

EDUCEN Culture & Urban Disaster

A Handbook



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Introduction

1. Culture and Risk

2. Culture and risk: path dependencies

3. Cities and DRR

4. Inclusion in Disaster Risk Reduction

5. Actors Response and Interaction

6. Replicability, Empathy, and Cultural Learning

Authors

References

9

14

29

51

77

99

137

172

180





Introduction

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Disaster and Culture literature

Disaster and culture had its heyday in the 1960s and '70s, with American scholars like Moore, Anderson and Wenger and Weller, but fell out of fashion, except for a great book by Hoffmann and Oliver Smith on Cultures and Catastrophe in the late 1990s.

The theme returned to the limelight when the Federation of Red Cross and Red Crescent Societies made it its theme in the 2014 World Disasters Report and its companion volume, 'Cultures and Disasters' edited by Fred Krüger et al. We acknowledge and build on their excellent work, taking it to Europe and seeking to give it some practical 'hands and feet'.

As none of these books pays a lot of attention to urban disaster or to Europe, we hope our handbook goes some way towards filling this gap.

Guide to the EDUCEN Handbook: purpose, logic and structure

More than half the global population now live in cities, many of whom lack 'urban survival skills' to sit out an extreme situation. Cities moreover bring together people from a wide variety of backgrounds. They may not know their next-door neighbours, but usually they have networks of people coming from the same region, religion, or other affiliation. Rather than treat urban dwellers as individuals, we claim there is great merit in situating them in their identity and solidarity networks.

Systems theory teaches us that there is strength in diversity. Socio-cultural diversity however is mighty puzzling. This is a guide for the intrigued and perplexed by disaster and culture. It is not a recipe book, but gives you the "what", "why" and, where possible, "how" on working with cultural diversity and urban social networks when adversity strikes. Culture, we claim, is not only a hindrance and a source of misunderstandings, but also an asset that can bring creative solutions and save lives. Cultural networks, we find, have communication lines and repertoires of action that help them survive in and learn from disaster.

But culture is not so easily identified; you only notice culture when you trip over it. The present book aims to help you at four levels:

- recognise
- analyse
- instrumentalise
- act

The present Handbook, a printable, digital tool that is easily and freely accessible by users, has the option to download different sections. It includes a series of sections and chapters on key themes, a wiki, a toolkit, a series of Guiding Questions for reflections and a video library.

Many of our examples draw on our own experiences. In the two-year EDUCEN Coordination and Support Action, funded by the European Commission (www.educenproject.eu), we exchanged, tested, adapted, and learned from each other in seven disaster-prone European cities and urban regions: L'Aquila, Dordrecht, Istanbul, Lorca, Milan, Umbria and Volos. "We" are a diverse group of European researchers and practitioners, many not steeped in social sciences but stumbling on culture and finding ways of handing it in our daily work.

The core chapters of the Handbook consist of the experiences, procedures and tools developed and collected by the participant EDUCEN city teams and experts. We thank the non-team colleagues inside EDUCEN as well as external experts who kindly contributed inputs.

Apart from drawing liberally on the city manuals, the handbook relies on the State of the Art report developed for and with EDUCEN. The State of the Art constitutes the base and organising principle for the conceptual chapters, the guiding questions and the Wiki-section. In principle, supporting material can continue to be uploaded in the platform since it is in digital format. In this way, the handbook can evolve as a living document with new experiences in EDUCEN cities but also from 'new' cities.

Especially the city manuals exemplify the EDUCEN approach, and the development and implementation of the different approaches and tools developed. The EDUCEN approach is to engage with and see the benefits of cultural diversity, and the importance of treating people as social beings: people are not (only) rational individuals, but are social actors, embedded in (often multiple) networks, which they turn to for information and help in a crisis.

All these aim to support disaster risk reduction professionals in particular to better appraise relevant cultural aspects in their own 'communities of practice'. Each EDUCEN city or urban region has its manual, systematising its experiences, tools and lessons learned, to help others working and living in the relevant city along. Of course other cities may benefit as well. The examples in the Handbook part draw on these learnings to illustrate the wider points on culture and disaster. It has two main elements:

- a *substantive element*, in a series of Sections and thematic chapters on how to integrate culture into Disaster Risk Reduction (DRR);
- a *procedural element*, on tools, methods and steps to identify and include elements of culture in DRR.

A word of warning: it can get a bit complex in places. To help you along, we start with an easy-access part with some definitions and key starting points to orient you on the topic. From there you can move on to the trickier stuff: how to do social network analysis with mathematical modelling; the debates on whether there is such a thing as a 'community'. Each section in the handbook consists of a practical and accessible 'front end' and a more in-depth 'back end'. The front end starts with 5 general sections, which are divided into a number of chapters (including boxes, photos, etc.), that resonate with the interests of disaster (risk) managers and city planners (see below for Detailed Index). In some cases, the chapters are further divided into sub-topics. The back-end of the handbook provides users with the opportunity to gain more in-depth knowledge on theories, methods, discussions and experiences underlying the questions, tools and methods of the front

end. This information is retrieved through 'read more' buttons throughout the handbook.

We also bring to the table practical tools – games, social network analysis, focus groups, exhibitions – and guiding questions that may serve as points for professional reflection. We aim to provide decision-makers, planners and trainers with knowledge and tools on integrating culture in DRR and DRR in urban planning, throughout the stages of the Disaster Risk Life Cycle – prevention, mitigation, preparation, response and rehabilitation. While many of our tools and insights are "all-hazard", our focus has mainly been limited to earthquakes and (pluvial and fluvial) floods.

While we of course hope that, for example, city planners will benefit from reading the forward thinking we offer on cities as complex systems, we also would like to encourage them to read the chapters on domains they may not be so familiar with. City planners are often focussed on buildings and infrastructure, but need an understanding of the social complexity and cultural characteristics of the people living in urban centers. Disaster Risk Managers on the other hand are by training focussed on saving people, but may want to increase their understanding of what kind of city they will work in and (sub)cultures they will work with and for. Community leaders may at times feel excluded by disaster planning and communication, and may use ideas from this handbook to engage responders with fresh, inclusive initiatives.

The Sections have the following topics:

- Culture and risk
- Cities and disaster risk reduction
- Inclusion in disaster risk reduction: engaging with diverse disaster affected groups
- Actors, response, and interaction in disaster risk reduction
- Replicability, empathy and cultural learning

We also present tools, methods and steps, guiding questions and a wiki to identify elements of culture and integrate them into DRR in Section 6.

Intrigued? Want to know more? Please feel free to contact us for information and collaboration:

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An aerial photograph of a city, likely Minneapolis, showing a dense urban area with many houses and buildings. A large river, the Mississippi River, flows through the city, surrounded by lush green trees. The image is in black and white, with a blue overlay on the right side.

1. Culture and risk

16	1.1. How to recognize culture
20	1.1.1. Technoculture
21	1.2. Culture: why it is an asset
22	1.2.1. Why our comfort zone matters and what to do about it
23	1.2.2. Proxy indicators
24	1.3. (Mis)recognising Culture
25	1.3.1. Implications

This Section introduces the slippery concept of 'culture' and how it can be recognised but also misrecognised. It also explains why culture, while admittedly a potential source of frustration and misunderstandings, is also an important asset in dealing with disaster risk.

1.1. How to recognize culture

Author: Karen Engel, Jeroen Warner

Because cultural aspects are present at multiple levels of an organization, of a group and of an individual, culture can be elusive and overlapping, which makes it difficult to 'notice'. Misunderstandings can happen between people from a similar culture, so between two groups originating from a different faith, profession, or country, they are likely to have much greater consequences. And yet, recognizing it is challenging.

Based on a wide literature scan, we find the following traits of 'culture':

- Cultural aspects are relevant and common to a particular group and subsequently binds the group members together;
- Culture is meaningful and highly valued by a particular group;
- Culture is profoundly implicated in motivating people to think, interpret and judge the world and do the way they do;
- Culture is learned. It is transmitted from generation to generation and internalized to such an extent that it becomes 'second nature' and is largely taken for granted;
- Culture is arbitrary and not 'natural'. The actual nature of a group's culture is the result of their decision-making processes. It could have been completely different;
- Culture encompasses 'problem-solving tool[s] that enable individuals to survive in a particular, environment' (Schein, 1999);
- People can belong to different cultural groups;
- Culture and power are intimately linked. (Inglis 2005:9-10)

Different cultural elements can be differentiated:

- Manifestations, such as art, ideas, communication, artifacts, tools, rules, and laws;

- Beliefs, values, and worldviews, such as ideologies, assumptions, and attitudes;
- Knowledge, such as scientific knowledge, local knowledge, and indigenous knowledge;
- Social structure, such as agency, relationships, social networks, social control and power;
- Behavior and practice, such as customs and norms, rituals, and traditions. (Thomalla et al. 2015: 9).

Some of these elements are more visible than others. Most are invisible and so fundamental to people that they are difficult to negotiate about.

While useful, these definitions are from the outsider view. From an insider perspective, culture is 'that what which is considered „normal“; “the way it’s done “round here”. Much of culture is hard to identify and explain to others, because it has been internalized, comes naturally, and this self-evidence facilitates routines and social organization. This is particularly difficult for newcomers who are not socialized into the culture and will have to discover it most likely through a process of trial and error. Generally, cultural differences come to the surface most frequently when two cultures come together and collide. In case of a collision, there will most likely be a clash ('ouch!') moment accompanied by friction and possibly even more overt conflict. This is because we inevitably see and judge our environment, our fellow human beings and ourselves through the lens of our own cultural background. When for instance, two aid workers work together on a case but learn that they interpret the risks of the situation completely differently. Is one wrong and the other right? Or are they interpreting the situation in accordance to different norms and values?

To meaningfully recognize culture it is therefore key to be continuously aware of one's own reactions towards others and in particular the question marks that appear when interacting with others. One functions, interprets and more importantly judges surroundings and others in accordance to one's own culture. However, what may be normal to one might not be to the other. So when interacting with others, be alert to feelings of perplexity and shock and before escalating the situation to hostile confrontation, wonder what it is that puzzles you and engage in an inquiring fashion with the other. Are there cultural assumptions underlying their act and/or your reaction?

Such question marks generally point at a possible cultural difference. Why don't Dutchmen wear helmets when cycling through heavy

traffic? Why do many Byzantine and Ottoman buildings have beams placed intermittently around walls of buildings (Bankoff 2014: 58)? Are they decorative or might they even have a seismic function? Such observations and questions allow one to learn about the environment one is in. One could, for instance, learn that when a community has areas where homes are built on stilts that flooding is a relevant phenomenon for the people of the community. In other words, recognizing culture will not just enable one to increasingly cooperate or understand why cooperation with others is maybe difficult, but it will also open the door to learn more about the environment one is in and the way people interpret and deal with that environment.

Beware: introspection can be confrontational. You will be looking into your most inner self and possibly have to question fundamental assumptions which have been, up and until that day, the basis of your essence, while realizing that they are arbitrary and can, if you want to, be different. The key is first to identify and reflect on the cultural differences and then find a way to move forward that is acceptable to both parties. That is when it gets difficult, especially when such inner elements as values and norms are being questioned.

There are various social interactions that require thoughtfulness in light of the possible cultural implications they could entail. Firstly, one has to be aware that people are generally part of different cultures. As a result, even though you are part of the same organization and share the organization's culture, you might still experience culture clashes because competing cultural values or norms take the upper hand. For instance, families can have their own cultures and in a specific situation this culture's elements might be considered more weighty than for instance the organization's. In situations in which the organization's culture does not provide sufficient guidance a member may resort to his or her own cultural values that would.

Part of these types of cultural interactions are interactions between people with different ethnic or religious backgrounds within one organization. However, people with the same religious and ethnic background can be part of quite different cultural groups. Secondly, cultures can interact between groups when working with different organizations. Civil and military organizations for instance can have very different cultures. A mission for a military unit, for instance, starts when you leave your home and ends when you get back home. For a civil organization, a mission is when you leave your quarters in the host country to, for example, do search and rescue activities and ends when you get back to your quarters. This different interpretation of a mission can

cause friction. Similarly, there can be serious cultural clashes between a professional organization and a community one.

Culture is quite functional: it enables people to interpret and judge the world around them, i.e. order, and function more effectively without continuously having to cognitively engage with one's surroundings. It prevents one from being taunted by hyper-reflection like the centipede in the following poem:

'The Centipede was happy quite, / Until a Toad in fun / Said, 'Pray, which leg goes after which?' / And worked her mind to such a pitch, / She lay distracted in a ditch / Considering how to run' (Katherine Craster 1841-74).

Furthermore cultural elements have a cultural logic and function. In case of hazards for instance, communities tend to cultivate elements that will enable them to understand and deal with the events and prevent, as much as possible, dismay. As a result, culture affects how people understand risks and guide the way they act in light of these. A collection of cultural elements cultivated to deal with a recurrent hazard is known as a disaster subculture. Disaster subcultures emerge when communities are repeatedly affected by potentially disastrous hazards and members take each disastrous occasion to learn and improve their capabilities to deal with these phenomena so that they will be less disastrous in the future. Since these elements have meaning and are valued by communities experiencing disaster risk, they have to be taken into account in DRR (Warner and Engel 2014).

They can be valuable resources, but they could also be the cause for strenuous relationships. They can for instance be the reason why a certain community does not want to implement some solution experts have come up with.

Since it is known that cultural interactions will be an important part of one's work in DRR and the success of one's interventions will stand or fall by the way they are dealt with it is worthwhile looking into cultural implications in 'peacetime'. As such, one can determine to what extent culture can be an opportunity or is rather a challenge to be dealt with and identify ways to deal with these. When you have to do this during an emergency, you are too late. In an emergency there is no room for hyper-reflection and the possible immobilization this might entail. People have to largely turn to automated behaviour, particularly also to have enough cognitive space to deal with unexpected situations. This means one should focus on encountering and dealing

with different cultures in the preparation phase. This can be done in different ways. For instance, one could include in every after-action report an appraisal of cultural matters. Also one could make it part of the preparation phase by including a cultural appraisal when doing for instance a network analysis. Key tools are generally, qualitative in-depth and group interviews and continuous interaction and reflection with relevant people.

It is also recommended to not just think of potential 'problem groups' when it comes to planning and preparing for disaster. There are cultural groups networks that could contribute to one's DRR efforts. Take for instance, boy and girls scouts, voluntary rescue brigades and hobby groups like electrical clubs or radio aficionados. Such groups might have certain knowledge and technical skills that can prove really helpful during a disaster.

1.1.1. Technoculture

Complex technological systems tend to be seen as the most optimal way of dealing with various natural hazard related problems. While these can be of help, a sole dependence on them can have adverse effects. In Dordrecht, for instance, the decreasing exposure to flooding has brought complacency and forgetfulness. In the South of the Netherlands, however, (non-life threatening) flooding used to be frequent and as a result relevant risk awareness, knowledge and capacities tends to be more widespread there than in the west of the Netherlands that has already been fully diked up. Today embankments have been installed in the southern province of Limburg and communities there are being told flooding will no longer be part of their lives. This will most likely lead to a reduction of flood preparedness, even though the possibility of flooding remains. The probability might be small, but is still above zero (Engel et al 2014).

Unnecessarily exposing people to disaster risk is not an option. However, believing that one can master nature is not either. A middle road would be to cultivate an intelligent mix of technical and human capacities that will not just enable higher levels of resistance, but also significant levels of resilience. Also, to ensure technical systems are properly embedded in a community and do not force communities into highly dependent relationships with for instance experts, especially when it comes to early warning systems. In light of DRR it worthwhile that people can interpret their environment and in particular

threats that might be imminent. Often time is of the essence and it is thus disadvantageous for people to have to wait for vast complex socio-technical systems to inform them. Such systems generally require time that is unavailable and in addition often encompass numerous linkages that can fail. It may be better to make tools or facilitation availability for community members to be actively involved in their own safety and prevent a false sense of security from arising, confer, for example, Dutch dike teams (trained to put metal sheets in front of vulnerable buildings) and 'dike armies' (patrolling the defences when the weather gets rough).

Suggestions for Further reading

It is recommended to map local skills and repertoires, as well as the 'risk landscape' people perceive. There are good guides to participatory action research

You may find the Reachingresilience.org handbook useful in this respect.

A Swiss example: http://www.polsoz.fu-berlin.de/ethnologie/personenliste/froemming/Participatory-Mapping-of-local-Disaster-Risk-Reduction-Knowledge_-Reichel_Froemming.pdf

1.2. Culture: why it is an asset

Author: Peter Tamas

When we are under stress, as in a disaster, we will revert to known familiar patterns. These patterns tell us where to go for information, who to trust, what we should do and with whom we should do it. They will tell us who we must look after and they also tell us who is obliged to look after us. Most of these patterns will tell us to trust, to share with, to help, and to be helped by the familiar. All of this happens without our thinking. These patterns are conditioned. This means that when there are distinct groups in a city they will have strongly conditioned patterns that link them to other members of their group. These patterns are usually difficult, if not impossible, for outsiders to see. They, however, are far more durable than what people have learned, for example, in training sessions in which people are told about early warning systems for floods. This conditioning will survive a generation or two after a population immigrates. If disaster responders rely on

training and information, they will likely fail. This information provided by outsiders is easy to reject. If disaster responders partner with members of the community and if, together, they become part of the tendencies, the conditioning, of that population, then they will be able to leverage the assets, the strengths, the conditioning of that community so that they both look after themselves better (they will be first responders) and such that their actions are more compatible with those of the professional disaster response community.

1.2.1. Why our comfort zone matters and what to do about it

When we have time and energy and when we are feeling relaxed and competent, we willingly work at the edge of our comfort zones. This is when we are happy to try chicken feet stew for supper and shisha for desert...and find both desirable though perhaps not in the same night. The minute we are stressed, however, we will snap back to where we are comfortable. There is no way to avoid this snapping back and it would be foolish to try. When we are in our comfort zone we can think and act faster. We get in trouble when our comfort zone is not where we need to be to perform well. The only strategy available is to change what we find to be natural, to change what is comfortable, to change what counts as our comfort zone so that it is where we need to be when we are under stress.

The things we do, and the things that we do not, talk about – they matter.

Professionals do particular things in particular ways that are recognized to work. In addition, we are professionals in part because we talk about the right sorts of things in the right sorts of ways. Sometimes having some topics off limits is a good thing. There is no reason in professional conversations to talk about how bloated and constipated you are today...unless you are an adult performer preparing for a scene in which your bowel condition matters. While both may be very important, neither belong in most professional discourses. What counts as professional, like our culture, has taken generations to form and it changes slowly. Some of the things that we talk about do not help and there are some things that we avoid discussing that we should talk about. For example, both police and the military are still figuring out if and how to talk about mental health. Real men, they are learning, do cry and this, it seems, might be good to make part of professional

talk. When disaster responders look at other communities there are all sorts of things that we do not think and/or do not say. We might, for example, label a Muslim community in some slightly insulting way and not talk about how it makes us uncomfortable to deal with women wearing head-scarves: it might be OK to label others but not OK to talk about our own discomforts. These patterns matter. Talking about others in simplistic terms draws lines that then become harder and harder to cross and not talking about our own discomforts makes it impossible for us to take the first, and necessary, step.

It is difficult to identify and deal with 'unmentionables' and 'undiscussables'. For those who are in a culture, one way to begin to find undiscussables is to look for discomfort. Discomfort is a flag that we have talked about something that is not proper. In most situations our reaction to mention of an undiscussable is analogous to a loud belch at the dinner table: we don't see it, we minimize it, we make a joke of it, and, whatever we do, we quickly move on and pretend it did not happen. These strategies minimize disruption. They help us keep on with business as usual. Too bad for us that our business as usual is not good enough. If we have decided that the way we do things is not good enough, when we trip over an undiscussable the correct strategy is to stop, to flag it with a statement along the lines of 'I just saw/heard a belch. That didn't feel right.'

Having undiscussables makes our work efficient. It reduces what we can and need to think about. They work great until we are in a different world. The minute we are in a different world, we need to question what we do and do not talk about. Fundamental to these discussions is something called 'metacognition' which is essential to something called the relational model of intercultural communication (Imahori and Lanigan 1989).

1.2.2. Proxy indicators

When we look at people we make intuitive judgements about them. The Dutch, for example, say 'trust me by the blue of my eyes.' In this case blue eyes are a proxy indicator of trustworthiness. We have all sorts of proxy indicators that matter in a particular culture: the firm handshake, the straight gaze, the confident voice, being male, being clean shaven, being well dressed, using appropriate vocabulary, driving the right car. None of these measure what we are actually interested in. They, and many others, might work well enough in some contexts. When we move to new contexts, however, these proxy indicators

might not work and we won't know when they fail. This means that when we are working in new environments we can't trust our intuition. Intuition, however is very convenient. It lets us make fast decisions that, when in the right circumstances, work well enough. Intuition will get us in trouble unpredictably when we are not in familiar circumstances. This means that we have to make every decision deliberately. This takes time and effort. In a disaster, when the unthinkable happened nevertheless, we don't have time and we are exhausted. This means that we will not be able to make deliberate decisions. We must, therefore, train our intuition before a disaster so that the proxy indicators we have are good enough for the full diversity of communities we will work with in a disaster. This will take time and energy up front.

1.3. (Mis)recognising Culture

Author: Peter Tamas

Today disaster responders have to deal with many different kinds of people. We will take a quick glance and make initial decisions about the characteristics of that group and, on that basis, decide what we can and should do. If we are going to deal with people from that group, we will use our group based classification as a starting point for figuring out who that person really is. While this sort of decision making serves us well most of the time, there are a few ways in which they get us in trouble.

1. The rules we have for classifying people took many generations to evolve. They might fit the world of our grandparents. When we are in new circumstances, as we are in any major European city, and we use old rules to classify new people, they will fail in ways we cannot predict and often cannot even see.
2. We are invested in our rules. We do not like it when they are wrong and we will persist in using them even when they don't fit quite right.
3. When our rules do not fit quite right, rather than parking the rules and starting from scratch our initial response will often be to get a bit grumpy and try to make them fit.
4. Once we have figured out that they do not fit and we start from the ground up, the group based decisions we make will still be sticky. It will take time and effort for us to adjust
5. When we are under stress, we do not think twice. We will revert to

simple rules and stick with the group based decisions they suggest

6. Most of what is happening here is not conscious. This means that just learning will not fix what we do. Learning happens between our ears. Most of the decisions we make here are more gut-level intuitive calls.

It is possible for us to learn new things. We may, for example, learn how to work with people who are really quite different, people who behave in ways we initially thought were not good. This sort of boundary crossing work has to be done in consort by people on both sides. This is extra work that takes time and effort. In normal circumstances this is fine. We have the time and head space required to reach out, to make links, to figure out what is going on and how to work together. Under stress, however, we will all revert to the familiar and the efficient.

Putting this all together, all of the work that we do figuring out contact people in distinct groups, all the time spent going to meetings, all the time we spend building trust, may very well come to nothing. When the disaster strikes, we will all tend to go back to our primal thinking: making quick judgments, clumping people into groups that are easy to think about, sticking to the familiar and doing what makes sense to me and those who think like me. Under stress our natural reaction is to kill off all of the careful thinking, all of the nurtured relationships, all of the individual understandings that let us see people rather than classes. In a disaster, our natural tendency is to crawl back into the culture, the shell, that is most familiar.

The only way to get to the point where, under stress, we go in the right direction is through conditioning. This is well known to the military whose training revolves around the saying 'train as you fight, fight as you train.' The only way to work effectively with diverse cultures in disaster is to fully integrate that diversity into preparation...so much so that it becomes impossible to think any other way.

1.3.1. Implications

To work effectively across cultures both disaster responders and members from the diverse groups who make up their cities must be conditioned. This means that, at every step of the way, we must not only be sharing or informing, we must be behaving in ways that build and use the relationships and the trust on which lives will depend

in a disaster. This will be difficult because conditioning is far more expensive than training.

When the disaster is not pressing, with the exception of one organization, it is very hard to justify the time and money required for conditioning. Armed forces know about conditioning. They regularly second staff to work in other organizations. These other organizations are pleased to host these seconded soldiers. Further, in the military, approximate 1/3 of staff hours are spent in some form of training and this does not count all of the rituals that structure feelings and behaviour in ways that are useful for combat. This ratio is not supportable in almost any civilian organization. In civilian organizations, people are paid for what they are doing during a day and hired because they know how to do it. This means that time is fully committed to immediate tasks. Resourcing for current task loads means that there is no time required to design and undertake the sort of conditioning that will save lives when it matters.

It is difficult to talk about building conditioning into civilian organizations but it is possible. It can be made part of our jobs, our job descriptions, our performance review, our organizational culture. Our jobs can pay us to engage and our organizational culture can encourage us to find comforts in the diverse communities in our cities. This may be as simple as where we choose to get lunch together, who we work with on the annual litter picking day or where we recommend incoming colleagues look for housing.

It is, however, illogical to talk about building conditioning into the diverse communities that make up our cities. People do what makes sense to them today and our organizations can change what makes sense so that we are nudged towards engaging across difference. This does not work in private lives. The only way to build conditioning into the cultures of those we wish to serve is by going to them, by working with them on their terms to do what is important to them today, recognizing that what is important to them today may very well not matter all that much to us. If we do this for a long time we will build relationships, we will build trust. Working with each other will become part of who we are. It is precisely the relationship and the trust that will matter in a disaster. Police have known this for at least a generation. The whole institution of community policing was and remains a seismic shift in what it means to police. More importantly, it is a fundamental change in what it means to be a police officer.

If we are to work effectively in our increasingly diverse and always

changing cities, we can learn from the police and the armed forces. With the armed forces, we must make the time, the resources and the effort required to condition ourselves such that, when stressed, we behave appropriately. With the police, we must change how we are in our cities so that the time we spend those who become our neighbours and friends alters their conditioning such that the, under stress, also behave appropriately.

If we get culture right, then the improbable and the illogical becomes instinctive.

- we will leverage the bonds from which the diverse communities that make up are cities are built.
- we will see ourselves as part of those communities, as supporting them so that our new friends and neighbours, when they respond first they will do so in a way that both preserves lives and integrates with the professional response that will quickly follow.





