urban zones under disaster risk", action taken by the government (2005), a very large portion of the building stock remains highly vulnerable to earthquakes. This is alarming for a city that almost straddles one of the most active fault lines in the globe, which is expected to generate an M 7.0 or greater earthquake in the next decades. However, real-estate development and trade play a key role in Turkey's developing economy, which result in high degrees of opposition to any tentative strict regulation in terms of land management and urbanization. This can be made worse by the potential for clientelistic schemes based on the manipulation of land and property as speculative- income sources, undermining risk mitigation and

prevention efforts as well. Major earthquakes in the past in Turkey have often exposed corrupt practices and deliberate negligence in building codes encouraged by political clientelism. The predicted "Istanbul Earthquake" would probably not be an exception in this sense.

The link between clientelism and vulnerability -in the Turkish case- is indeed a revealing example of how social, economic and political conditions determine vulnerabilities in society. Some of these determinants have only however recently become part of the discussion since a technical-engineering perspective has so far dominated the mainstream discourse on disasters. It is now generally accepted that the differences in socio-economic conditions translate in different levels of vulnerability. But other inherent characteristics may also have significant impact on the vulnerability of a group. Age and gender are such two attributes, yet we believe that there is one characteristic that is more transcendent than any other: disability. Independently from their gender, age, income level or social status, disabled individuals constitute probably a group that endures the utmost hardship following a disaster. The social structure of Istanbul is characterised by highly different population segments and social groups, encompassing a wide cultural variety and very dissimilar life styles that co-exist (but increasingly get distanced from each other, mainly as a result of a growing inequality). Still, these differences tend to fade when disaster strikes.

Disabled people have special needs that are often neglected or classified under those pertaining to a broad category of "disadvantaged groups", when emergency management plans are prepared. Moreover, the resources dedicated to the "disadvantaged" are usually disproportionally low for fulfilling those individuals' needs and demands. Concerning Istanbul, some limited action has been taken since 1999 which is far from having overcome these shortfalls. Besides, not all citizens (disabled or non-disabled) will receive assistance following a disaster if we still consider disasters as singular moments where the existing capacity of both public and private services has been surpassed by demand. Consequently, additional action is needed to include the disabled in disaster preparedness processes and to increase their autonomy (and resilience) vis-à-vis catastrophes. Taking these needs into account, EDUCEN's Istanbul Case Study aims to reduce this specific group of urban citizens' vulnerability to disasters through a social action that could be replicated in other similar contexts.

Like any country across the globe, the disabled constitute a significantly large "minority" in Turkey, especially if we take into account individuals with chronic diseases. Although the latest available data (12 % of the general population) is from 2002, we have no reason to consider that this figure has decreased. The global estimated average, in a recent figure given by the World Health Organization, supports this proportion: 15 %. Again, according to the 2002 data, people with auditory, speech and visual impairments, orthopaedic and mental disabilities constitute 2.58 % of the general population in Turkey. Consequently, we can assume that Istanbul is home to a "core" disabled group of about 400.000 individuals considering also the increase in population since the last survey. As for the remaining 9.42 % (roughly 1.3 million people), this group is mainly composed of citizens with chronic health problems. Even though citizens with chronic conditions (if not coupled with a certain form of disability) often experience less limitations in life and possess a greater autonomy, this chronic group should be the subject of specific measures since they usually also have special needs to be addressed during and after a catastrophe.

1.1.2.L'AQUILA CASE STUDY

L'Aquila: tools and methods for information flow in formal and informal cultural networks

The earthquake that almost destroyed the city of L'Aquila in 2009 provides especially useful information on the importance of cultural networks, due to some particularities of the management of this disaster. This event had a strong impact on the existing formal and informal urban networks, and particularly between local community and authorities.

Although some days before the episode the local communities were scared due to the long sequence of low-intense earthquakes, and that local knowledge was suggesting to find a shelter, official information channels disseminated reassuring information. Before that event, the authorities disseminated warnings based only on scientific and technical knowledge, neglecting the reliability of local community perception. Because of the good reputation of the Civil Protection Agency, at both local and national level, local communities had confidence in this information. Several people died in their home because they were not prepared for the disaster. This had a strong negative impact on the trust level of the local community towards the emergency managers, with consequences on the acceptability of emergency management and recovery measures.

After the earthquake, the local community was forced to abandon the city centre. New towns were developed in safer places, disaggregating the original socio-cultural networks. New social and cultural networks emerged after the disasters, with often different cultural aspects.

Introduction to L'Aquila and information networks in DRR to increase resilience

L'Aquila is a medium-size city, located in the Central Italy with a population of 70.221 inhabitants as of 2015, although many thousands more of tourists and foreign students visit the city yearly. It is the capital city of the Province of L'Aquila and the mountainous Abruzzo region. L'Aquila is surrounded by Apennine Mountains and very close to one of the most important natural protected areas in Italy: the National Park of 'Gran Sasso e Monti della Laga'.

Figure 72. Location of the city of L'Aquila within Italy (Copyright of background map: Google, 2015)

Earthquakes have been present throughout the history of L'Aquila, a medieval city founded in 13th century. This fact derives of the situation of the city, partially upon an ancient lake-bed that amplifies seismic activity. There are documented episodes of serious earthquakes in 1315, 1349, 1452, 1461, 1501, 1646, 1703, 1706 and 1958; with thousands of casualties caused by these. On April 6, 2009, an earthquake of 5.9º on the Richter scale hit central Italy having its epicentre near L'Aquila. Official reports state that 308 people died directly because of the earthquake, and number of injured was approximately 1,500. The number of seriously damaged buildings was over 3,000, several of them collapsing. Most of the inhabitants of L'Aquila abandoned the city, with estimations that "around 40,000 people who were made homeless by the earthquake found accommodation in tented camps and a further 10,000 were housed in hotels on the coast" (*The Guardian,* 1 May 2009).

Before the earthquake, the city was well known for its historical heritage, being a walled city with a maze of narrow streets, lined by Baroque and Renaissance buildings.

The case study of L'Aquila explores how the role of culture, and in particular of cultural networks, can improve disaster risk reduction by focusing in this case on earthquakes. EDUCEN implementation in L'Aquila case aims to make authorities and emergency operators aware of the role played by local knowledge in DRR, and capable to integrate this knowledge in the DRR decision making processes.

1.1.3.LORCA CASE STUDY

Lorca and tools to map risk and information flow in flood emergencies

The Lorca case study aims to improve the internal capacity in the dissemination of crucial information during disaster events. In particular the focus is on how culture can become an asset to enhance a more efficient and wider transmission of information and thus improve disaster risk reduction to extreme events such as earthquakes, forest fires near populated areas or flash floods. Another key aim is raising awareness of the potential benefits of incorporating culture in DRR, especially focusing on regional and local authorities, as well as emergency practitioners and land and water use planners. Regarding both aims, the Lorca case study plans to investigate the potential benefits for strengthening and increased utilization of the socio-cultural networks and also focuses on better understanding of the dynamic nature of socio-cultural networks, making it useful in the different phases of DRR.

Introduction to Lorca and information flow during flash flood extreme events

The case study will take place over an area covering the administrative boundaries (see figure 73) of two municipalities: Lorca (91,759 inhabitants, as of 2014) and Puerto Lumbreras (14,742; as of 2012). For practical issues, hereon we will refer to the case study as Lorca case study. Settlements in Lorca have been identified coming from 5,000 years ago. It was a Roman city and even gained importance during the Middle Ages, first under Muslim occupation and later as a defence frontier between Christians and Muslims. Thus, it possesses a valuable historic heritage, with Lorca castle arising as the most notable landmark.

Figure 73.. Location of the cities of Lorca and Puerto Lumbreras within Murcia region in South-East Spain

Lorca is the third city within Murcia region and the main one in the shire of Alto Guadalentín, a large valley which has turned into one of the most important agricultural areas in Spain. Paradoxically, the

area characterises by a semi-arid climate. Indeed, the Guadalentín river was named after the Arabic words "mud river". In fact, agriculture heavily depends on groundwater abstractions and water diverted from the neighbour Tagus river basin. The livestock sector is also very relevant in this area, in particular pig breeding.

The area has historically suffered serious disaster episodes. A major one was the flooding of town in 1802 as a consequence of the collapse of the walls of the main water reservoir of the city, with casualties estimated at over 700 people. The area also has historically faced recurrent droughts, even forcing massive migration episodes due to famine. More recently, on May 2011, the town was struck and seriously damaged by an earthquake with a magnitude of 5.1º in Richter scale, with an epicentre so close to the surface that made it equivalent to an 8º normal earthquake, which killed 9 people.

A very relevant issue regarding EDUCEN is social structure of the population. In the past 15 years, the area has experienced a very significant population growth, mainly because of immigration of rural workers mainly coming from Morocco and Ecuador. In addition the population of European retired people, who come to live to the area after retirement attracted by the nice weather and lifestyle, has become significant. The foreign population is estimated as a 20% of total, with a strong bias of male population (the male population is a 50% higher than female).

Lorca area is affected by large climatic contrasts: it suffers frequent droughts, but also torrential rains which provoke recurrent floods; very high temperatures happen along the summer and heavy frosts are usual in winter.

In example, the study area -i.e. administrative municipalities of Lorca and Puerto Lumbreras- has been recently affected by several disaster events, which constitute a relevant sample of the high exposure of this region to catastrophes:

- In 2011, it was struck by one of the most intense earthquakes produced in Spain in the last decades
- In 2012, an especially intense flash flood episode happened which also caused flooding in some areas for several weeks
- In 2015, recurrent heat waves hit the area, favouring a forest fire episode which affected low-density populated areas.

The most adequate example to show the rationale of the case study can be the flash flood episode, in particular because of most direct involvement of SEGURA and its value to depict the importance of prompt and effective communication in these episodes.

As shown by the graph of water flow in Nogalte wadi, a tributary to Guadalentín river, and the tow images of figure 74, in less than 20 minutes and due to an extreme event of heavy rain, the situation changed from an dry riverbed to a wide and fast-flowing river.

Figure74.. Flash-flood episode in Puerto Lumbreras (September 2012)

A very illustrative video showing the effects of this combined episode of flash flood and local heavy rain can be watched here: https://www.youtube.com/watch?v=YoNT9WmSfxg

Some lessons were learnt after the internal analysis of this episode:

i) There is a need to formulate an action protocol between the river basin Authority and local authorities to improve communication in these crisis events in order to bring together in a more efficient manner all parties working on the same issues with a common goal: DRR. Existing protocols can be improved by better definition of ways to approach and communicate with local stakeholders and population concerning warnings, alarms and specific measures. One of the lessons extracted was that the river basin Authority is not adequately involved in emergency planning and management even though this organization produces and holds very valuable information. For example, the Segura river basin Authority manages a system – named SAIH- that takes real time data about rainfall and flows, but this information is not shared in real time.

ii) Immigrants and foreigner tourists were much more affected by the floods. This evidence shows the room for making use of formal/informal networks for an improved flow of information in these or other minority groups. An increased role of soft infrastructure is definitely required for a better preparedness and management of these catastrophes.

1.1.4.MILAN CASE STUDY

Milan and methods organisational cultures for safety in mega events and

The overall purpose of the Milan Expo case study is to understand the potential effects of cultural differences in disaster response regarding disruptions in infrastructural systems.

The overall purpose of the Milan Expo case study is to have a clear understanding of the role of organizations in relation to the technical systems they operate and the reaction of users coming from different cultures to any kind of disruption in the system.

The most specific objectives were monitoring the potential disruption during the event through newspapers and social media; understanding better how the multi-organizational culture has been formed; Collecting information about the structural development in the area due to EXPO; Collecting

information about the changing risk landscape as a result of increasing exposure; Collecting information about ways to increase the effectiveness of those who respond to disasters and Providing guidelines that can be used in different localities

Introduction to Milan and organizational cultures in mega events case study

The Milan case study will be conducted within the administrative borders of Milan Province. Milan is located in the Northern Italy, in the Lombardy Region (Figure 75). Milan is the second largest city in Italy, with more than 1.3 million inhabitants within the city borders, and more than 3 million inhabitants within the Milan Province (2014 ISTAT data) (Table 7). The city is well connected with its region. Lombardy region's population is around 10 million inhabitants, distributed over an area of approximately 24,000 square kilometres. Regarding its dimension, economic importance, cultural level and political influence the Milan Province is in the center of the Italian economy. The major assets of Milan's economy are fashion, architecture, culture and media. (Source: In Compass, Interreg Project EU).

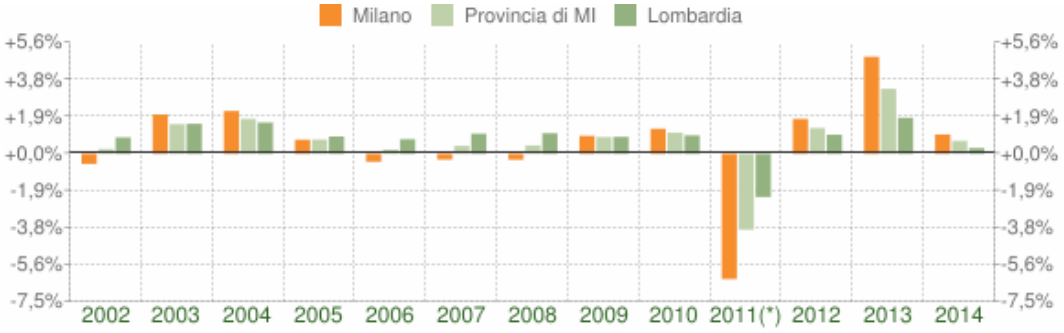
The Milan Province is prone to hydro-meteorological and technological (industrial) disaster risks.

Figure 75. Milan's location in Northern Italy

Table. The changes in the population number.

Source: Municipality of Milan – ISTAT data the day 31st of every year.

(*) After census



According to the Istat census data, the city is not growing naturally, migration is the reason for the increasing population. On January 1st, 2015 the number of people with a foreign nationality was 248,304 (Table 8). The city is attracting people, both from other Italian cities and other nations. The cultural heterogeneity of the city and its province makes it an interesting case study for EDUCEN.

Table 76.. The population trend with foreign nationality

Source: Municipality of Milan – ISTAT data 1st January 2015

(*) After census

Mega-events are tools for marketing cities to become globally significant and attract national and international interest from all over the world. Mega-events are also engines for the structural and infrastructural development of cities, as economic resources gained by Mega-events are used to activate urban development (Steffani, 2011). To obtain a mega-event, a well-maintained infrastructure system is a must. However, having good quality infrastructure is not sufficient for being a part of this worldwide competition and hosting a mega-event. Providing resilience against disruption to infrastructure and services is strongly necessary to ensure the competitive advantage of cities, as well as safety and security of infrastructures.

Milan hosted EXPO 2015 since May 2015 until the end of October 2015. However, hosting a mega-event brings a major challenge to meet resilience targets. That is, the **increased exposure of the population, including both inhabitants of the city and tourists/visitors** coming to the event. That tremendous increase of exposed population from different cultures does not necessarily add new risks, but concentrate the current risks in cities in one place. Therefore disaster risk reduction considering the cultural diversities must be a part of the investment to increase the resilience of the infrastructural systems. Besides, there are the other issues such as **the new risk landscape,** including terrorism, traffic jam and changing hazard conditions that increase the vulnerability of cities, and the multiple interaction pattern of infrastructure systems. The latter occurs between the three layers existing in the city: **spatial, organizational** (public institutions or private, depending on the owner of the infrastructure system) and **social** (the users of the system).

Figure 77.. The location of 2015 Milan Expo Site: 2015 Milan Expo Map

The approach adopted by Milan Expo case study will be mutual learning by observing the changing risk landscape, and having meetings with the related actors. The focus of the study will be on the changing social and spatial structure of the study area, and how those changes affect crisis situations.

1.1.5.UMBRIA CASE STUDY

Umbria and methods to manage post- flood damage data

The main objective of the work carried out in the Umbria case study has been the joint development of tools and methods to collect, store, structure post-flood damage data and then analyze such data in order to obtain a comprehensive representation of the damage, including as far as possible also indication regarding indirect damage. Such analysis should be provided in the form of reports developed according the multiple possible uses of the data as suggested by De Groeve et al. (2013).

The effort in the Umbria case study comprises the development of a procedure in order to:

- Help the Regional Civil Protection to collect data from different sources, including critical service providers (lifelines managers that can be either public, private or semi-private companies) and other offices of the Regional Government, damage and losses data;
- Include the direct survey forms into a procedure;
- Share the results with regional officers and professional volunteers

Introduction to Umbria: a region vulnerable to floods

The Umbria region is located in the Central Italy. Perugia and Terni are the two provinces of the Umbria Region. The Tiber's river three principal tributaries flow southward through Umbria. According to the 2011 survey (ISTAT) there are 883,000 inhabitants. In the survey in 2008 ISTAT estimated that 75,631 were foreign-born immigrants that live in Umbria, which is equal to 8.5% of the total population of the region in 2008. In the Umbria Region there is a University to teach Italian language and culture to foreigners. The cities in Umbria are in part of the historical cultural heritage of Italy. The economy of Umbria depends on the small and medium sized firms starting from the 1970s. Tobacco, olive oil and wines are the major products of the Umbria region.

Figure78.. Location of Umbria

Figure79.. Recent flood in Umbria

The Umbria case study stresses the cultural differences among several organizations and its effect on crisis management. Organizations have cultural differences in terms of management and methodologies used. The tests within this case study suggest that data collected after flood events do not permit satisfactory damage function validation, due to inconsistencies and mismatched methodologies in acquiring relevant data about hazards, vulnerability of exposed items and systems, and damage. This experience led to the recognition that a stronger effort should be put into improved flood damage data collection after flood events. However, the Region being the main user and promoter of such enterprise, meant that new damage procedures could not be developed and applied just for the sake of better data. There was also a need to support loss accounting to compensate private citizens and for public facility repairs on the one hand and to provide guidance for recovery and reconstruction on the basis of "forensics" purposes on the other.

1.1.6.VOLOS CASE STUDY

Volos and tools and methods for cultural memory to learn from the past for DRR policy

In Volos, the huge wave of refugees from Asia Minor after 1922, the 1955 devastating earthquake disaster and the current social and economic crisis in Greece all shaped cultural memory of the city.

Old and new crises provide a basis for exploring the culture and disaster nexus, identifying worthwhile cultural assets and informing crisis management.

Thus, the main focus of the approach adopted for the pilot activities in Volos CS is on the nexus between disaster preparedness and shocks (new and old) in society and culture. This approach is aimed to be supported by the conceptual Work Package on Cultural Memory which promotes the learning from past experiences as a requirement and pre-condition to learn in the present.

The key final goal is to use cultural memory as a mean of awareness raising and better preparedness for critical events.

Introduction to Volos: memories and cultural assets in DRR

Figure 80. Location of Volos

Volos is a coastal port city in Thessaly region situated midway on the Greek mainland. The urban area counts for 150,009 inhabitants (as for 2015) and covers 496.6 km^2.

Volos has been a significant industrial centre and is also the only outlet of Thessaly (the country's largest agricultural region) to the sea. The effect of its economic situation on disaster risk reduction and the effect on vulnerable groups will be put at the core of EDUCEN activities in the Volos case study. After the mid-80s deindustrialization started and the current economic crisis has significantly deteriorated the situation. Presently, the area experiences one of the highest unemployment rates in the country.

According to recent unemployment data (May 2015) from the Manpower Employment Organization, there are 18,783 registered unemployed persons. According to Employment Observatory, unemployment in the age range 24-45 is about 45% (2014). Official data at Prefecture level indicate an unemployment rate in Magnesia of 33.3% in 2012 (the highest in the country). Unofficial data estimates a rise in the unemployment rate to 40%, with higher rates for the young and women. Also indicators on local Gross National Product, industrial production, savings and retail keep deteriorating.

These issues directly relate to main the social structures existing in Volos.

Besides, the city has undergone the shock of integrating a huge number of refugees from Turkey 90 years ago (13,773 according to data). Although there was a need for workers especially in the industry, the integration of this new Greek population was not smooth. They were housed in barracks in a shanty town which was destroyed by a fire in 1930. Little by little the Turkish refugees moved towards the part of the city where is Nea Ionia today. These refugee communities still maintain an identity as a social group.

In terms of main hazards, the area suffers relevant risks to earthquake and floods catastrophes. For example, in the period 1954-1957, severe earthquakes ruined much of the city and in addition these episodes were followed by flash

floods.

The development of Volos into the city it is today has been based on crises and disasters. A rough analysis of Volos urban structure reveals the strong effect of both the gradual integration of Greek immigrants from the exchange of populations between Greece and Turkey in 1922 and the earthquake disaster of 1954.

As a key example, the history of founding of the area of the neighbour municipality of Nea Ionia is directly linked to the arrival of 1,300,000 refugees in Greece after the "Asia Minor catastrophe" and the exchange of populations between Greece and Turkey at 1923. After the formation of the new settlement by refugees, the area was named Nea Ionia, after Ionia in Asia Minor, their original homeland.

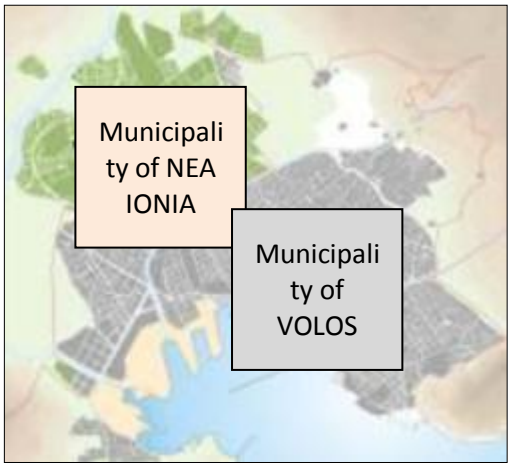


Figure 81. Municipalities of Volos and Nea Ionia

Natural catastrophes have also have seriously stricken Volos throughout the XX century in the form of earthquakes and flash floods. These episodes also had serious impacts on the urban structure. For example, after the 1954-57 earthquakes the old urban tissue was wiped out and the reconstruction fully taken up by the Army promoted the construction of standardized new buildings.

Therefore, the Volos Case Study allows a narrow analysis of the role of cultural memory into: i) the mapping of social groups in space and time and the perception of disaster risk for different cultural groups, including vulnerable groups, and ii) disaster planning in terms of urban and structural vulnerability of the city.

Cultural memory refers to the recording and handing down meanings and interpretation from generation to generation. The consideration of cultural memory as an asset in DRR focus on the identification of how to identify and use accumulated experience and knowledge from past crises and disasters to inform and enhance present and future DRR and DRM. Therefore, the aim of the pilot activities of Volos Case Study is to highlight memory/ies and local knowledge of how society handled crises in the past and disaster of what "worked well" and what did not work in past disasters and if/how this can be of benefit for DRR today.

The basis of the study will be mainly the built environment, which performs vital cultural, housing and infrastructural and economic functions. The structure of these areas is linked with time-honed practices of city dwellers. Poor maintenance and demolition impairs the protection function, and thus, the dynamic preservation of this environment coupled with an improved knowledge of cultural memory on risk has a key role to play in disaster planning.

A current debate in terms of urban planning pivots around the enhancement of safety and renewal of the old urban tissue –now significantly populated by immigrants- versus actions dealing with preservation and mild interventions of the building stock.

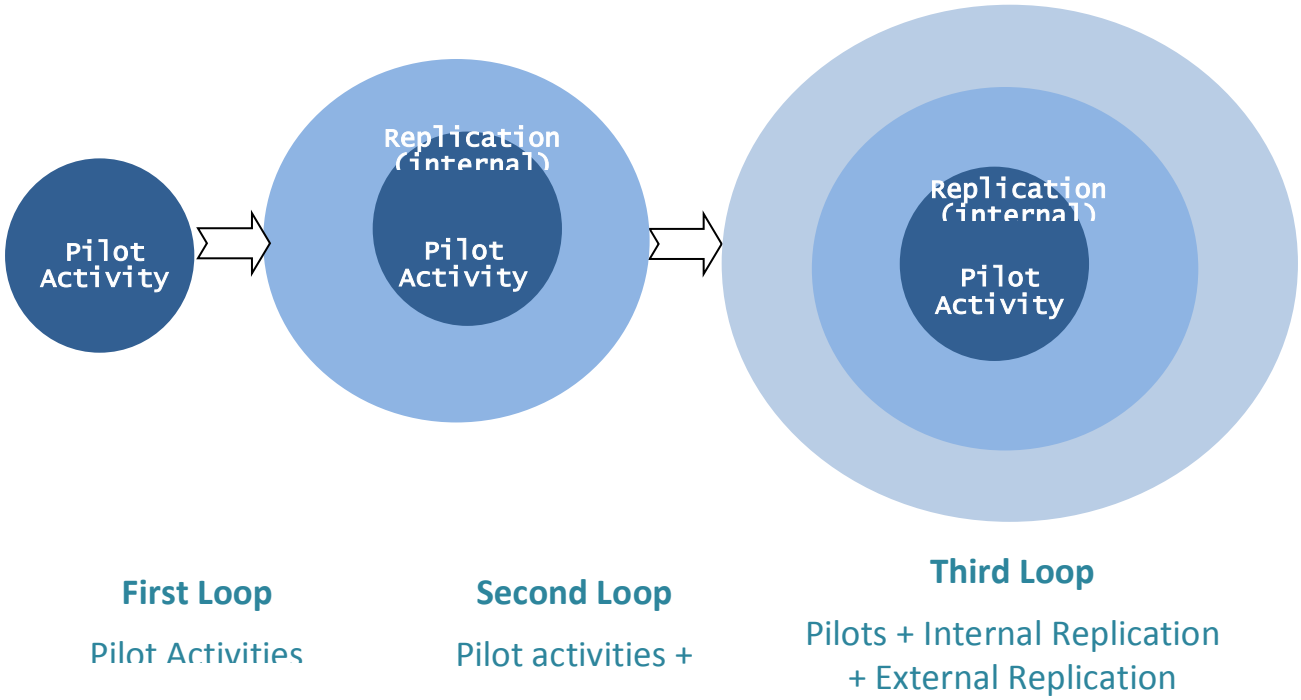
1.2.Replication loops for adopting tools and methods to incorporate culture as an asset in DRR

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.

Figure 82.**: Replication loops to adapt tools and methods to adopt culture as an asset in DRR**



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.

Transferability Framework: loops methodological frame

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 cultural memory; cultural networks; mutual

learning; hard and soft infrastructure; and cultural empathy- in the local cities Disaster Risk reduction policies (top down).

First Replication loop: design of tools and 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 (in our case the case study leaders which ranged from a municipal company in Greece, a search and rescue organisation in Turkey, a river basin agency in Spain, a university in the cases of Milan or Umbria and a research centre in the case of L'Aquila. 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".

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.*

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** to be adapted, used and validated in a real environment. One of the lessons learnt is 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. In other words 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.

Table 1. Pilot activities and tools and methods

Top down/ Bottom Up	CITY	TOPIC	TOOL AND METHOD DEVELOPER	Case Study LEADER
Bottom Up	Istanbul	Disability awareness in DRR	AKUT	Search and Rescue organisation, AKUT
	Lorca	Hazard awareness mapping for local people	CHS	River Basin Agency (Confederación Hidrográfica del Segura)
Top down	L'Aquila	Cultural networks – role of infrastructure (WP3)	CNR-IRSA	National Research Council, CNR-IRSA, Italy
	Milan	Organisational culture of safety	POLIMI	Public University, Technical University of Milan, Italy
	Volos	Cultural Memory	NLDA	Municipal company ANEVO, Greece

For example, one of the most adopted tools and methods was centred on games to help develop cultural empathy. A series of games were used by the different cities, in each case slightly adjusting the implementation to best suit the city needs.

Table14: Cultural Empathy through Games

Game	Location	Target Group/Players
Zombi Game	Dordrecht, Holland May 2015	Experts attending conference
	Wageningen, Holland, Nov 2016	Students in DRR
	Utrecht, Holland 2016	Students and experts in DRR
	Valladolid, Spain Dec. 2017	Civil Protection

Flood Game	Lorca, Spain Oct 2015	First responders
Gift of Culture	Stockholm, Nov. 2016	Academics and city experts
Flood resilience Game	Valladolid, Dec. 2016	First responders, institutional actors and community groups
Cultural memory Game	Dordrecht, March 2017	Experts and Academics
	Volos, April 2017	Local people

The second replication loop: "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 Toolkit that as a key element 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". However as explained earlier tools and methods will always have to be adapted before they are adopted to suit the needs of the specific city since these tools and methods have to be culturally grounded.

Box: "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.

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 have been that the city itself often brings additional tools, methods or approaches the city wants to incorporate, i.e. a process of social innovation is thus

The city of Dordrecht has been one of case study cities hosting the final conference of the EDUCEN Project and in EDUCEN Website (March 2017).

Box: Collaborative Workshop (http://www.educenproject.eu/single-post/2017/03/29/Final-Conference **)**

A collaborative workshop was hosted in Dordrecht for both peers from other cities and thought and policy leaders. Participants at this workshop, peers from other cities, could take lessons learned as part of inter-cultural communities of practice, while thought and policy leaders can take procedures back to their own contexts where these can inform the strengthening of regional and international relationships.

The city of Dordrecht in a demand led approach -as described earlier - identified three of EDUCEN tools and methods as particularly relevant: the role of cultural memory, the use of Social Network Analysis, and the use of games to increase risk awareness and a culture of safety in vulnerable populations (in this case identified as the younger Dutch population)

As an example of a Second replication loop the city of Dordrecht also applied tools and methods on Cultural memory as had already been done for Volos.

Box: Cultural Memory in Dordrecht (Hagen, S., Noeverman, K. Jansen, T. and Kelder, E. Dordrecht City Council; Helena de Jong, NLDA)

In recent history Dordrecht has not experienced disasters. The last flooding of the embanked area occurred in 1953 which resulted in a large amount of damage. This same flood event resulted in a large disaster in the nearby province of Zeeland and some neighbouring municipalities. The worst flood disaster with the biggest impact in Dordrecht dates back to 1421. This disaster has had a major negative effect on the development of the city. Especially the 1953 disaster is well known in the Netherlands and included in history school books. In the night of 31 January 1953 a spring tide combined with a north-westerly storm caused dike breaks at over 900 locations in the South West of the Netherlands. 2000 km2 was flooded and 1835 people drowned. The effects of the flood were long-lasting, for the region but also for the country as a whole. Dordrecht only just escaped the disastrous effects of the Great Flood with the primary dike ring around the city remaining intact because the dike rings of the Hoeksche Waard and the Alblasserwaard broke and took the pressure away. The water however did enter the northern part of the city and caused severe damage to buildings and infrastructures. In the following weeks, Dordrecht functioned as a sanctuary for refugees from hard hit surrounding areas, sheltering victims in public buildings and inhabitants' homes.

The municipality of Dordrecht has used social media, dedicated water websites, water ambassadors and a water safety exhibition to connect with residents and establish a network throughout which people's awareness with regard to water safety can be enhanced. However, many of these DRR activities and plans only reach a certain group within the population, which in general can be described as white elderly male residents. Municipal DRR activities are often attended by representatives of this group, while other groups are often not reached with the current DRR communication of the municipality.

Several features in present day Dordrecht are reminders of what happened during the storm surge of 1953. Examples of what can be found within the current public domain are: around 40 photos of the high water event are placed on street corners, there are monuments, and flood level marks of the water height during flooding can be found on buildings. Besides these physical mementos many elderly people residing in the city have experienced the flooding themselves.

As personal experiences with flooding seemed to have boosted awareness with regard to water safety, the municipality of Dordrecht started to reach out to the elderly people and explore how their experiences with water, particularly with the event of 1953, shaped their current attitudes and perceptions of disaster and disaster risk management. In order to investigate intangible forms of memory, five focus group interviews have been conducted with eye witnesses of the 1953 disaster. In total 18 (14 male, 4 female) persons participated in the interviews with each focus group consisting of 3 or 4 participants. All respondents were eye witnesses of the flood but not all respondents lived in Dordrecht, some experienced the event in the province of Zeeland or South Holland where the consequences of the flooding were more severe than in Dordrecht. The participants were young at the time of the disasters, many were not even adults with the youngest respondent being 6 at the time of the disaster. The central topic during these discussions revolved around people's memories, feelings and behaviour regarding flood safety in Dordrecht. They were also asked what role their memories currently play.

What immediately became apparent from the interviews was that they all had very vivid memories of the disaster. In the conceptual part it was found that cultural memory can function as a knowledge repository, that cultural memory of disaster informs community interpretation of and reaction to new disasters, and that it has an explanatory function. An interesting result was that most respondents mentioned that they do not think of the Great Flood very often. However, all respondents pointed out some specific occasions or situations in which their memories on the disaster were triggered. This indicates that both tangible forms of cultural memory such as memorials and adaptations in the environment do serve as a reminder and as a knowledge repository of what happened. Furthermore is was found that several respondents started talking about having respect for the water. These statements suggests that the cultural memory of disaster is better understood by people who personally experienced the disastrous event than by people who do not have previous experience.

A second case where tools and methods have been replicated is the case of mega events to document organizational learning on emergency management during mega events. The tools and methods to document organisational culture and learning in mega events were implemented first for the Milan EXPO 2015 and then for the 2012 London Olympic Games. The first case was the city of Milan with the EXPO in 2015. The same interview protocol and methods were used to document learning for the 2012 London Olympics. The box below summarises the replication of this type of

analysis for the case of London. This provided additional insights on emergencies and organizational learning during mega-events. One further advantage from the transferability within the second learning loop between city case studies was learning from these different cases and different contexts on a "culture of safety". The focus on mega events was on providing a safe-secure and resilient infrastructure system for mega-events, and organizational learning.