2. Culture and risk: path dependencies

- 30 2.1. Cultural heritage and disaster in today's cities
- 31 2.1.1. Cultural heritage has important symbolic and material value for community identity
- 32 2.1.2. Cultural heritage has socio-economic value for cities
- 33 2.1.3. Cultural heritage may serve as a source of resilience to communities
- 34 2.1.4. Protecting and preserving cultural heritage
- 36 2.1.5. Dilemmas in reconstructing cultural heritage after disaster
- 39 2.2. The role of memories of disaster
- 40 2.2.1. What is cultural memory?
- 40 2.2.2. Manifestations of cultural memory
- 45 2.2.3. Why is cultural memory important for communities?
- 47 2.2.4. Why is cultural memory important for disaster managers?

After devastating disaster, many understandably would like nothing more than to 'move on' and start afresh. 'Building back better' on a disaster site points the way to a brighter future. However, we would be remiss to forget about the past. This chapter looks at the crucial importance of cultural heritage, followed by cultural memory, for growing or maintaining a 'safety culture' and understanding differential responses to disaster events.

In fact, disasters are important identity shapers. Cultural identity is bound up with history: disasters deeply shape people's sense of history (at national level e.g. in 1953 for the Netherlands) and in so doing shape culture. Historical choices tend to have a path dependency impinging on future developments. But also the "shadow" of past treatment may hang over the acceptance of help and acceptance of preventative measures. The cultural background of society, and the cultural filter through which hazard information is interpreted and adapted to, are continually changing as the balance between risk and mitigation alter (Alexander, 2000).

Communities have proven to learn from shocks and transform their cultural systems to ensure the reduction of future impact of recurrent events. The variations over time indicate that cultures are not static, but are continuously evolving. Changes, however, take time and do not come about over night as they have to be socially desirable and accepted and valuable to the community at hand. In addition to variations over time, there are also variations within cultures or subcultures. For instance, communities confronted with specific challenges to their livelihoods like recurrent hazards, often develop an assortment of techniques, tools and artefacts to effectively deal with the hazard at hand.

This means that it is important to recognize that 'one size fits all' solutions are not likely to work when it comes to dealing with culture(s).

2.1. Cultural heritage and disaster in today's cities

Authors: Helena de Jong, Miranda Dandoulaki

The last decades have seen a series of disastrous events that were costly in terms of cultural heritage. Fires, earthquakes, flooding, tsunamis, land and mud slides, wind, and storms are among the major causes of loss and damage of cultural heritage.

Cultural heritage is commonly defined along the lines of ‘the archaeological and historical built environment and moveable heritage’ (Taboroff in Kreimer et al., 2003). This heritage serves a role in preserving local identity and personality, but also local knowledge; preserving heritage has educational purposes in awareness raising, as the layout of a city (plazas, avenues), the construction of buildings (for example earthquake resistant) and infrastructure (multiple escape routes) may reveal a logic that is often more in tune with urban exposure to natural hazards than today’s urban development. The following definition of cultural heritage is used by UNESCO: “the legacy of physical artefacts and intangible attributes of a group or society that are inherited from past generations, maintained in the present and bestowed for the benefit of future generations” (UNESCO website).

Cultural heritage is seen as a major component of quality of life and plays an important role in society and community wellbeing (Tweed and Sutherland, 2007). The loss or deterioration of heritage can seriously affect local and national communities for several reasons:

2.1.1. Cultural heritage has important symbolic and material value for community identity

Direct contact with cultural heritage enables history to come to life, and contact with culture inspires, humanizes, and enriches people, Alexander (n.d.) noted. Cultural items, he continues, contribute to the ‘spirit of place’. When a disaster occurs, the destruction of this ‘spirit of place’ can weaken a person’s sense of identification with a place and affect the determination to rebuild. On the contrary, a strong ‘spirit of place’ can inspire disaster survivors to overcome the obstructions they face due to the disaster and reconstruct not just their functional environments but also those that represent their heritage (Alexander, n.d.). The psychological impact on communities due to the loss of cultural heritage to which they are closely associated should not be underestimated. Local communities and individuals feel a socio-psychological need to see and feel that the familiar environments with which they identify are not totally wiped out (Wijeratne in ICOMOS, 2008).

Milko Morichetti, an Italian art restorer, expresses this sense of identification as follows:

“Without the culture that connects us to our territory, we lose our identity. There may not be many famous artists or famous monuments here, but before anything, Italians feel proud of the culture that comes

from their own towns, their own regions. And when we restore a church or a museum, it gives us hope. This is not just about preserving museum culture. For us, it's about a return to normalcy" (Medina, 2009)

Moreover, during the post-disaster and post-conflict phase, heritage landmarks and the continuation of traditional cultural practices may contribute to the recovery of a community and help vulnerable people recover a sense of dignity and empowerment (UNESCO website).

2.1.2. Cultural heritage has socio-economic value for cities

The historic built environment not only provides a city with character and a sense of identification for local communities, it can also boost the local economy and create jobs. Cultural heritage is repeatedly identified in both academic literature and policy documents and by regional and national governments as an economic source that can provide employment and realize profit and local development (Loulanski, 2006). Heritage and its preservation have long been regarded as oppositional to economic development (it is either historic preservation or economic growth) but they are increasingly seen as effective partners in development, as Loulanski (2006, p.56) argues. By investing in cultural attractions and infrastructure, cities seek to secure a niche position on the international tourism map. Tourism also represents an important source of financial resources for the preservation and restoration of the heritage (Russo and van der Borg, 2002), including traditional crafts, practices, skills and knowledge. It is for instance noted that in Europe, heritage is vital to the competitiveness of tourism, which is valued at 586 billion euros per annum and employs 9.7 million people (Jigyasu et al., 2013).

Moreover, cultural heritage attracts investments and promotes locally based jobs related to a wide range of activities such as tourism, conservation, construction, arts, and the production of crafts. It is therefore also a powerful asset for inclusive economic development (Jigyasu et al., 2013).

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



Figure 2.1.1 Flood boards in Dordrecht, the Netherlands

2.1.3. Cultural heritage may serve as a source of resilience to communities

Heritage can play an important role in reducing a disaster's impact on people's lives, properties and livelihoods (IFRC, 2014).

Cultural heritage in both its tangible and intangible forms may serve as a factor contributing to the survival of communities from disasters, both psychologically and materially. Traditional knowledge systems embedded in cultural heritage can play a substantial role in DRR (Jigyasu et al., 2013). Disaster risk may for example be reduced through traditional knowledge associated with environmental management and building techniques (IFRC, 2014). Cities, their identity and building techniques are for a great deal influenced by their environment and the threat of hazards. People adapt the built environment to adjust to living with risks in places where they are frequently exposed to hazards. These patterns become embedded in cultures over time (Moore, 1964 in IFRC 2014, p. 124).

This accommodation is reflected in the design of buildings and the materials and construction techniques¹. Heavy earthquakes in Southern Europe have for instance spurred major changes in architectural design and practice on several occasions (Buforn et al., 2004 in Bankoff, 2015).

¹ Important to note however is that these architectures are the result of a whole range of socio-cultural factors, not just the threat of hazards

In Dordrecht, the Netherlands, so called flood board are positioned in flood prone streets to prevent the water from entering shops and houses.

Moreover, traditional knowledge developed over time, enables communities in risk prone areas to recognize changes in the atmosphere, or the behaviour of flora and fauna, and prepare themselves (Jigyasu et al., 2013). "Protecting heritage from disasters is, therefore, not a luxury, but a fundamental consideration to be given priority together with other humanitarian concerns (...)" (IFRC, 2014, p. 123).

From the above, the following points are distinguished that may harness the strength of culture as a tool to reduce disaster risk (see also Jigyasu et al., 2013).

- Draw on traditional knowledge and blend scientific knowledge and technological advances with capacities and resources already available at local level
- Draw on traditional building techniques and locally available material as to inform modern day practice

2.1.4. Protecting and preserving cultural heritage

Cultural heritage is often concentrated in urban areas where trading and business activities have spurred the production of different displays of religious, civic, and private creativity. Such cities are often located in disaster prone areas, for example in coastal areas or alongside rivers or close to fault lines, and therefore vulnerable to natural disaster (Taboroff in Kreimer et al., 2003).

When disaster strikes, the loss of cultural heritage causes a wide range of destructions. Well known examples are the Italian city of L'Aquila where the earthquake of April 6, 2009 caused the destruction of many of the city's historical and monumental heritage. Amongst others, several churches, the city's oldest gate built in 1548, and the National Museum of Abruzzo, housed in a 16th century castle, have collapsed and/or are too unstable to enter. Another EDUCEN case study, the Italian region of Umbria, a landlocked region in the centre of Italy, has been hit hard by a series of earthquakes in August and October 2016. Damage to cultural heritage has been severe. In Norcia, one of the affected towns, the Basilica of St Benedict dating back to the



Figure 2.1.2. The Basilica of St Benedict in the town of Norcia after the earthquake

XIV century, survived the August shock but the force of the October earthquake proved too powerful, and caused the church to collapse.

In Istanbul, the likelihood of a devastating earthquake is estimated at 62% within the next 30 years. Istanbul is not only the financial, commercial and industrial centre of Turkey, producing 56.6% of the nation's export, but is also the cultural cross-roads of eastern and western heritage. The city has the highest number of museums of the country and hosts some of the most important monuments of the Roman, Byzantine and Ottoman Empires (Johnnides, 2010).

Despite the serious nature and consequences of the destruction or damage of cultural heritage, the number of heritage properties that have developed a proper DRR plan is surprisingly low (UNESCO 2010). Nevertheless, the last decades have seen several initiatives at international and regional levels in the field of cultural heritage and DRR. These initiatives aim on the one hand to introduce DRR into heritage protection and management, and on the other to intensify and mainstream heritage concerns in larger DRR initiatives (Jigyasu et al., 2013).²

² An overview of key international conferences, workshops, training courses and publications on disaster risk reduction of cultural heritage can be found in the Jigyasu et al., report 'Heritage and Resilience. Issues and Opportunities for Reducing Disaster Risks' (2013: 50).

A major challenge for the protection and preservation of cultural heritage is the fact that it is managed through a very diverse set of ownership or management arrangements, including among others private foundations and national and local governments. To reduce the risk to cultural heritage, heritage managers have to collaborate with disaster management authorities, universities, NGOs, political leaders at national and local level, the private sector, and the public.

The commitment of local governments, in particular mayors, is also vital to the protection of cultural heritage and DRR. In 2012, mayors from cities throughout Europe adopted the 'Venice Declaration on building resilience at the local level towards protected cultural heritage and climate change adaptation strategies'. Fostering partnerships between these different actors and that protect and draw on cultural heritage- on international, regional, and local level- for DRR is therefore vital.

2.1.5. Dilemmas in reconstructing cultural heritage after disaster

As explained above, disasters often severely damage the built environment and in it immovable tangible cultural heritage. Individual buildings, groups of buildings, whole neighbourhoods and settlements of historic or vernacular (traditional) character, under preservation status or not, are damaged at various degrees or even collapse. It then becomes a major issue to decide what to keep from what existed before the disaster and at what price in terms of resources, money and time.

Difficult trade-offs present themselves in a time when pressures to the response mechanism are severe and often overwhelming. Should all buildings deemed to be dangerous be demolished as soon as possible and what procedures should be followed? Should owners of dangerous historic buildings be allowed to proceed with engineering interventions for removing dangerous elements or even for the demolition of the dangerous building? In case of listed historic buildings that are deemed damaged beyond repair, should protection of heritage be considered to prevail over protection of lives? Apart from historic buildings and monuments, what should be done with damaged (in some cases damaged beyond repair) traditional buildings and neighbourhoods that are not listed as monuments to be preserved? How long should recovery be delayed in order to protect tangible cultural heritage either already listed or not? Who should deal with such

trade-offs and make decisions and how should this be arranged?

Especially in earthquake disasters, damaged buildings can be dangerous for people, for instance during aftershocks. Even more, people feel threatened by buildings; old buildings are often seen as dangerous without exception. In these conditions, preservation of existing buildings and neighbourhoods appears to be a luxury at best and an unnecessary present threat and future risk at worst. In the midst of emergencies and urgent needs, it takes a long term outlook to see the significance of heritage for future quality of life and sustainable development.

Every disaster is unique in its socioeconomic, historic and geographical context. There is no one-size-fits-all prescription towards the protection of cultural heritage in a disaster. There are

Saving historic and vernacular buildings after the Konitsa, N. Greece, earthquake disaster

Konitsa is a remote town in Northern Greece. In the '90s, it was a town of about 5,000 people mainly living on agriculture and services. Parts of the town and many buildings were of a vernacular form. There were also numerous listed monuments and historic buildings.

In 1996, Konitsa suffered an earthquake disaster. A first destructive earthquake caused severe damage to the building stock and great fear to the people. Yet, it was the main shock a week later that caused devastation and panic. The population did not have previous earthquake experience.

After the devastation, the population and the Municipality put pressure for the demolition of all old damaged buildings. Even buildings under preservation were at risk from demolition in haste. A trusted central government agency responsible for earthquake protection intervened and acted as consultant to the Municipality, advocating for the protection of vernacular and historic buildings and for preservation of the image of the place. Furthermore, the previous good practice of the city of Kalamata, in Southern Greece, in preserving cultural heritage after the earthquake disaster of 1986, about ten years earlier, was communicated to the Mayor of Konitsa via informal networking among Mayors. In the heart of the emergency, the attitude of the Municipality shifted towards preserving the identity and the vernacular character of the city and with it the stance of the population.

As a result, Konitsa preserved its vernacular and historic identity which together with its rich natural resources has now become a tourism asset.

(Dandoulaki 2010)



Figure 2.1.3. Damaged building in Konitsa (source: EPPO, <http://www.oasp.gr/node/410>)

some commonalities in observed positive cases, though. In societies and areas with disaster experience, the knowledge that the disaster is not the end but a phase, assists in maintaining a long term view. In such cases, the city and the society realise more that they will have a future and that the foundations of this future lay in post-disaster decisions. If there is no local disaster experience, consultancy and know-how by trusted knowledgeable external agencies can be very helpful (see the example of Konitsa, Greece). What counts more, though, is the attitude of the devastated society towards culture and cultural heritage, history and continuity. Perception of cultural heritage and its value is different in different societies, so is the meaning of preservation of cultural heritage (Heritage Council of Victoria, 2014. HLF, 2015).

Activities for saving historic and vernacular buildings, groups of buildings, neighbourhoods and settlements cannot be postponed for long, beyond the emergency phase or some elements to be preserved will be ruined or even demolished in the chaos and panic of post-disaster situation. During the emergency phase (typically the first 72 hours after the disaster) cultural heritage is under a range of new risks such as (UNESCO 2010, p. 41):

- Theft of fragments or movable objects of the property.
- In case of flooding, contamination through pollution and mould growth.
- Risks arising from the surrounding environment or habitat.
- Insensitive actions by relief agencies or by volunteers due to lack of awareness; for example pulling down damaged structures or causing damage from water used for extinguishing fires.



Figure 2.1.4 Upper Konitsa today.



2.1.5. Konitsa today (source: Konitsa Municipality, <http://www.konitsa.gr/visit/villages/43-konitsa>)

- Risks by inappropriate damage assessment of heritage.
- Confusion and delays due to lack of coordination and preparedness.

Salvation and preservation of cultural heritage should therefore start as early as possible after the disaster.

Emergency intervention measures of technical and non-technical character should be taken promptly. Technical measures include special damage assessments, documentation of the building and its condition (photos, drawings, reports etc.), emergency propping, removal and safe storage of significant elements of the building, emergency repairs. Non-technical measures refer to emergency planning concerning cultural heritage salvation, the deployment of special emergency response teams with clear roles and responsibilities for each member and equipped with safety equipment and appropriate material resources. It is also essential to have built complementary pre-disaster capacity and to have initiated educational and communication actions. No matter how well prepared, it should be expected that existing planning, preparedness, as well as knowledge and knowhow will be challenged by unexpected post-disaster circumstances.

At any case, pre-disaster awareness of the significance of cultural heritage pays off during the pressing emergency phase and also, having in place a strategy for the preservation of cultural heritage including institutions and legislation, as well as inventories and documentation of historic buildings and their contents. Furthermore, it would be greatly advantageous to already have a disaster governance structure in place that integrates the cultural heritage community.

2.2. The role of memories of disaster

Authors: Helena de Jong, Anne van Tilborg

Remembering hazardous events has important value to communities. Memories of previous disasters not only inform people's knowledge of their environment and vulnerability, it also influences their interpretation of risk and their response to future disaster. Memories of disaster may be expressed in public life in different forms, ranging from memorial plaques to myths. Over time, these manifestations of memory of disaster provide communities with the knowledge, practices and techniques to survive in a particular environment, and enable them to make sense of a disaster in recovery phase.

Memories play an important role in determining the way people respond to disaster risk, 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.

A valuable concept in this regard is 'cultural memory'. Cultural memory ensures that meanings and interpretations of disasters are recorded and handed down from generation to generation. It provides a means by which following generations can understand, contextualize, prepare for, and recover from catastrophes.

But what is cultural memory? When does memory become 'cultural'?

2.2.1. What is cultural memory?

When does memory become 'cultural'? To answer this question it is helpful to make a distinction between collective memory, sometimes also referred to as social short-term memory, and cultural memory, also known as social long-term memory. Collective memory is based on oral tradition, shared by the group, often the family, and tends to disappear with the death of the last eyewitness of the event. Cultural memory goes further back and is understood as a social long-term memory based (at least in part) on written and material sources (Pfister et al., 2010). By contrast, cultural memory needs to be underpinned with documents such as newspapers, archives, pictures, and monuments (Pfister, 2011). Besides texts, images and rituals, Assmann argues that cultural memory may also exist in the form of narratives, songs, dances, rituals, masks, and symbols. For cultural memory to materialize, communities need to come together on certain occasions, for instance

through a joint celebration (Assmann, 2008 p. 109-118). Thus, whereas collective memory fades with the death of the last eyewitness, cultural memory lasts for generations.

Cultural memory is not about how the past is scientifically investigated, but refers to how we remember the past, and how we (re-)interpret certain events. This explains why it is called memory and not knowledge about the past (Assmann, 2008). Moreover, processes of remembering are selective, and subject to emotions, moralities, politics and historical-many times unequal- social relations (Ullberg, 2014 p. 3). In brief, cultural memory of disaster encompasses how “catastrophic events” are absorbed into history (Alexander, 2000). It reveals how communities adapt their cultural reservoirs over time in light of disastrous events.

2.2.2. Manifestations of cultural memory

Cultural memory may be expressed in many different forms. It is manifested in practices and structures as diverse as storytelling, small talk, myths, official discourses, monuments, rituals, landmarks, and arts. A distinction can be made between tangible and intangible cultural memory.

Tangible cultural memory

Tangible cultural memory refers to the ‘touchable’ or visible forms of cultural memory. Memory of past disaster can for example be materialized through mnemonic tools such as museums, archives and memorials (Ullberg, 2014). This tangible form of cultural memory of

The Museum of the City of Volos (Greece) enhances cultural memory of historical events in the city’s history, including the earthquake disasters of the 1950s. However, it is not within the museum’s purposes to advance disaster risk awareness. EDUCEN makes an effort to bridge the gap between knowledge about the history and culture of the city, past disasters included, and triggering awareness and action towards disaster risk awareness and protection. Therefore, the project acted as mediator between the Museum of the City of Volos and the Earthquake Planning and Protection Organisation of Greece (EPPO). Moreover, EDUCEN pushed for the development of tools to advance visitors’ disaster awareness and to inspire taking measures towards disaster protection at an individual, family and school level. EDUCEN, in agreement with the Museum and EPPO, opted for the development of tools specifically directed at teenagers who were considered as one of the most challenging group of visitors.



Figure 2.2.1. Cultural memory of the 1421 flood in Dordrecht, the Netherlands

disaster can also be found in Dordrecht, a city in the southwest of the Netherlands that experienced flooding disasters in 1421 and 1953. A clear example of tangible cultural memory of the 1421 flood can be found in the form of a monument in the city centre of Dordrecht. The monument is an inscription on the wall which states in Dutch:

“t land en water dat men hier ziet, Waren 72 parochien , na s’ kronyks bediet; Geinundeert door ‘t water krachtig, In ‘t jaar 1421 waarachtig”

The text refers to the supposedly 72 villages that have been ruined by the water.

Cultural memory of the 1953 flood is also present in the city. At several locations high water marks can be found on walls of public and private buildings, which show how high the water got in 1953. Such marks serve as a way to remember and compare the frequency and severity of floods over time. Another noticeable form of tangible cultural memory are the 40 photos on street corners throughout the city that portray the same street just after the flooding of 1953.

Another well-known form of tangible cultural memory are memorials. Memorials in the public sphere are well suited to recall the memory of historical disastrous events. They serve as a place to call to mind what happened. Frequently, they also are a location where people gather in annual commemorative events. Memorials can take a variety of forms. The Katrina National Memorial Park for example commemorates the damage done to by hurricane Katrina to the city of New Orleans in 2005. The curving lines in the design of the park suggest the traditional spiral shape of a hurricane



Figure 2.2.2 One of the 40 photos portraying what Dordrecht looked like after the 1953 flood

Marks on public buildings are also frequently seen manifestation of tangible cultural memory on disaster. High water marks carved on the walls of public or private buildings for example present a typical form of cultural memory. They serve as a way to remember and compare the frequency and severity of floods over time. High water marks are for example visible in the wall of the “Gartenhaus” situated on the bank of the Tauber River in Southern Germany (Pfister, 2010 p.9). A total of 24 marks are visible on the wall, serving as a point of comparison for each subsequent flood.

Another form of cultural memory on disaster can be found in commemorative plaques which often serve as remembrance of what happened and the lives that were lost. These commemorative plaques sometimes also contain poems. Poems present another form in which cultural memory on disasters comes to the fore. An example of an expression of cultural memory in the form of poetry can be found below. It is documented for the flood of the Drac River in Grenoble in France, 1733. The poem was published two months after the event.

*The ground vanishes, the mountains descend;
Observably, brooks and rivers rise;
Grenoble and its surroundings are below a real sea;
Everything trembles, the cattle, the birds, and humans;
Grenoble, you are lost. The monster swallows you.
(Pfister, 2010 p.8)*

Moreover, tangible cultural memory can be manifested in books, paintings, and photos, news clips and movies. As present-day disasters are more easily recorded through modern communication tools and



Figure 2.2.3 The story of Beatrix de Rijke

social media, they are less prone to change over time (Erll, 2008). Media technologies and the circulation of media products nowadays play an important role in the transmission of cultural memory of disaster. Moreover, mass media construct narratives about disastrous events, thereby influencing how a disaster is remembered.

Intangible cultural memory

Intangible cultural memory refers to the less visible manifestations of cultural memory such as stories, myths, rituals and ceremonies, festive events and performing arts such as music and theatre. Telling stories is a well-known example of intangible cultural memory of disaster. There are many stories and myths that attempt to explain or come to terms with natural disasters. An example of how a narrative keeps the memories of the 1421 flood and its consequences alive can be found in the EDUCEN case study city of Dordrecht, the Netherlands.

In several Dutch museums, such as the Rijksmuseum in Amsterdam and the Hof van Nederland museum in Dordrecht, a story is told on a child named Beatrix de Rijke (Beatrix the lucky one) who survived the flood of 1421 in the Netherlands. The story goes that her cradle miraculously floated on the water because a cat kept the cradle in balance. When the crib washed ashore in Dordrecht, the municipality decided to take care of the costs of the orphan girl. The story of Bea-

Tangible forms of cultural memory	Non- tangible forms of cultural memory
Paintings	Stories/ oral traditions/ myths
Newspaper articles	Performing arts such as songs, dance, puppet shows, theatre
Photos	Traditions and rituals
Monuments and memorials	Social practices
Landmarks	Festive events
Libraries/ books	Commemorative events
Museums or exhibitions	
Archives	

Table 2.2.1. Overview of manifestations of cultural memory of disaster

trix was first published by the city historian Matthijs Balen in his 1677 Description of the City of Dordrecht. However, an image of the cradle with the cat can already be found as one of the details on a panorama of the flood by the Master of the St Elisabeth Panels, displayed at the Rijksmuseum in Amsterdam.

After a disaster, communities feel the need to make sense of what happened and search for answers- supernatural, religious, or scientific- to explain the event, Cashman and Cronin (2008) note. In an attempt to come to terms with a disastrous event, existing cosmological, ancestral, or scientific frameworks may be adapted and transformed into stories that offer myth-like explanations. The narratives often contain a merger of metaphors, heroic exploits, rumours and scientific explanations and commonly emphasize the event as the responsibility of a higher power, often a god, monster, giant, or ancestor (Cashman and Cronin, 2008).

Examples from Iceland and Japan illustrate how such narratives continue to play a role in modern communities.

In Iceland, the consequences of an volcanic eruption are kept alive through narratives, especially in rural communities, where heroic stories about narrow escapes and bravery during an eruption have been passed on to the younger generation (Johannesdottir and Gisladdottir, 2010 p. 414). Research by Johannesdottir and Gisladdottir on people's perceptions of Katla, a sub-glacial volcano in southern Iceland, found that several legends and myths exist. The respondents in their research repeatedly mentioned two legends, the legend of Krukkur and the legend of Katla. The legend of Krukkur is about prophet from the

middle ages, Krukkur, who had predicted that if the outburst flood of Katla had reached a certain place, the eruption of Katla would cease and change its starting place and erupt at sea. In 1918, the flood reached the specific place and in 1963 and 1973 two huge eruptions occurred at sea not far from Katla. Some residents then indicated that the predictions of Krukkur had proven valid and that Katla would not erupt again. In the legend of Katla, respondents refer to Katla as a female. This has its roots in a legend from the Middle Ages about a female who threw herself into a crater after a conflict with residents in the community. Soon after, there was an eruption which was seen as revenge of Katla. An eruption of Katla is seen as "the return of Katla". In the affected communities, "strong oral traditions and storytelling serves as a constant reminder of the hazardous environment they live in", Johannesdottir and Gisladdottir (2010 p. 418) argue.

Another example of intangible cultural memory in this form can be found in the Japanese stories on earthquakes. According to a popular myth, the tremors of the earth are caused by restless catfish (or Namazu in Japanese) underneath the earth's surface (Bestor, 2013). Namazu is one of the *yo-kai* or "monster" creatures of Japanese mythology that have been seen as causing misfortune or disasters. Namazu are also found in printed form, on posters or pamphlets. The first known Namazu prints date from shortly after the Edo (modern Tokyo) earthquake of 1855. Nowadays, Namazu prints can also be found on earthquake safety posters (Reitherman, 2013).

Besides stories, folksongs commemorating disasters have a long tradition. The songs often share certain elements like recounting of the details of the event and the suffering of victims and survivors, and serve a common function in helping to heal society (Carr, 2004). Songs also illustrate the psychological impact of disastrous events, often illustrating the relationship between the hazard and the community (Cashman and Cronin, 2008).

Another example of intangible cultural memory are rituals and events like public commemorative silence. These (often national) commemorative events have become an important part of the history and identity of past and present communities throughout the world (Eyre, 2007). "Event specific public activities such as memorials provide a communal forum for the outpouring of intense emotions, public recognition of the collective loss, and the reassurance that the group, while damaged, continues (Hawdon and Ryan, 2011 p.1368). Such rituals and events are often performed on disaster anniversaries and may for example include the laying of wreaths, lighting candles, or reading the

names of the diseased.

The following table provides a non-exhaustive list of different forms of tangible and intangible cultural memory of disaster.

2.2.3. Why is cultural memory important for communities?

Cultural memory of disaster, tangible and intangible, on disasters serves several purposes for communities.

First, cultural memory functions as a knowledge repository of historical experiences. Cultural memory in the form of a monument or oral traditions can provide communities with crucial information on, for example, precursory signs of the hazard, descriptions of the event –including specific vulnerable locations, directions, timing and duration, impact on the local population, and pre- and post-hazard changes in the landscape. It may furthermore provide information on community hazard mitigation, such as past areas of danger, safe areas, and evacuation routes. The research of Johannesdottir and Gisladdottir (2010) on the villages of Alftaver and Vik, Iceland, for example revealed that most residents had first-hand knowledge on the outburst of volcano and the risk of a tsunami from former residents in the area. They acquired their knowledge from their ancestors who experienced outbursts in 1860, 1823 and 1918 (Johannesdottir and Gisladdottir, 2010).

Specific knowledge on the presence of hazards has proven extremely valuable in the case of the 2004 earthquake and tsunami in the Indian Ocean where different ethnic groups of Aceh, Indonesia were hit unfairly: whereas about 170,000 Acehnese and Minangkabau people died, in the same region, only 44 Simeulue people passed away. The research shows that the Simeulue detected the tsunami very early due to their knowledge of the environment which enabled them to escape to the mountains. Research found that their knowledge on tsunamis is rooted in oral accounts of an event that occurred in 1907 killing between 400 and 1800 people. About 85% of the surveyed population said they were aware of this event, which they learned from their parents and grandparents. Its precursory signs such as sea withdrawal had been remembered and passed down from generation to generation. After the earthquake people went to check if the sea was withdrawing, spurring immediate evacuation. In this case, oral traditions on tsunamis documented the experience of past generations and pro-

vided a means through which following generations understood what was happening (Gaillard et al., 2008).

Second, cultural memory of disaster provides communities with interpretations and response plans (Schenk, 2015). This has important implications for the ways people explain an event and react to it. When remembered, memorialized and compared, experiences of disasters may for example inspire the invention of social practices and techniques in dealing with recurrent hazards. As stated by Engel et al. (2014), "communities living in hazard-ridden or disaster-prone areas develop an array of coping mechanisms as well as more deeply embedded practices to deal with threats and opportunities their environments encompass (...)". "Experiencing recurrent disaster pushes communities to develop cultural strategies and practices to deal with these adverse events and ensure increasing levels of resilience". Historical records and architecture have provided evidence of cultural adaptations to environmental threats (See also Bankoff, 2011).

Although Dordrecht was among the areas that narrowly escaped the destroying impact of the flood, several forms of cultural memory on the flood can be found in the city. Adaptation to physical hazards posed by the water has led to a range of coping mechanisms, including engineering solutions such as the well-known Delta Works. Moreover, the risk of flooding is seen in the adaptation of houses in risk-prone areas and the use of flood boards in the main street of the city. Examples of architectural adaptation can also be found in the parishes of IJtteren and Borgharen in the south of the Netherlands. In IJtteren, the majority of houses have built their first floors as high as, or higher than, the highest flood levels reached before the house was built (Velotti et al., 2011). This enables them to stay in their houses when the parish is flooded and keeps most of their private goods safe from the water (Engel et al., 2014). Memory thus has an instrumental value to communities as it spurs the development of problem-solving tools, serving as a community education tool, that over time proves to be valuable to surviving in a particular environment (see Schein 1999, p. 43, Engel et al., 2014).

Third, cultural memory on disasters provides people with an explanation. Psychological studies on the aftermath on disastrous events have shown that trauma can shake the foundations of a person's faith and generate a search for answers- may they be supernatural, religious, or scientific. An important component of community resilience to hazards is accepting the event. Such acceptance may be realized through the adaptation of existing cosmological, ancestral, or scientific frameworks, but may also be done through creative and artistic

expressions or myth-like explanations. Simple explanations, whether or not in the form of myths or superstitions, enable communities to make sense of the experience (Taylor, 1999). When such explanations are not available, psychological recovery from a disastrous event may be hindered. Besides the positive aspects of cultural memory it is important to note that the search for explanations can also misinform behaviour of communities or hinder mitigation measures of outsiders. Oral traditions, myths or other explanations for an event that are transmitted effectively may for example replace “rational calculation” in a community’s response to disastrous events (Paine, 2002). Moreover, people may also use cultural and historical explanations to minimize fears and to live a normal life, increasing their vulnerability. Such explanations may very well differ from scientific explanations and if not well understood, hinder adequate disaster response of disaster risk managers as we will see below.

2.2.4. Why is cultural memory important for disaster managers?

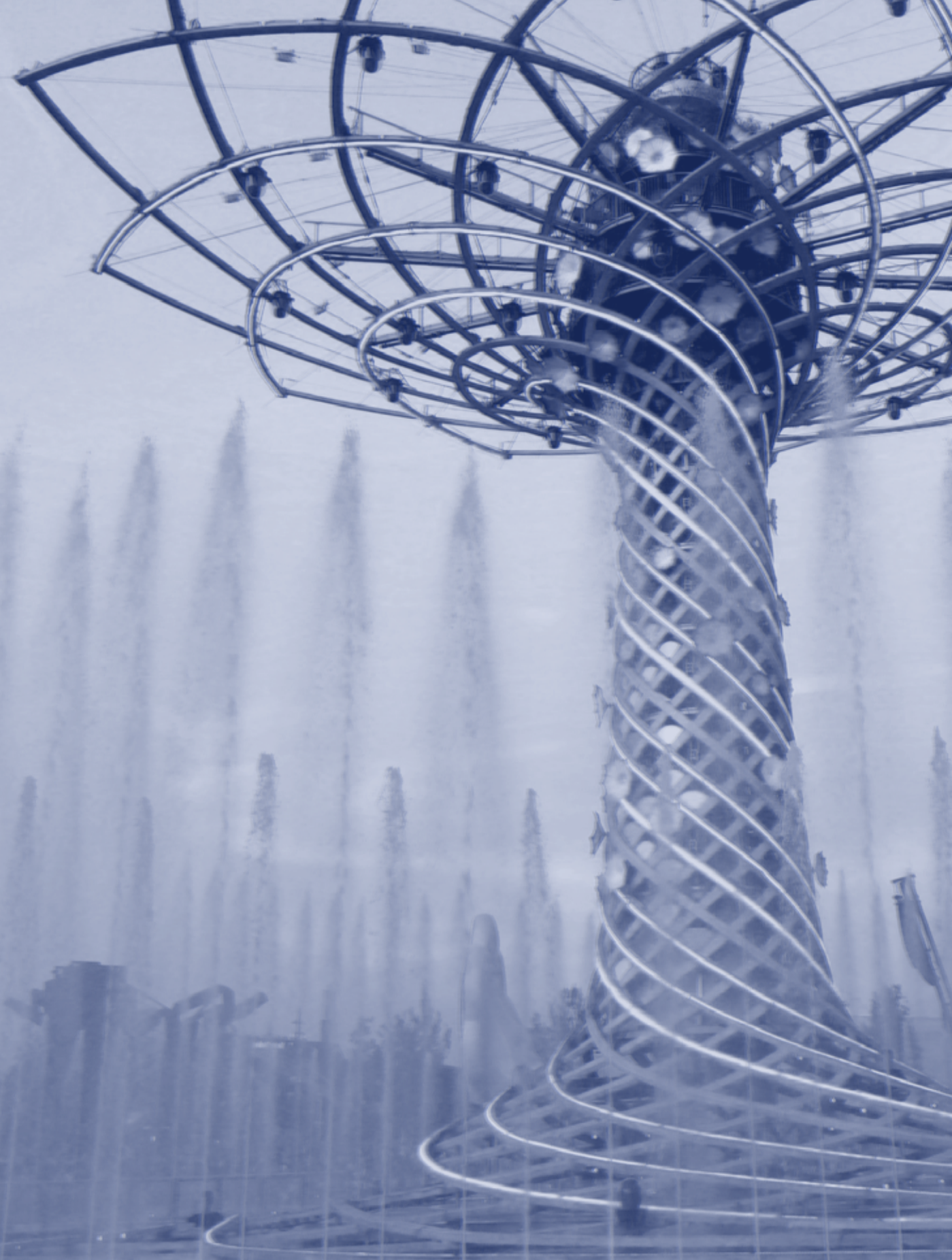
The influence of cultural memory on people’s knowledge, behaviour, and ability to find explanations and make sense of past disaster has important consequences for disaster risk management practice. For disaster managers this entails that communities sometimes might not respond the way they expect them to behave. As stated by Dash and Gladwin (2007 p.70) “Although emergency managers and others assume that people will act rationally- hear a warning, realize the danger conveyed in that warning, and leave when told to do so (because the cost of staying outweighs the benefit)- more often than not, many of those at greatest risk choose not to take protective measures each time a warning is given.” People’s protective response to warnings is a consequence of the perceptions they have. Most of the time, people evacuate and take shelter only when they find themselves being in imminent danger and if they perceive that taking action is appropriate considering the threat (Mileti and Peek, 2000).

Risk perceptions often rely on intuitive risk judgements and beliefs rather than on rational deliberations, and therefore may considerably differ from risk assessments by experts. As Alexander argues “decisions about whether to mitigate a natural hazard are often not a function of how dangerous the hazard is in absolute or objective terms but how dangerous it is perceived to be” (2000 p.73). A frequently noted factor as shaping risk perception of natural hazards is previous

experience with, and memories of previous hazards. Cultural memory of disaster may thus influence risk perception. In the case of the Mulde river in Germany, no one seemed to have anticipated that the river could rise as high as it did in 2002. Most of the affected people had previous experience with floods but because they thought they understood the river and its variations, they could not envisage the 2002 flood (Kuhlicke et al., 2011). Memories and previous experience with hazards in the above cases led to inaccurate perceptions of risk. Such flawed perceptions could result in a lack of preparation and mitigation measures, and damage and victims that could have been prevented.

Cultural memory plays an important role in determining the way people respond to disaster risk, engage in disaster management practices and accept disaster relief in an emergency situation. Warning information and activities of disaster risk managers are processed through the social and cultural lenses of communities which are constructed by their particular cultural context, and amongst others, by their own experience, knowledge, and explanations of disaster. It is therefore vital that response agencies become aware of, and accept the different logics and rationalities that people rely on in the face of risk. The presence of monuments, museums, high-water marks, and stories and myths incorporated in collective long-term memory of communities may present important clues for community perceptions and behaviour to disaster risk managers.

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.





3. Cities and Disaster Risk Reduction

52	3.1. Cities: places of complexity
54	3.1.1. Historic and present dynamics in cities
56	3.1.2. The relevance of spatial scales to cities
59	3.1.3. Urban patterns
62	3.2. Links between physical infrastructure and social networks in L'Aquila
63	3.2.1. Resilience of hard and soft infrastructures
65	3.2.2. Building back better, the case of L'Aquila
69	3.3. How cities are managed matters
70	3.3.1. Strategies and intervention across the "disaster cycle"

Cities have distinctive physical, environmental and socio-cultural features that may increase hazards, exposure and vulnerability and ultimately disaster occurrence. This section introduces cities as places of complexity, as connectors of multiple domains and scales, as places with particular identities and specialisations. We feel it is important to raise awareness of how urban traits related to the urban fabric, the multiple links at different spatial and temporal scales affect Disaster Risk Reduction, partly drawing on our own EDUCEN experiences. The section is organised as follows. The first subsection presents the main features that make cities so complex, requiring analysts and decision makers to adopt a systemic approach in order to comprehend and manage such complexity. The second subsection describes the key role played by lifelines as critical infrastructures guaranteeing cities' life and functioning. In the last section the implication of cities' and critical infrastructures' complexity for disaster risk management are wrapped up, providing synthetic guidelines for mitigating and reducing risks across the so called disaster cycle.

3.1. Cities: places of complexity

Author: Funda Atun and Scira Menoni

Cities are complex three-dimensional spaces in which social, political and economic organisations interact in different ways and at multiple levels with buildings, infrastructures, production and service facilities, open areas. These interactions reflect the cultural features and the degree of technological development of cities and their inhabitants.

Cities share with complex systems virtually all features that characterize them as such. First, given the nonlinear interrelationships between systems and components, it is impossible to predetermine how the latter will interact in the future or under changed conditions. Second, planning and locational decisions are strongly "path-dependent", particularly those regarding the establishment of new urban functions in a previously not urbanized area. Third, it is extremely difficult to forecast cities' response to external forcing such as that imposed by natural hazards or man made severe accidents. Other important aspects that need to be considered are: the fast evolution of the "urban", particularly in the more recent decades, implying differential development dynamics and multilayered governance, resulting from a deeply transformed geography. In fact, in the new urban landscape fringes tend to blur into rural areas making it very hard to define a clear cut border between what is "city" and what is not. Additional complexity derives

from a simple quantitative datum: more than 54% of the world population lives today in cities, 75% in Europe, reversing any prior historic trend and requiring therefore highly skilled managers to keep cities function and able to respond to multiple stresses including natural disasters and man made incidents.

The implications for nowadays risk governance are well depicted in Figure 3.1.2. showing how cities being at the crossroads of different systems are in the meantime physical objects and assets (the urban fabric and the natural systems) and nonmaterial, included in the economic and social systems. The image suggests that environmental sustainability in cities can be achieved only coupling and integrating economic, social development with measures aimed at preserving the natural capital. In general terms it can be held that cities where the link between natural and man-made environments has been addressed in a sustainable manner are also less exposed and vulnerable to natural hazards. On the contrary, cities where such link has been neglected

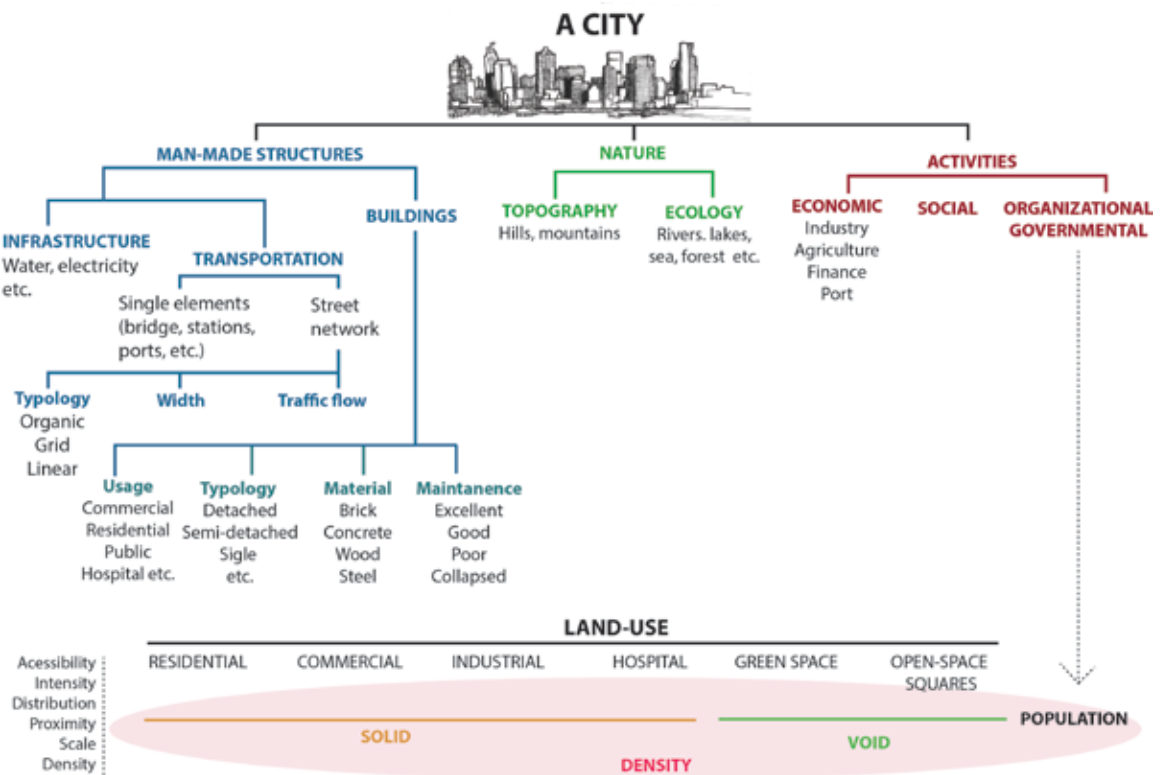


Figure 3.1.1. Cities at the cross-connection between the built and the natural environments, the social and economic systems

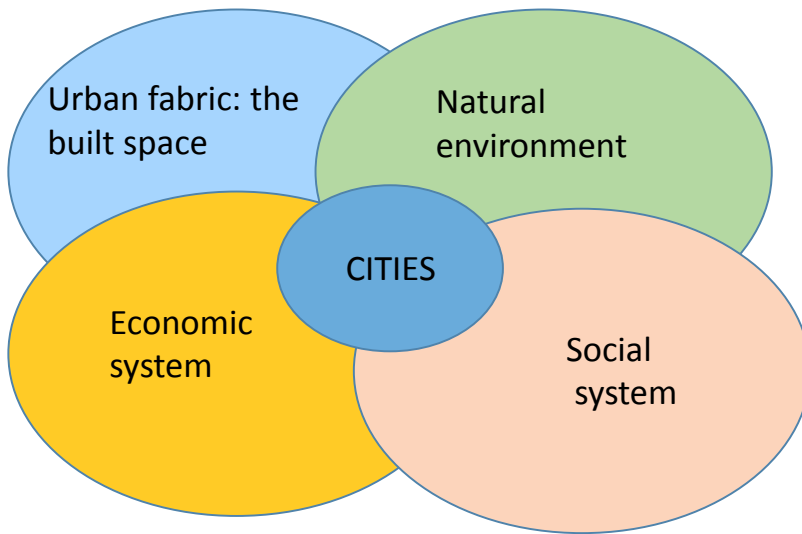


Figure. 3.1.2. Cities at the crossroads of the built environment, social, economic and natural systems

display unsustainable patterns of development that make them also more prone to damage and disruption when stressed by natural extremes.

Contemporary cities need to be comprehended as nodes acting at multiple scales in space and time.

3.1.1. Cities at the crucible of multiple historic and present dynamics

In the past cities used to take decades to build new areas, to transform a city centre, to introduce new infrastructures. Today cities may face much more rapid changes in terms of the pace of construction, creation of new networks and shift from one developmental model, such as industrial, to another, more service oriented. This is the consequence of the many forces that drive change, from increased mobility to, more recently, digital and communication technologies.

Nevertheless, city vulnerability is not only the result of recent changes, even when they occur very rapidly; but also of past decisions, of trends that started long ago. Vulnerabilities in a city have accumulated over the course of time. If this is true for the past, it will be even more so in the future. Future vulnerabilities will be the result of today's decisions

mixed with changes in the natural, social, political and economic environments.

Different temporal dynamics unfold in cities: some are the result of long duration processes that accumulate over decades and centuries. They are the result of micro level decisions or lack of decisions, of actions that are prescribed in cities regulations or embedded in the non material culture of inhabitants. For example, how people use places and buildings that depend on their culture may be or become incompatible with the original layout of buildings requiring changes in internal configuration of spaces leading to unpredictable yet dramatic outcomes in case of extreme events forcing. The opening of large shop windows at the first level of buildings, or the elimination of structural components to create parking spaces or laboratories may change the original performance of buildings against horizontal accelerations; the use of basement as residential units or offices clearly puts at risk the life of people and valuable goods in flood prone areas. City managers need to be aware of the fact that not only hard components of cities determine structural features, but also the soft way spaces and artefacts are exploited and change to conform them better to new uses.

Other dynamics reflect abrupt changes, due to the interruption of ordinary life, after a war, a disaster, a dramatic change such as the one that occurred with the industrial revolution, when old schemes were

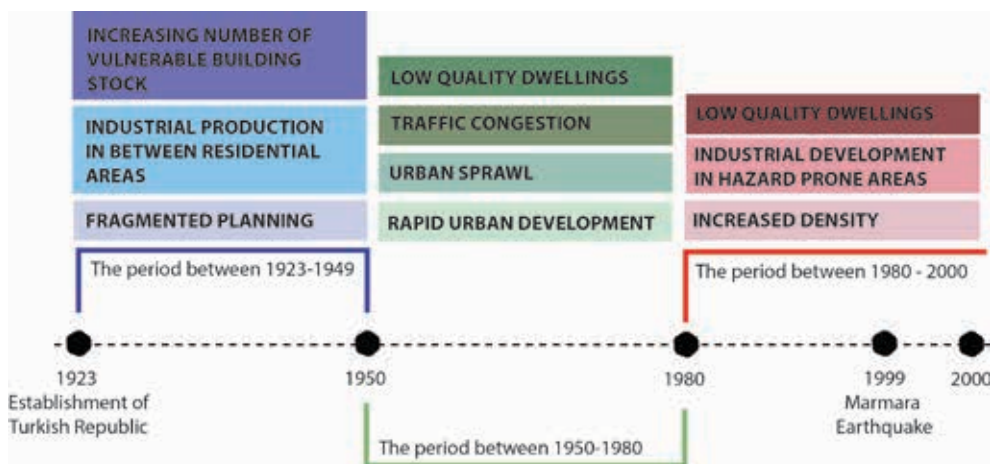


Figure 3.1.3. Vulnerability patterns produced by rapid urbanization: the case of Istanbul. The effect of the rapid urbanization process in Istanbul is provided as an example. After the 80s, newly built large industrial facilities in hazard prone areas, population and buildings density gave tremendously

wiped off, destroying centennial walls to allocate more space for factories and urbanized peasants. Such deliberate changes include modifications in the city layout, patterns, with the introduction of new infrastructures, large palaces, new economic attractive centres.

Whilst the recognition of past dynamics is important to reconstruct the decisions and events that have led to the current situation in terms of vulnerability and resilience, planners and city managers encounter difficulties in imagining future scenarios. Planners are not trained to foresee how the environment they are used to and in which they have prepared to be operational in case of disaster may change suddenly and abruptly. They are not used to recognize in an apparently stable landscape and in the natural features that are part of it the potential for abrupt changes in the future. Also disaster managers must be aware when preparing for an emergency that references that they have placed on their maps may be destroyed and disappear after an extreme events hits a city.

3.1.2. The relevance of spatial scales to cities

Local, regional, national and global levels are interconnected, though in different ways for metropolitan and central areas on the one hand, for small-medium towns and marginal and non-central areas on the other. Actually the situation is much more diversified and complex than the dichotomy between central and peripheral may hint at: cities may be central in a global perspective, but they can also be central to a nation or to a region, given the services and the type of functions they offer to other cities gravitating on them. Cities that are at the margin of global networks can be still central to a region. The different scales are in tension with each other, and this tension owes a lot to the type of existing networks (both physical and nonphysical, hard and soft).

Understanding those complex interrelationships and interlinkages is key to detect the ripple effects a disastrous event may have on social and economic systems. A disaster nowadays is seldom only local: immigrants from South East Asia have become a supportive communities for the countries hit by the tsunami in 2004; the 2011 earthquake affected some economic sectors in the USA depending on specific products that were produced in Japan. The fact that distances count differently in a globalized world means that regions and cities are closer or farther depending on their position and centrality in the various transport routes. This has implications also for the way in which aid and support can be provided once a disaster has hit in a region. Often

aid arrives quicker to the airport of a capital city or to the regional central district than it takes from there to be moved to the areas that have been most affected, if the latter are located in detached, sparse and remote locations.

Scales that are relevant for cities may therefore vary from closely local to global, depending on the relative position of such cities, on their role as a service provider and as an economic actor in regional, national and international contexts. This does not necessarily imply that only core central cities must be protected, but rather that differential risk mitigation policies are needed to acknowledge for the diversity and the degree of relevance of cities within and across spatial scales.

Cities' specialization as they position themselves at different spatial scales

Cities' culture, resulting from past trends and present choices, shape the way in which cities position themselves locally and globally, also through designed strategies.

Cities were initially mainly a market place or a political centre, but have become in the modern times a place of production, offering services ranging from basic to high level, such as educational and driving technological and economic innovation. 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. Every type of 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".

Specialization entails prevalence of certain types of patterns, both in the two and three dimensional spaces, reliance on predominant types of infrastructures and services.

The city's specialization should orient decisions on what to protect most and first, on what are viable means of protection, on how they can be implemented without constraining the activities and operations that are mostly needed for the specialized city.

Damage due to business and services interruption may be suffered miles away from the epicenter of the disaster; the network of cities to which the affected area pertains may feel the repercussions of the event in terms of unavailability of goods, lost customers (at least for



Figure. 3.1.4. Volos

The major economic function of a city shapes its structural pattern and physical artefacts. Considering the ex-industrial role of Volos in Greece helps us to understand the huge fabric blocks in the city and the city's functional grid pattern.

some time), lost gateways for their products. Strategic choices will have to be made in order to restart those activities that are crucial for the city's position in the network they pertain to, guaranteeing that it will not lose its role. However the issue must be looked at also at other scales, as what one city can lose may be gained by another, that is already well positioned before the impact of the event. How to account for those shifts is a matter that needs to be considered by national governments. Methods and tools to measure indirect impacts are still in their infancy and there is still much to be unveiled and explained in order to make pertinent analyses at different scales.