Box: An organisational culture of safety in mega events: the case of the 2012 London Olympics (written by Funda Atun, POLIMI)

London 2012 Olympic Games are the most recent example in Europe with the same scale as the 2015 Milan Expo. We involved the 2012 London Olympic and Paralympic games as an example, also because, London 2012 Olympic Games were handled well politically, organizationally and structurally. Even after the event, the legacy still remains and the advantages are seen in social, structural and economic environments. London 2012 Olympic Games was the city used to replicate tools and methods on how to document an organizational culture on safety during mega events.

The ***objective and purpose of this tool is to understand the cultural differences and similarities between different organizations involved in safety and security planning before, during and after the mega event***.

The method has three main parts:

1) First part: a literature and report analysis about the event.
2) Second part: experts were chosen purposefully to represent three main areas: safety, security and resilience, with one representative for each section were some experts (and stakeholders) involved in the London Olympics. These experts were invited to a mega-event workshop in Milan (March 2016)(http://www.educenproject.eu/milan-ingles).
3) Third part: in-depth interviews with open ended questions. A number of related the related organizations, were approached and interviewed, including the London Resilience Team, London Fire Brigade, London Metropolitan Police, London Borough of Tower Hamlet and London Borough of Newham and Transport for London (resilience team, London surface travel, London tube network) http://www.slideboom.com/presentations/1430183/Securing-the-London-Olimpics. With the people who agreed to be involved in the survey, we conducted in-depth interviews.

The 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".

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.

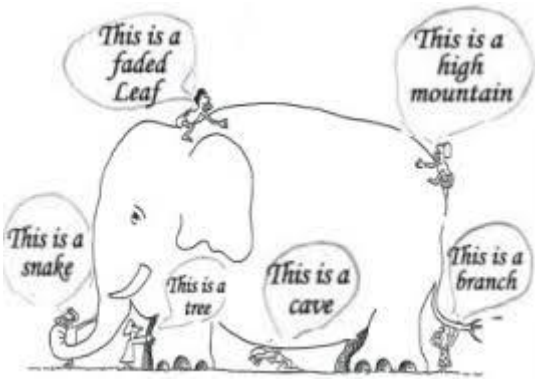


Plate. The Blind man, the elephant and cultural aspects in EDUCEN

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.

Box: The replicability of a Social Network Analysis tool on the role of formal and informal networks into DRR (by Raffaele Giordano and Alessandro Pagano, IRSA, Italy)

The transferability of the SNA method to other cities has already been partially tested. Two other cities demonstrated interest in implementing the L'Aquila approach for the assessment of the effectiveness of the interaction network in the case of emergency. This section describes the lessons learned during the "experience transfer" process. The transferability of the methodology was successful overall. Specifically, the first transfer process involving the city of Lorca, which required a more direct involvement of the tool designers in the implementation of the methodology. The Lorca experience allowed to revise and adapt the protocol for the implementation of the methodology, to take into account the difficulties encountered during the first replication attempts. The following describes the main advice for the replication.

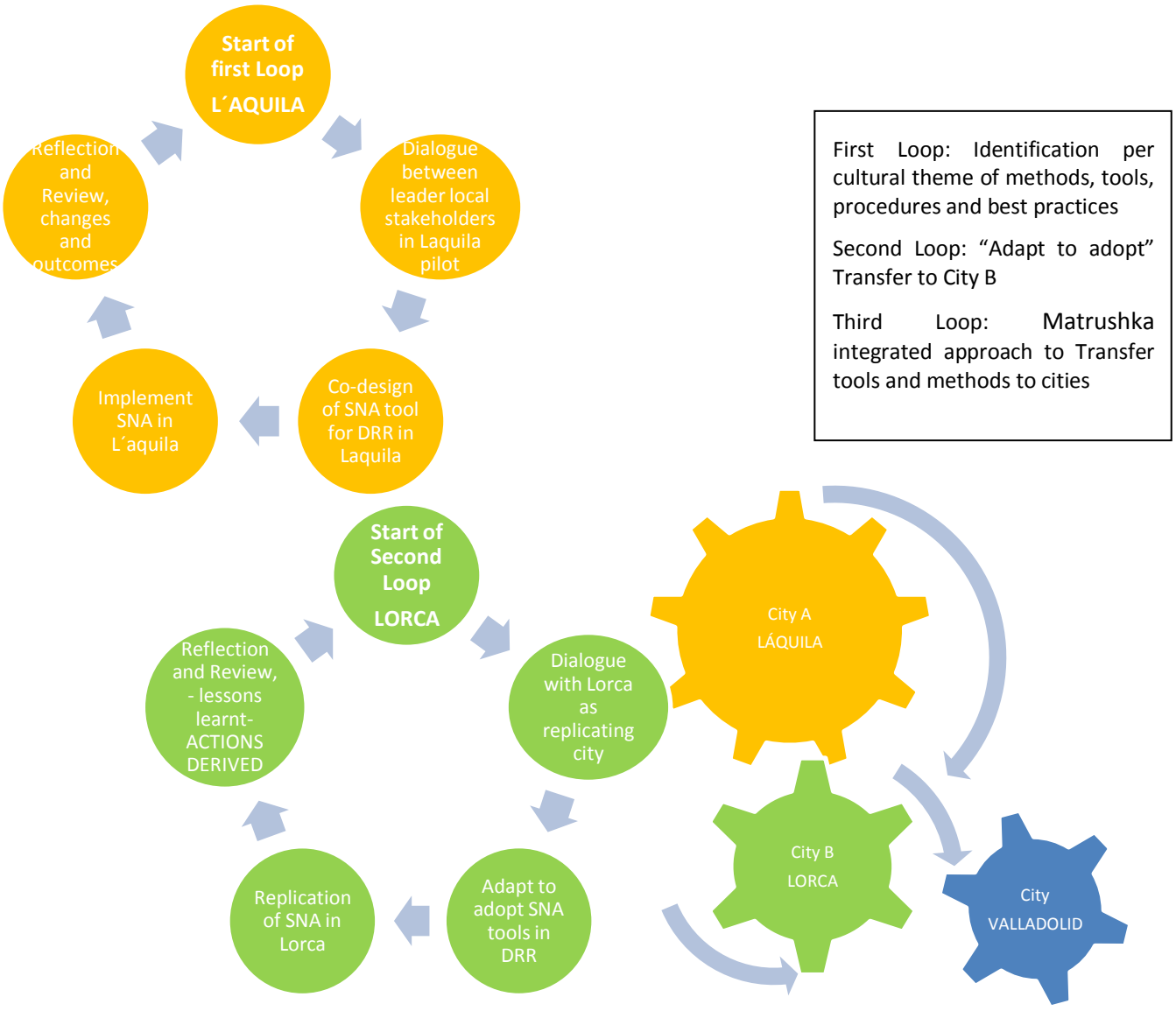
1. One of the key issues concerns the capabilities of the analyst involved in the collection and structuring of the local knowledge to clearly discern between the actual emergency managers' experiences and the official protocol of interaction.

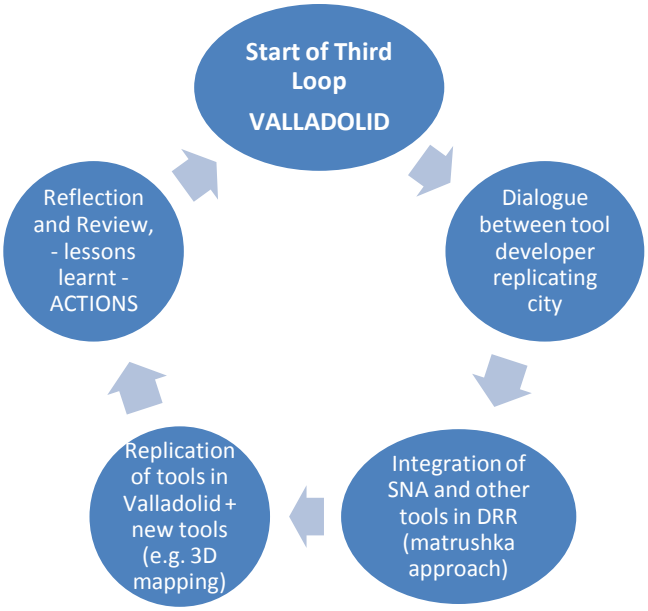
2. The implementation of the tool for analysis in the two replicating cases – i.e. Lorca and Valladolid – demonstrate that emergency managers are deeply grounded in their procedures that can therefore mix up experiences and procedures. This represents a critical bias for the analysis, because it impedes the modelling of the informal network activated during an emergency.

In order to reduce this bias, the analysis (and analyst) should be focused on a specific

emergency management episode. Using a Critical Event Analysis as a starting point, as described in the SNA tools, is useful in the knowledge elicitation phase. Moreover, the analysis should focus on a relatively recent episode. The more distant in the time that the emergency episode, the more likely to suffer from the bias to mix actual emergency managers' experiences and the official protocol of interaction as bias.

Figure 83.: Design of three Loop replication of tools: L'Aquila-Lorca-Valladolid





The EDUCEN Approach: culture as an asset in Valladolid (Spain)

The third replication loop undertaken in Valladolid was framed as an activity of the Duero basin authority and as part Flood Risk Management Plan of the Spanish part of the Duero River basin agency, approved by Royal Decree 18/2016, dated January 15, 2016. Specifically tools and methods developed were used a part of a measure with Code 15.03.01 in the Flood risk Plan, to establish or improve public awareness to prepare different social and economic agencies and agents for floods.

The activity took place in the Rondilla Civic Center, which is located in one of the neighbourhoods susceptible to floods in Valladolid, in accordance with the zoning made by the National System of Cartography of Flood Zones of the General Directorate of Water. All the agents involved in flood risk management, both at the level of institutional agents and citizen groups attended the event.

Box : Attendants to the Flood awareness day using an integrated approach to culture as an asset

- Duero river basin agency
- Municipal Archive of Valladolid
- Directorate General of Water Science
- Museum of Valladolid
- City Hall of Valladolid
- Rescue and Rescue Association
- Civil Protection at the State level
- Association Friend of the Pisuerga river
- Civil Protection, Junta de Castilla y León
- Neighborhood Association Pilarica
- Civil Protection,
- Newspaper El Norte de Castilla
- Meteorological Service (AEMET) - Delegation in Valladolid

The main objectives of the event were:

1. To allow the different actors involved and affected by risk and management of the floods to get to know each other, acting as a starting point to facilitate greater interaction and contact in the future.
2. Acting as the first in a series of activities designed to increase the level of information and perception of flood risk developed by Duero river basin agency in accordance with the EU European Floods Directive.
3. Present and validate the results of the Social Network Mapping exercise on the flow of information using methodologies developed within the framework of the EDUCEN project.
4. Identify barriers and actions to improve communication and agree on "future purposes".

The day began with interventions and key message by the Water Commissioner and by the Project Leader, the Duero River basin agency, and by a representative from the General Water Directorate.

Some key messages:

>You have to live with the flood instead of living against the flood

>There is no risk without a human factor.

>Flood Risk Management is a shared responsibility

What did the social network mapping exercise show us?

Some key conclusions from the mapping of the actor network and critical information in the management of flood events were:

Table15: What did the social network mapping exercise tell us?

Actors	**Information**
• Infra-utilization by local groups of information available • Very vulnerable actors are disconnected: • Limited means (personal and material) prevents the effectiveness of the preparation (Drills) and emergency (exhaustion) • Lack of awareness of responsibility for action by mayors in small municipalities	• Low generalized perception of risk at institutional and citizen level • Need for greater anticipation in the advices of release of water from reservoirs • The SAIH information system in some cases is not updated or cannot be interpreted • Key information that should have a high degree of diffusion among the actors include: the Flood plan, hydrological information, action instructions and community alerts

Table16: What barriers and actions are needed improve communication in flood management?

Barriers	**Drivers**
• Resistance to change and	• Homogenize terminology

technological innovation • Difficulty in communicating with municipalities • Lack of training in some agents • Insufficient citizen awareness • Uncommunicative format of SAIH • Heterogeneity of alert nomenclature • Citizens' responsibility to follow advice • Perception of 112 as health emergencies • Too many alerts lead to confusion • Lack of a press department in CHD • Lack of means • Insufficient adaptation and mastery of ICTs • Population is aging and thus reticent to change	• Bulletins that include an interpretation of the data to the parties • Training courses in town halls • Citizen information through social networks • Meetings for review of protocols • Increase of SAIH measurements in real time • Know dates of regulation of reservoirs • Sensitization and training for citizens • Plan to disseminate information to the press • Establish synergies and support between groups • Training workshops for agents involved • Awareness campaigns targeting different population groups

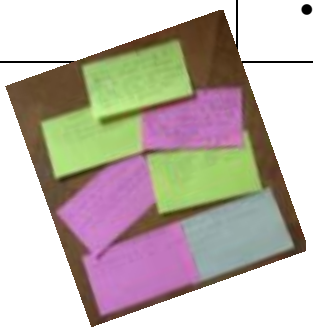


Table 17: Loops, tools and transferability between cities

LOOP	CITY	Pilot Activity/Tool	Transferability	Further potential transferability
1st Loop FRONTRUNNER CITIES	Istanbul	Integrate a Disabled awareness culture into DRR	Within Turkey	Spain; Greece
	L'Aquila	SNA Hard and Soft infrastructure	Lorca	Valladolid
	Milan	Infrastructure and culture of safety and security in mega events	London	Zaragoza
	Volos	Cultural memory Games to raise awareness on DRR	Dordrecht	Valladolid

2nd Loop REPLICATOR CITIES	Lorca	SNA Role of social media (bottom up method) App for risk awareness	Valladolid	-
	Dordrecht(1)	Cultural memory	-	-
				-
	London	culture of safety and security in mega events	-	-
3rd Loop REPLICATOR CITIES (integrated Matrushka approach)	Valladolid	Cultural memory + SNA+ Games	Other cities in Duero basin	

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

One of the main aspects in the application of the tools and methods has been the gradual emergence of different **communities of practice,** which can provide a key element for mainstreaming culture as an asset to increase resilience in DRR. The case studies, as can be seen in the case study manuals 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 (**communities of practice-CoP),** 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"

Box**: **Communities of practice: (extract from Using learning to harness social and organizational culture for disaster risk reduction (2016) https://www.sei-international.org/publications?pid=3031 ***Authors: Barquet, K; Boyland, M; Osbeck, M. and***

Thomalla, F.)

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 disaster risk reduction, communities of practice have been defined as "temporary horizontal organization[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).

As these communities are often seen as horizontal, self-organizing and spontaneously emerging groups, they may be perceived as incompatible and even competitive to established hierarchical organizations. It is here where organizations play an important role in facilitating and fostering their establishment by acting as conveners rather than knowledge providers (Wenger and Snyder 2000).
Communities of practice within DRR may have several functions, but knowledge management is an integral one. While there are several ways to explore knowledge management, Kimble et al. (2000) propose dividing knowledge into "hard" and "soft". The former is formalized and structured and can be captured, codified and stored. The latter can be classified as socially constructed knowledge generated by social activity, and internalized domain knowledge, which is linked to skills, expertise and proficiency. Through communities of practice, hard knowledge is used and made available, and at the same time, knowledge management is addressed and transformed into experience (Sarmiento et al. 2012).

The **formation of living networks of experts on cultures in disasters encompassing community members and practitioners (communities of practice-CoP)** have drawn together with 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 network. The collaborative procedure required building the sorts of cross-cultural linkages that are necessary for the formation of inter-cultural communities of practice. This made the collaborative procedural work a valuable objective in itself.

An intangible asset: local communities of practice in the case study cities

Over the last two years a series of workshops were held in the case study 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.

Box: Steps on How to facilitate the emergence of a local Community of practice on culture and disasters

The first step is to map those organizations 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 risk to natural catastrophes 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 organizations 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. Second, policy makers operating at different levels (including the European Commission Community of users on security https://www.securityresearch-cou.eu/about and http://www.educenproject.eu/single-post/2017/03/14/SAFE-SECURE-RESILIENT-SOCIETIES-COMMUNITY-OF-USERS-MEETING).

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 a champion 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 come 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 will 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.