Modern cities' culture orient choices towards specializations that can be permanent overtime or confirm the capacity to host for a certain period important events, exhibitions, games. In this respect, mega-events such as Olympic games, Expo exhibitions, universal fairs have become the object of both policies aiming at competing at the global level and of controversies depicting such events as disruptive of citizens' everyday life and well-being. The capacity to host such events, though, is important nowadays as it may boost local economy and generate new networks and exchanges (De Steffani, 2011).

Mega-events, cities and organizational cultures

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. If the mega-events are handled well politically, organizationally and structurally, they provide great advantages to meet social, structural and economic challenges.

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.

Having good quality infrastructure is not sufficient for being a part of this worldwide competition and hosting a mega-event. Hosting a mega-event brings a major challenge to meet resilience targets, meaning, the increased exposure of the population, including both inhabitants of the city and tourists/visitors coming to the event. Guaranteeing the safety and security of such events has become a critical point, especially after September 11, but also prior to it. 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. Therefore, disaster risk reduction (DRR) that considers these cultural diversities must be a part of the investment to increase the resilience of the infrastructure systems, leveraging efforts on the three layers existing in the territory: spatial, organizational (public institutions or private, depending on the owner of the infrastructure system) and social (the users of the system).

3.1.3. Urban patterns result from and shape the relationship among systems and systems' components

Cities' complex interdependences between elements and systems occur in the three dimensional space. An urban pattern is the combination of buildings' density, 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, finally, the features of the natural envi-



Figure 3.1.5. The street pattern in Lorca

Lorca contains both organic and linear patterns in its street morphology. The city was organized on a human scale, and highly walkable. It provides a low speed of travel within the narrow streets and a high speed of travel in the recently built linear pattern.



Figure 3.1.6. The street pattern in Istanbul

The pattern is taken from a residential section of Istanbul. The area includes a mono-functional housing development that does not provide functional feasibility. However, the distribution of the streets provides accessibility.

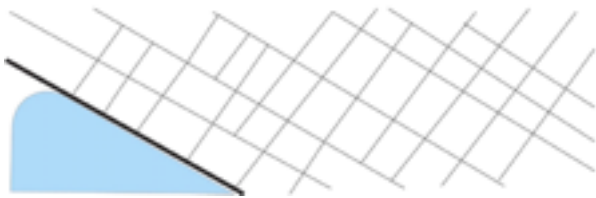


Figure 3.1.7. The street pattern in Volos

Volos has a grid street pattern that provides a rapid connection between distant parts. Highly accessible. Urban blocks are mixed-use, combining residential, touristic and commercial activities.

ronment, that constraints and in the meantime provides opportunities for cities' development.

The type of urban pattern has decisive implications for emergency management, and in particular for all activities related to evacuation, positioning of roadblocks, selection of areas devoted to locate civil protection and rescuers trucks and devices. A regular grid, such as that characterizing the original roman-style settlement can be easily found in colonial cities, in modern expansion areas such as in Volos in Greece and sometimes also in ancient towns such as Tourin in Italy provides redundancy in access ways to almost all point shaped element in cities and fastest in and out travels. Furthermore, the regular grid permits to better define areas pertaining to predetermined emergency centres and to distribute rationally services such as hospitals, fire brigade stations, etc.

Circular, round grids are more complicated to manage: redundancy is still guaranteed but not to all locations, avoiding central nodes is virtually impossible, congestion is more likely in ordinary times and to be expected and therefore carefully managed in emergencies.

Linear cities are those that develop along the coast or important infrastructures such as roads and railways; they are characterized by the general absence of significant alternatives in case of transportation routes failures and by the fact they are easily cut in more parts disconnected from each other that will need to respond a crisis independently from each other. This was certainly the case in Kobe a rather emblematic example of linear city, hit by the earthquake in 1995.

Whilst cities generally present a predominant pattern, there may be also coexistent patterns, particularly in large metropolitan areas that result from the aggregation of pre-existing settlements once autonomous and of newly added development zones.

Different city patterns require city and disaster managers to adopt different strategies in deciding the location of critical infrastructures, in defining self reliant zones and in preparing themselves, other agencies and citizens for contingencies.

However consideration cannot be limited to the plan layout: buildings, transportation networks, services, work activities occur in three-dimensional space. The relation between the latter needs to be considered also vertically.



Figure 3.1.8. The streets of a historical town in Umbria Region versus a main street in Istanbul Metropolitan City (the photo credit: Emre Meltem).

The urban pattern in the third dimension has relevant implications also during emergencies, as it implies the easiness of carrying and using cranes if necessary, of maneuvering firemen tracks, etc. In modern times different interventions can be thought of, provided that such relationships are recognized, for example by adapting emergency cars and means to constrained environments.

3.2. Physical and social networks to guarantee cities' resilience

Authors: Alessandro Pagano and Raffaele Giordano

Disasters cause serious damage on structures and infrastructures, particularly in urban areas. All the lifelines ('hard infrastructures', e.g. water supply, transport, power supply, telecommunication) are impacted by extreme events, and their functionality is limited as a consequence of both physical damages and changes in the operating conditions. Lifelines are vulnerable elements, but also crucial assets to guarantee the safety and well-being of the impacted population.

Lifelines provide a very clear example of assets that work and function at multiple scales due to the internal hierarchy among individual components (typically plants and networks and networks of differential capacity), to the mutual interdependency among infrastructures (the power system is vital for all the others, to pump water and to guarantee communication survival), and to the interconnectedness between lifelines and any other urban function and asset. Such a high level of interdependency cannot be understood only locally, as lifelines are organized

regionally, nationally and across borders (for example, large gas and oil pipes connect Africa to Europe and Eastern to Western Europe). In order to guarantee the resilience of hard infrastructures, policies have been set at the European level, however their success depends strongly on how local, regional, national service and networks providers are able to prevent, manage the damage due to natural disaster and to recover, and to what extent they are interacting with emergency managers.

A strong connection exists between the reliability of hard infrastructure and social networks. Community organizations and community-based networks play a key role in disaster preparedness and recovery. Local knowledge, understandings, perceptions, resources, and cooperative strategies are crucial to determine system survival and, particularly, to properly drive recovery conditions. The More specifically, infrastructural systems play a fundamental role in keeping alive the social networks within a community in case of disasters by continuing to provide key services. The process of recovery after extreme events, is also generally supported by the availability of critical services, which significantly contribute to increase the resilience of the whole community.

Thus, the role of hard infrastructures (e.g. water supply infrastructures) at urban level supports the efforts of local communities during the emergency phase, revealing as a key asset to cope with the disaster.

3.2.1. Resilience of hard and soft infrastructures

The concept of resilience tends to be strictly related to both static and dynamic components of disasters across pre and post event context. A static model of resilience identifies and organizes critical variables, whereas a dynamic model represents how and why such variables change across time and space. Resilient systems have a reduced probability of failure, lower consequences from failures and a reduced time for recovery. Referring specifically to urban environments, resilience is related to the capacity of cities to cope with and recover from external shocks. An urban system can be considered resilient if it is sustainable even during the hazard occurrence phase, the most critical period, in which the city suffers the impacts of an extreme event and tries to reconfigure both its physical and social aspects towards a new equilibrium.

The infrastructural system of a city has to be conceived as linked with social and institutional systems, but also with the economic and environmental ones that are all embedded within the urban context and

dynamically interacting. Physical (hard) infrastructures involve amendments to the physical surroundings and landscape to serve a given purpose (e.g. transportation, power supply, water supply, management, and treatment). Social (soft) infrastructures refer to the networks and interactions among individuals, groups, and institutions within and outside the community. The link between them is crucial, since the resilience of a system is described by its level of functionality and assuming that it directly represents the level of satisfaction of citizen.

Enhancing resilience means improving the capacity of the whole system to anticipate threats, reduce vulnerability and allow a complete recovery from impacts. Several factors contribute to increase the resilience, which might not necessarily be related to the 'physical' characteristics of the system. They may depend on individual conditions (e.g. well-being and survival skills) and on community characteristics (community connectedness, community infrastructure, participation in disaster response and recovery, engagement in decision making). All these features are found to be highly influential before a disaster strikes, as well as in the event of a disaster and during recovery.

Several extreme events suggested that infrastructural systems play a fundamental role in keeping the social networks alive within a community in case of disaster by continuing to provide key services. The process of recovery after extreme events, is generally supported by the availability of critical services, which significantly contributes to increase the resilience of the whole community.

The Case Study of L'Aquila supported drawing a few key conclusions:

- Physical infrastructure provides vital support to communities during emergency and recovery phases after a disaster. 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, since the needs of the whole system change according to the specific path of recovery determined by the specific strategies implemented.

3.2.2. Building back better, the case of l'Aquila

After a disaster strikes, a prompt return to the status quo is needed. Nevertheless, simply rebuilding cities to pre-disaster standards would recreate the vulnerabilities that existed earlier and expose them to future disasters. Reconstruction is generally an opportunity to build back better. It is the restoration and improvement of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors.

This “build back better” approach advocates for the restoration of communities and assets in a manner that makes them less vulnerable to disasters and strengthens their resilience. Disaster risk reduction measures should be included into post-disaster recovery and rehabilitation processes. Resilient recovery and reconstruction are widely recognized as imperative for sustainable development.

Recovery thus represents much more than a return to the pre-event state. Recovery actions can also promote both physical and economic resilience, and prompt or facilitate investment in infrastructure upgrades and urban revitalization. Resilient recovery and reconstruction can be realized through a variety of strategies: enhancing preparedness; relocating critical facilities to safer areas; integrating disaster risk reduction measures into infrastructure improvements; strengthening governance structures, including the development of institutional mandates for disaster risk management; using the reconstruction process to address urban planning challenges; and establishing predictable contingent financing mechanisms, including disaster risk financing.

The issue of ‘Building back better’ emerges after major disaster, like the L’Aquila earthquake in 2009. The Italian city of L’Aquila (and its province) was struck by a disastrous Magnitude 6.3 earthquake at 3.32 a.m. on 6 April 2009. As a consequence of the event, 308 people died and 1500 were injured. Although the physical event was



Figure 3.2.1. Damaged lifelines in l'Aquila 2009

relatively moderate, its impacts were particularly high mainly due to the very high vulnerability of lives, livelihoods, building stock and institutions in the Apennine Mountains. The physical vulnerability level of its masonry buildings (poorly maintained and not strengthened), mainly located in the historical city center, led to enormous damages. Reinforced concrete structures were affected as well. Surprisingly, more casualties were due to the collapse of reinforced concrete buildings than of the masonry ones, due to their higher vulnerability (Contreras et al. 2014).

As a consequence of the earthquake and of its impacts on the built environment, L'Aquila is still undergoing a complex process of reconstruction. Particularly, on the one hand the extent of damages in the whole urban area limited the functionality of infrastructures and the accessibility for community (see e.g. Fig. 3.2.1); on the other hand, the changes in the population localization due to both temporary sheltering strategies and to the evolution of new permanent areas, forced a radical change of the performances required to the infrastructures. Particularly for the purposes of EDUCEN project, the water supply system represented the key infrastructural system to analyze.

The experience and the knowledge developed during the earthquake and in the aftermath of the disaster, provided crucial information to support the reconstruction phase. Learning from past errors and

from the key criticalities encountered was a fundamental step for an innovative, sustainable, effective, safe, 'resilient' design. Just to provide an example, the high uncertainty of the available information and the poor accessibility of some infrastructures often limited the possibility to operate promptly during the emergency; similarly, the need to adapt the whole network to both changes in the urban pattern and specific local needs (e.g. the need to provide some buildings with water using a network with a huge number of breaks) during the reconstruction phase, caused significant stress levels for the system. The urban critical infrastructural systems were thus deeply rethought, and redesigned according to the new needs of the city, and to the experience.

The design of the 'SMART TUNNEL' reflects a basic principle: electricity, gas, water and communication systems are key services supporting daily activities and the well-being of a community (<http://www.sottoserviziqa.it/it/home.html>). The basic idea behind the smart tunnel is simply to collect and integrate all the critical services in an 'invisible' shell, i.e. an underground concrete gallery, in order to protect them from external threats and make them easily accessible and repairable, both in case of disasters and in ordinary operation.

Providing safe drinking water to a community in case of disasters is one of the main commitments of emergency managers and local authorities. Particularly, the urban water distribution network of L'Aquila city, is being currently rebuilt according to innovative criteria, such as the districtification. The basic idea is to split the whole network into a number of subsystems characterized by spatial and functionality homogeneity in order to facilitate maintenance and management procedures. Districtification allows: a) controlling leakages and water



Figure 3.2.2. One of the main damages in 2009: Gran Sasso Aqueduct

losses; b) isolating single subsections of the whole network; c) implementing more effective measurements of hydraulic parameters. The distrectification supports flexibility and adaptation capability to the evolution of the urban pattern, and thus is strongly connected to the evolution of the whole city.

The L'Aquila case study is unique and relevant also because it allows the comparative analysis of two different networks operating within the same urban pattern. The urban water distribution system was completely redesigned after the disaster and is currently being built.

The selected measures, according to graph theory computed in an undirected and unweighted version, are summarized in the following Table 3.2.1. (full details can be found on our www.educen.cultureand-

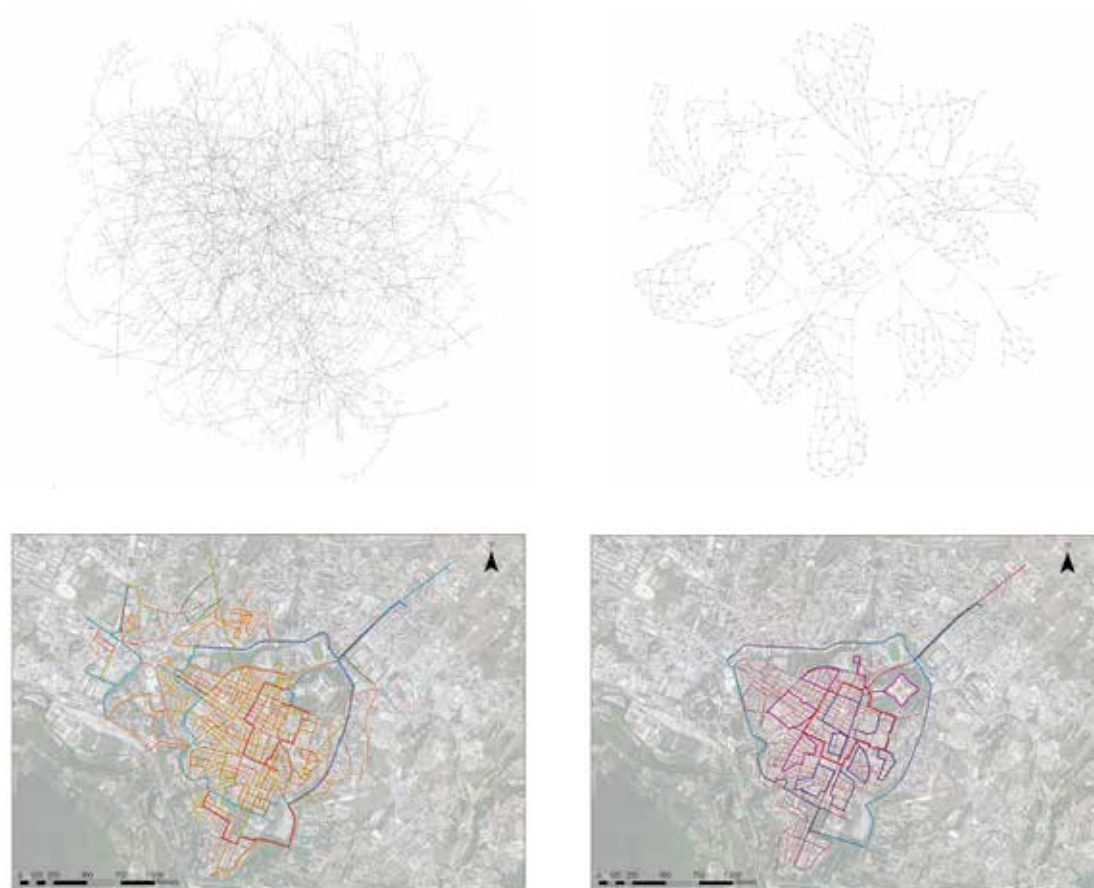


Figure 3.2.3. Representation of the urban water distribution network according to graph theory: OLD and NEW networks.

NETWORK K	q	K	D	I_T	C_C	R_m	C_B	D_{ap}	D_{BR}	λ_2	$\Delta\lambda$	fc
NEW – CS	0.006	3.0 0	26	13.4 3	0.041	0.25 2	0.412	0.1	0.1 1	0.0027	0.386 9	0.500
NEW – ZM	0.013	2.6 3	23	10.7 4	0.02	0.16 2	0.584	0.285	0.5 1	0.004	0.379 8	0.387
OLD	0.0006	2.1 5	97	32.7 6	0.004	0.37	0.455	0.391		0.00041	1.124 7	0.127

Table 3.2.1. Overview of the results of Graph theory analysis

disaster.eu). It is worth mentioning that the 'NEW' network is made of two independent subnetworks ('CS' – Centro Storico and 'ZM' – Zona Media), and thus the metrics are computed independently. The results generally contribute to suggest a better resilience of the new network, particularly in terms of flexibility, robustness and redundancy. Nevertheless, a comprehensive analysis should also be coupled with hydraulic models and with suitable performance indices.

3.3. How cities are managed matters

Authors: Funda Atun and Scira Menoni

As the trend towards urbanization has been growing fast in the last decade, international organisations such as the World Bank (Kreimer et al., 2003), the OECD (Corfee-Morlot et al, 2009), United Nations have devoted large attention to cities, defining guidelines to support the difficult task of planning and managing cities of the present age.

City managers are confronted with an ever rising pile of demands for better services, faster communications, greener spaces, and with new obligations set by policies. In the last couple of years a number of important agreements have been signed at the global level such as the Sustainable Development Goals, September 2015; The Sendai Framework for Disaster Risk Reduction, March 2015; the New Urban Agenda decided at Un Habitat III, October 2016; and the Paris Agreement on Climate Change, October 2016. Those agreements will need to be implemented locally at the city's scale, with concrete measures

and strategies. Creating a bridge between the indications listed in the agreements is a necessity before being an opportunity favouring knowledge exchange.

Fragmentation and separation of competences scattered among a large number of ministries, agencies, and even at the local scale among uncoordinated bureaus, is often the prevailing style of government, that undermines the benefit of investments and initiatives.

The field of disasters is even more complex, as it is not restricted to the traditional arena of city managers and planners, but must necessarily include those actors that intervene during an emergency, such as the army, fire brigades, police, medical doctors that do not have generally a strong role in cities' governance. They are asked to play a role only limitedly to disaster impact and recovery. In order to better complement and integrate policies, however, it would be recommended to involve such actors more broadly, taking into account their perspective also when deciding about critical infrastructures location, development zones, preservation projects of historic centres. Furthermore, stronger cooperation should be sought also with private organisations such as critical infrastructure providers and insurance companies to work together, exchange data, information and define common strategies to avoid cities' functional disruption during and after an extreme event's impact. In this respect insurers are already collaborating in some countries such as Norway and France to provide their data deprived from sensitive elements in order to inform about past and future potential risks at the city and even at the asset level.

3.3.1. Strategies and intervention across the “disaster cycle”

Figure 3.3.1 highlights the types of capacities that need to be put in place in particular to make cities resilient to disasters. In the 'x' axe the different phases are representing in which different behaviours are required: before the event it is necessary to plan adequately, during the emergency it is necessary to absorb the stress and respond, during recovery fast return to normalcy is required even putting in place temporary repair measures. In the reconstruction it is necessary to learn from the event in order to revise procedures and design that proved to be unsuccessful or unsatisfactory.

The capacities that are necessary are distinguished between: physical, necessary to make infrastructures more redundant, better equipped with safe-fail mechanisms; informational, related to the best use of

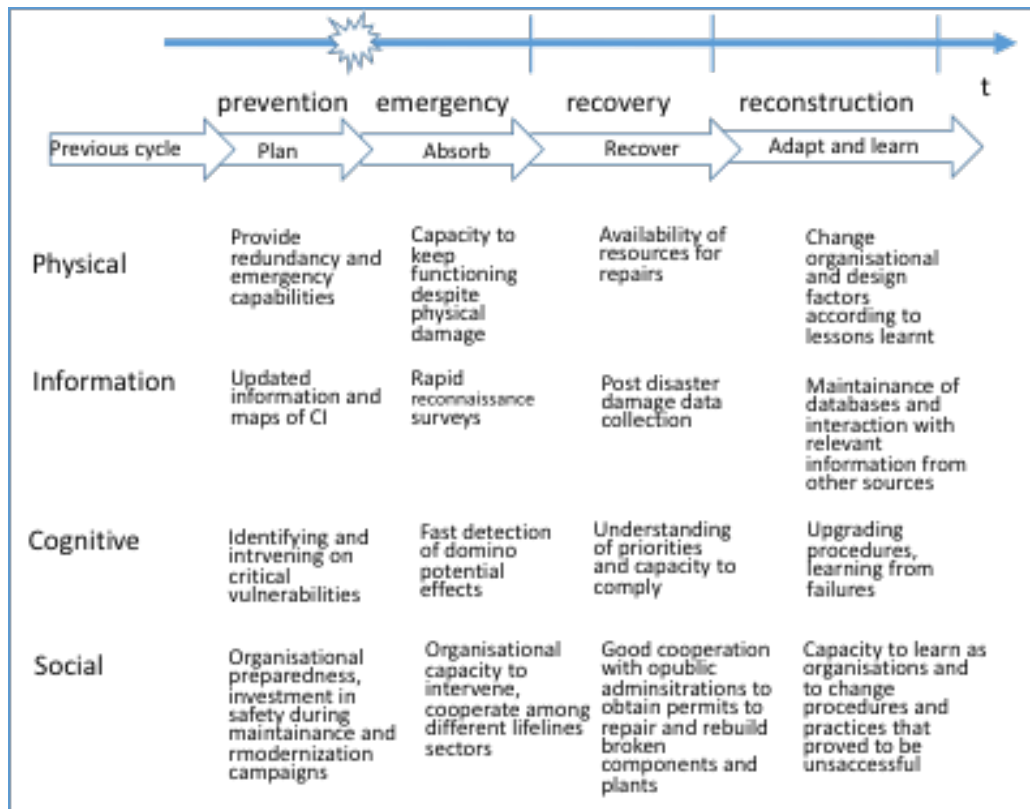
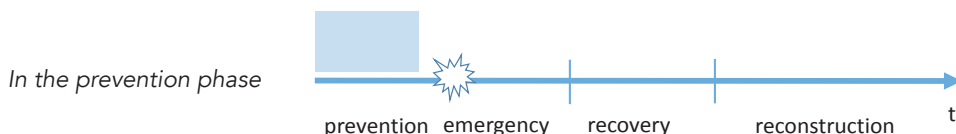


Figure 3.3.1. aspects that need to be considered to make critical infrastructures more resilient to disasters (after Linkov et al., 2013)

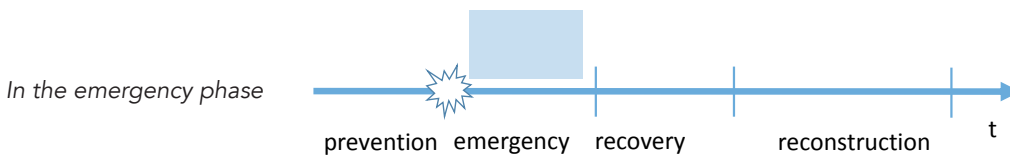
data and information to support decision making at each phase; cognitive, related to the understanding and the early detection of critical domino effects potential; and social, mainly related to the organizational capacity to coordinate and intervene in case of need. As it can be easily seen the capacities are both “hard” and “soft”.

At the global scale, the Resilient Cities Campaign carried out by UNISDR has been certainly the most eminent example of large scale initiatives aiming directly at the city level; similar stance has been taken by



the Rockefeller Foundation with the 100 Resilient City project. At present the Sendai Framework for Disaster Risk Reduction is addressing all spatial levels, specifying for each what are the main targets to be achieved in the next fifteen years, starting from March 2015 when it was approved in the World Conference held in Japan.

The main issue with all those initiatives is their very general approach that needs then to be interpreted and applied at the city level, ranging from metropolitan areas, where real intervention has to be carried out going down to the single neighborhoods or districts' level, to medium and small cities.



In the prevention phase, a number of decisions can be made to avoid exposure in the most hazardous zones, reduce physical and systemic vulnerabilities to the multiple stresses that may affect the city, and finally define structural measures to reduce the hazards' intensity and/or frequency. A mix of measures is generally more likely to be effective, depending on the specific characteristics of the context and the risks at stake.

Pre-disaster awareness as regards the significance of cultural heritage pays off during the pressing emergency phase and also, having in place a strategy for the preservation of cultural heritage including institutions and legislation, as well as inventories and documentation of historic buildings and their contents.

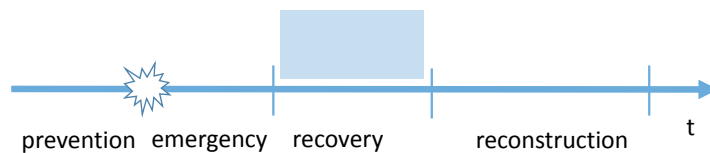
Depending on the level of destruction, the environment in which city managers and civil protection forces will have to intervene may be significantly disrupted and changed, posing many challenges in order to respond to immediate needs. In the emergency phase the first priority is to search and rescue victims and provide temporary shelters. Enchained events, including na-techs, that are more probable in urban environments due to the interaction of infrastructures and the presence of industrial areas must be prevented and mitigated as much as possible.

The management of emergencies will be carried more or less smoothly depending on the prior preparedness, on the existence and

good quality of emergency plans and on the prior integration of the latter with urban and land use plans, for example for accommodating temporary camps and areas for the gathering of emergency means.

Even though immediate needs for life and health get the highest priority, people do care also about the preservation of those values and assets that represent their self-identity and in the meantime may constitute a reason for hope and “rising from ashes” again (Anderson and Woodrow, 1998).