Table 18: Example of Communities of Practice in case study cities

L´AQUILA, Italy: Local Emergency Manager, National emergency management, Technical Municipal office , Regional Civil Protection agency, National Civil Protection agency, Local Red Cross team, External Red Cross teams (coordinators and operators), Local Fire Brigade team , External Fire Brigade teams (coordinators and operators), Local Police team, External Police teams (coordinators and operators), Members of the community, Representative of the community, Representative of the media. MILAN, Italy: Police Headquarters; Carabineers; Italian Finance Police; State Forestry Corps; State Fire-Brigade Service; Red Cross Italy; Army; Aeronautic Army, Health, social support, veterinary: Lombardy Region D.G. health; Lombardy Region AREU, AAT-118; Lombardy Region ASL Milano 1; Lombardy Region Milano Region of UMBRIA, Italy: Regional Civil Protection Authority, The Emergency Control Centre of the Regional Civil Protection Authority; Civil Protection Authority offices in charge of data management; Researchers of the Politecnico di Milano; Civil Protection volunteers (thirty volunteers) with professional expertise in geology, engineering, architecture ISTANBUL, Turkey: İED İşitme Engelliler ve Aileleri (People With Auditory Disabilities and Their Families) Association, Altı Nokta Körler Derneği İstanbul Şubesi (Six Black Dots Blinds' Association Istanbul Branch), Engelsiz Erişim Derneği (Access Wihout Barriers) Association, TSD Türkiye Sakatlar Derneği (The Handicapped Association of Turkey), TOFD Türkiye Omurilik Felçlileri Derneği (The Spinal Cord Paralytics Association of Turkey), SEBEDER Sesli Betimleme Derneği (Association for Vocal Description) VOLOS, Greece: Metropolitan Region of Attica, the Region of Thessaloniki, Decentralized Administration of Central Macedonia, Earthquake Planning and Protection Organization of Greece, Direction of Recovery

from Natural Disaster , Impacts of the Ministry of Infrastructure, Region of Magnesia, Office of Civil Protection of Volos Municipality, Civil Protection of Pelion Municipality

LORCA, Spain:

Townhall of Lorca (Ayuntamiento de Lorca), Regional government of Murcia región (Comunidad Autónoma de Murcia), Water Directorate, Spanish Ministry of Agriculture, fisheries and environment (Dirección General del Agua del Ministerio de Agricultura, Alimentación y Medio Ambiente), Segura River Basin Agency (Confederación Hidrográfica del Segura), Civil Protection (Protección Civil) at national, regional and local level, Spanish meteorological service (Agencia Española de Meteorología - AEMET), Flood affected neighbohood groups (Asociacion de vecinos); local newspapers.

VALLADOLID, Spain:

Duero River Basin agency (Confederación Hidrográfica del Duero), Municipal archive (Archivo Municipal de Valladolid), Water Directorate, Spanish Ministry of Agriculture, fisheries and environment (Dirección General del Agua del Ministerio de Agricultura, Alimentación y Medio Ambiente), City Science Museum (Museo de la Ciencia de Valladolid), City of Valladolid (Ayuntamiento de Valladolid), Search and Rescue Service (Asociación de Rescate y Salvamento), Civil Protection (Protección Civil) at national, regional and local level, Friends of the Pisuerga river (Asociación Amigos del Pisuerga), Regional government of Castilla and león (Junta de Castilla y León), Neighborhood association of La Pilarica (Asociación de Vecinos Pilarica, Protección Civil), Newspaper North Of Castilla (Periódico El Norte de Castilla), Spanish meteorological service-Valladolid branch (Delegación en Valladolid de AEMET)

Transnational and Upscaling of communities of practice

Another important element of the communities of practice has been the potential to develop transnational community of users. These are more difficult due mainly to language barriers and resource constraints. However, the potential to explore thematic Community of Users based on key emerging themes could offer great potential for speeding up social innovation and mutual learning. One of the consequences of the Workshops held have been that in workshops organised around specific themes like Volunteers, Leaders/gatekeepers and Increasing awareness., around Climate security and DRR (http://www.educenproject.eu/single-post/2017/02/21/A-cultural-change-Climate-security-in-Disaster-Risk-Reduction) or around Disability inclusive disaster policies (http://www.educenproject.eu/single-post/2017/03/25/DISABILITY-INCLUDED-DISASTER-TRAINING-HAS-BEEN-PRESENTED-TO-AKUT%E2%80%99S-TRAINING-VOLUNTEERS). 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.

Figure 84.**: cross city learning between Lorca and (Spain) Kristianstad (Sweden)**

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 organisation thus the materials developed are intended to be adopted to be implemented at national scale. The Umbria case study was different from the onset since it did not focus on a city but rather on a regional scale. Here events during the summer of 2016 had added a level of complexity where the methods and tools developed e.g. on data are providing support in the recovery phase for DRR. This was clearly seen in two cases: Volos (see Box) and Lorca in October 2015, in October 2016 http://www.educenproject.eu/single-post/2016/10/03/The-information-management-in-flood-episodes and in April 2017 in http://www.educenproject.eu/single-post/2017/04/27/Dissemination-workshop-in-Murcia).

Box: Volos community of Users as Diffusers of Innovation: Local- regional- National **http://www.educenproject.eu/single-post/2016/07/01/Case-study-Meeting-in-Volos-Greece-on-July-7th-2016**

Round table discussion of experts about the relationship between cultural memory and disaster management in Greece Metaxourgio, Volos on July 7, 2016 a number of topics were discussed and analysed, namely, a) the relationships between culture and disaster management at the national and local level. Experiences and examples, b) Cultural memory of past critical events and its use for civil protection and disaster management. Experiences, examples and proposals for better employment of cultural memory in disaster and crisis management and c) Proposals on how tools and methods developed could become more useful and usable for civil protection and disaster management.

Figure 85.Round table held on 07/07/2016

2.LEARNING: EDUCEN Tools and Method Guidelines for how to use Culture as an asset

As explained earlier, the handbook toolkit has been co-developed and tested with end users and local communities in EDUCEN case study cities (Loop 1 and Loop 2) and also in cities external to EDUCEN (Loop 3), trying to reach out in particular to the most vulnerable/excluded groups.

The present handbook has two main aspects:

The first is procedural, on methods and steps to follow to identify and include elements of culture at all levels and stages of DRR

This, if acted on, will increase the effectiveness of disaster responders and it will contribute to more resilient cities thanks to the incorporation of cultural assets into DRR, which will translate in higher response times and lower fatalities, while strengthening disaster policies by integrating culture.

This methodology has emerged from the small scale testing undertaken in EDUCEN which can be up scaled and generalized by extracting the common features needed to have cultural sensitivity in the DRR cycle

The second is a series of products and tools to integrate culture into DRR.

Here we collect a series of tools, approaches, standalone show and tell examples, for example to provide guidance and practical know how on how to incorporate culture into DRR.

A number of formats co-exist in this delivery, so that messages can be represented in different ways. Some aspects will need more reflection and need more time, like guidelines; but others like the simulation games need the use of other media.

2.1.The EDUCEN toolkit

The EDUCEN toolkit includes methods for the valuation of *cultural memory*, *soft infrastructure* and *organisational cultures* as assets in DRR as well as an enhanced consideration of *vulnerable groups*. It also adds a comprehensive methodology for *social and cultural networks analysis* and a set of *serious games*.

The activities in EDUCEN cities have varied in a number of elements as a condition to enrich the project outcomes by documenting and giving room to the specifities of the cities and their contexts. Every city has made its choices in terms of tools and methods tested, in a more *a la carte* style, each

CS city, providing as a result useful lessons in terms of future replication. That is, how other cities may adopt the tools and methods that are better suited to their conditions and that better match their needs.

The work undertaken in the case studies is documented in specific local **Manuals** that can be accessed online.

Tools and methods included in the Handbook:

- Wikki
- Guiding questions
- Video Library
- Tool kit (link to toolkit)
  - *Adapting a training model for Inclusive Disaster Risk Reduction*
  - *Guidelines for a successful megaevent*
  - *Social Network Mapping and analysis*
  - *Technical, Organizational, Social and Economic (TOSE) through System Dynamics Modeling techniques (SDM)*
  - *Cultural memory game*
  - *Games to foster empathy*
  - *Collaborative learning for DRR*
  - *Guidelines: using cultural memory as an asset in disaster risk reduction*

3. EMPATHY: Using games to foster empathy, experience, and learning

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

What is more, we shouldn't forget about potential problems connected with knowledge exchange. In many cases, people involved cannot even formulate their message because the situation is unclear or unstable. Sometimes knowledge exchange can also be disturbed due to cultural factors or history of previous conflicts or interactions.

We can use simulations and serious games to overcome such obstacles. For example, we can make participants take on the same roles that they play in real-life. Such activity is called policy exercise. This gives them an opportunity to describe the situation from their point of view andy share their knowledge, opinions and concerns with others. Such activity is also a useful tool for researchers and

policy-makers since it helps them understand endangered communities and learn more about the people they want to protect. On the other hand, we can make participants play roles different from those which they assume on a daily basis. This activity is called a serious game or simulation. In this case, the participants are given the opportunity to understand positions and actions of other actors. Apart from sharing their own knowledge, they can address conflicts and problems they experience in contact with other stakeholders. This promotes empathy and can be treated as the first step in creating a better common understanding of the situation.

- Games, when used properly, in disaster risk context 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. > (end of quote)

This spurs new ideas and makes participants more willing not only to accept them but also to take part in their implementation.

Games, simulations, policy exercises

In his article "Manifesto for a Ludic Century" (2013) Eric Zimmerman calls the 20th Century the age of linear information, and the 21st Century the age of games. Because we live in a world of complex systems, we need systemic tools to describe it. Linear media (books, movies, lectures), no matter how attractive, allow its users only to learn passively ("learning-to-know"), without exposing them to direct practice ("learning-to-do") (Aldrich 2009). Games, simulations and policy exercises, on the other hand, offer their users possibility to learn actively, as they act as metaphors reflecting specific systems (Mendler de Suarez, Suarez, Bachofen, 2012). Consequently, a carefully designed game provides its players with a first-hand experience of the system that it represents.

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 & 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).

Such games can employ procedural rhetoric - "the practice of using processes persuasively" (Bogost, 2007). A set of processes is applied by a game designer in order to "construct" game's reality. These processes are later experienced by players during a gameplay and help them grasp the mechanisms ruling the real world. Consequently if a game designer desires to communicate the need for better cooperation between different actors involved in flood risk management, her game should allow players to discover that their success depends on effective collaboration. Procedural rhetoric makes the message more transparent and more easily adopted by the target audience (Walsh, Magnuszewski, Slodka-Turner, 2012).

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 policy require detailed information about the system it is embedded in and life-like feedback which would help verify the feasibility of the created policy. Educational games may also 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 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).

Similar goals may be achieved by applying policy exercises (Duke & Geurts, 2004) - also known as open simulations. They use social simulation tools that combine computational models and participation of real actors. During policy exercises participants usually assume their real-life roles and function in their cultural context. This way, they are able to discover the motivations behind their decisions and the external factors that influence them. Policy exercises are based on collaboration between actors and scientists and analyze how problems emerge in complex systems and what intervention would be most effective. According to Mayer (2009), policy exercises allow us to capture and integrate technical-physical and social-political aspects of policy problems. What is more, as policy exercises feel real, they enable players to store more information, learn faster and develop intuition in decision-making. A huge advantage of this approach is that even untrained actors may engage in highly complex processes (Stefanska et al., 2011).

3.1. Games to connect culture and disasters

Coles and Zheung (2011) provided an initial approach to a decision-making support for disaster managers interacting across cultural boundaries. During disaster response, a cross-cultural partnership is the key to establishing a common operating perspective. Lack of communication means less effective use of resources and misunderstanding the objectives. Disaster managers that work in cross-cultural partnerships should know which objectives are misunderstood, which shall be changed or renegotiated. As soon as an operating perspective is created, actors should cooperate to develop an optimal outcome acceptable for a whole partnership and for individuals. The individual chance for gaining benefits grows when other actors' opinions and motivations are added to the understanding of the problem.

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 identify the actions that can be taken by local communities in response to a flood risk in their neighborhood. The Telephone game allows improving the communication flow in early warning systems. Both games have helped improve 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. They can also be used in disaster preparedness trainings and may be adapted to address diverse attitudes, perceptions, behavior and cultural values and beliefs within the various communities (Mendler de Suarez, Suarez, Bachofen, 2012).

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 includes:
-exploring how cultural factors affect different phases of disaster risk management;
-demonstrating the benefits of ex ante disaster risk reduction 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 organizations and individuals, before and during an emergency situation;
-ability to deal with evacuation in an urban area inhabited by multilingual and multicultural community

The Lorca simulation was the basis for the Gifts of Culture game (also developed as part of the EDUCEN project) which provides an empathy training for both disaster professionals and community members. The game is set in a culturally diversified environment. As the group, the players are able to experience both the obstacles and the possibilities arising from the situation and to do their best to increase overall community resilience. On the individual level, each role offers a first-hand experience of how various cultural factors influence the decision-making process. Some roles, e.g. the disabled or refugees, provide even more profound insight into real-life barriers, since the experience is boosted by specific restrictions (isolation, inability to speak, etc.) This introduces an additional, emotional dimension to the game and (as the debriefing sessions prove) leads to increased understanding of the nuances of working in a culturally diverse environment.

The Evacuation Challenge Game, another project that was created as part of EDUCEN, 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 and are often bound by some restrictions (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 action should be adjusted to meet the needs of people with disabilities.

The Flood Resilience Game is one of those games that promote policy of cooperation in a multi-stakeholder environment. The game is designed to help participants – such as NGO staff working on flood-focused programs – to identify novel policies and strategies which improve flood resilience. The game is set in a community living in an area exposed to floods, occurring with different severity. Players take on roles of members of different citizen groups, local government and water board officials. They can perform different actions that can increase the resilience of their community. However, the impact and effectiveness of these actions depend on the players' ability to cooperate and develop a consistent strategy. The direct interactions between players create a rich experience that can be discussed, analyzed and lead to concrete conclusions and actions. The players may

discover their vulnerabilities and capacities, appreciate the benefits of cooperation and get an insight into interdependencies ruling their activities.

3.2.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, running simulations and games, the organizers should consider many ethical issues. Most people treat games as entertainment, yet it doesn't mean they are prepared or fully aware of what can happen during a gameplay. It must be remembered that 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,
- using proven group work techniques helps create an atmosphere of openness and trust,
- during activities that affect the emotional sphere, an 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 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 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, 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 session players analyze 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 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 workshop following Kolb's cycle starts with an experience - a game; then during the first part of debriefing, players reflect upon their moves; conclusions from that part should be then used to make 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 experiments thus we encourage every DRR professional not only to include games in their actions but also to actively pursue new ways of its application.

Further reading

- Aldrich, C. (2009). *The Complete Guide to Simulations and Serious Games*. San Francisco: Pfeiffer.
- APA, (2010) http://www.apa.org/ethics/code/principles.pdf.
- Bogost, I. (2007). *Persuasive games. The Expressive Power of Videogames*. Cambridge, London: The MIT Press.
- Coles, J., Zhuang, J. (2011). Decisions in Disaster Recovery Operations: A Game Theoretic Perspective on Organization Cooperation. *Journal of Homeland Security and Emergency Management*: 8(1), 35.
- Crookall, D. (2010) Serious Games, Debriefing, and Simulation/Gaming as a Discipline, *Simulation & Gaming* 41(6) 898–920.
- Daszynska-Zygadlo, K., Pajak, M. (2016). Educating About Complexity and Sustainability Through Serious Games. In: Wach-Kakolewicz, A., Muffoletto, R. (eds). *Perspectives on Computer Gaming in Higher Education*. Poznań: Bogucki Wydawnictwo Naukowe.
- Duke, R.D. (1974) *Gaming: the future's language*. New York: Halstead Press.
- Duke, R.D. & Geurts, J.L.A. (2014). *Policy games for strategic management*. Amsterdam: Dutch University Press.
- Juhola, S., Driscoll, P., Mendler de Suarez, J., & Suarez, P. (2013). Social strategy games in communicating trade-offs between mitigation and adaptation in cities. *Urban Climate*, 4, 102-116.
- Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. New Jersey: Prentice-Hall.
- Kriz, W. C., Reinmann-Rothmeier G., Mandl H. (Hrsg.), F. (1995). Debriefing the debriefing process. In D. Crookall & K. Arai (Eds.), *Simulation and gaming across disciplines and cultures* (pp. 235-242). Thousand Oaks: Sage.
- Kriz, W. C. (2003). Creating effective interactive learning environments through gaming simulation design? *Simulation & Games: An International Journal*, 34(4), 117-134.
- Krolikowska, K., Kronenberg, J., Maliszewska, K., Sendzimir, J., Magnuszewski, P., Dunajski, A., & Slodka, A. (2007). Role-Playing Simulation as an educational tool for sustainable development - Karkonosze Mountains case study. *Simulation and Gaming*, 38(2), 195-210.
- Leigh, E., Spindler, L. (2004). Researching congruency in facilitation styles. In W. C. Kriz & Th. Eberle (Eds.), *Bridging the gap: Transforming knowledge into action through gaming & simulation* (pp. 309-317). München: Sagsaga.
- Mayer, I.S. (2009). The Gaming of Policy and the Politics of Gaming: A Review. *Simulation & Gaming*, 40(6). 825-862.
- Mendler de Suarez, J., Suarez, P., & Bachofen, C. (eds) (2012). *Games for a New Climate: Experiencing the Complexity of Future Risks*. Boston: The Frederick S. Pardee Center for the Study of the Longer-Range Future, Boston University.
- Ratan, R., Ritterfeld, R. (2009). Classifying Serious Games. In: Vorderer, P., Ritterfeld U., Cody M.J. (eds) *Serious Games: Mechanisms and Effects*. Hoboken: Taylor & Francis.
- Salen, K., Zimmerman, E. (2004). *Rules of play. Game design fundamentals*. Cambridge, London: The MIT Press.
- Stefanska, J., Magnuszewski, P., Sendzimir J., Romaniuk, P., Taillieu, T., Dubel, A., Flachner, Z., & Balogh, P. (2011). A Gaming Exercise to Explore Problem-Solving versus Relational Activities for River Floodplain Management. *Environmental Policy and Governance*, 21(6), 454-471.
- Visman, E. (2014). Knowledge is Power. *Unlocking the potential of science and technology to enhance community resilience through knowledge exchange*. London: Humanitarian Practice Network.

- Walker, W.E. (1995). *The Use of Scenarios and Gaming in Crisis Management Planning and Training*. Santa Monica: RAND.
- Walsh, A., Magnuszewski, P., Slodka-Turner, A. (2012). Can Banks Self-Regulate? Voluntary Agreements, Intrinsic Motivation and Games. *Economic Affairs*, 32(3), 58-64.
- Yamori, K. (2009). Action Research on Disaster Reduction Education: Building a "Community of Practice" through a Gaming Approach. Journal of Natural Disaster Science, 30(2), 83-96.
- Zimmerman E. (2013). Manifesto for a Ludic Century. In: Walz S.P., Deterding, S. (eds). *The Gameful World. Approaches, Issues, applications*. Cambridge, London: The MIT Press.

3.3. Run the game by yourself

A number of games were developed by the EDUCEN partners during the project. All of them - and also additional ones are available to download and play for free. Each game comes with a detailed instruction. Games are available in different languages.

Gifts of Culture

Gifts of Culture is a board game role-playing simulation of a culturally diverse community. 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 of the actions players can undertake has its advantages and disadvantages. Information sharing and collaboration can greatly improve their outcomes, however, diverse cultural backgrounds make it very difficult.

The Gift of Culture allows players to experience how cultural differences can lead to troubles but at the same time they can also be helpful. Play and use the "gift of culture" to improve community flood resilience.

The game was designed and developed within the EDUCEN project.

Why use this game:

- Players understand different ways how cultural factors affect disaster preparedness and ability to cope.
- Players improve collaboration and information sharing skills, especially in regards of collaboration between organizations and individuals representing diverse cultural backgrounds leading to improved disaster resilience.
- Players increase their understanding of disaster risk for heterogeneous cultural backgrounds.

To use this game download it from the website:
giftsofculture.games4sustainability.org.

Flood Resilience Game

The Flood Resilience Game is an educational game that allows players to experience, explore, and learn about the flood risk and resilience of communities in river valleys.

The game is designed to help participants – such as NGO staff working on flood-focused programs – to identify novel policies and strategies which improve flood resilience. The game is set in a community living in an area exposed to floods, occurring with different severity. Players take roles of members of different citizen groups (workers, farmers, entrepreneur, financial services agent), local government and water board officials.

The direct interactions between players create a rich experience that can be discussed, analysed and lead to concrete conclusions and actions. This allows players to explore vulnerabilities and capacities leading to an advanced understanding of interdependencies and the potential for working together. The game has been designed to align with the framework of the Zurich Flood Resilience Measurement tool (but also operates completely independently).

Why use this game:

- Players experience the effects on resilience of investments in different types of "capital" – such as financial, human, social, built, and natural.
- Players have a better understanding of the influence of preparedness, response, reconstruction on flood resilience.
- Players learn of the benefits of investment in risk reduction before the flood strikes.
- Players explore the complex outcomes on the economy, society and the environment from long-term development pathways.
- Players discover the types of decisions needed to avoid creating more flood risk in the future, incentivizing action before a flood through enhancing participatory decision-making.
- Players experience all these complex ideas with a simple and concrete game elements so that participants can connect with their daily realities.

To use this game download it from the website:
floodresilience.games4sustainability.org

About That Forest

About That Forest is a web-based role-playing simulation game that takes place in a forest and the community that lives in it. Participants take the role of people living in the forest. They try to achieve their goals, facing many challenges, interacting with the decisions made by other people living in the forest and an uncertain environment. The village where the community lives is located by the river that runs through the mountainside. Because of that, the village is exposed to floods that are caused by the rainfall. Forest has a capacity to absorb the rainfall. The bigger the forest is, the more rainfall it can absorb. Rainfall that is not absorbed by the forest gets to the river and causes floods. Floods cause financial losses for the community members. These losses are distributed unequally between the community members. Players don't know how much money other community members have exactly, but they can see how wealthy the others are.

Why use this game:

- Players learn practices that create a sustainable system in any environment, business or organisation.
- Players practice strategic and leadership skills.
- Players explore effectiveness and stability of policies for management of common goods.
- Players understand how disasters factors into policies and management of the common goods.

To run this game register on the Games4Sustainability games platform and run your own session:

https://play.games4sustainability.com/

Learn how to use the games platform here:

http://www.games4sustainability.org/games-platform/

Evacuation Challenge Game

The Evacuation Challenge Game presents challenges connected with disaster response and evacuation during the disaster (in this case – zombie apocalypse!) in diverse culturally and linguistically environment. Participants take on the roles of citizens and rescue team members, but unbeknownst to them, the road to the safety won't be easy!

The game was designed and developed within the EDUCEN (European Disasters in Urban Centres: a Culture Expert Network) project within the EU Horizon 2020 Programme.

Why use this game:

- Players understand problems connected with language barriers during risk situations.
- Players understand problems encountered by people with disabilities.
- Players learn about problems connected to evacuation in multicultural and multilinguistic environment.
- Players realise importance of cooperation and communication.

To use this game download it from the website:
evacuationchallenge.games4sustainability.org

3.4.What games should I use?

We prepared some questions that will help you to determine which game matches your needs best. It takes up to 10 minutes to find the game tailored to you.

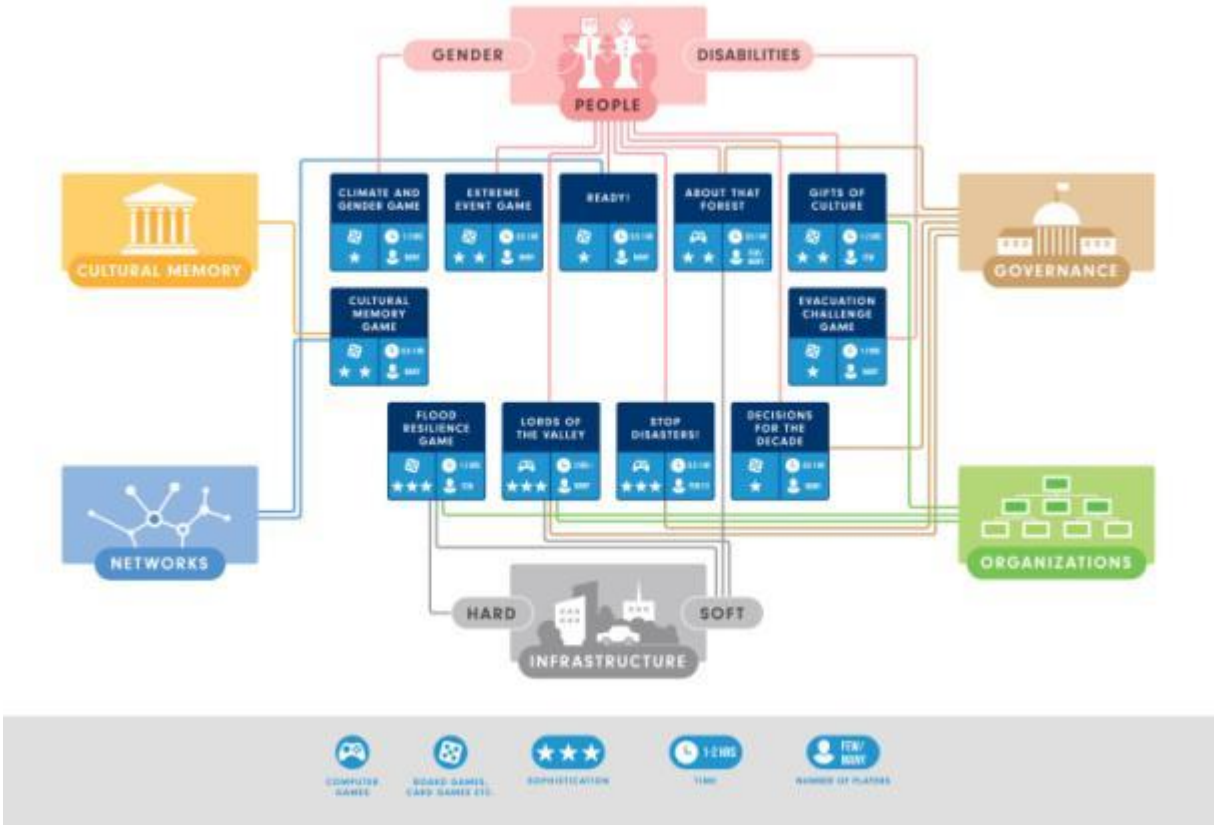


Figure 86. Infographic about games

3.5.Annotated list of games about culture and disasters

Overview of existing policy exercises/simulations and games that can be used to improve disaster preparedness and response actions

About That Forest (could we hide the table in a way that you could only see it if you click on "about that forest"?)

Title	**ABOUT THAT FOREST**
Description	About That Forest is a web-based role-playing simulation game that takes place in a small community that makes living from a forest. Players set their own goals and then try to achieve them. They face many challenges, including the uncertain environment and the consequences of the decisions made by other people. Community lives by the river that runs through the mountainside. Because of that, it is exposed to floods that are caused by the rainfall. Forest has a capacity to absorb the rainfall. The bigger the forest is, the more rainfall it can absorb. Rainfall that is not absorbed by the forest gets to the river and causes floods. Floods cause financial losses for the community members. These losses are distributed unequally between the community members. Players can vote for policies that are based on different solidarities proposed by the cultural theory (individualistic, hierarchical, egalitarian). They can also make up their own rules. The game allows to exercise cooperation and decision-making in disaster-prone environment when multiple worldviews are involved.

Target group	local communities, disaster managers, policy makers, NGOs
Benefits	Players learn about different types of behavior connected to the cultural theory in the context of natural disasters and depletion of natural resources. Players learn practices that create a sustainable system in any environment, business or organisation. Players experience complex organizational reality and organizational culture. Players explore effectiveness and stability of policies for management of common goods.
Created by	Centre for Systems Solutions
Number of players	best played with 10-30
Number of moderators	1
Duration	1-2 hours + 1 hour debriefing
How to obtain this game	To run this game register on the Games4Sustainability games platform and run your own session: https://play.games4sustainability.com/ Learn how to use the games platform here: http://www.games4sustainability.org/games-platform/

The Climate and Gender game (could we hide this table as the previous one?)

Title	**THE CLIMATE AND GENDER GAME**
Description	The Climate and Gender game supports learning and dialogue on the different vulnerabilities of women and men facing climate change and its results, including floods and droughts. With the added element of gender roles the game becomes an interesting starting point in a discussion on women's place in a harsh world of constantly changing risk.
Target group	aid workers, NGOs, local administration, local communities
Benefits	Players discover how climate changes affect lives of farmers in Africa. Players learn of role of gender in facing changing risk. Players are encouraged to discuss different vulnerabilities of women and men facing natural disasters such as flood and droughts.

Created by	Red Cross/Red Crescent Climate Centre
Number of players	10 – 40
Number of moderators	at least 1 (a support team of 1-3 facilitation assistants can be helpful for larger groups)
Duration	1-2 hours + 1 hour debriefing
How to obtain this game	To run/play this game download it from the game's website. http://climatecentre.org/resources-games/the-gender-and-climate-game

Cultural Memory Game (same, hide table and show it when clicking on "cultural memory game")

Title	**CULTURAL MEMORY GAME**
Description	Cultural Memory Game confronts the players with the history of a city that experienced a serious disaster in the past. However, last decades were kind for the city and its people and nobody seems to take the risk seriously anymore. The game content can be adapted to the situation of different cities.
Target group	youth, museums, schools
Benefits	The game helps players understand the role of the memory of past disasters and recognize its signs. At the same time, players learn why being prepared is so important and where they can find information about that.
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

Decisions for the Decade

Title	**DECISIONS FOR THE DECADE**
Description	Decisions of the Decade is an interactive game that helps people to recognize that there are many uncertain aspects to the future of the climate, and therefore, risk management may require being prepared for surprises such as natural disasters. The game supports the education for community resilience and encourages the understanding between members of the community, aid

	workers and other stakeholders involved in disaster risk reduction in rural communities.
Target group	aid workers, local communities, ngos, public administration
Benefits	Players learn about different risks and climate change impacts. Players learn to plan for extremes as an individuals and as a community. Players experience the uncertainty and other challenges connected to the disaster risk reduction and disaster risk management
Created by	Red Cross/Red Crescent Climate Centre
Number of players	8-40 people, in teams of 4
Number of moderators	at least 1 (a support team of 1-3 facilitation assistants can be helpful for larger groups)
Duration	30-60 minutes + debriefing
How to obtain this game	To run/play this game download it from the game's website. http://www.climatecentre.org/resources-games/decisions-for-the-decade

Evacuation Challenge Game

Title	**EVACUATION CHALLENGE GAME**
Description	The Evacuation Challenge Game presents challenges connected with disaster response and evacuation during the disaster (in this case – zombie apocalypse!) in diverse culturally and linguistically environment. Participants take on the roles of citizens and evacuation team members, but unbeknownst to them, the road to the safety won't be easy!
Target group	aid workers, local communities, ngos, youth, disaster managers
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 multicultural environment. Players realise importance of preparedness training, and why the said training should be adapted with diverse community in mind.

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

Extreme Event Game: Coastal City

Title	**EXTREME EVENT GAME: COASTAL CITY**
Description	Extreme Event Game: Coastal City presents coastal city facing the category 5 hurricane. Players are set to deal with the issues and problems arising throughout the city and on the way learn about community resilience and key elements to overcoming chaos and increasing disaster management skills.
Target group	aid workers, local communities, ngos, public administration, youth
Benefits	Players learn how to use available resources, respond to extreme events and assess the impact of disaster. Players experience the risk and learn to overcome problems as a community. Players are encouraged to create the understanding between different stakeholders. Players understand the key topics connected with the community resilience.
Created by	Koshland Science Museum
Number of players	12-48
Number of moderators	at least 1
Duration	1 hour + 1 hour debriefing
How to obtain this game	https://www.koshland-science-museum.org/explore-the-science/extreme-event/plan-your-game

Flood Resilience Game

Title	**FLOOD RESILIENCE GAME**
Description	The Flood Resilience Game is an educational game that allows players to experience, explore, and learn about the flood risk and resilience of communities in river valleys. The game is designed to help participants – such as NGO staff working on flood-focused programs – to identify novel policies and strategies which improve flood resilience. The game is set in a community living in an area exposed to floods, occurring with different severity. Players take roles of members of different citizen groups (workers, farmers, entrepreneur, financial services agent), local government and water board officials. The direct interactions between players create a rich experience that can be discussed, analysed and lead to concrete conclusions and actions. This allows players to explore vulnerabilities and capacities leading to an advanced understanding of interdependencies and the potential for working together. The game has been designed to align with the framework of the Zurich Flood Resilience Measurement tool (but also operates completely independently).
Target group	flood professionals, local communities, ngos, policy makers, public administration
Benefits	Players experience the effects on resilience of investments in different types of "capital" – such as financial, human, social, built, and natural. Players have a better understanding of the influence of preparedness, response, reconstruction on flood resilience. Players learn of the benefits of investment in risk reduction before the flood strikes. Players discover the types of decisions needed to avoid creating more flood risk in the future, incentivizing action before a flood through enhancing participatory decision-making. Players experience complex organizational reality and organizational culture.
Created by	Centre for Systems Solutions - CRS
Number of players	8-16

Number of moderators	at least 1
Duration	1-2 hours + debriefing
How to obtain this game	To run/play this game download it from the game's website. http://floodresilience.games4sustainability.org/#download-the-game

Gifts of Culture

Title	**GIFTS OF CULTURE**
Description	Gifts of Culture is a board game role-playing simulation of a culturally diverse community. Players become the representatives of various groups living in the 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 of the actions players can undertake has its advantages and disadvantages. Information sharing and collaboration can greatly improve their outcomes, however, diverse cultural backgrounds make it very difficult. The Gift of Culture allows players to experience how cultural differences can lead to troubles but at the same time they can also be helpful. Play and use the "gift of culture" to improve community flood resilience.
Target group	local communities, ngos, policy makers, public administration, youth
Benefits	Players understand different ways how cultural factors affect disaster preparedness and ability to cope. Players improve collaboration and information sharing skills, especially in regards of collaboration between organizations and individuals representing diverse cultural backgrounds leading to improved disaster resilience Players increase their understanding of disaster risk for heterogeneous 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

Lords of the Valley

Title	**LORDS OF THE VALLEY**
Description	The Lords of the Valley is a mobile game that takes place in the valley of the river exposed to unexpected droughts and floods. Participants take role of farmers-businessmen, water authorities, local authorities, bank and non-governmental organization. Players attempt to achieve their own goals, facing many challenges arising from the decisions of other players and the unpredictability of the environment. The Lords of the Valley game is a laborator for practicing strategy, collaboration and leadership in a complex environment.
Target group	aid workers, local communities, ngos, public administration
Benefits	Players develop skills for effective communication and collaboration in contacts with stakeholders with different worldviews and goals. Players diagnose various organizational problems. Players experience complex organizational reality and organizational culture.
Created by	Centre for Systems Solutions - CRS
Number of players	12 - 36
Number of moderators	at least 1
Duration	3-4 hours + 1 hour debriefing
How to obtain this game	To run/play this game go to the game's website and contact its creators. lordsofthevalley.games4sustainability.org

Ready!