In the recovery phase

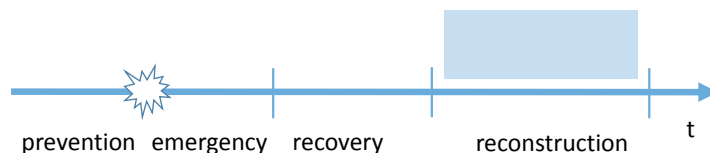


In this respect, intervening on cultural heritage to save what has survived complete destruction may be vital for the community. Technical measures include for example shoring structures to safeguard their resistance capacity in case of earthquakes, and moving to safer places movable objects such as ancient books, paintings and sculptures. L'Aquila in Italy was probably one of the cities that has experimented the larger shoring intervention ever after the earthquake in 2009.

The recovery phase is perhaps the most critical for the destiny of a city after a disaster. It is the time when critical decisions are made regarding reconstruction. It is also the time when damage data are collected and analyzed in order to not only to estimate the needs in terms of finance and resources for rebuilding and restoring, but also to learn lessons and decide about intervention modalities that will reduce pre-event vulnerabilities, making cities more resilient.

Post-disaster damage assessment has gained much more attention recently than ever before, making it clear that improved understand-

In the reconstruction



ding of what has been damaged and why is essential to support better decisions about priorities and modality of intervention. The experience carried out in the Umbria Region after the two floods in 2012 and 2013 provides an example of damage assessment that is attentive to the spatial and the temporal scales at which damage unfolds, regards all sectors relevant in urban life, and matches the damage with the description of the physical phenomena that has provoked it.

In the case of cultural heritage, specific damage assessments, documentation of the building and its condition (photos, drawings, reports etc.) need to be conducted, considering the differences between ordinary buildings and structures and ancient constructions.

Many point at the reconstruction as the phase offering the largest window of opportunities for improving the pre-event situation, as after a disaster some restrictions in the use of land and more stringent building codes may be accepted more easily. It is a time when also relocation of some assets and lifelines can be decided to make future cities more resilient. However such window closes fast, certainly faster than the time needed for the overall reconstruction, and ineffective decision making and implementation may not exploit the opportunities offered by the event. During reconstruction various risk mitigation and climate change adaptation measures can be better integrated than in ordinary conditions. Reconstruction of cultural heritage require very strong competences of the building sector with specialized personnel and knowledge regarding ancient techniques and materials.





4. Inclusion in Disaster Risk Reduction

79	4.1. What is community?
79	4.1.1. Questioning community
81	4.1.2. Community and disaster interventions
83	4.2. Engaging with beliefs and religious groups in disaster
84	4.2.1. Working with beliefs and religious groups
86	4.3. Diversity and people with disabilities
87	4.3.1. Disaster policies and frameworks
88	4.3.2. Disability
89	4.3.3. Disability Inclusive Disaster Risk Management (DiDRM)
91	4.3.4. In Practice: Lessons Learned on DiDRM in Istanbul
93	4.4. Gender and special needs
93	4.4.1. The concept of gender
94	4.4.2. The link between gender and disaster
95	4.4.3. Gender-specific disaster management instruments
96	4.4.4. Other groups with special needs

The late British PM Margaret Thatcher, used to claim that there is no such thing as a society, as we are all individuals. That view is neither shared in this handbook, nor by the United Nations.

The Sendai Framework for DRR 2015 – 2030 calls for an ‘all-of-society approach’ that is people-centred and inclusive. It enjoins governments, among others, to engage with all relevant stakeholders, including women, children and youth, persons with disabilities, poor people, migrants, indigenous peoples, and older persons in the design and implementation of policies, plans and standards.

It means ensuring that DRR policies and practices not only include them, but are also sufficiently attuned to their special needs and conditions. In the EDUCEN project, gender and disability were highlighted as priority areas in this regard, but also other groups were discussed in the EDUCEN workshops and exercises.

You may note that we make scant reference to ‘community’ as in ‘community-based DRR’ or ‘community resilience’. In the below, Robert Coates explains why a ‘community focus’, while laudable, may obscure important differences.

You may also note, that we focus on ‘diversity’ rather than on ‘vulnerable groups’. While, for example, clearly more elderly people are likely to need special help in disaster than young adults, labelling specific groups as vulnerable is to neglect their agency and self-perception. Very few social groups identify themselves as ‘vulnerable’ or ‘marginalised’ and while less-resilient in one respect, they may have crucial knowledge, capacities and networks in other respects.

That is not to say that special attention is not in order. We zoom in on religion, gender and disability as aspects that are found at all ages and

All-of-Society Guideline of the Sendai Framework

DRR requires an All-of-Society engagement and partnership. It also requires empowerment and inclusive, accessible and non-discriminatory participation, paying special attention to people disproportionately affected by disasters, especially the poorest. A gender, age, disability and culture perspective should be integrated in all policies and practices, and women and youth leadership should be promoted. In this context, special attention should be paid to the improvement of organized voluntary work of citizens (United Nations (2015) Sendai Framework for DRR 2015-2030, p. 19)

walks of life in cities, and thus also in urban disaster. We pay special attention to AKUT's encouraging results in working with and for people with disabilities in the Istanbul megacity.

4.1. What is community?

Author: Robert Coates

Community-based approaches are now a fundamental pillar of DRR and response. This was made explicit in the Hyogo Framework (2005-15), which directed global policies and initiatives with the by-line: Building the Resilience of Nations and Communities to Disasters. Vulnerability and resilience work is now increasingly measured and perceived according to more or less-cohesive communities and social support networks.

Yet it is not so clear what a 'community' really means. Are communities the close, cohesive units they are imagined to be, and does this even matter for disaster professionals? Rather than to assume that the community in question presents the same characteristics and motivations across its members, the cities section of this handbook advised us to unpack 'the social mechanisms that actually create resilience in a community'. This is a key point in what follows.

- The first half of this chapter briefly looks at the idea of community,
- The second half considers what community aware behaviour can add to DRR work. Above all, here we think through what an improved understanding of community does to deliver better risk reduction and response.

4.1.1. Questioning community

Like 'culture' itself, the word community is slippery – it means different things to different people in different places. Communities are indeed often perceived from outside rather than from within: migrant communities in European cities can easily be thought of as individual units, with common languages, identities, or customs. This may contain a grain of truth but it may also be an easy generalisation that papers over numerous cracks. The differences among each groups' members may in fact be much more pronounced, with ethnic, political, linguistic, religious, socio-economic or gendered differences pulling people

in different directions, and making their communication and behaviour in disaster settings harder to predict.

But many of these 'intra-community' differences can of course also apply to any group of city residents. While ethnic, linguistic, religious, or class ties might very often be strong indicators of community in European cities, the extent to which members of these groups agree amongst themselves on the best approach to preparedness, rescue, rebuilding, and future resilience is an open question.

Communities very often differ in their access to power holders in politics or business – and in many cases government actions on risk reduction are not spread evenly according to, for example, risk of flood or earthquake damage in each location. Rather, timely delivery of services and infrastructure can depend as much on a group's ability to lobby for its own interests as it can the actual cost of project implementation.

Authors have often used the term social capital to explain the bonds that community members have in common. Following research in both Italy and the United States, Putnam (2000) viewed the quality of community as lying within social networks. 'Weak ties'—as opposed to the blood ties of family—described the practices of trust and understanding that were built around the social networks of church, work, and neighbourhood activity. The stronger these 'weak' ties were, the more community members relied on each other for support, planning, and organisation in difficult situations such as crises and disaster.

Yet these community ties should not be seen as straightforward, or as things that outside initiatives can build and produce automatically. While community is certainly about shared interests and values, it is also about place – that is, the experience of living together in a proximate area. Looking specifically at marginalised, working class districts, renowned social theorist Pierre Bourdieu called this the 'site effect': people might have origins in very different cultural or ethnic backgrounds but come together as a community by nature of dealing with the same local issues and sharing the same local memories. Be it their employment and housing situations, political or social campaigns, or a trauma, tragedy or disaster, people were brought together. Social and cultural capital could act as constraining forces for community development as much as enabling ones. 'Essentialising' a particular community (say, Roma people, slum dwellers) as 'problematic', needy or wanting therefore causes problems as it fails to deal with the issues that pulled the community together in the first place.

In a more recent essay, Noortje Marres (2005) declared that issues spark a public into being: communities are not 'pre-given' things but are formed, develop, and then change according to the issues (in this case, disasters) that unite them in a common goal.

4.1.2. Community and disaster interventions

The above discussion helps us when considering the role of external professionals in disaster situations. We should not be romantic about the pre-existing ties that bind a disaster-affected community together, but maintain an awareness that social cohesion and mutual acceptance of other community members helps people to recover from disaster impacts. With this in mind, we must work to encourage and strengthen community bonds – not only for the mutual help that each member provides, but for the purpose of strengthening the community's collective ability to access political, planning, and economic decision makers in a unified approach into the future.

In a wide-ranging survey of flood victims in the UK, Butler et al. (2016) found that negative impacts on individual well-being were at their most critical point one year after flood events. A large part of the health problems experienced were due to people feeling a sense of isolation from those making decisions about their future needs – whether in terms of social-organisational needs or local infrastructure. People felt like they were coping alone and that they were powerless to take actions to better their situation.

Critical to this were people's attachments to the places in which they lived. Where adapting to future flood risk required significant change—both to infrastructure design and social organisation—people were more resistant to change and wanted to preserve traditional practices and landscape characteristics. People demonstrated little power in getting across the priorities they felt themselves in order to preserve place attachment. This directs us towards sensing a balance between 'hard' infrastructural resilience work and rebuilding communities' attachments to the places in which they live in order to maximise risk reduction outcomes. Doing the correct survey and conversational work across community members, and thus including their voice in disaster management decision-making was one of the projects' key findings – as was the need to take seriously local peoples' descriptions of the places in which they lived, across both landscape, social and political factors.

Key ideas can therefore be considered for engaging with communities in the disaster risk context:

- Studies on social vulnerability and resilience point to the important place of community workers in giving support, disseminating information, and connecting communities with governance institutions. In emergency situations, and throughout the post-disaster period, use of these workers should be comprehensively evaluated and supported in order to increase wide ranging benefits across communities.
- The writing of flood plans, emergency evacuation procedures, or timelines for disaster recovery should be written together with local communities, both to gain their perspectives and to inspire the communities' own conversations about future planning and community connectivity.
- Social mapping can be undertaken to gain insight into how community members perceive their own situation and their relationships with other key stakeholders. This can produce surprising diversity of bodies to draw on in both disaster preparedness and response, and more critically still, reveal the relative importance local actors give to state, private sector, NGO, political or foreign bodies.
- Assistance can be given to communities in how to influence decision makers and draw attention to their situations. Uses of the media, and social media, may be critical. Gough (2000–2002), writing on New Zealand, reported that government agencies undertook risk perception studies, where residents explored how to create communication channels to increase dialogue between themselves and government bodies responsible for disaster situations.
- There is a tendency for community leaders, often men, to speak for everyone, but less involved parts of communities, including women and young people, quite often bear the greatest brunt of disaster impacts. Activities undertaken with youth in the past have included drama role-plays of disaster evacuation plans, or flood or earthquake preparedness strategies.

4.2. Engaging with beliefs and religious groups in disaster

Author: Mona Regad

Beliefs, in particular religious beliefs, have numerous attributes and functions. They are heterogeneous and dynamic, as they change and develop through time and space under the influence of the societies they take root in. Beliefs mediate the relationship between human beings and their environment, are used to make sense of the world and of experiences, and thus shape how communities perceive and react to disastrous events. It is thus important to consider these beliefs throughout the disaster cycle.

Faiths and convictions are sensitive topics which are usually not addressed upfront, especially in emergency situations. They challenge 'rational' assumptions and because they are intangible, they can be difficult to understand and to recognise. Yet as they form a major part of culture, beliefs influence all aspects throughout the disaster cycle:

- how communities look at risks and disasters;
- how they respond to it;
- how they recover from it;
- their capacity and eagerness to implement DRR strategies.

Religion has an active role in bringing people together. Religion can act as a resource for people by giving access to networks of support and by providing ways of coping with disasters. Beliefs provide a framework for understanding, interpreting, preparing and responding to disasters. Natural hazards-induced disasters are sometimes interpreted across cultures and cults as divine expressions of God's punishment, anger, or retribution for human sins.

Research in Italy, Hungary and Turkey has shown that groups understanding disasters such as earthquakes as caused by fate or God were not well prepared for disasters, because they did not believe having any control over the event. This behaviour is referred to in psychology as external locus of control, where people place outcomes outside of their reach and thus the feeling of having no responsibility in it deters them from taking preparedness actions. Religious beliefs can also work in the opposite way, by fostering internal locus of control, where each individual is in ownership of his own fate or karma. Regarding climate change mitigation for example, Buddhist notions of interconnectedness and mindfulness can be operationalised to foster better practices towards sustainability (Daniels 2010; Oral et al. 2015)

This influences the capacity of people to respond. On one hand, fatalistic understandings can support passive attitudes and can deter people from evacuating a risky area or implementing preparedness measures. On the other hand, faith-based interpretations can also help people being more aware of their vulnerability and provide grounds for mitigation practices. Indeed, certain communities can value being proactive and engaging in preparedness activities as a way of negotiating with the divine and influence the risk.

4.2.1. Working with beliefs and religious groups

People's understandings of disasters within religious or spiritual frameworks are more widespread than is commonly assumed, not only in preindustrial societies but also in secularising Europe (Chester, Duncan and Dibben 2008).

Faith-based community groups have their own modes of organisation, practices and communication means. Accessing religious groups for disaster preparedness and DRR is therefore crucial for disseminating information.

As a starting point, it is important to consider religious groups both as targets and resources for disaster management.

Some tips to consider when working with religious communities:

- Involving groups representatives in discussions and planning about DRR
- Connecting with faith leaders to build trustful relationships and facilitate the implementation of a DRR framework with inputs from both civic and religious actors
- Adapting language and material: speaking the same language than partners and affected populations helps in securing good communication
- Developing tools for training faith leaders and for securing outreach and continuity within communities (ex: disaster preparedness as part of school curriculum)
- Developing a form of religious literacy by being aware of appropriate customs and behaviours (ex: clothing, behaviour towards women, food prohibition and dietary laws regarding food provision...)

Faith leaders are valuable resource persons as they can act as brokers between aid organisations and communities. They benefit from the community's trust and thus it can be profitable to be introduced by them to the people and to learn from them about the group's culture before starting to work. Evacuation instructions, for example, may be better accepted and followed when enacted by a priest, an imam or a rabbi than by a state representative or an aid worker.

In the same way, religious buildings are strategic locations as they are home to important practices and eventually social activities by religious communities. Churches, temples, mosques and synagogues are perceived by their attendees as safe places, where they may seek refuge or advice. Therefore, contingency plans could eventually consider them as places to accommodate displaced people, or distribute food, while paying attention to the fact that these spaces do not have the same impact for people from different cults.

Religious communities are organised at various levels and potentially have their own understanding of risk. Christianity, as any faith group, is divided between multiple organisations levels that will be mobilised in times of emergency. Schools, hospitals, cemeteries, social services, and aid providers may belong to the same faith and operate within the same networks. Tapping into these networks is necessary to reach populations who might not be on the same map than aid agencies or authorities.

Religion and volcanic risk in Southern Italy (Etna and Vesuvius)

Religious terms of reference have been and remain vital elements in the perceptions held by a significant proportion of the population in Southern Italy when confronted by volcanic eruptions, particularly those that have occurred on the Vesuvius and Etna. Many of Mount Etna's eruptions have been associated by Roman Catholic communities living in the vicinity with religious interpretations and rites. Among the general public living in the vicinity of Mount Etna, there is the belief that disasters may be averted through religious faith and practice through the role of saints. Some people believed the patron saint of the town could have stopped the lava, so some people decided to put the statue of the saint in front of the oncoming lava. They positioned it 50 meters away, hoping it would perform a miracle but it was no good. Yet, in Southern Italy, there is neither negative evidence of fatalism, nor that action by the government has been resisted on purely religious grounds. For example, the evacuations carried out during the 1906 and 1944 eruptions of Vesuvius had the general support of the population affected, and on Etna no central or local government initiatives have been resisted because of religious considerations (for more information see Chester, Duncan and Dibben 2008).

A US-based tool to involve religious and cultural communities is the LEADER process: Learn, Educate, Assess, Determine, Engage, Review. It is used in emergency situations, but is also useful for preparedness:

- Learn about the disaster's impact (hazards maps, Vulnerability and Capacity Assessments, risk maps produced by communities and government agencies...)
- Educate yourself on local faith communities
- Assess your religious literacy and competency : what is your current state of knowledge? With which communities are you the most comfortable working with? Where to source training or information to increase your team's religious literacy and competency? Which biases do you have that might alter your perception of certain religious groups?
- Determine an Engagement plan: who/what/when/where/why/how? This is the point where connecting with brokers, key actors who will positively affect your reach and intervention, is necessary, as well as considering existing capacities.
- Engage religious leaders and communities by building respectful and trustful relationships
- Review and keep improving your plan.

For more information, see the US Federal Emergency Management Agency's (FEMA) training in Religious and Cultural Literacy and Competency.

4.3. Diversity and people with disabilities

Author: Çağlar Akgüngör

Disasters highlight the human diversity in a very dramatic way: A person's or group's characteristics translate into different levels of vulnerability to disaster risks, which in turn lead to an "unequal distribution" of the disaster impact. Rapid onset and large scale events such as major earthquakes, floods or hurricanes cause the biggest harm and loss on the "less-privileged". The latter's exposition level to risks is also usually higher and their capacity to mitigate those risks is lower due to several factors. A low level of income is often mentioned as the prevalent factor since it may limit seriously people's ability to access to risk information and to take the necessary measures to reduce their exposure. Poverty not only signifies a limited access to disaster-resistant infrastructure and services like education (more access to in-

formation) that would increase the protection level, but also a diminished capacity to recover after the disaster. On the other hand, the economic situation is often intertwined with other human conditions or characteristics in shaping vulnerabilities: Combined with socioeconomic conditions, gender, age, disability, health condition, ethnicity and other particularities generate a class of “most vulnerable” which is disproportionately affected by catastrophes.

“One size fits all” plans and actions may exclude the most disadvantaged groups, who are also the least equipped for influencing policy-making processes. A positive development at the international level in this respect is the rising trend of “inclusiveness”, in part as a consequence of recent major disasters that have made the problem more visible, but also as a result of decades-long efforts by advocacy groups.

4.3.1. Disaster policies and frameworks

The Sendai Framework for Risk Reduction, drafted in March 2015, is the most recent, comprehensive framework that clearly emphasizes the need for inclusion in the DRR. Adopted by 187 UN member States, it brings the concept of inclusion as a fundamental element for reducing disaster losses: “DRR requires an all-of-society engagement and partnership. It also requires empowerment and inclusive, accessible and non-discriminatory participation, paying special attention to people disproportionately affected by disasters, especially the poorest. A gender, age, disability and cultural perspective should be integrated in all policies and practices, and women and youth leadership should be promoted.” (article 19d) The Sendai Framework also stresses that inclusiveness cannot be reached by a top-down approach, and it requires active presence of the possible disadvantaged groups who would be given the opportunity to express themselves and to mobilize their resources (intellect, knowledge and skills) in order to contribute to the design and implementation of the DRR plans and actions, article 36).

Although the Sendai Declaration’s focus is mainly on the reduction and mitigation of the risks and building resilience, its recommendations on inclusiveness can (and should) be extended to any phase or activity of the disaster cycle. Notably, post-Sendai declarations follow this trend. For instance, the Dhaka Declaration on Disability and Disaster Risk Management drafted in December 2015 has urged governments around the world to “implement the Principles of the United Nations

Convention on the Rights of Persons with Disabilities (UNCRPD), and other human rights treaties to ensure the participation, inclusion and leadership of persons with disabilities within all disaster management programs" (article 1) (Dhaka Declaration on Disability and Disaster Risk Management 2015) The Dhaka Declaration to ensure the participation, inclusion and leadership of persons with disabilities within all disaster risk management programmes." (Article 1, Ensuring people centric approach)

The recognition of diversity and the need for inclusiveness has also been considered as a "key finding" by the World Humanitarian Summit in May 2016, which shows that inclusive approaches will become part of the humanitarian policies and actions as well (World Humanitarian Summit Commitments to Action 2016).

The UN Convention on The Rights of Persons With Disabilities (2006) stresses that: "State Parties shall take, in accordance with their obligations under international law, including international humanitarian law and international human rights law, all necessary measures to ensure the protection and safety of persons with disabilities in situations of risk, including situations of armed conflict, humanitarian emergencies and the occurrence of natural disasters." (Article 11, Situations of risk and humanitarian emergencies)

The well-known proverb "a chain is only as strong as its weakest link" is very much true with respect to vulnerability to disasters. It is clear that "a community can only be safe when all of its members are able to cope better to avert disasters" (INCRISD 2014). Inclusion should therefore not be seen as "optional"; inclusion is about equality of rights and opportunities for all those exposed to the same risks. To this end, it is necessary to create the mechanisms that will ensure participation in DRR effort; to empower the disadvantaged both from the point of knowledge and skills so they could participate and contribute. The last step is to develop tailored approaches that will encompass all the stakeholders. In other words, it is about replacing "one size fits all" developing approaches to DRR and disaster management by "universal" ones.

4.3.2. Disability

Most people associate the term "disability" with some form of physical impairment and a quasi-permanent state of incapacity, which is why the wheelchair icon became the omnipresent symbol of disability.

Yet this term points to a wide spectrum of physical or mental conditions that may coexist and cause very complex situations. The medical perspective alone is hardly sufficient for understanding disability. From a societal point of view, disability also comes to signify a particular life style, a different way of thinking, experiences and culture as well. In other words, it is a human condition rather than a pathological state.

The “social model of disability”, which claims that the disability results from the reaction a society gives to difference, is increasingly replacing the medical model, which focuses on the difference itself. According to the social model, individuals become disabled when the society fails to recognize human diversity and to lift the barriers that restrict their options and action margin in life. While the term “barrier” is often associated with physical obstacles such as the lack of adapted infrastructure or accessibility solutions, adverse socioeconomic conditions and lack of support may also be considered as barriers, even if “intangible” or not directly measurable: prejudice, beliefs, perceptions, negative attitudes, stereotyping or discrimination continues to prevent people with disabilities from enjoying a “full life”.

The social reality described above affects the life of a significant part of the world’s population: According to the World Health Survey 15.6 % of the World’s adult population; 2.2 % having significant difficulties in functioning. Still people with disabilities have difficulties in enjoying their fundamental rights, including consultation, and in benefiting from the same services and opportunities offered to the rest of the population. While Disaster Risk Management (DRM) emphasizes the vitality of improving people’s capacity to cope with disasters and building social resilience, in order to minimize the potential effects of disaster risks. These goals, however, cannot be reached through “generic” DRM frameworks designed for the “average citizens” without significant health issues, who are supposed to possess adequate resources and a sufficient literacy level to access information.

4.3.3. Disability Inclusive Disaster Risk Management (DiDRM)

Disaster risk management (DRM) involves risk mitigation, preparedness to disasters and disaster management. It is “a way of thinking and acting around risk” which goes beyond infrastructure-based solutions and focuses on society, emphasizing the vitality of improving people’s capacity to cope with disasters and building social resilience, in order to minimize the potential effects of disaster risks. These goals, howe-

ver, cannot be reached through “generic” DRM frameworks designed for the “average citizens” without significant health issues, who are supposed to possess adequate resources and a sufficient literacy level to access information. Inclusiveness, therefore, becomes necessary to bring under the same protection umbrella the ones excluded by the “one size fits all” attitude. In this sense, Disability Inclusive Disaster Risk Management (DiDRM) aims to compensate the lack of adapted strategies for individuals with disabilities.

It is important to retain that DiDRM is a rights-based approach and based on the principle that people with disabilities should enjoy the same level of information, support, service and they should be given the same range of options offered to the rest of the population facing risks and disasters. On the other hand, it is equally important to retain that DiDRM is not only about receiving services, or benefiting from various forms of protection. It also involves active participation to the design and to the implementation of DRM actions by people with disabilities, who know best their needs but also capabilities and strengths.

DiDRM's key principles can be summarized as follows:

- **Participation:** People with disabilities should participate to planning, implementation and monitoring of the DRM activity. This suggests that the barriers to their participation should be lifted and the opportunity for dialogue be created (they should be empowered first if necessary, for example in terms of knowledge).
- **Non-discrimination:** The exclusion factors preventing people with disabilities' from being part of the DRM activities and services have to be eliminated.

The UN Convention on The Rights of Persons With Disabilities (2006) stresses that: “State Parties shall take, in accordance with their obligations under international law, including international humanitarian law and international human rights law, all necessary measures to ensure the protection and safety of persons with disabilities in situations of risk, including situations of armed conflict, humanitarian emergencies and the occurrence of natural disasters.” (Article 11, Situations of risk and humanitarian emergencies)

The Dhaka Declaration on Disability and Disaster Management (2015) urge governments to “Implement the Principles of the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD), other human rights treaties to ensure the participation, inclusion and leadership of persons with disabilities within all disaster risk management programmes.” (Article 1, Ensuring people centric approach)

- **Accessibility:** Disaster risk information, participatory DRM activities and all DRM-related services should meet the accessibility needs of various disability groups.
- **Tailored solutions:** People with disabilities should not be considered in broad categories and the complexity of disability phenomenon should be taken into account in the DRM processes. Specific solutions should be developed for the widest range of possible cases.

4.3.4. In Practice: Lessons Learned on DiDRM in Istanbul

Although states are the leading actors of DRM, recognition of diversity and inclusion cannot be achieved through public sector action only. The adoption of an inclusive attitude towards people with disabilities is also a must for all stakeholders, including NGOs and other types of civil initiatives working in the domain of disasters and mass emergencies. The difficulty is that the road to inclusiveness is not without pitfalls, despite the apparent simplicity of the DiDRM principles as summarized above. In this sense, we believe some lessons we have learned during EDUCEN Project Istanbul Case Study may help other organisations in their DiDRM efforts.

AKUT Search and Rescue Association has aimed at developing a disability inclusive public disaster preparedness program. From AKUT case study team's perspective, the main objective was to make the disaster preparedness materials accessible for people with sight and/or hearing impairments while incorporating disability-specific information into the content for 3 selected groups; persons with sight impairments, persons with hearing impairments and those with reduced mobility. Consequently, the action has debuted as a feedback collection and formal adaptation work. A series of extended focus group meetings have been organized in order to review AKUT's existing program and content, in collaboration with disability organisations.