Title	**READY!**
Description	Ready! is a game which introduces players to the topic of disaster preparedness and disaster risk reduction. It shows an innovative approach to focusing attention on those issues. The game is prepared to be set in a real-case

	scenarios.
Target group	Affected community members. The game can also be played with disaster managers, volunteers, branch officers etc.
Benefits	Players learn of the benefits of early warning and other aspects of the disaster preparedness. Players experience planning for extremes as an individuals and as a community. Players learn what type of preparations are necessary to withhold against different natural disasters. Players learn more about topics connected with community resilience.
Created by	Red Cross/Red Crescent Climate Centre, Parsons The New School for Design's PETlab
Number of players	10 - 50 players, in teams of 5-10 players
Number of moderators	1-2
Duration	30 minutes + 1 hour debriefing
How to obtain this game	To run/play this game download it from the game's website. http://climatecentre.org/resources-games/ready

Stop Disasters

Title	**STOP DISASTERS**
Description	This disaster simulation game, (from the United Nations (UN) and International Strategy for Disaster Reduction (ISDR) 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. The player's role is to plan and construct a safer environment, assess the disaster risk for the environmental disaster hazards, while attempting to limit the damage when natural hazards strike. You are given advice along the way; some will be good, and other will be bad.
Target group	children, youth, NGO, local communities
Benefits	Players understand the risks that can be brought on by poor city management. Players learn what type of preparations are necessary to withhold against different natural disasters. Players learn more about topics connected with community resilience.

Created by	United Nations (UN), Inter-na-tional Strat-egy for Dis-as-ter Reduc-tion (ISDR), Playerthree
Number of players	1
Number of moderators	none
Duration	15-30 minutes (depending on difficulty level and chosen disaster) + 1 hour debriefing
How to obtain this game	To play the game go to the game's website. http://www.stopdisastersgame.org/en/playgame.html

3.6.Gifts of Culture: Diversity in the context of flood resilience

The Gifts of Culture allows players to experience and appreciate both negative and positive aspects of cultural differences, developing better understanding of mutual needs. Play and use The Gifts of Culture to improve community flood resilience.

A calm, sunny day in a small river valley surrounded by hills and plains. The idyllic scenery betrays no signs of the disaster which is yet to come and turn the lives of the community upside down. But even earlier, in their attempts to protect their families, the inhabitants are faced with one of the biggest challenges of the modern world - lack of understanding and inability to cooperate with others.

This is how the Gifts of Culture board game starts. It simulates a diverse community living in a flood-prone valley. The players, who enter the valley to become its inhabitants, are invited to attend a community meeting, which constitutes the main part of the game. Though all the community members represent different views and ideals, they are all driven by the same goal – to ensure the safety and possible best living conditions for "their" people. But is it possible to satisfy them all?

As the representatives of the Local Citizens Board, the players are entitled to set priorities and make decisions about the investments in the valley. Their ideals, beliefs and biases are closely rooted in their group's culture. The final decision how to spend the money they were allocated belongs to them, yet the letter they received from the families they represent acts as a constant reminder of their responsibility for their supporters. It is not easy to move in this complex reality populated by farmers, workers, local entrepreneurs, retirees, people with disabilities, NGOs, immigrant workers and refugees whose interests and priorities overlap and collide.

The gamekit consists i.a. of a big map of the valley which depicts the situation of each family group Every player accepts responsibility for his new family, knowing that their wellbeing and safety depends entirely on his actions.

To make the game even more challenging, some players are bound by certain restrictions. The representative of the disabled sits with her back facing the map. The immigrants and refugees representatives cannot speak, using only notes and pictures to transmit their messages. Although vulnerable, they still try to push their ideas connected with safety and financial matters, yet they are often unnoticed by other players focused on their aims.

This mechanism is intended to work as a metaphor for social exclusion. Immigrants are often not allowed to participate in voting and decision-making activities occurring in their place of stay. The same goes for the people with disabilities, as in planning and budgeting processes their needs are often not taken into account. The most disadvantaged are the refugees, who are not only frequently

excluded from the local decision-making processes, but are also feared and distrusted by the rest of the community, and their presence in specific areas is often perceived as problematic.

At the beginning of the game, the players usually focus on funding actions that bring benefit to the group they represent. What can I do for my people? Insurance and preparedness package seem a natural choice. Unfortunately, these solutions in their basic form are not inclusive as there are plenty of people who are denied the access to the safety mechanisms. Inclusion actions such as temporary residence registration could change that, but most of the Local Citizens Board members turn blind eye to the wordless requests of the refugees, immigrants, and people with disabilities.

The first shock comes when the players are confronted with the results of their actions. Because of the exclusion, not all of the groups represented in the Board are properly prepared for the magnitude of the flood. Moreover, the players whose focus was merely on improving their group's wellbeing, would be shocked to discover the repercussions of their decisions. It is also worth mentioning that the lower was the players' safety level, the more wellbeing points they've lost in consequence. In turn some of the families reach a critical point and their living conditions are more than miserable. In order to recover, they thus need immediate medical aid.

Those who managed to retain or gain high safety and wellbeing points, e.g. the entrepreneurs or the workers, may, for the time being, feel safe. However, as soon as, the humanitarian crisis comes, all the families lose some additional wellbeing points. At this is when some vital questions arise: "How come we are in humanitarian crisis when my people have a high wellbeing level?" "Why do we lose wellbeing points when the others are in crisis, not us?"

No man is an island, and this applies also to the valley dwellers. The game reflects everyday problems and, like in real life, all events are interconnected - the poor wellbeing of some families negatively affects the wealth and health levels of the whole community.

In the face of new challenge, the players have an option: either to act jointly to tackle the humanitarian crisis or work alone on raising the wellbeing of the group they represent.

By acting alone, they can focus solely on protecting the interest of their group. Yet, since, all the Local Citizens Board members were allocated limited budget units to counteract the crisis, it may not be enough to pursuit their individual goals. As a result, the players start to communicate and cofinance common actions, which triggers movement towards better wellbeing and safety of all the groups, including these who were most affected by the flood.

The road to hell is paved with good intentions, they say, and it cannot be more true in this case. On the surface all the players are now striving for the better good, but, there are still the refugees, the immigrants, and people with disabilities whose needs stay ignored in the discussion. The language and physical barriers prevent them from active participation in negotiations, and the rest of the community shows no intention of helping them overcome these obstacles. Even the NGO, who was set to support these in need, is often helpless in their attempts to understand the needs of the disadvantaged groups. For example, they focus on wellbeing and inclusion actions when in fact, what they need the most is a safety improvement.

The aim of the game is thus to highlight the importance of discussions and negotiations which shall precede any actions. For example, financing accessibility programs without the participation of the most interested groups, may only worsen the situation.

Furthermore, the negotiation process will stay impaired if the players decide on accepting closure and social boundaries. The less contact they have with different cultures, the more limited they are in terms of their perspective thinking and ideas. It is a common belief that people are strongly rooted in their own culture and naturally take on the collective way of thinking. The game does not entirely deny this thesis, as the players are not asked to question their group's interest, yet they are at least encouraged to show some initiative and act across divides.The cooperation brings about both

financial and strategic benefits because the players are not only able to cofinance their needs, but also to rely on solutions they wouldn't have come up with otherwise. Each representative has a chance to contribute to common good with his idea - each culture brings different things to the table, be it stronger need for consensus, specific knowledge regarding some actions or even the preference for more altruistic factors. With new ideas, it's time for discussion. All the representatives share their arguments for and against the specific actions, objectives, and needs. And that's exactly where the "gifts of culture" are hidden. In diverse communities, the problem-solving process might take longer, but thanks to the many perspectives and knowledge exchange, it can result in many more interesting solutions. The players learn that it isn't the cultural diversity that causes problems in the valley, but the lack of mutual understanding. Accepting different points of view enables the players to see the broader picture of the problems and plan actions in a long-term perspective.

At the beginning of the Gifts of Culture, the community resembles an amateur choir. Each group has a different voice but doesn't know how to use it collectively. However, with some training (and a little bit of will to cooperate) they can finally achieve harmony in which their unique timbres are still audible.

These are not only voices but also emotions that play an important role in the game. With every round, the players become more and more immersed in the new reality. The wellbeing and safety of their group are put at the centre of their concerns. For some players, especially those impersonating the members of the excluded groups, the game might become highly emotional. It is very important that these emotions be addressed by the moderator during the debriefing session after the game, but on the whole, they can only help the players understand the nuances of working in culturally diverse environment, marked by social inequalities, discrimination and social exclusion.

Through the experience of joint gameplay, the players improve cooperation and information sharing skills, especially in regard to collaboration between organizations and individuals representing diverse cultural backgrounds. The result of this being better disaster resilience. They not only learn some basic ways to support each other but also to communicate their needs, to share their knowledge and tackle complex problems.

The Gifts of Culture was already tested with various groups at EDUCEN project meetings, Balaton group meetings and in the Stockholm Resilience Centre. With feedback from the players, the process of improving and modifying the game is still in pending. Its new polished version will hopefully explore even more interesting interactions and decision-making processes.

The game was developed by the Centre for Systems Solutions (CRS) within the EDUCEN project.

Michalina Kulakowska - an author and editor at Games4Sustainability.org, a game designer at the Centre for Systems Solutions and a co-designer of the Gifts of Culture game. In her daily work, she focuses on serious games in the area of sustainability.

3.7. Evacuation Challenge Game: How to introduce empathy into civil protection policies

The game presents challenges connected with disaster response and evacuation during the disaster (in this case – zombie apocalypse!) in a diverse culturally and linguistically environment. Participants take on the roles of citizens and rescue team members, soon realizing that the road to safety won't be easy!

Evacuation in the face of a disaster is a challenge for all parties involved. Panic and confusion are friends neither to the evacuation team nor to the evacuees. But there are more obstacles on the

road to safety than people usually think of. The Evacuation Challenge Game is just the right tool to help realize them.

Evacuation Challenge Game simulates an evacuation action during a disaster in a culturally and linguistically diverse environment. The participants take on the roles of citizens and evacuation team members. And although the disaster here (in this case zombie apocalypse) is entirely fictional, the challenges the players face during the game are intrinsically linked to real life.

At the beginning of the game, the participants are divided into groups. Each player receives a set of simple instructions. Yet, only one of the group is equipped with the most crucial piece of information - the zombies are drawing nearer and, since the concept of mercy is not known to them, the whole city has to be evacuated as soon as possible. From this time on, the most informed group, that is the evacuation team, will carry the burden of responsibility for all the players engaged into the Evacuation Challenge.

Their main purpose in the game is to evacuate all the participants to the designated safe place. The question is how to do it if most of the players are blissfully unaware of the approaching danger? The evacuation team has limited time and resources to bring the mission to the successful end.

Despite the obstacles, they decide to rush into action. The first moves seem unexpectedly easy, as the people display willingness to cooperate and obediently follow the instructions. The action runs smoothly until one of the players refuses to interact with the rescue team. It is now obvious that the operation won't be a piece of cake.

It turns out that the members of the evacuation team are not as well informed as they thought. They seem completely unprepared for a new challenge - a cultural and linguistic melting pot they were thrown into. As they continue to play, the participants start to display a number of impairments; some can only speak their native language, others cannot see or hear. There are some evacuees with mobility problems and other players bound by specific tradition or cultural taboos that may become an obstacle during evacuation efforts. All the restrictions inhibit communication and pose danger of staying behind.

Add all these factors, and you will see how complex the reality of the players has become. The evacuation team is already acting under high pressure. Not only do they have to find the way to convey their message but also help these who are unable to rely solely on themselves. Will they succeed? What skills and resources will they depend on? What to do in a situation like that?

One possible scenario involves forcing the evacuation without any explanation. It may, however, bring more damage than benefit. The people with restrictions would still be unaware of the risk. In the overall chaos and confusion they might not only refuse to follow the rescue team's instruction but also show open resentment or aggression towards them.

There is a better solution to this problem. It entails taking time to explain the reason for evacuation and effort to understand the needs of the evacuees. In this sense, this seems a more elaborated scenario, but in the long term it is the only one which does not impose on but offers help to all the players, including those with health or cultural restrictions. Consequently, the game may be treated as a test of cooperation and communication skills. Unfortunately, the resources the evacuation team depend on are limited. With varied restrictions on both sides, it is difficult to convey the information about zombies' attack and effectively evacuate people who don't speak the same language, are disabled or bound by their cultural taboos.

Sadly enough, in most cases, the Evacuation Challenge Game players fail in evacuating all participants. And a vast majority of those left behind belong to the restricted groups.

The Evacuation Challenge Game exposes the lack of preparedness in the area of civil protection. Most of the agencies working in this field are rarely equipped with a coherent plan to deal with the issues of multiculturalism or disabilities occurring in their communities. There is thus an obvious need to embed empathy for and understanding of these problems even before a disaster strike. The game allows the stakeholders to identify some of the obstacles which are often omitted in planning for disaster and risk management and coping. These include i.e. miscommunication due to cultural differences and absence of proper training for the evacuation members or risk managers who often lack knowledge on problems experienced by socially and culturally excluded groups. In this sense, the Evacuation Challenge Game helps understand how the language and cultural differences affect the capacity of an emergency crew to provide an effective help during disasters.

The Evacuation Challenge Game, created by the Centre for Systems Solutions, was played during the EDUCEN meetings in Wageningen, Netherlands and in Valladolid, Spain. The game can be easily modified for different regions and cities to suit the needs of various groups by incorporating traits characteristic to the community in question.

Michalina Kulakowska - an author and editor at Games4Sustainability.org, a game designer at the Centre for Systems Solutions, a co-designer of the Gifts of Culture game. In her daily work, she focuses on serious games in the area of sustainability.

3.8. Flood Resilience Game: How to help flood professionals to identify policies and strategies that can make communities more resilient

The Flood Resilience Game is an educational game that allows players to experience, explore and learn about the flood risk and resilience of communities in river valleys. The game is designed to help participants – such as NGO staff working on flood-focused programs – to identify novel policies and strategies which improve flood resilience.

Two groups of NGO workers met in two distant parts of the world - Peru and Indonesia.

Despite 18,000 km of ocean separating them, they shared a common goal: to help river valley communities that are vulnerable to floods. They were going to explore the ways to do that by playing a game.

The Flood Resilience Game is a simulation that helps the flood professionals to identify policies and strategies that can make flood-prone communities more resilient. The game presents the challenges that flood-prone communities in developing countries face every day. This way it creates an environment for exploring the strategies to increase flood resilience. The aspects of communication and collective decision making are also strong in the game, in result making it a fine tool to diagnose the problems connected with the organizational culture of specific institutional actors in the community.

The NGO staff who tested the game in Jakarta and Lima took roles of citizens living in a river valley (farmers, workers, entrepreneurs) and its authorities (local government and the water board). They confronted the harsh day-to-day reality. While the citizens had to find ways to provide for their families, the authorities bore the responsibility of managing the valley's infrastructure and advancing its development. A couple months later, the modified version of the game was played in Valladolid, Spain. Because of the urban setting, new roles were added to the game - retirees and unemployed people. The game can be adjusted to address specific needs of the community in which it will be applied.

The community in the Flood Resilience Game works as a system where all the parts are connected. As their resources are limited, both citizens and authorities must face hard choices. How much the residents spend on their food depends on the state of the food market. If they don't eat properly, their health will worsen, they will be less efficient at work and in result they will earn less. They can go to the health clinic, but it costs them their hard-earned income. Their households bring them losses when flood damages them. They have children that they would like to educate, but the accessibility of education depends on the state of the local school. Farmers suffer losses when the water supply is damaged; when the road is in a bad shape, workers have to spend more time to get to their workplaces in the distant city; entrepreneurs rely on the electronics and machines so they cannot provide their services when the power station is not working properly. Local government and the water board decide on the management and flood protection of specific infrastructure facilities, like the food market, the hospital, the power station, and more. But they don't have enough means to take care of everything.

Just as in the real life, citizens and authorities of the valley have a lot on their minds, even without floods lurking around the corner. Nobody knows which parcels the flood will strike. Only the water board have the historical data about past floods. There is also the feeling of confidence because the levees are supposed to protect the valley. During the first round of the game, the community members focus on reacting to the danger. They prepare the sandbags in case of a flood, they learn how to perform first aid or evacuate themselves properly. Preparedness-oriented actions are a clear choice at this point, as they don't take much effort that is needed elsewhere. But is it enough?

Then the levee breaks. It is always a moment of shock. "What happened, we were safe behind the levees, how come there is a flood now?"

Levees are an expensive investment, and they have some advantages - but their strength is limited. And when they break, not much can stop the water from devastating the area. This effect is even bigger if the people are confident that they are safe because the levees protect them.

After the first round, the losses in the valley are significant, but not critical. There are some flood accidents, resulting in the health decrease of the victims. Some houses and assets are damaged. If the owners don't repair them immediately, the damage will pile up. It is similar when it comes to the infrastructure. Damaged hospital makes the cost of going to the health clinic much higher.

People of the valley know that there will be next flood, but they don't know how strong it will be. In the second round, they start to think how they can reduce the risk of damage. The long-term actions, like the house retrofitting or permanent infrastructure protection, become popular among the

players. They also discover that it is more efficient for them when they help each other, or when they create joint funds to finance specific actions. This social capital is often neglected in the context of the disaster response, and the role of the cooperation sparked by bonds between the community members is often underestimated.

Social capital is one of the five capitals (5C) represented in the game. Others include:

- human capital (represented by the investment in education and health),
- physical capital (public infrastructure and private assets),
- financial capital (savings gathered by players, avoiding losing the long-term ability to produce income, also insurance - more about it later),
- and natural capital (using ecosystems and their services for increasing flood resilience - more on it later).

These capitals are complementary and describe the assets that the community consist of. Identifying and using them properly fosters community development and safety.

With each flood the community experiences, the need for progressing from reactive actions towards flood resilience becomes more and more clearer. The third round introduces more advanced actions. The water board can now decide to create the early warning system. It is a huge investment but - when it's working, and the community members know how to use it - it boosts the effectiveness of other protection measures. Citizens and authorities can buy insurance for their houses, assets, and infrastructure they manage.

They face the dilemma of further community development. Should they spend their budgets to improve their houses and infrastructure?

The question how to link the development and growth with disaster risk management is not easy. Real-life cases show that new infrastructure or housing is often built on flood-prone areas. There are many reasons why this can happen. The citizens and authorities may not be aware of the risk. The land may be cheaper than in the safer locations. On the other hand, there is also the dilemma of investing in development when the safety is uncertain. But does it mean that the community should abandon its development goals? This is a hard choice that players have to face.

The fourth round represents a longer period - 15-25 years. During this round, the citizens and authorities decide on implementing long-term actions. They can relocate from flood-prone areas to the safer ones. They can use the natural capital and reforest the deforested parcels. They can also build a retention polder in the upper course of the river. Then, players experience how these decisions improve their safety in a long run. But they also see the future from the different angles: their level of development, the quality of their life, the effects of education of their children. Combined with the lessons from previous rounds, such "time-compression" allows the players to understand how they can design their future, so their community becomes flood resilient.

In the Flood Resilience Game, the players begin with little knowledge about the real flood vulnerability of their community and the ways of improving their safety. Throughout the game, they progress from reactive actions (levees, preparedness) towards avoiding risk creation (prospective risk reduction). At the same time, they struggle with everyday problems (making a living, being healthy, taking care of children's education). The game also recreates interdependencies between the specific

members of a community. This way it highlights the need for communication, cooperation and solidarity between them. All of this helps the players connect what happens in the game with their daily realities. Two-hour gameplay allows them to live through a couple of decades, so they can experience the long-term effects of the decisions that they can make now. In result, they can grasp better the whole concept of flood resilience, and why it is so important.

The game was developed by the Centre for Systems Solutions (CRS) in collaboration with the International Institute for Applied Systems Analysis (IIASA), with funding from the Zurich Flood Resilience Alliance.

Lukasz Jarzabek - game designer at the Centre for Systems Solutions, co-designer of the Flood Resilience game.

The first version of this text was previously published on the Games4Sustainability.org website.

4.REFLECTING ON EXPERIENCE: Lessons learnt and key messages

Lessons learnt from case studies

In this chapter, some reflections from Case Study results are thrown, with the aim to provide practice and policy advice on how to do better next time, to enable learning and replicability from the Educen experience.

Figure **87. Better comprehending how soft and hard infrastructures interact in order to make the whole urban system more resilient in case of disaster. Lessons from L´Aquila case study**

The involvement of emergency managers helped developing the awareness on the need for an innovative approach to infrastructural resilience, moving beyond the traditional technical one. The approach based on SDM was thus highly useful to provide a formalization of the interconnections among such different dimensions concurring to resilience, and to integrate a complex set of variables.

Main conclusions drawn by emergency managers are summarized in the following:

Physical infrastructures provide a vital support to communities during emergency and recovery phases after a disaster.

On the one hand, the uninterrupted availability of critical services is a requirement to guarantee the safety and the well-being of a population when a disaster occurs and speeds up the recovery: in this direction, the technical performances of the whole infrastructural system are a key asset to deal effectively with emergencies and contribute to community resilience. On the other hand, the resilience of a community affects the level of service provided by the hard infrastructural system as well: the behaviors of the users (e.g. good practices, flexibility, …), their level of knowledge along with the skills of the authorities managing the emergency and driving decision-making – in a word, their *culture* - have a direct influence on the response of the hard infrastructural system.

Infrastructural systems must directly match the needs of a community, and thus should firstly reflect the spatial distribution of the served population.

Secondly, the performances of infrastructural systems should be flexible enough to evolve with time, in the aftermath of a disaster and in the recovery phase as well, since the needs of the whole system change according to the specific path of recovery determined by the specific strategies implemented.

Complex systems exposed to extreme events significantly change their state and conditions over time.

Dynamic approaches are therefore needed to analyze their evolution, since they allow describing the change of system conditions through the different phases, taking explicitly into account the impact of strategies and decisions to cope with emergency conditions (through scenario analysis).

The main outcomes discussed with practitioners are summarized in the following:

Classical approaches to infrastructural reliability or performance level may be limited in describing the complexity of real systems. The resilience assessment of engineering systems, such as infrastructures requires a comprehensive approach moving beyond the merely technical dimension. The 'culture' (of both organizations and communities) is a key asset to describe resilience. The CS allowed to broaden the perspective with specific reference to more traditional approaches to resilience, going beyond the mere analysis of the structural (or 'technical') dimension. The operational dimension takes into account the preparedness of the authorities to cope with emergency situation, their resourcefulness, their rapidity, the internal skills and flexibility. The social dimension is strictly connected with the capability that the community (and its sub-groups) show in dealing with emergency conditions. The economic dimension of resilience is a key driver too, either accelerating or stopping the processes related to emergency management and recovery.

The SDM model allows the definition of scenarios, which can be used to perform a 'what-if' analysis. The 'what-if' analysis support measuring how changes in a set of independent variables might influence dependent variables in a simulation model, to anticipate the potential evolutions of the system. This analysis is highly relevant to identify the impacts of the implementation (or absence) of specific strategies to enhance system's resilience in all its dimensions.

Main outcomes for the local community

Finally, the analysis of the activities carried out in the L'Aquila CS allowed to identify important outcomes for the community. The discussion that took place during the participatory exercise, and the debate supported by the results of the EDUCEN analysis, make the local community aware of their role as emergency responders. Specifically, they become aware of the importance of the dense connection among different actors at local level to be used as an alternative channel to make the emergency information flowing as fast as possible. Moreover, the role of the community leaders (i.e. representative of the citizens' associations, etc.) as crucial interface between the institutional system and the other members of the community. >That is, they could facilitate the flow of information and support the local authorities in translating technical information into understandable and actionable information for the community.

Citizens are generally the first responders when a disaster strikes, and thus represent a key 'backup' resource in emergency conditions with respect to official ones, supporting the operation of critical services. The existing connections within a community, and the main features of the community itself, represent a fundamental asset to deal with disasters. Referring to infrastructural systems, the behaviors of people and users of critical services are highly influential on the performance path of an infrastructural systems, either hampering or fostering the processes of recovery, and contributing to determine the entity of impacts. The available knowledge, particularly related to the memory of

previous disasters, is a key issue as well, since support the citizens in developing a better awareness and in the implementation of the most suitable behaviors.

Do you want to know more? (link to chapter on soft/hard infrastructures in handbook)

Figure **88. Flow of information- development of an APP for citizens. Lessons from Lorca case study**

Under the Educen project framework, CHS tried to improve access, especially in people with minor resources (cultural and economically) How?

Ways to access, minor data: Easy access, all the people know some of these data. More accesible than GIS

App (Smartphone) and Explanation in web

If i am walking on the field i can know exactly and in 10 seconds if i am in a hazard place.

How to analyse the network of interaction among different emergency responders and affected groups? Lessons from L'Aquila and Lorca case studies

The methodology allowed the CS to map the complexity of the interactions and, through the selection of a set of graph theory measures, to better comprehend the interaction mechanisms influencing the effectiveness of the cooperative emergency response. Training material has been developped under Educen. The objective is to enable the creation of a community of practice, composed by experts in emergency management capable to support emergency managers in better comprehending the complexity of the interaction networks.

The involvement of the Municipal branch of the Civil Protection Agency in the EDUCEN project allowed to establish a fruitful debate with the other institutions involved in the emergency management at urban level. The bilateral meetings and the workshops organized during the implementation of the CS activities allowed us to better comprehend the diversity of the intervention procedures for the different institutional actors. The EDUCEN activities shed a light on the complexity of the coordination activities in case of emergency, when different actors need to collaborate in order to develop a common ground of information for the implementation of the different emergency actions.

Another crucial lesson learned during the implementation of the EDUCEN project concerns the difficulties in transferring important information to the community during the different phases of the emergency.

Specifically, the meetings organized in L'Aquila CS allowed us to questioning the institutional information flow channels. The narratives collected during the CS implementation demonstrated that coupling the formal information flow channels with the existing informal networks could lead to an increase of the rapidity and effectiveness of the information sharing process.

One of the main results of the L'Aquila CS concerns the replicability of the methodologies and tools developed and/or implemented in the CS. During the implementation of EDUCEN project, two "follower" case studies were interested in implementing the methodologies for the analysis of the complexity of emergency interaction networks, i.e. Lorca (Spain – flash flood) and Valladolid (Spain –

flood). Specifically, the Lorca CS allowed us to start the structuring of the training materials, whose main scope is to enable the transferability of the methodologies and tools to other contexts.

Figure **89. How to adapt a training model for disability inclusive disaster risk reduction? Lessons from Istanbul case study**

Conveying information to people with disabilities, even in accessible formats, do not make a training program inclusive per se.

Genuine inclusiveness happens when people with disabilities can take part in any section and/or any phase of the program by their own choice and assume any role offered to other volunteers.

In other words, the host organization itself has to become inclusive. For an ONG like AKUT, this would require a significant effort at different levels, starting by the improvement of physical accessibility to the association´s premises, to the modification of the recruitment and orientation process (use of online learning tools for people with reduced mobility or sign-language translation for people with hearing impairments).

* Inclusion is a goal that requires commitment on behalf of the organization aiming it. Unfulfilled promises and impertinence are causes of frustration for persons with disabilities, who would also be discouraged from participating to other actions in the future because of such negative experiences.

* The tendency to see inclusion as an empathetic process is quite common. Nevertheless, inclusion is not about empathy, which can be described as the drive and the effort to understand another. This capacity is certainly relevant in the context of inclusiveness, yet the issue of DiDRM cannot stand on an individual capacity (that people might not have developed enough, also). Inclusion is based on the principle of equality between human beings and the associated human rights. People with disabilities have right to receive whatever services AKUT offers, just as they have the right to participate to any activity of the association they consider appropriate.

* A possible pitfall in developing DiDRM actions is to design an action from which the relevant disability groups can actually benefit in isolation. The idea of designing dedicated disaster preparedness modules for different disability groups is a typical example. Such an approach would allow participants with disabilities to access to the disaster-related information and knowledge but would also separate them from the non-disabled ones, which is unacceptable and against the very concept of inclusiveness. DiDRM strategies and solutions should also aim for social cohesion and integrity in all stages of the DiDRM by emphasizing coexistence of persons with disabilities and those without.

* Inclusion also relies on accessibility solutions. Accessibility has several dimensions and forms depending on the context and the type of disability. There is no single generic accessibility solution. Making a printed booklet accessible for people with total hearing impairments and making a training hall accessible for people with reduced mobility require different approaches, techniques and instruments. Persons with disabilities as end-users are the best guides on which tool to use. It is critical to take their suggestions into account. Members of the Istanbul Case Study team, for example, have realized that most of their ideas about accessibility tools and options were based on false assumptions.

* Regarding the accessibility issue, people with disabilities attitude is generally realistic, as they limit their expectations depending on the context. They appreciate their non-disabled partners´ efforts for ensuring accessibility. They also tolerate, even compensate for deficiencies, provided that they

consider the partner´s efforts as sincere. As for the accessibility of training materials, the most efficient strategy is to seek for usefulness. For example, a visual element does not have to be orally described for people with sight impairments if it does not have informational value.

* DiDRM also requires commitment from people with disabilities, in the sense that their systematic presence in the DiDRM programs incite the non-disabled individuals to change their perspective on disability. People with disabilities are not necessarily dependent on others during disasters, and many are perfectly capable of assuming various roles in the DRM actions. Yet, their is need for demonstration of this capacity, which requires continuous, active participation by people with disabilities.

* DiDRM is about mutual learning as well. No matter how efficient an organization is in the disaster preparedness and response, it needs the life-knowledge (and support) of people with disabilities to become inclusive. This is only possible through integration and dialogue.

Do you want to know more about Disability Inclusive Disaster Risk reduction?

Figure **90. How to operationalize culture as an asset for DRR? Lessons from Volos case study**

Past disasters are fast forgotten especially in the face of new risks and developmental challenges. When present generations have no disaster experience, cultural memory can become a key tool for DRR.

If revealed and operationalized, cultural memory of disasters is a valuable asset in rising disaster risk up in the hierarchy of perceived risks, especially in times when every day socioeconomic risks prevail. Commemoration of past disasters and shedding light to tangible and intangible marks they left in society and in the city is a path towards engaging cultural memory in DRR.

The identification of marks of cultural memory in society and in the city takes much effort especially for non-locals; it is the locals who should lead the way in investigating how past crises and disasters were embedded in history and how cultural memory is registered in the various pieces of the mosaic comprising the city.

The DRR community should recognise the potential role of museums (and especially of city museums and history museums) in preserving cultural memory of past crisis and disasters and make efforts to reach joint win-win solutions towards utilising cultural memory for DRR. A mediator (a wiling and knowledgeable external agent) may facilitate bypassing the separation between the two fields.

Cultural memory of disasters and crises is grounded on historic facts and local knowledge and manifests itself tangibly and intangibly. In addition, various communities, social groups, places hold different memories of disasters. Therefore one should not expect one-size-fits-all solutions towards enabling cultural memory for disaster reduction and disaster management.

Figure **91.Determining urban cultures and communities to improve communication regarding DRR. Lessons from Dordrecht case study**

The main vulnerabilities of Dordrecht are its location within the delta and the fact that it is an island. Due to these factors in combination with the short prediction time of extreme

storm events (1-2 days in advance) and dangerous weather conditions during storms, preventive evacuation of inhabitants of the island of Dordrecht is very limited.

The main vulnerabilities of Dordrecht are its location within the delta and the fact that it is an island. Due to these factors in combination with the short prediction time of extreme storm events (1-2 days in advance) and dangerous weather conditions during storms, preventive evacuation of inhabitants of the island of Dordrecht is very limited. It is estimated that preventive evacuation is possible for 12% of the population. There is a realistic chance that the evacuation would lead to traffic jams on the island, due to the fact that the neighboring municipalities are also threatened in such a situation and road capacity towards the safer areas is limited.

Actively transmitting cultural memory of disasters to next generations remains a large challenge in Dordrecht with regard to flood experiences. The municipality has explored the experiences of elderly with regard to the 1953 event and how these experiences shape their current attitudes and perceptions of flood risk management.

The next step is to apply the knowledge and awareness of elderly people to increase flood risk awareness among other populations in Dordrecht, particularly to youngsters. Youths present an valuable target group for several reasons. First, they do not seem aware of water related risks in the city. Second, they are relatively easy to reach through schools or sports, and third, it is expected that they can transmit their knowledge to their parents and families, ensuring a considerable reach.

Educen partners developed a game inspired in Dordrecht. This game uses memory on disaster and risk already present in the city to enhance disaster risk awareness among all residents via young people. Games are very well suited for transferring knowledge. Games have a positive contribution to the learning process because they are experimental, the players can experience complex situations and test new strategies without having to deal with the real consequences of their decisions. Serious games furthermore create a fun environment which facilitates debate between people who are not otherwise not brought together. For these reasons, serious gaming as a learning approach can be particularly relevant in cultural memory.