Interaction and dialogue with people with disabilities has altered AKUT volunteers' perceptions of disability, the EDUCEN Istanbul case study's focus shifted to inclusiveness, repositioning accessibility as merely one of its pillars. The case study team also made the following observations:

- 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 organisation itself has to become inclusive. For an NGO 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).

- 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 inclusion is based on the principle of equality between human beings and the associated human rights.
- People 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. 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.
- 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, there 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 organisation is in the disaster preparedness and response, it needs the knowledge (and support) of people with disabilities to become inclusive. This is only possible through integration and dialogue.

4.4. Gender and special needs

Author: Georg Frerks

4.4.1. The concept of gender

Gender is defined as “the socially defined or constructed sex roles, attitudes and values which communities and societies ascribe as appropriate for one sex or the other. Gender does not describe the biological sexual characteristics by which females and males are identified” (The Sphere Project 2000). Bouta, Frerks and Bannon say that: “Gender roles vary according to socio-economic, political and cultural contexts, and are affected by other factors, including age, class and ethnicity. Gender roles are learned and negotiated, or contested. They are therefore changeable. Besides differences in roles between women and men, roles among women and men differ as well, while both women and men may also combine different roles individually over time or even simultaneously” (2005: 3).

It should, however, be underlined that making gender synonymous with the positions and roles of women and men constitutes an extremely limiting and reductionist gender view. According to Dubravka Zarkov gender is better seen as an organizing principle of social life that affects different levels of social reality, not only individual people. Gender is part of everyday social relations of power that reproduce or challenge gender and gendered relations (Zarkov in Bouta et al 2005).

Over the last two decades, gender issues have increasingly become an explicit part of disaster analysis and management and there is a growing awareness of the different relations between gender and disaster. The call for gender-sensitive disaster management is motivated by the question of how to intervene in disaster situations without losing track of their gender dimensions, not rarely with the explicit aim to prevent that women are overlooked or marginalized in disaster response. This is also needed to ensure that disaster responses are tuned to the gender-specific needs and problems that women and men face.

- The effects and impacts of disasters differ for men and women due to biological, sexual and socio-cultural factors
- Gender dynamics often translate into particular gender-specific patterns of vulnerability as well as resilience and also affect patterns of coping, how disaster experiences are built up, and risks perceived.
- Stereotypical images of women as passive and incapacitated victims

overshadow the fact that they possess valuable knowledge, skills and experiences that as a consequence remain unnoticed in many disaster policies and responses.

“A gender perspective should be integrated into all disaster risk management policies, plans and decision-making processes, including those related to risk assessment, early warning, information management, and education and training” (The General Assembly and the Hyogo Framework for Action quoted in Valdés 2009: 19).

4.4.2. The link between gender and disaster

The effects and impacts of disasters differ for men and women. This is due to biological, sexual and socio-cultural factors including gender relations in a community. Different reproductive functions, menstruation, pregnancy, child bearing and lactating require culturally adapted support and protection for women and girls. These biological and gender dynamics often translate in particular gender-specific patterns of vulnerability as well as resilience. They also affect patterns of coping, how disaster experiences are built up and risks perceived, how risk awareness is distributed and attitudes forged. In many instances the distribution of knowledge, assets, income, livelihood possibilities, decision-making power, and access to services is also highly gendered.

In addition, women and girls are often seen as physically and emotionally weak, inferior to men and boys, dependent, subordinate and generally as a burden. In disaster these perceptions are extended to identify them as passive and incapacitated victims. In reality, women appear to have valuable knowledge, skills and experiences, but this goes unnoticed in disaster policies and formal disaster mitigation and recovery arrangements (Ariyabandu 2009).

There is evidence that the mortality rates in recent disasters (esp. the Indian Ocean tsunami) have been higher for women than for men, due to a combination of cultural aspects and gendered patterns of vulnerability. But also disaster recovery is biased with less participation, access and rights for women.

A gender focus should not exclude men. Gender is always a relational topic, and also men and boys have specific needs, capabilities and vulnerabilities. It is also of the essence to deal with masculinities and

the way they inform male behaviour and attitudes. Several programmes did focus on women only, sidelining men who also had lost nearly all they had in the disaster and also had their share of grief and sorrow. But apart from that, successful interventions simply will have to include men, in an effort of 'men-streaming', as it was dubbed by Bannon and Correia (2006) as meaningful changes cannot happen without the 'other half of gender', as Bannon and Correia have titled their book on men's issues in development.

There is a lot of helpful material available on how to make disaster management gender-inclusive or gender-specific in the form of guidelines, tools and checklists. Be aware that these may need to be adjusted to your own specific situation or purpose.

4.4.3. Gender-specific disaster management instruments

There is a burgeoning literature on how to make disaster management gender-aware, gender-inclusive, gender-specific, gender-fair or simply 'gendered'. It is not possible to do justice to all what has been written and we suffice a by only a few references that can further guide researchers and practitioners.

Elaine Enarson is the founder of the Gender and Disaster Network (GDN). She is one of the most influential scholarly writers on the subject. Her several publications are a rich source to review the debate. The chapters 'Representation of Women in Disasters' and 'How Gender Changes Disaster Studies' in her book are very informative and insightful (Enarson 2011). Enarson designed for the GDN "Six principles for engendered relief and reconstruction" comprising again over fifty issues warranting attention in disaster planning, analysis and implementation (reproduced in Valdés 2009).

The GDN website (<http://www.gdnonline.org/sourcebook/index.htm>) provides access to the Gender and Disaster Sourcebook. In addition, Chakrabarti and Walia offer a comprehensive toolkit for mainstreaming gender in emergency response, comprising again sixteen partial toolkits for the issues covered varying from preparedness and early warning, search and rescue, health, livelihood and Water Supply and Sanitation (2009).

Based on its experiences with the tsunami relief aid in Sri Lanka, UNIFEM has gendered the five priority areas of the Hyogo Platform for

Action (reproduced in Joshi and Bhatt 2009). In addition Joshi and Bhatt offer six specific recommendations to better engender future disaster recovery (see 2009: 318).

4.4.4. Other groups with special needs

There are many other groups with special needs that require special attention in disaster response. They include children, the elderly, socially excluded communities, homeless, (illegal) migrants, chronically ill, (linguistic) minorities, tourists, HIV positive individuals, males who have sex with males (MSMs), occupational minorities. Many of those groups are socially excluded and face special risks or lack empowerment.

According to the facilitators' guidebook 'Practicing Gender & Social Inclusion In DRR', socially excluded groups experience varying degrees of alienation (distancing) in the disaster reduction or emergency response programs. This distancing is also an outcome of the wider social processes within which these groups usually receive inadequate attention and are systematically disadvantaged owing to different reasons. These groups face social exclusion on the following grounds:

- These groups are, in various ways, kept away from full participation in the wider economic, political, cultural, and social life;
- The enduring discrimination and historical social features entrapped these groups in a situation below the minimum threshold of well-being while hindering their full participating in the society.
- They are lacking in power and access to decision-making that could influence policies or create opportunities for improving their standard of living.

'Social exclusion describes a process by which certain groups are systematically disadvantaged because they are discriminated against on the basis of their ethnicity, race, religion, sexual orientation, caste, descent, gender, age, disability, HIV status, migrant status or where they live. Discrimination occurs in public institutions, such as the legal system or education and health services, as well as social institutions like the household, and in the community' (DFID 2005). However, the degree of discrimination varies from one society to another, as do the forms that social exclusion takes. Social exclusion operates on the ground and accelerates the vulnerabilities of these groups through three different processes:

- exclusion in the community and social interaction,
- institutional or organisational exclusion and
- exclusion by the market

(Directorate of Relief and Rehabilitation, Ministry of Food and Disaster Management (2009, p. 16-17)





5. Actors Response and Interaction

101	5.1. The role of culture in multi-organisational emergency management
101	5.1.1. Challenges with information sharing and coordination in emergency response
102	5.1.2. Introducing a culture model: the trading zone
105	5.1.3. On methodology and methods: a research agenda
106	5.1.4. The emergency responder as reflective practitioner
106	5.2. Organisational interaction in emergency management
108	5.2.1. Mapping network interactions in L'Aquila
113	5.2.2. Mapping network interactions in Lorca, Spain
120	5.3. The role of volunteers and gatekeepers
120	5.3.1. The role of volunteers in DRR
124	5.3.2. The role of local leaders and gatekeepers in DRR
127	5.3.3. Working with volunteers and gatekeepers in DRR: recommendations from five European cities
128	5.3.4. Actions for improving DRR in the Italian, Swedish, Dutch and Spanish contexts
130	5.4. The role of the armed forces and civil-military interaction
131	5.4.1. Requesting military support
134	5.4.2. Civil-military coordination

A multitude of actors, their perceptions, their knowledge base and value commitments (and political interests) are engaged in processes of risk analysis, decision-making, and disaster management.

The stakeholders usually involved in disaster management are:

- Authorities; Public administrations play a prominent role at all levels during disaster and public servants or elected officials have the ultimate responsibility for making top-level decisions.
- Non-governmental organisations: local, national, and international NGOs may also be involved in different aspects disaster. They may be engaged in DRR and in the response phase they may provide emergency and transitional settlement, shelter, water, and sanitation.
- The community; not a single entity but as noted earlier, a highly diverse range of social actors whose voluntary work actually saves and rehabilitates most people in a disaster.
- Emergency services; fire, rescue, emergency medical services and law enforcement represent the first institutional response. They, and other emergency responders, might be involved in tackling the emergency on site, warning, evacuation, and communication.
- Armed forces: in some countries, response to disasters is managed by civil defence or civil protection departments dominated by armed forces personnel. Tasks of the armed forces often include operational and logistical support to civilian teams (Lopez-Carresi et al. (eds) 2013)

In this chapter we ponder what happens when organisational cultures meet when facing an emergency. If they did not know each other all that well before the crisis, misunderstandings, confusion and overload can easily arise. Situational awareness can be substantially improved by understanding the different ways professionals are used to talking to each other, and to disaster-affected people about what's going on. It takes insight in how organisations understand themselves, their place in the network of actors involved in disaster management, and the nature of that network. We provide a method for Social Network Mapping, seeking to capture not only formal but also informal actors – who they are, with whom they communicate, where they tend to get their information from. The 'spider web' this generates (illustrated by L' Aquila and Lorca) helps us prepare better for the next disaster event. The chapter then zooms in on two key but underappreciated actor groups in the response network: volunteers and 'gatekeepers', and how they could be more effective in DRR. Finally, we focus on

the role of the military. We discuss how the difference in culture and organisation between civil and military organisations can complicate disaster CIMIC (civil-military cooperation), and what may be done to make things easier.

5.1. The role of culture in multi-organisational emergency management

Authors: Kees Boersma, Jeroen Wolbers

5.1.1. Challenges with information sharing and coordination in emergency response

One of the most pronounced key challenges in emergency management concerns how to adequately share information and coordinate the rescue efforts of different emergency response organizations. In emergency response various organizations with different backgrounds, specialized operational expertise, and professional jargons try to develop a shared understanding of the situation. In order to do so, they must bridge their jurisdictional and organizational boundaries. This is challenging because each response organization has operational field units at different levels, different functional command structures, and separate back offices for information and resource management. Consequently, emergency management literature often describes failing information management due to problems of information overload, difficulties with information technologies and validation of information, and insufficient attention for data sharing (Comfort and Kapucu, 2006; Kapucu, 2006; Moynihan, 2009; Netten and Van Someren, 2011).

Recently scholars have started to address the cultural dimension in emergency response operations. For example, Morris, Morris and Jones (2007) describe that the success of the US Coast Guard rescue operations in the aftermath of hurricane Katrina was based upon being able to speak the different professional languages of many different stakeholders. In a different analysis of the response to Hurricane Katrina, Moynihan (2012) shows how the Department of Defence performed a culture-switch to adopt to a new multi-stakeholder operational logic. Similarly, Tsai and Chi (2012) argue that cultural distance is the missing link in explaining the gap between desired and perceived effectiveness of Incident Command System in Japan and Taiwan.

Yet, a coherent perspective on the cultural dimension of multi-organisational response operations is missing. The main focus of this chapter is, therefore, to explore the cultural dimension in multi-organisational emergency response coordination. We propose a coherent cultural model, which builds upon and integrates several years of empirical studies into Dutch emergency response organisations (Boersma et al., 2010; 2012; 2014; Wolbers et al., 2012; Wolbers and Boersma, 2013; Treurniet et al., 2016; Wolbers, 2016).

5.1.2. Introducing a culture model: the trading zone

Organisational culture has been described as a pattern of (a) basic, shared assumptions, (b) invented, discovered, or developed by a given group, (c) and instrumental for organisational members to cope with problems and uncertainties (Schein, 1996; Giorgi et al., 2015). It is seen as the social glue that holds the organisational members together. In the case of emergency responders this means that the fire department, police and ambulance services each have distinct cultural characteristics that give the professionals an unique identity, but at the same time can also cause misunderstanding between them as soon as they have to work together.

However, the description of culture as a static set of shared assumptions is an oversimplification of the actual situation. Stories of first responders provide us with a far more complex and dynamic picture, showing that tensions can develop because of cognitive and normative diversity within a particular response organisation. The attribution of meaning (an important part of the cultural process) is complicated and can lead to fragmentation as well as integration, diversity as well as unity. In line with JoAnne Martin's organisational cultural analysis (2002), we argue that a monolithic approach that sees each response organisation as having an own 'culture', neglects the complexity of the cultural dimension. In order to understand the role of culture in the multi-organisational, and dynamic environment in which emergency responders operate, we propose a model that adheres to that complexity. We do so, by addressing the practices of emergency responders from an interpretive perspective, which considers organisational culture:

- 1) to be a layered phenomenon, which including the values and the deep assumptions within the organisation,
- 2) to be multi-dimensional since it is not a static, monolithic phenomenon in which each organisation has a distinctive culture (i.e. are

integrated). Instead, these cultures can also be differentiated (i.e. have subcultures) or be fragmented (i.e. different perspectives can exist within one subculture) and they can change over time,

3) to be an outcome of sensemaking and sensegiving in which organisational members (de/re)construct reality based upon these processes to find out what is going on in times of uncertainty.

In the actual practice of emergency response operations, we have often witnessed professionals from the different response organisations in discussion with one another about the characteristics of the emergency, their actions, and the consequences of the actions for the response operation. This interaction is characterized by a process we regard as negotiation. We propose a model of cultural-in-practice to capture the recurring processes of negotiating actions and interpretations between emergency responders. The negotiation between emergency responders take place in trading zones: situations in which local coordination of ideas and action take place despite differences in the (professional) backgrounds, norms, and routines the first responders (see for this concept: Galison, 1997). A trading zone as a setting that embodies coordination efforts, is an ongoing accomplishment in which diverse groups interact across their boundaries, by agreeing on the rules of the trade, while the objects traded can mean different things to both groups.

The trading zone has four dimensions. First, groups that interact in the trading zone have different professional backgrounds, a phenomenon that we call: epistemics. Second, by developing their own professio-



Figure 5.1.1. A layered cultural model for understanding first response organizations in action

nal knowledge and standards these groups create an own identity. Third, the groups confront their different interpretations by initiating in a negotiation process across their professional boundaries through boundary work. Fourth, this negotiation process occurs by sharing the interpretations of a particular situation by storytelling. We have placed these elements on two axes in a culture model (figure 5.1.1).

The vertical axis in our culture model shows the diverse nature and backgrounds of emergency responders interacting in the trading zone, through their epistemics and identity.

Epistemics refers to the jargon of different professional languages in relation to the organisational practices in which this professional knowledge is developed (Knorr Cetina, 1999). The connection with actual practices is important to understand the relations between the concepts in our layered culture model, as epistemics are made up of patterns of activities that are constructed in daily interaction, that demarcate the existence particular professional fields. By interacting with artefacts the professionals generated knowledge that is seen as particular to that field, which also creates a boundary between different epistemics. In this way the epistemics can be directly related to processes of brokering ideas between different communities.

Identity refers to professionals who tend to identify themselves with their own organisation; especially in situations in which they are confronted with other professional organisations (Tajfel and Turner, 1986). We acknowledge the necessity for the strong identification and loyalty of the members with their operational field. At the same time, in the dynamics of emergency response operations the context in which identification occurs often changes to result in 'identity work' (Alvesson, 2000). This leads to the situated nature of identity, which means that in one context one identifies with being an emergency responder working together with other emergency responders, while in another context one might identify him or herself with being a police officer who has to work together with a fire officer.

The horizontal axis in our culture model focuses on the action and practices of emergency response in-action, in which storytelling and boundary work takes place.

Boundary Work describes the process of sharing information across the boundaries of organisations (Star and Griesemer, 1989) to negotiate actions and interpretations (Kellogg et al., 2006). Boundary spanning occurs when emergency responders interrelate on the basis of

understanding each other's needs and requirements for coordination. Learning how to bring together each other's complementary skills, learning from the experience of others and closely examining information is a key asset for developing cross-boundary coordination. Boundary objects are part of coordination mechanisms by representation, which offer a common referent that people can use to interact, align work and create shared meaning.

Story telling conceptualizes the process of sharing and making explicit the interpretations of emergency responders, in which they describe the situation and their actions (Feldman et al., 2004). The stories told by the first responders have a plot (the main message), characters (what are the relevant actors in the story) and a narrative (what is the story about and how is the story presented). Through sharing their stories implicit, problem conceptualizations are made tangible by signalling potential problems, clarifying misunderstandings and exchanging information.

5.1.3. On methodology and methods: a research agenda

Our trading zone model aims at unravelling the cultural dimension by exploring and understanding sensemaking and sensegiving practices of emergency response professionals (Weick, 1995; Weick et al., 2005; Maitlis and Lawrence, 2007). As sensemaking is a process that describes how actors perceive and enact their environment, we adhere to an interpretative, constructionist perspective (Yanow and Schwartz-Shea, 2006). This perspective focuses on collecting and analysing data in which the stories of the actors involved are central. Storytelling (narrative analysis) as a method enables the researcher to uncover the otherwise hidden assumptions of the emergency responders, as well as their organisational values. Through stories actors implicitly, and sometimes explicitly, negotiate their interpretations and actions. The ethnographic approach (Hammersley and Atkinson, 2004) is very useful in unravelling trading zones since it enables the researcher to follow the real-life conversations and the negotiation of the interpretations of the emergency responders. A typical cultural study based on our model takes place by adopting three methods: observations, interviews and document analysis to come to a triangulation of data.

5.1.4. The emergency responder as reflective practitioner

Negotiation in the trading zone is not a neutral process; it involves power and interests. A such, for emergency response to engage in a trading zone, a stance is required that increases their reflexivity. Reflexivity and knowing in-action (Schön, 1987; Thompson, 2008) can make differences, power, and interests that are embedded in interpretation processes explicit. Increasing reflexivity can be achieved by telling stories about the bottlenecks that emerge in the response operation. This often makes the different interpretations of the situation the actors adhere to explicit. Yet, is not only important to tell the story from one perspective, but it is especially important to include the other professional perspectives as well. Reflexivity allows the emergency responders to make their different professional backgrounds visible to themselves and others, and find new creative solutions to traverse their professional boundaries. This, of course, is a learning process that (literally) needs training and education, in order to let professionals recognize the constraining and enabling characteristics of multi-organisational work. Reflexivity starts with the recognition of a problem, and continues with the development of affective responses and empathy. Therefore, a multi-organisational operation in emergency response involves asking and answering the questions (Yanow, 1997): What do I do? Why do I do it? What does it mean for me, as a professional, and for the other professionals I work with and for? In this way, first responders can create a trust in each other's skills and routines, and work towards a shared process of sensemaking and sensegiving.

5.2. Organisational interaction in emergency management

Authors: Raffaele Giordano, Alessandro Pagano

This chapter aims at supporting emergency managers in enhancing the interaction processes among actors involved in emergency management and response, through a better understanding of the complexity (ramification) of the interaction network, and ambiguity in problem framing and understanding the situation.

The core activity of taking decisions and implementing actions in the complex and highly dynamic environment during and after a disaster often exceeds the ability of a single centralized entity to cope. No single entity can have completely control of these multi-scale, distributed, highly interactive networks, or the ability to evaluate, monitor and manage these emergencies in real time. It is becoming crucial to

overcome the classical emergency management approaches in which institutional organisational structure tends to follow stable boundaries, established authority figures, and protocol driven actions. Nowadays the response to crises has become an emerging, large-scale system consisting of individuals, groups, organisations and jurisdictions that need to coordinate their actions for delivering effective operations. In crises, a “temporary multi-organisation” as defined by Cherns and Bryant (1984) needs to be deployed, implying several difficulties of coordination and shared management of the situation(s). Cooperative response actions need to be carried out in a network form (Abbasi, 2014), and can benefit or be impaired by the connectivity patterns of the different emergency responders (Vespignani, 2011).

Enhancing the coordination effectiveness in case of emergency among the different responders is the main scope of several studies aimed at overcoming the organisational factors hindering cooperation. Up to now, most research has been carried out on what happens within a single organisation under stress, while knowledge is still limited on what happens when multiple organisations need to coordinate in unison to make the best of their capacity in a highly stressful environment. That is, lack of cross-sectoral structures, lack of common goals, lack of common concepts, lack of distribution of information, lack of trust, competitive practices and lack of situational awareness. Although most of the efforts carried out in order to enhance cooperative emergency management have been focused on technological innovation for information sharing, we need a shift toward enhancing the interactions among the different actors in emergency management.

Existing formal protocols of interaction ignore how cultural diversities, with specific reference to organisational culture, influence the way different actors perceive the topology of their own interactional network, and, consequently, their strategies to cooperate with other entities. Empirical evidence demonstrates how some actors assume a strongly hierarchical structure of the interactions (Sorensen and Stanton, 2013). Other actors consider the multi-central structure as the most effective one to allow the rapid exchange of information and cooperation within each level of the organisational structure and between different levels (Smart and Sycara, 2013). Neglecting these differences could lead to the development of ineffective procedures for emergency management, because the actors will not recognize the network through which they collect the information and cooperate as trustable.

The dynamic and complex nature of crisis situations does not allow for a static framework of the crisis responses. Interaction networks chan-



Figure 5.2.1. The city of L'Aquila

ge dramatically during an emergency. Some actors could assume the role of informal leaders, whereas the official responders could be characterized by a low level of trust. The existing institutional protocols for information management in case of emergency seem incapable of adapting themselves to this changing interactional situation.

The experiences in EDUCEN demonstrate that in order to shift cultural diversity from a barrier to an enabling factor for cooperative emergency management, methods and tools are required that enhance the understanding of the dynamic processes influencing the interactions among different actors in the different phases of the DRR.

5.2.1. Mapping network interactions in L'Aquila

For EDUCEN, we mapped the network of interactions among the dif-

Organisational culture in L'Aquila, Italy

The city of L'Aquila experienced a disastrous earthquake in 2009. Different barriers hampering the cooperation among the different actors were registered. The communication limits in the preparatory phases and during recovery gained a lot of attention.

ferent emergency responders, both institutional and non-institutional to analyse the flow of information and cooperation activated during the different phases of the 2009 earthquake emergency.

This event highlighted several limits in the information sharing protocols, and specifically between the institutional actors and the community. These limits had a very negative impact on the level of trust local community had in 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 networks emerged after the disasters, showing different cultural aspects.

In order to cope with emergencies, the official protocol of interactions among the different actors can be represented as in figure 5.2.2.

As shown in the figure, the protocol is strongly hierarchical and permits little information sharing between actors at the same level in the process. The analysis of the interviews carried out in the case study,

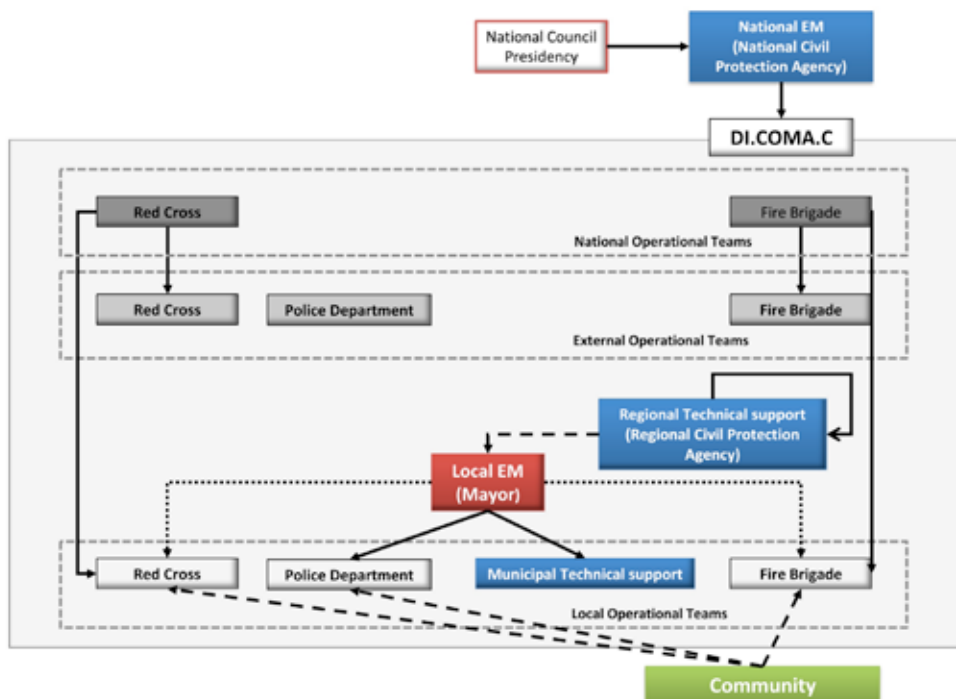


Figure 5.2.2. Official protocol of interaction

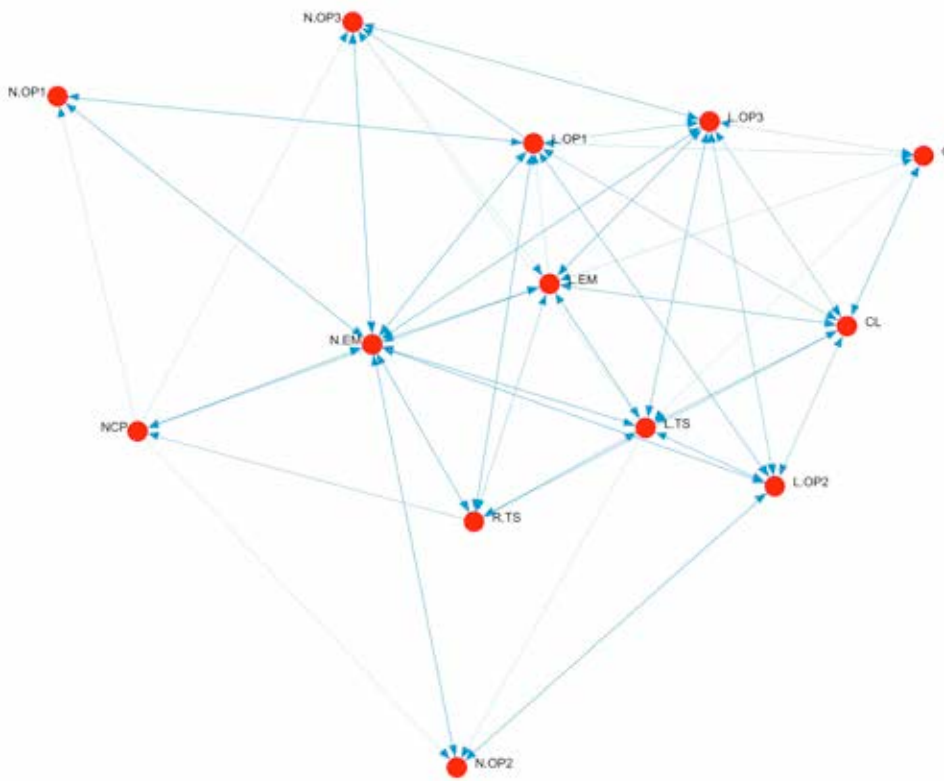


Figure 5.2.3. Map of the interactions network activated during the emergency management phase

involving both official responders and members of the community, allowed the mapping of the actual network of interactions, as shown in figure 5.2.3.