Figure **92. How to co-develop methods to assess post-flood damage? Lessons from Umbria case study**

The Umbria Region case study is the only one within EDUCEN that deals with a region and not with a city. If from a geographic and territorial perspective, the case is a relevant an example of a tiny net of villages and towns connected by a dense network of regional, municipal and secondary roads, from a political and administrative standpoint it shares with all other regions in Italy the same functionality and the same types of administrative structures.

The main objective of the work carried out in the case study has been the joint development of tools and methods to collect, store, structure post-flood damage data and then analyse such data in order to obtain a comprehensive representation of the damage, including as far as possible also indication regarding indirect damage.

One of the Key messages from the Umbria Case Study is Better damage and loss data are important to support a number of policies, from international, such as the indicators of the Sendai Framework for DRR, to European, to national. At the latter and at regional levels better damage data are not useful only for accounting purposes, but to support a more resilient recovery and reconstruction as the case of the Central Italy earthquake clearly shows in our own reconstruction of the event for the Umbria Region. Enhanced damage data are fundamental for evidence based decisions regarding mitigation measures, to better understand damage mechanisms so as to reduce pre-event

vulnerabilities and also for improving risk assessments that need to be more contextualized fully acknowledging the characteristics of the built environment and of urban and regional fabric.

Do you want to learn more? (link to Umbria case study)

Figure 93. **How to understand organizational culture and roles during mega events? Lessons from Milan case study**

Hosting a mega-event brings a major challenge to meet resilience targets due to the >increased exposure of the population, including both inhabitants of the city and tourists/visitors coming to the event. That tremendous increase of exposed population from different cultures does not necessarily add new risks, but concentrates the current risks in the city in one place

The overall purpose of the Milan Expo case study is to have a clear understanding of the role of organizations in relation to the technical systems they operate and the reaction of users coming from different cultures to any kind of disruption in the system. The case study includes stakeholders and experts who have been involved in the Milan Expo activity. Having meetings with these actors has helped us to understand the differences between the conceptual frameworks and maps that have been prepared following normative patterns (rules, roles, actions), and the actual situation during EXPO that was encountered. Indeed, the findings of the case study suggest several courses of action for decision makers and emergency planners. Exploring the following as future strategies can facilitate the attainment of resilience.

Mega-events such as EXPO and the Olympic Games require the involvement of several stakeholders working together for the same overall purpose, with the responsibility of the diverse target groups with different resources. If the mega-events are handled well politically, organizationally and structurally, they provide great advantages for social, structural and economic challenges. Such events also help promote international programs, especially an EXPO about nutrition and sustainability, which helps to make effective development strategies and establish networks in the environmental field. Networks will likely take on an increasingly significant role for DRR, including CCA, because of their capacity to bring stakeholders together to share experiences and increase the knowledge base, and thus facilitate improved decision-making by stakeholders in policy and practice.

Lessons learnt from the Zombie game in Valladolid.

This game revealed the importance of the availability of information about the risk you are exposed to, in order to have a correct preparation and response; The importance of drills so that people are trained on how to act; The importance of trust in people with disabilities; The importance of the perception of authority with signals (uniforms, public address) to get people to collaborate. In addition, it was concluded that aspects of cultural taboos and disabilities are not currently resolved in Civil Protection and is an aspect to be improved.

Lessons Learnt from the Flood game in Valladolid.

The game revealed the importance of the collaboration and negotiation of all agents. It highlighted the difficulty to maintain a high level of well-being and for making individual decisions regarding the use of economic resources to increase the level of protection that guarantees well-being. It also showed how collaboration and collective decision-making lead to better solutions and a higher level of protection compared to individual decisions. Finally, it was concluded that collective decisions between citizens and administrations led to more efficient solutions and increased welfare.

Key messages from Educen main themes

Key messages on Culture & Memory

· The EDUCEN work package on Culture & Memory highlights that communities learn from their disaster history and adapt their behavior and building techniques, thereby shaping disaster 'subcultures'. Memories serve as a knowledge repository which provides communities with crucial information on potential hazards in their area and hazard mitigation. Moreover, memories disaster provides people with an explanation, -supernatural, religious, or scientific-, enabling people to mitigate trauma and stimulating acceptance of the event.

· The Work Package stipulates that memories from previous disaster play an important role in determining the way people engage in disaster management practices and accept disaster relief in an emergency situation. It is therefore vital that response agencies become aware of, and accept the different logics and rationalities that people rely on when faced with disaster.

· We found that memories from previous disaster manifest itself in different forms. They can be found in the form of museums, monuments, architectural adaptations, or high water marks, but they may also be found in stories, songs, myths, or theatre shows.

· Having disaster risk management informed by cultural memory and its potential impact may help to reduce misunderstandings and inefficiencies and improve communication and interaction between disaster managers and local communities.

· The Work Package stipulates that memories can be used a positive force in reducing disaster risk. Disaster risk managers may for example build on them to improve disaster risk awareness among populations in hazard prone areas. We identified several ways to use memories of previous disaster as an asset in disaster risk reduction: through linking up with museums, by organizing a walking tour exploring cultural memory, and by playing a serious game on cultural memory. The methods have been tested in the EDUCEN case studies of Dordrecht, the Netherlands, and Volos, Greece.

· Cultural heritage plays an important role in societies and community wellbeing. The loss and deterioration of heritage can seriously affect local and national communities as it has important symbolic and material importance for community identity, often has strong economic value for cities, and may serve as a source of resilience to communities.

· Disasters therefore not only cause material damage to heritage sites but they may also severely affect the livelihoods linked to cultural heritage and the incomes generated through tourism.

· The Work Package on Culture and Memory also dealt with civil-military interaction in domestic disaster. Research was conducted in L'Aquila, Italy and in Marken, the Netherlands. It was found that challenges arise regarding the sharing of key information and that collaborating organizations are not always aware of the technical details of each other's material. Moreover, communication problems (jargon) and issues regarding task division and responsibility may arise.

· An important way to resolve such problems is the organization of exercises. As the organization of large scale exercises is expensive, however, sharing information between civilian and military organizations could therefore also be done in a more cost effective way: by sharing a scripted event and discussing how the respective organizations would deal with the event, what material and/or machines they would use, and when they would be able to be at the scene. This allows organizations to get to know each other but also enables them to identify when and where they could supplement one another in the case of a disastrous event.

· The activities regarding civil military interaction in domestic disaster also revealed the importance of having local responders present at the disaster scene. They are often trusted, and speak the same dialect. Local responders therefore may provide a sense of comfort and

understanding to the affected people. Collaboration between such local responder organizations, whose members often work on a voluntary basis, and outside responders may play an important role in comforting victims and has also proven to be very functional. Local responders in L'Aquila for example helped outside responders finding their way in and around the city.

Key messages on Cultural Empathy

Over-reliance on biophysical data and inadequate appreciation of the diversity of ways decisions are made at all levels of society can often lead to policy failures. This applies also to the field of Disaster Risk Reduction (DRR), as using relevant science and technology to support local communities at risk is not fully effective without understanding the social and cultural contexts at the community level.

When that understanding is present, achieved through participatory knowledge exchange with these communities, the accessibility, usability and legitimacy of disaster risk information improves dramatically. However, high costs of gathering data related to how various members of society actually think and decide can often hamper the efforts to work within such an approach. This raises the question: Can we lower the costs of understanding disaster risk socio-cultural contexts through experience? Tools like policy exercises and serious games emerged to fill this gap.

Policy exercises and games can help the experts understand the cultural factors behind decisions of community members. They can also be used to train the communities to make them prepared for disasters. Games can be adapted to address diverse attitudes, perceptions, behavior and cultural values and beliefs within the various communities. Empathy training is not something that can be done passively. The best way to understand somebody's emotions, decisions and motivations is to put oneself into this someone's shoes.

Games offer an opportunity for the experts or the local stakeholders to experience the specific situation from different points of view than their own. The range of how this approach can be used is very wide: from a simple game that allows evacuation experts to experience the evacuation efforts from a disabled person's side, to a policy exercise that confronts e.g. the local community members with dilemmas faced by the immigrants with no knowledge of local language. This direct experience provided by games, followed by reflection, may lead to a change of attitudes and the emergence of new perspectives.

Key messages on soft and hard infrastructures

Cities have never been just sets of buildings and infrastructure only; cities are the sum of individual components, consisting of services, residential dwellings, production sites and people. All throughout history, cities have always been among the most complex institutions created by humanity.

The urban fabric is the result of a specific spatial organization of buildings, assets, open spaces and infrastructures. It corresponds not only to a predefined design, but also to subsequent adaptation to emerging needs, to the way people use buildings and places and, finally, to the features of the natural environment of a city, including the density of buildings, the prevailing typology of the road network, i.e. ring, grid or linear, and the width of the streets in comparison with the height of the buildings, and how these affect the emergency response procedure.

Social factors relate to how the social groups in the city that increasingly pertain so to multiple cultural origins, interact. Social factors are also important to explain how cities are managed, not only with respect to risks, but in all aspects of contemporary life. Besides, social factors influence social vulnerability to disasters.

Economic Factors: Cities were initially mainly a market place, but have become in the modern times a place of production, and more recently a place of services ranging from basic to high level, such as

educational and innovation centers. In today's context, some cities have become very specialized, such as trade cities, port cities, finance cities, political and administrative nodes, religious destinations, etc. Such specialization entails a different city culture, with important consequences as to how cities interact with each other and in the way they interact with "nature".

The natural environment: More neglected has been the relationship between the natural and the man-made environments of cities, but it is rather evident that nature has constrained and still does constrain urban morphology. Furthermore, the link that has been established between natural and man-made environments has led towards sustainable development and less exposure and vulnerability to natural hazards.

Spatial and temporal multi-scalar features of todays' cities

Contemporary cities need to be comprehended as nodes acting on multiple scales in space and time, depending on their connections with their surroundings. We cannot limit the consideration to "local" aspects, because nowadays local, regional, national and global levels are interconnected, though in different ways for metropolitan and central areas and for small-medium towns and marginal and non-central areas.

Mega-events and cities:

Mega-events are marketing tools for cities to make them globally significant and attract national and international interest from all over the world. Mega-events are also engines for the structural development of cities, as economic resources gained by mega-events are used to activate urban development. Mega-events include the notion of culture in terms of two perspectives; organizational culture and culture in hard infrastructure. The former is about the cooperation of several national and international organizations to achieve a successful mega-event. The latter is about improving the structural condition of a city, as to obtain a mega-event, a well-maintained infrastructure system is a must. However, having good quality infrastructure is not sufficient for being a part of this worldwide competition and hosting a mega-event. Providing resilience against disruption to infrastructure and services is also imperative to ensure the competitive advantage of cities, as well as the safety and security of infrastructures.

Resilient cities: bridging between urban policies for security, disaster risk reduction and climate change adaptation

In this regard, in addition to the EU Directives, other important political processes at higher levels can be included here; for example, Sendai Framework, the Resilient Cities Campaign or the Hyogo Framework of Action that dictate important trajectories for making cities and communities better equipped to face and cope with crises. On the other hand, security, safety and adaptation concerns cannot be underestimated in ordinary city management and urban planning.

key messages on culture and learning

- The WP on culture and learning has highlighted that formal policy processes limited to the public sector are not sufficient to improve and strengthen current disaster risk reduction (DRR) strategies. Civil society and local entrepreneurs are important actors to engage in the development of strategies as well as during the disaster response and recovery.

- There is a need to better integrate the knowledges and activities of different communities of science, policy, and practice across sectors, with stronger focus on the needs and priorities of the people at risk. On-the-ground learning needs to better inform decision-making by translating tacit knowledge into policy and practice. This could be facilitated through increased civil society participation or public-private partnerships. Additionally, networks of experts, like EDUCEN, provide

important 'safe spaces' for people from different groups and sectors to share their experiences and, this way, bridge different organizational and social cultures.

- In order to incorporate culture into DRR, there is a need to better understand how local culture affects the vulnerability and resilience of people at risk. We also need to better understand how different organizational cultures within organizations engaged in DRR shape the formulation of problems, strategies, policies, and interventions to reduce risk.

- DRR needs to be more inclusive and incorporate a broader spectrum of civil society actors. WP4 identified the role of gatekeepers and volunteers as crucial for establishing trust and improving risk communication and management.

o By involving gatekeepers or local leaders, a more inclusive DRR process is likely to improve authorities' engagement with groups that might otherwise be difficult to reach.

o Increased contact with gatekeepers can improve awareness raising campaigns and make them more effective because of increased trust in and ownership of the risk management process and because campaigns can be better tailored to the needs of different social groups at risk.

o Engaging volunteers in DRR efforts through locally-relevant policy and practice, more comprehensive training for volunteers, better systems and databases that allow for better coordination, and by building relations between volunteer organizations and local communities can help harmonize disaster relief efforts and create more local acceptable for volunteers' role during the emergency phase.

- There are stark contextual (Northern – Southern Europe) contrasts in disaster risk governance that to a large extent are influenced by places' cultural memory of risk. This includes values and perceptions towards the role and type of government; and traditions, attitudes and values towards civil society involvement in DRR. While this could pose challenges for operationalizing global frameworks like the Sendai Framework for DRR, the insights from WP4 identified considerable opportunities for cross-case learning and exchange of experiences on ways of utilizing culture for improved DRR.

- Cooperation between the public-private sectors is increasingly necessary to facilitate knowledge transfer. For example, improved cooperation of government agencies with insurance companies could provide better data on levels of vulnerability and resilience; cooperation with consultancy firms and the IT sector could enable a transfer of technologies for improved awareness rising through social media and mobile and other applications; stronger cooperation with research centers and universities could provide authorities with a complementary resource to generate necessary knowledge or technologies (e.g. through doctoral or master students) and additionally provide a much needed link between research and practice.

Key messages on cultural networks

· The main characteristics of the socio-cultural networks – i.e. trust, obligations, norms, etc. – affect the effectiveness of the risk information and warning dissemination strategies, and, thus, the capability of the different actors to react in time and properly to the emergency, reducing the disaster impacts;

· Formal and informal interaction networks co-exist during an emergency. The 2009 earthquake experiences demonstrate how the official information sharing strategies and interaction protocol could fail or, simply, have a limited effectiveness. Nevertheless, informal interaction mechanisms were activated by both institutional and non-institutional actors, allowing the flow of information and the cooperative emergency management;

· L'Aquila experience supports the understanding of the dynamic nature of the socio-cultural networks, and the impacts of stress – i.e. a disaster – on their characteristics. The social structure is

created through cross-scale relationships between people and organizations and encompasses interactions with information/knowledge and social learning processing.

· A strong connection exists between soft and hard infrastructures: the reliability of physical infrastructures during the emergency management contributed to mobilize the social capital through the social network. Similarly, the resilience of the community conditioned the level of service provided by the infrastructure.

Community and social networks

The restoration of social networks in disaster impacted areas depends on obtaining goods and capitals, and on governmental policies; however, the characteristics of the community in which the business is located, may significantly condition recovery process and related strategies.

Disasters thus cause short- and long-term effects on social structures as well. Establishing causal relationships in social network formation and dynamics is difficult because of the complexity of engineering social relations in a controlled environment. The negative consequences people experience in any disaster are conditioned by their perceptions of risk and their vulnerability, and how these factors influence their ability to make and carry out decisions.

Among the emerging lessons in the immediate and long-term aftermath of disasters is the role that community organizations and community-based networks play in all stages of disaster preparedness and recovery. Community responses demonstrate the importance of local knowledge, resources, and cooperative strategies in determining their survival and recovery. Recovery processes are also closely coupled with preexisting conditions of community and social networks.

SECTION 6: TOOLS AND METHODS IN EDUCEN

1. Wiki

This WIKI intends to provide guidance on analysing, identifying and mapping cultural assets and challenges of culture in urban disaster management. The guide builds on the information collected in the State of the Art report written for the EDUCEN project and aims to set the stage for a practical application of this information in real situations.

Culture is a critical driver of risk perception, vulnerability, and resilience. Yet the multiple roles that culture may play as an asset or obstacle in disaster risk reduction (DRR) have so far not been explored and set out. There is a lack of compelling exemplary stories of culture in DRR inEuropean cities. Most studies that triggered our attention for ‘culture’ and ‘disaster’ either (a) provided non European examples (b) described disasters in rural areas (c) focused predominantly on the protection of physical cultural heritage or (d) were to a large extent historical in their content.

EDUCEN aims to investigate the influence of cultural aspects on how different people may perceive a risky situation and act/react according to this perception. EDUCEN understands 'culture' as: The (learned) knowledge, beliefs, values, art, rules and law, customs and norms, and social structure that people use to comprehend and give meaning to the world around them, and which together form the “toolkit’’ or repertoire of habits, skills, and styles from which people construct “strategies of action’’.

Important to note here is that individuals are not passive recipients of culture but rather active participants that create and give meaning to culture. People can select certain aspects of culture, whilst rejecting others, to construct ‘’strategies of action’’.

1.1. Conceptual introduction

VULNERABILITY