The comparison between this network and that representing the official protocol of interactions in case of emergency demonstrates the inadequacy of the protocols to fully capture the complexity of the interactions. The actual network is far less hierarchical and accounts for informal interactions taking place even among institutional actors. That is, during the knowledge elicitation phase we learned that, besides the official interactions, in case of emergency the institutional actors activated personal relationships to gather important information.

The combination of the different networks allowed the mapping of the complex interactions among the main elements activated during the emergency, i.e. agents, knowledge and tasks (figure 5.2.4).

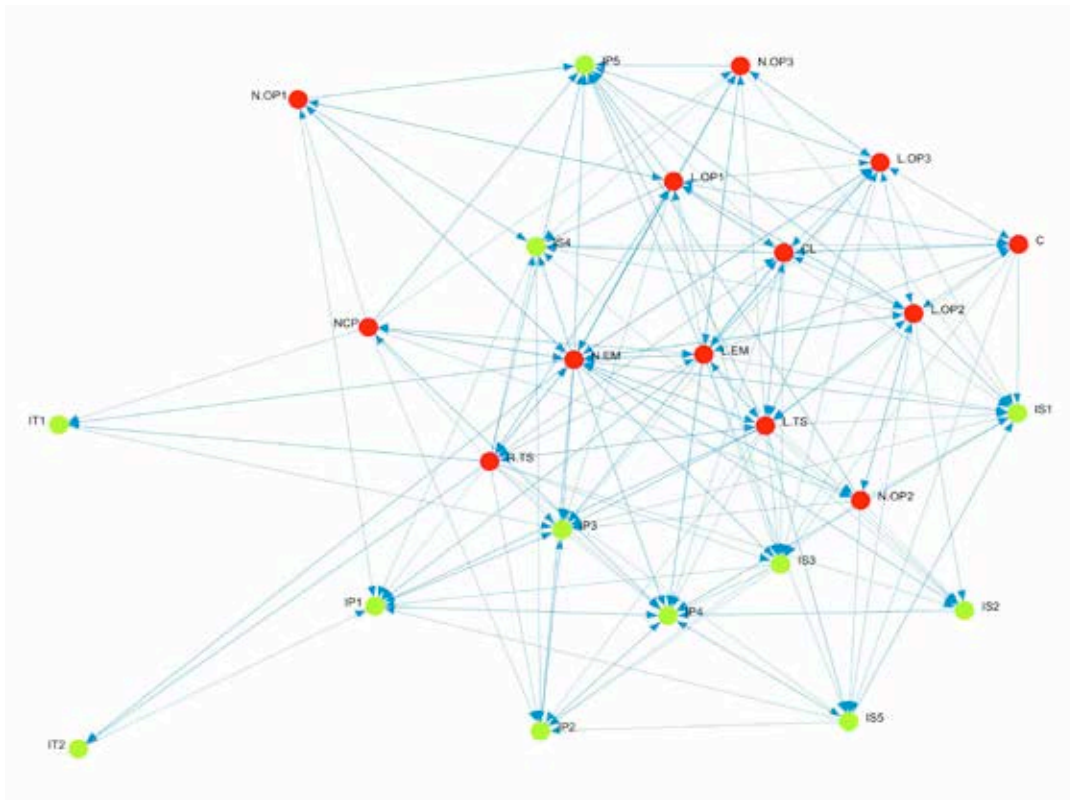


Figure 5.2.4. Network of interaction among agents, knowledge and task according to both experts and local knowledge

The figure shows the actual complexity of the interaction mechanisms supporting the emergency management. Failure in this network – lack of an information, missing cooperation for task implementation, etc. – could provoke uncontrollable cascading effects leading to the failure of the whole emergency management process. Therefore, it becomes crucial for the emergency managers to enhance their comprehension of this complexity, in order to implement actions aiming to increase the effectiveness of the emergency management network and to reduce its vulnerability.

The experiences from the L'Aquila case study demonstrated how the organisational culture influences the way the different organisations perceive the interaction network in which they have to operate in case of emergency. Some institutional actors, such as local emergency managers, considered the multi-central structure as the most effective structure to enable a rapid exchange of information within each level of the organisational structure and between different levels. These le-

Name	Role	Type	L'Aquila
L.EM	Local Emergency Manager	Individual	Mayor
N.EM	National emergency management	Organisation	Di.Coma.C.
L.TS	Local Technical Support	Organisation	Technical Municipal office
R.TS	Regional Technical Support	Organisation	Regional Civil Protection agency
N.TS	National Technical support team	Organisation	National Civil Protection agency
L.OP1	Local Operational Team #1 (Health assistance)	Organisation	Local Red Cross team
N.OP1	National Operational Team #1 (Health assistance)	Organisation	External Red Cross teams (coordinators and operators)
L.OP2	Local Operational Team #2 (Fire Brigade)	Organisation	Local Fire Brigade team
N.OP2	National Operational Team #2 (Fire Brigade)	Organisation	External Fire Brigade teams (coordinators and operators)
L.OP3	Local Operational Team #3 (Police Dept.)	Organisation	Local Police team
N.OP3	National Operational Team #3 (Police Dept.)	Organisation	External Police teams (coordinators and operators)
C	Community	Individual	Members of the community
CL	Community leaders	Individual	Representative of the community

Table 5.2.1. List of stakeholders involved in the L'Aquila case study

vels seem capable to adapt their information collection strategy to different conditions, showing resilience to failures in official protocols of information sharing. Institutional actors with a dense network of interactions – regional emergency management – seemed capable to shift from the formal to the informal network in order to gather the information needed. But the official responders, such as the national civil protection and the fire brigades, assumed a strongly hierarchical structure for information exchange. These actors exclusively trusted information flowing from the top through intermediary, and easily recognizable, levels. This is because they needed to reduce “noise” in information collection. Neglecting these differences can lead to ineffective strategies for information sharing for emergency management. Integrating the city’s emergency management into a hierarchically structured network could negatively affect its role as response coordinator. To the contrary, increasing the number of information centres in the responders’ networks could paralyze their activities. The experien-

ces gained in L'Aquila suggested that developing effective emergency management strategies requires a clear understanding of the differences among agents' understanding of the interaction network.

Finally, the adopted methodology allowed us to emphasize the role of the community in the emergency management phases, and to make the institutional actors aware of the need to account for the community's understanding of the emergency situation. Specifically, the analysis of the community network allowed us to better comprehend the reasons why the level of trust in institutional information is so low. The community network is strongly polycentric, allowing community members to select the more suitable information sources and activate informal networks of information sharing, as the information provided through institutional channels is not easy for them to comprehend. The analysis of the network allowed to define the central role played by the community leaders in facilitating the flow of information. They represent the actual information centres for the community. This result was considered as crucial for the definition of potential improvements of the emergency management procedure.

5.2.2. Mapping network interactions in Lorca, Spain

An analysis has been done on the interaction network supporting the flood emergency management in Lorca and Puerto Lumbreras municipalities, located in the region of Murcia in South-eastern Spain. The area is highly disaster prone, mainly to floods, but also to droughts and earthquakes. Lorca is the third city within Murcia and the main one in the shire of Alto Guadalentín, a large valley that has become a key agricultural area in Spain. Paradoxically, the area is characterised by a semi-arid climate.

The area has historically suffered serious disaster episodes. Specifically, Lorca's Puerto Lumbreras area is prone to hazards: major events include the Puerto Lumbreras flood in 1973 and St. Wenceslas Flood in 2012. These events caused several fatalities and damages to buildings and infrastructures (e.g. Puentes dam was destroyed twice by flooding).

The flood episodes typically occurring in the area may be extremely dangerous due to their quick onset: the flow rate can increase up to 2000 m³/s within minutes, conveying in two hours approximately the same volume of water that is normally expected in a whole year. Specifically, in the flash flood event of the 2012, the Nogalte wadi, a tributary to the Guadalentín river, changed from a dry riverbed to a wide



Figure 5.2.5. The Puentes dam

and fast-flowing river in less than 20 minutes.

In order to cope with flash flood emergencies, a protocol of interactions was developed aiming at facilitating the coordination and the flow of information among the different institutions and official responders. The following figure schematizes the official protocol of interactions in case of emergency in the Murcia autonomous region.

As shown in figure 5.2.7, the protocol assumes a hierarchical structure concerning the flow of information. The Spanish Meteorological Institute (AEMET) is responsible for disseminating early warning information based on the weather forecasts. According to the level of warning - red, orange or yellow - actions should be taken by Murcia's emergency management unit (Murcia 112). During flood events, two independent monitoring networks collect data:

- the rainfall monitoring system provides real time data to Murcia 112.
- the SAIH, the Segura River Basin monitoring system, provides

Organisational culture in Lorca, Spain

The Lorca municipality has historically suffered serious disaster episodes. The St. Wenceslas Flood (2012) caused several fatalities and damages to buildings and infrastructures. This experience showed some bottlenecks in the “formal” channels of information and data sharing. In particular, the capability of the institutions to provide community with accessible and understandable information on flood risk was strongly questioned and led to some conflicts involving community and institutions.



Figure 5.2.6. The St Wenceslas flood of 2012

updated data on rainfall, the level of the water in the riverbeds and the level in the reservoirs.

These two monitoring systems do not exchange information. According to the protocol of interaction, Murcia 112 plays the central role in

Name	Role	Acronym
Spanish meteorological Agency (AIMET)	National technical support	N.WF
Segura river basin authority	Regional technical support	L.TS
Murcia emergency management	Local emergency management	L.EM1
Fire brigades	Local operational team	L.OP1
Military emergency unit (UME)	National operational team	N.OP
National civil protection	National EM	N.EM
National Government	National coordination	N.GOV
Municipality	Local emergency management	L.EM2
Media	Information provider	MC
Other Municipalities	Local emergency managers	L.EM3
Local Police	Road functionality	L.OP2
Network managers	Road functionality	R.OP2
State police	National emergency unit	N.OP3

Table 5.2.2. List of institutional stakeholders involved in flood emergency management

the emergency management. It coordinates the rescue activities of the first responders through Murcia's flood response committee, INUN-MUR. On the other side of the interaction network, the Segura river basin authority, in case of warning, activates its internal monitoring and decision-making committee whose main scope is to adopt the needed actions for managing the water in the reservoir according to the flow of water in the riverbeds.

The municipality represents the interface between the emergency management authority and the local community. According to the existing protocol of interventions, its main role is to facilitate the flow of information to the community and to implement the decisions taken by Murcia 112 at local level, e.g. the evacuation of the local population.

Previous experiences have shown bottlenecks in the "formal" channels of information and data sharing. In particular, the capability of the institutions to provide the community with accessible and understandable information on flood risk was strongly questioned and led to some conflicts involving community and institutions. Moreover, ineffective communication among institutional agents was registered, both between the Segura river basin authority and Murcia 112, and between Murcia 112 and the municipality. Based on these experien-

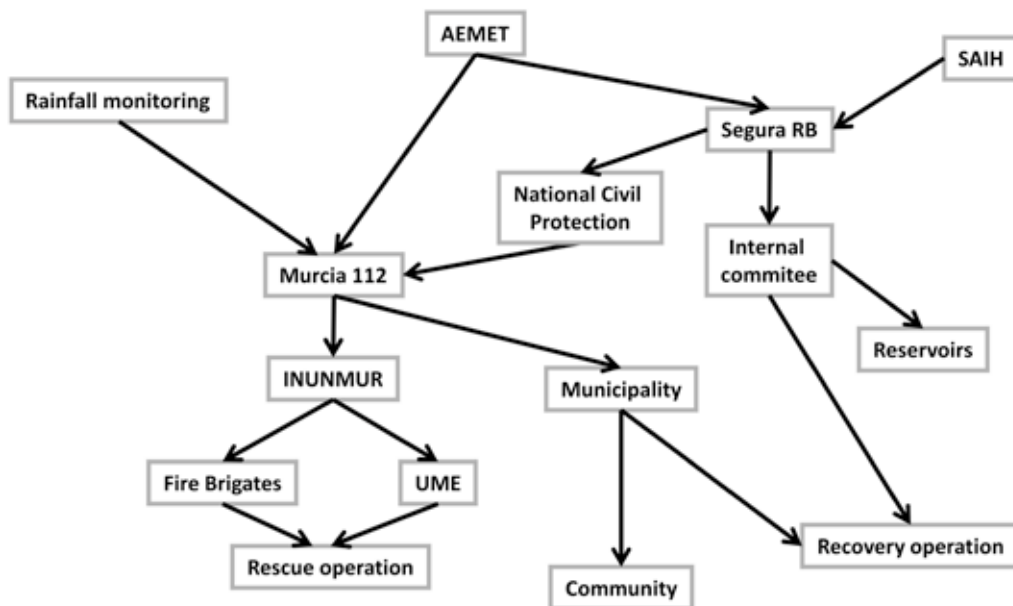


Figure 5.2.7. Protocol of interactions and information flow among the institutional actors in case of emergency in Murcia

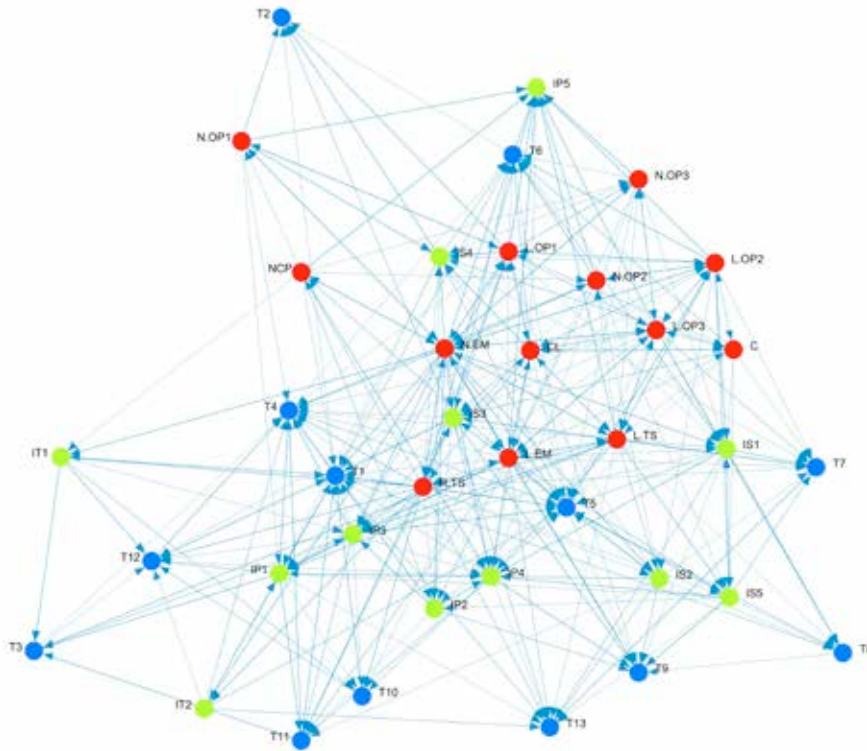


Figure 5.2.7. Protocol of interactions and information flow among the institutional actors in case of emergency in Murcia

ces, negotiations were started to revise the operative protocol. Our analysis aims to support this revision and adaptation process through the analysis of the formal and informal networks of interaction, and the detection of vulnerable elements in the network.

The following pages describe the results obtained through the implementation of this methodology.

The official protocol of interactions to be activated among the institutions in case of emergency has been used as a starting point for the definition of the set of actors to be involved in the knowledge elicitation phase. The table shows the list of the institutional actors involved in the cognitive mapping interviews. A main role was assigned to the institutional actors as well, which can also be useful to generalize the methodology. The acronyms were selected in order to facilitate the development of the network maps, as shown in figure 5.2.8.

The aggregation of the collected narratives allowed to develop the complex maps of interaction, as shown in figure 5.2.8.

The shows the actual complexity of the interaction mechanisms supporting emergency management. Failure in this network – lack of information, missing cooperation for task implementation, etc. – can provoke uncontrollable cascading effects leading to the failure of the whole emergency management process. Therefore, it becomes crucial for the emergency managers to enhance their comprehension of this complexity, in order to implement actions aiming to increase the effectiveness of the emergency management network and to reduce its vulnerability.

Graph theory measures were implemented in order to identify the key elements and the main vulnerabilities of the network. Table 5.2.3 shows the results of the analysis which aimed the identification of key agents in the network.

The analysis allowed us to identify the most crucial agents in the network accounting for the complexity of their relationships with the

Name	Role	l'Aquila
Total centrality degree	National civil protection Municipality	These actors are characterized by a high number of connection (both in- and out-) with most of the other agents in the network.
Betweenness Centrality	Municipality Segura RBA Murcia 112 Community leaders	These actors occur on many of the shortest paths between other agents. This means that these actors can easily move information from one part of the other of the network.
Hub centrality	Segura RBA Murcia 112 Community leaders	Individuals or organisations that act as hubs are sending information to a wide range of others each of whom has many others reporting to them. Therefore, they act as hub of information within the network.
Most knowledge	Segura RBA Murcia 112 National civil protection Media	These actors have access to important pieces of information.
Most task	Murcia 112 Municipality National civil protection Segura RBA	These actors are called to perform the most important tasks.

Table 5.2.3. Key agents in the Lorca flood emergency network

other agents, which affects their capability in moving information from one side of the network to the other. Moreover, the adopted approach assumed that an agent is crucial in the network performance if s/he brings important knowledge and if s/he cooperates in performing important tasks.

The results of the analysis demonstrate the importance of the three most influential institutional actors at local level, i.e. the Segura river basin authority, Murcia's emergency management and the municipality. These actors had a dense network of interactions with the other agents (centrality measures), and had access to a wide set of crucial information, which allowed them to carry out crucial tasks. Beside these results, the analysis of the network emphasizes the actual role in the emergency management of the community leaders and the media. These actors were not mentioned in the official protocol of intervention. Specifically, community leaders could easily act as an interface between the institutional system and the local communities. Their high value of the betweenness centrality and hub centrality demonstrate that these actors could facilitate the sharing of the emergency information.

Similarly, the network analysis showed the role of the media during an emergency. Most institutional actors were in direct contact with media. Therefore, they had access to important information.

The developed network was also analysed in order to identify key vulnerabilities, i.e. those elements that could lead to failures of the emergency management operations and/or to decreasing effectiveness of the responding actions. The key vulnerabilities are described in table 5.2.4.

The results of the analysis were used as basis for the discussion with the local decision-makers and stakeholders. At the beginning of the process, they were aware that improvements in the protocol of interactions were needed. Nevertheless, they were focusing exclusively on the interaction among the institutional actors. The analysis carried out in this work increased their awareness about the role played by the informal interactions, taking place within the institutional system and between institutional actors and the members of the community. Using the results of the key vulnerabilities analysis, participants started discussing about suitable strategies to improve the flood emergency management plan, accounting for the complexity of interactions. The discussion focused specifically on the role of the media. Most institutional actors agreed that enabling a more effective bi-directional communication with the community members through social media would be beneficial for sharing emergency information. The institutional actors

were interested in enhancing the capability of the current media channels to collect, store and analyse the feedbacks from the community. The capability of local communities to contribute to the monitoring of the emergency evolution was deemed important by the participants.

In order to enhance the preparedness for flood emergency management, the need to improve the cooperation between institutional actors and the local community was considered crucial. According to the results of the discussion, this activity could improve the capability of the local population to react in case of emergency in cooperation with the official responders. To this aim, suggestions were made to train the community leaders to be referred to as “agent of change”. Participants referred to the results of the “key agents” analysis in order to identify this potential improvement.

Therefore, the first and most important positive result of the used methodology concerns the increased awareness of the institutional actors about the need to shift the focus from investing economic and human resources in developing innovative emergency information collection tools, to enhancing the capability of the different actors to co-operate in case of emergency.

5.3. The role of volunteers and gatekeepers

Author: Karina Barquet

The cultural learning component in the EDUCEN project has facilitated a learning process to identify enabling and disabling factors for culture and social dynamics to be recognized in DRR. The process has led to the identification of volunteers and gatekeepers as important actors in strengthening current DRR strategies and plans in Europe.

5.3.1 The role of volunteers in DRR

Volunteering can mean different things to different people. Here we refer to volunteerism as the planned voluntary behaviour intended to benefit others, taking place within an organisational setting, for a prolonged period (Cumming, 2012). Volunteerism is a fundamental source of community strength and resilience that exists in all societies. It is expressed through a wide range of activities, including traditional for-

ms of mutual aid and self-help, formal service delivery, campaigning and advocacy, as well as other forms of civic participation (UNV, 2011).

The role and contribution of volunteerism is well recognized and highlighted in the Sendai Framework for DRR as crucial for adopting a more people-centred preventive approach to disaster risk. When a disaster happens, volunteers are often the first to act (UNV, 2011). However, the integration of volunteers and civil society organisations throughout the disaster management cycle varies between different contexts. The form and extent of volunteers' integration into formal DRR activities, as well as perceptions on what their role is differ greatly.

During a workshop with stakeholders from five different European cities in Lorca (Spain), L'Aquila (Italy), Kristianstad (Sweden) and Dordrecht (the Netherlands), participants highlighted the role of volunteer organisations as important for mobilizing society, for communicating across sectors and groups, for negotiating amongst competing demands, and for advocating solutions that benefit groups rather than individuals.

While gatekeepers (discussed below) were seen as crucial for reaching particular social groups, volunteer organisations were considered important for mediating between different social groups. Despite positive developments towards increased civil society participation through volunteer organisations, there remain several challenges related to their integration and coordination, as well as level of trust from civil society. "Sometimes volunteers may be a burden and create additional problems. The timing is crucial to determine who should be involved when. If there are too many without having a clear role they will create problems and require resources for food and accommodation" argued a participant. "In the Spanish case, the lack of coordination and proper training of volunteers can create additional problems. The large, organized associations have their own structure and division of roles, however, coordinating between organisations and the 'frugal' volunteers that show up in the face of emergency and the government institutions is complicated and very challenging" argued another participant. "Sometimes people do not trust volunteers: in Spain volunteers are a very heterogeneous group, some are professionals and many know what they are doing, but not all of them. There is a perception that they do not have the knowledge or capacity which is not accurate" argued a participant.

Stakeholders identified volunteers as a heterogeneous group with different capacities, levels of training and availability. These organisa-

tions ranged from well-established volunteer organisations with internal structures such as the Red Cross to more spontaneous volunteers that showed up during an emergency. Authorities often lack knowledge about the different capacities and strengths of voluntary groups and individuals, which can put people at risk. It is a complex task to find where the different capacities fit and at what time. When a group is organized it is easy to collaborate with them, if not, it adds a level of complexity.

Participants highlighted the need for governments and volunteers to co-develop a long term plan and a strategy to have the right people ready at the right time throughout the DRR cycle, and not only during an emergency. In Italy for example, there is often much focus on the emergency phase, but volunteers are needed to work with awareness raising and public opinion as well, for building understanding amongst youth and accessing other groups in society. For this, volunteers would need a different type of training than the one available today, for instance in capacity building on existing legislations for DRR and emergency response.

The experiences in Spain and Italy of past and present hazards have led to continuous improvements on strategies and action plans in DRR and DRM and was believed to be an important factor to engage volunteers as an important group in DRR and DRM. An attempt to improve coordination of volunteers was made both in the Spanish and Italian cases by creating a contact database to keep track of individuals. In Spain, this database only contains contact information of the persons volunteering. In L'Aquila, the database also specifies their main skills, experiences and capacities. However, neither of the countries has established quality controls, assigned budgets or personnel in charge

Less vulnerability coupled with high levels of trust in institutions limits the role of volunteers in DRR

The Netherlands and Sweden have a different experience on the role of volunteers in DRR than the Southern cities in Italy and Spain. The fundamental difference is linked to the fact that neither Sweden nor the Netherlands have much recent experience in disasters. As a result the role of civil society and volunteers remains unclear. During the workshop representatives from Sweden and the Netherlands shared that a key factor that they believe has limited the role of volunteers and civil society in general has to do with trust. In Sweden and the Netherlands there is high level of trust associated with government agencies and people tend to seek information from the government as opposed to civil society.

of maintaining and updating the databases. Thus, the databases are often unreliable and are not used.

We learned that Sweden has extensive experience both nationally and internationally with a long-standing tradition of preventive policies and has a continued presence in supporting international management of disasters (Björngren Cuadra, 2015). However, despite an increasing topicality internationally, volunteer work in Sweden can be said to have a relatively undeveloped role and function in the context of disasters as well as in serious events and crises. There are two potential explanations for this. The first is that in an international comparative perspective, the serious events that Sweden faces are fairly limited in scope. Sweden is geologically and geographically situated in a region that is struck by neither earthquakes nor tsunamis, even though floods, droughts and forest fires have recently caused significant damage. The second is due to that the state assumes all social responsibilities through an encompassing welfare state system which is believed to have hampered the establishment and role of voluntary organisations in DRR and DRM.

In Sweden, while rescue services have the legal mandate to request help from civil society in case of an emergency, there is a stark contrast with the levels of organisation and integration of voluntary work in Italy, where the national organisation and coordination of voluntary work in the country has evolved over several decades of experience in handling disasters. Today civil protection is a complex, surprisingly non-hierarchical, and highly organized agency composed by various voluntary groups across the country and with a clear mandate and jurisdiction to respond to society's needs during times of crises.

Italy has long-time experience of a well-developed voluntary organisation that operates across the country, and which in times of crises can function better and may be more reliably than the government itself. Similarly to Italy, Spain has a long history of different disaster events. Civil society has an important role in DRR. The formal inclusion of voluntary organisations into DRR in Spain has been traced to 1982 following the Tous dam event, which is considered one of the most significant socio-natural disasters in the history of the country during the twentieth century. That event triggered a paradigm change in the way disaster risks were perceived and managed locally and at multiple levels of governance. A concrete result from these changes was, amongst others, increased public participation particularly of voluntary groups to establish a warning system (Serra-Llobet, Tàbara, & Sauri, 2013). In Lorca for example, local associations together with

voluntary organisations and the private sector currently cooperate to create new warning systems through for instance new technologies.

5.3.2. The role of local leaders and gatekeepers in DRR

The concept of local leaders or gatekeepers can be traced back to ethnographic methods where it is understood as an individual who directly or indirectly provides access to key resources, be those resources logistical, human, institutional, or informational (Campbell et al., 2006). Engaging with gatekeepers entails the establishment of an ever-evolving relationship which has deep implications for how a researcher or practitioner understands a particular context and interacts with stakeholders. The opposite is also true. If gatekeepers are key individuals to access people or resources, they can also be obstacles, particularly in contexts where power relationships are reversed, but also in communities where traditional authority structures are in place (Campbell et al., 2006).

The concept of gatekeepers is used in a wide range of disciplines including geography, anthropology, management, urban planning, medicine, but also in disaster studies. In DRR, the concept of gatekeepers is sometimes understood as people who are in positions of power and possess large amounts of information on certain matters in a group. Gatekeepers in this context are deemed important individuals who maintain interactions with other group members in order to transfer information.

The definition of gatekeepers is not static. They act as mediators between culturally or linguistically diverse communities, and between communities and managing institutions. Their role is crucial because people with culturally or linguistically diverse backgrounds often prioritize social networks and informal sources of information, particularly in cases where language barriers exist or when communities mistrust the government (Shepherd and van Vuuren, 2014). The role of gatekeeping has not been adequately investigated in the context of disasters and emergency risk communication. However, some studies (Shepherd and van Vuuren, 2014) suggest that incorporating gatekeepers in DRR activities could contribute towards better emergency management preparation, but this requires an understanding of the cultural constructions of risk.

Stakeholders from L'Aquila highlighted the importance of gatekee-

pers as “cultural mediators” especially in marginal communities and refugee and immigrant populations: “The differences in social networks and groups could be better taken into account in plans and emergency activities through a better inclusion of gatekeepers in planning activities.” In contrast, the group from Lorca discussed the importance of gatekeepers in rural versus urban areas, arguing that gatekeepers are particularly important in rural areas as they can act as bridges and canalize information to the population and report back to the authorities. For instance, “farm owners can help evaluating damages, risks and canalizing the information and local needs to the authorities”, explained a participant.

In both Lorca and L'Aquila, gatekeepers were only made visible following a disaster event. The role of gatekeepers did not exist until the disasters occurred and there was a need to know about the others and inform neighbourhood associations without the traditional communication channels, which were destroyed or seriously disturbed after the disaster. Both groups agreed that the challenge now is to explore how to include gatekeepers in formal DRR plans and prevention work. They both spoke about the importance of developing and maintaining databases or applications that facilitate communication with gatekeepers. At the same time they argued that the cost of such action would be too high and that local authorities would not see the importance of investing on this action.

All cases agreed that it is important to plan in advance on how to identify gatekeepers. The challenge is how to do this. Crises are different and happen in different ways. For instance, in Lorca leaders during the floods were farmers, but farmers had no responsibility or leadership role during the earthquake. Different disasters gave rise to different leaders, because people were affected in different ways. Lastly, the role of leaders can change over time, and the process of identification needs to be continuous. A leader today might not be a leader tomorrow. Moreover, a positive leader able to unify individuals from a particular group, mediate between them and authorities, and communicate with other groups, could also turn into a negative one. This dynamic role of gatekeepers highlights the need for maintaining close contact with cultural leaders (e.g. persons officially or unofficially representing an ethnic or occupational group), religious leaders, and key actors within age groups (e.g. elderly or young); while at the same time remaining flexible for possible new actors.

Participants from the cities in Spain and Italy highlighted how following a series of disastrous events, there has been an increased recognition

on the role of key individuals in civil society to act as mediators or information nodes between some social groups and managing institutions. In these two countries, DRR approaches are starting to change towards more inclusive management structures due to the realization that civil society participation could fill the vacuum that state agencies have failed to fill. For instance, in cities like L'Aquila, where trust might be greater for key members of civil society than for some governmental institutions, having a mediating actor that enjoys support from both society and the government might be necessary to communicate and mobilize groups; or in Lorca where there are large minority groups with different cultural and linguistic backgrounds. For some of these minority groups, a gatekeeper or leader might play an important role for giving the group visibility and voice. This is important in order to communicate the group's particular needs as may be the case with refugee groups or certain ethnic groups.

In Spain for instance, the history of integrated risk management is more recent than in Italy, with the failure of the Tous dam in 1982 which triggered a more inclusive approach. Despite this, effective civil society participation remains a challenge, and interest to reach society varies greatly within and across managing institutions. In Lorca, for instance, some of the managing institutions have increased and improved their contact with local leaders through the EDUCEN project. This in turn gave institutions a better understanding of the problems, needs and wants of citizens in the area, but also an overview of available capacity amongst individuals which could be crucial for preventing fatalities during risk situations. However, the process driving this change has been met with lack of interest and resistance from some of the institutions, and scepticism from some of the members of civil society in Lorca.

In contrast to the Italian and Spanish experiences, the Swedish and Dutch cases admitted there is very little contact with social groups. In fact, participants were not aware of whether there are local leaders, who these might be, and whether they have a role to play in DRR. The role of local leaders or gatekeepers to build community resilience seems to be a concept often associated with the poorer corners of the world. In an international context, this is reflected in two ways: first, there is far less academic literature on the role of leaders and gatekeepers in countries like Sweden and the Netherlands, than in countries like Bangladesh or Nepal. Studies assessing cooperation across sectors in emergency management typically focus on the role of formal state and non-state institutions, but leave out "informal" leaders like gatekeepers (see for instance Nohrstedt, 2016; Nohrstedt and Bodin, 2014). In fact the only instance where civil society is re-

presented in these studies is through “formal” voluntary associations, which play a minor role in Swedish disaster management, as explained in the section above. Second, donor countries, like Sweden and the Netherlands, have a strong focus in building resilience through local participation in recipient countries but not at home. Despite this, participants from both cities admitted seeing the value of connecting with gatekeepers, but like participants from Spain and Italy, thought it was difficult to identify and contact them.

5.3.3. Working with volunteers and gatekeepers in DRR: recommendations from five European cities

A list of concrete recommendations to improve the work of volunteers in the DRR cycle, and increase the participation of gatekeepers in formal DRR work was produced by participants in the EDUCEN stakeholder workshop held in Stockholm. During the workshop representatives with different occupational backgrounds within DRR identified, described and reflected upon the role of volunteers and gatekeepers in DRR in their own cities. The conclusions emerging from this encounter can help DRR authorities improve their work with awareness raising and public participation, and for building social capital across sectors (public-private) and social groups with different cultural or ethnic backgrounds.

The interaction between stakeholders from different cultural and professional backgrounds demonstrated the importance to share experiences and identify similarities and differences in work on DRR between cities in Europe. The participants confirmed the need for greater attention to the role of volunteers and gatekeepers to build awareness in current policy planning for DRR.

A common message from all the cities is the need for improved involvement of volunteers in DRR. However, the ways to achieve this differed in each of the contexts. Whilst the role of volunteers is to a higher degree institutionalized in DRR in Southern Europe, cities representing Northern Europe shared that the government is the leading agent and civil society continues to play a marginal role. Thus, the potential to improve the role of civil society in Northern European contexts should be further assessed.

The role of gatekeepers is often disregarded in DRR work, despite the recognized benefits of engaging with this type of stakeholders. There

is a need to allocate time within the local government to identify and work with local leaders and other respected individuals in the community, particularly to build awareness and improve ways to ensure effective communication before and during an event. The workshop showed the differences between Lorca and L'Aquila where frequency in disasters have influenced improved communication and led to more sophisticated ways to communicate. For instance, civil society and the private sector in Lorca and Spain have played an important role in the development of new communication gadgets. By contrast, the lack of cultural memory in Sweden and the Netherlands of flood events were emphasized as a limiting factor among communities to demand information and efforts to share information from the government.

5.3.4. Actions for improving DRR in the Italian, Swedish, Dutch and Spanish contexts

After acknowledging the benefits and challenges in volunteer and gatekeeper inclusion

workshop participants collectively made the following recommendations to enhance understanding and action on the role of volunteers and gatekeepers in DRR:

- Increased participation of volunteers during the preparedness phase can be one of the most important and feasible actions for improving DRR work. Besides from creating risk awareness amongst volunteers, this can also enhance trust towards volunteer organisations, as volunteers establish a continuous relation rather than a one-time intervention.
- Improve the existing contact databases of volunteers and complement it with information on individual capacities (e.g. skills, experience, specific training). The main responsibility of managing this action would be on local authorities who would need to designate a budget to identify the different volunteer groups, develop and maintain the database and support the coordination with civil protection.
- Improve training for volunteers to include actions important for the whole DRR cycle, not only the emergency phase, like for instance basic legal and policy knowledge related to DRR; and to diversify sources of funding for training volunteers through for instance the private sector.

- Create one strategy for identification and inclusion of both volunteers and gatekeepers and have a plan on how to use spontaneous (volunteers/gatekeepers) in the best way.
- Engage older people, like the retired, who often have more time to participate in issues concerning their communities. They are also a particularly vulnerable group who might have a personal interest in engaging in DRR questions
- Include religious leaders who often have a well-established relation of trust to a group of the population. They can act as informants and mediators between managing agencies and civil society and between interest groups.
- Improve communication and cooperation with the private sector, particularly insurance companies, who have a good understanding of people's assets and vulnerabilities. In some countries, insurance companies are already integrated in DRR work. In others insurance companies and managing agencies continue to operate in silos. Increased cooperation and information exchange could be beneficial for the government, the companies involved, as well as the clients.
- Establish contact with local or thematic journalists who may hold important information and in some places might have good relations with local populations. They could act as mediators between civil society and managing institutions. Often, information coming from local journalists has higher credibility and reaches society faster than the official information disseminated by official government channels.
- Design a strategy for institutional stakeholder engagement. Some governmental agencies might have a better relation with society than others due to their role and jurisdiction. For instance it is probably easier for civil protection to access and contact gatekeepers than it might be for an organisation like the water managing institutions (Confederación Hidrográfica in Spain) which might be perceived as a "water police" rather than a civil society advocate. With good communication structures in place across managing institutions, several actors might be able to access the information gathered by institutions that lie closer to society.
- Women groups could provide a window of opportunity to access marginalized or foreign groups. However, these groups might not always be labelled "women's group", but could take the form of knitting groups, yoga groups, reading groups, or religious circles. In other places there might be a "gender" organisation or political party.

- Sport organisations can provide a link to youth but also may be able to provide “space” in times of a crisis, for instance by providing access to football fields to build temporary camps, or gyms to provide for temporary shelter. Sport organisations are often used to work in teams and could therefore also contribute with organisational skills during an emergency.

5.4. The role of the armed forces and civil-military interaction

Author: Sebastiaan Rietjens

“While retaining its primary role of safeguarding the country from external threats, the military has become one of the main partners of federal, state, and local agencies in disaster response operations, providing its available resources, logistical capacity, and operational services effectively used against both man-made and natural disasters” (Kapucu 2011, p. 7).

In studying the role of the armed forces in domestic disaster response operations, most attention has been paid to homeland security or counter terrorist activities, in particular in the aftermath of the terrorist attacks on New York, Washington, Madrid, and London.

Relatively little attention, however, has been paid to the role of the armed forces in addressing domestic natural disasters. In such a context, the involvement of the armed forces can be manifold and may include a variety of activities. Sylves (2008, p. 172) lists a great number of these activities including: search and rescue; emergency medical care; emergency transport of people; mass feeding; in-kind distribution of food, clothing, and other necessary commodities; epidemiological work and disease control; decontamination (in hazardous materials or radiological circumstances); temporary sheltering; firefighting; help in restoration of electric power and other utility services; debris removal to reopen roads; and bridge repair or temporary bridge replacement, as well as offer security and property protection aid. Armed forces are frequently requested to contribute to disaster response operations: are usually well organized, trained, mobile, well equipped, and available (Clarke, 2006, p. 1). Kapucu (2011, p. 9) stresses that armed forces:

- have manpower with specific qualifications, skills and expertise;
- forces are capable of a strategic and rapid mobilization;
- have a variety of equipment (e.g. helicopters, aircraft, earth-moving

machinery, respirators, medical supplies, power and lighting equipment, under-water capability) that most other emergency organisations lack.

Moreover, “the military’s relative autonomy and efficient bureaucratic structure with hierarchical rules; which are effective in command, co-ordination, and control of manpower, authority, and regulations, is beneficial in providing effective response actions”. (Kapucu, 2011, p. 9)

5.4.1. Requesting military support

When civilian agencies request military support, there are three guiding principles according to Salmon et al. (2011, p. 141):

1. “Military aid should always be the last resort, with the use of mutual aid, other agencies and the private sector all having been considered as insufficient or unsuitable;
2. The civil authority lacks the required capability to fulfil the task and it is unreasonable or prohibitively expensive to expect it to develop one; and
3. The civil authority has a capability, but the need to act is urgent and it lacks readily available resources.”

Additional factors that should be taken into consideration when requesting military support are (e.g. Kapucu, 2011; FEMA, 2008; Schrader, 1993):

- 1 Legality: whether the legal basis of military involvement aligns with the national laws and regulations that are in place (Kapucu, 2011). Most, if not all, European countries have specified the conditions under which armed forces may support in disaster response operations.
- 2 The potential cost of military involvement and its impact on the budget of the Ministry of Defence must be determined. Military assets are more costly than similar assets of civilian emergency responders in light of the reliability, security and robustness of military assets. Wiharta et al. (2008, p. 43), however, also stress that “because military assets are usually kept in a state of readiness for quick deployment, defence ministries already cover their procurement and basic running costs, whether the assets are being used or not. Thus, the idea that deploying military assets is much more expensive than deploying civilian assets should be regarded with caution”.

Most western countries have mechanisms in place for sharing the costs of military involvement in assisting to disaster response operations. In the US for example the Federal Emergency Management Agency (FEMA) reimburses the Department of Defence for some of the costs that occurred in disaster response operations (Schrader, 1993).

-3 Lethality: this defines the possibility of the use of lethal force while providing assistance. Although lethality is mainly an issue in cases of homeland security or counter terrorism, it may be important in the context of natural disasters as well. Several historical cases such as the aftermath of Hurricane Katrina have shown that maintaining law and order is an essential task to which armed forces also may contribute.

-4. Potential risks that may threaten the armed forces. Although the armed forces are trained to operate in unsafe places, natural disasters may pose severe risks to the soldiers that are being deployed. These risks may include the collapse of buildings, the danger of asphyxiation in case of (forest) fires or the breaching of dikes.

-5. The extent to which military services and resources are appropriate for providing assistance. Some practitioners and researchers involved argue that just because the military has the capacity to perform a task, it may not necessarily be the most appropriate entity to do so, since

Issues	Recommendations & lessons learned
<ul style="list-style-type: none"> • Lack of an organisation responsible for surface water flooding; • No clear coordination structure; • Lack of coordination between Meteorological (Met) Office and Environment Agency; • Lack of communication and sharing of key information between agencies; • Lack of mutual aid agreements between civil organisations; • Lack of clarity regarding roles and responsibilities of different organisations; • Ad-hoc systems, structures and protocols; • Lack of leadership at Gold (i.e. strategic) command level; • Instances where Silver (i.e. tactical) command was activated instead of Gold; • Lack of appropriate command HQs. 	<ul style="list-style-type: none"> • Should be a single national organisation with an overarching responsibility for all types of flooding; • Information must be readily shared between agencies in a form that can be used; • Joint warnings issued by the Met Office and the Environment Agency; • Enhanced IT, real time mapping and visualisation tools should be available to every Gold command; • Mutual aid agreements should be established between organisations; • Roles, responsibilities and capabilities of all agencies should be clearly defined and communicated; • Preparedness of HQs (e.g. accommodation, IT and comms systems) should be regularly tested; also purpose built HQs are required; • Communications procedures between agencies should be clarified.

Table 5.4.1 2007 UK floods, Gloucestershire region (Pitt, 2008; adapted from Salmon et al., 2009)

most militaries do not often train their personnel in disaster response. For example, the militaries apply different standards. They are expected to provide high-quality water to small populations rather than adequate water to large populations, as is needed in a natural disaster response (Wiharta, 2008). Also, in case of medical care militaries are mostly equipped to treat young men that are physically fit, while natural disasters may lead to many injuries (e.g. fractured bones) or patients (e.g. elderly, children) that the military is not used to deal with.

-6. The readiness of military forces to provide assistance that will not harm the primary mission of the Ministry of Defence (Kapucu, 2011; Buchalter 2007). In most countries the primary mission of the armed forces is safeguarding the country from external threats. Moreover, the armed forces of many western countries are heavily involved in overseas operations such as in Afghanistan, Iraq or Mali. This focus limits

Issues	Recommendations & lessons learned
<ul style="list-style-type: none"> • Complete loss of communications hindered the response significantly; • Lack of an appropriate incident command structure; • Lack of coordination between agencies e.g. Urban search and rescue and civil search and rescue; • Lack of a process for a unified response (National Incident Management System (NIMS) & National Response Plan (NRP)) inefficient for large scale catastrophic events); • State and local authorities lacked the ability to communicate with one another; • Command centres had unclear roles and responsibilities; • Secretary of Homeland Security had difficulty coordinating the activities of federal departments and agencies – he lacked situation awareness, both of the disaster and of the response; • Key decision makers at all levels were not familiar with plans or NIMS. 	<ul style="list-style-type: none"> • Need to establish a National Operations Center to coordinate national response and provide situation awareness and a common operation picture for federal government; • Interagency team should review and revise NIMS and NRP; All agencies/departments should align responses to NIMS; • There should a formal NIMS training program for all those responsible for incident management across agencies; • There should be an interagency planning and execution system; • Need to establish a National Information and Knowledge Management System; • Need to establish a National Information Requirements and a National Information Reporting Chain; • Need to establish mutual aid agreements; • Need to establish a national crisis communication system to support information exchange from the President, across the Federal government, and down to the State level; • Need to establish a deployable communications capability; • Need to clearly define roles, responsibilities and capabilities of different agencies.

Table 5.4.2. 2005 Hurricane Katrina, New Orleans (Banipal, 2006; adapted from Salmon et al., 2009)

Organization	Information management	Communication	Situation awareness	Equipment	Cultural issues	Training
Lack of clear and effective leadership	Poor information management	Lack of communication	Inadequate levels of distributed situation awareness	Inadequate communication technology	Incomplete procedures	Lack of multi-agency training exercises
Unclear command and control structure	Lack of an appropriate common operational picture	Communication of inaccurate or incomplete information	Inadequate levels of meta-situation awareness	Incomplete communication technology	Lack of understanding of military concepts, processes and procedures	Lack of experience in working with other agencies
Inadequate or inappropriate command and control structure	Lack of clarity regarding MACA requests	Lack of clear communication links between agencies	Lack of understanding of each agency's roles and responsibilities	Poorly equipped command centre	Lack of understanding of civilian concepts, process, and procedures	
Lack of clarity regarding each agency's rules and responsibilities		Lack of a common communication structure	Lack of understanding of each agency's capability and resources			
Inadequate multi-agency response frameworks, or procedures conflicting goals			Lack of understanding of each agency's contribution			

Table 5.4.3 Issues limiting civil-military coordination during emergency responses (Salmon et al., 2011, p. 153). MACA stands for "Military Aid to the Civil Authorities"

the readiness of the armed forces to get involved in domestic disaster response operations.

5.4.2. Civil-military coordination

Due to the growing diversity, complexity, and scale of many disasters, there is an increasing requirement for the military and civilian organisations to adequately coordinate their activities during disaster response operations (Salmon et al., 2011). For example, Hurricane Katrina, the BP Oil Spill in the Gulf of Mexico and the 2007 floods around Gloucestershire in the UK are all recent examples of disaster response operations in which military and civilian organisations worked alongside each other.

Despite its importance, civil-military coordination during domestic disaster response operations remains a neglected research area (Chen et al., 2008). The two tables illustrate the wide variety of issues emerging

when civil and military organisations attempt to work closely together, for two recent cases as well as the recommendations and lessons that were learned during their evaluation.

At a meta-level, Salmon et al. (2011, p. 153) have distilled and structured the issues that influence civil-military coordination during disaster response operations. They have grouped the issues into the following categories: the organisation, information management, communication, situation awareness, equipment, cultural issues and training.





6. Practical tools and guidance on integrating culture in DRR

139	6.1. Using games to connect culture and disaster
141	6.1.1. What game(s) should I use?
146	6.1.2. Examples of other policy exercises, simulations, and games to improve disaster preparedness and response actions
148	6.1.3. How to use games and policy exercises
148	6.2. Mapping and analysing the network of interactions during an emergency
155	6.2.1. Mapping the network of interactions
158	6.2.2. Analysing the map of interactions
??	6.2.3. Identification of actors
??	6.3. Collaborative learning for DRR
??	6.3.1. Implementing collaborative learning
??	6.4. Replication loops to incorporate culture as an asset in DRR
??	6.4.1. Transferability Framework: loops methodological framework
??	6.5. Communities of Practice on Culture as an asset in DRR
??	6.5.1. Local Communities of Practice in the EDUCEN case study cities
??	6.5.2. Transnational communities of practice

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

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

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

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

- exploring how cultural factors affect different phases of disaster risk management;
- demonstrating the benefits of ex ante DRR and preparedness and motivating the players to put them into practice;
- improving understanding and communication of disaster risk in a cross-cultural environment ;
- improving disaster-related communication flow among all relevant organisations and individuals, before and during an emergency situation;
- ability to deal with evacuation in an urban area inhabited by multilingual and multicultural community

6.1. Using games to connect culture and disaster

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

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

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

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

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

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

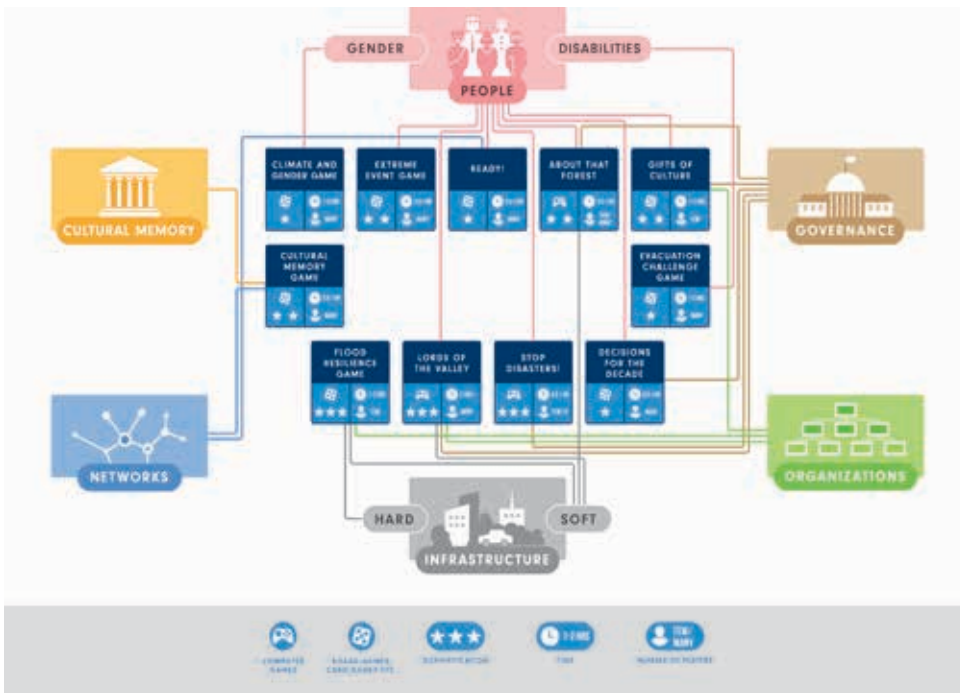


Figure 6.1.1 Infographic: What game(s) should I use?

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

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

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

6.1.1. What game(s) should I use?

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

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

Gifts of Culture game

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

Name	local communities, NGOs, policy makers, public administration, youth
Benefits	<p>Players understand different ways of how cultural factors affect disaster preparedness and the ability to cope with disaster.</p> <p>Players improve collaboration and information sharing skills, especially in regarding collaboration between organisations and individuals representing diverse cultural backgrounds leading to improved disaster resilience</p> <p>Players increase their understanding of disaster risk and become aware of challenges and opportunities of diverse cultural backgrounds.</p>
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

Table 6.1.1. Features of the Gifts of Culture game

Evacuation Challenge game

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



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

Name	youth, museums, schools
Benefits	<p>Players experience problems connected with language barriers during risk situations.</p> <p>Players understand problems encountered by people with disabilities during disasters and risk situations.</p> <p>Players learn about challenges of an evacuation in a multicultural environment.</p> <p>Players realise the importance of preparedness training, and the importance of training on diversity in communities.</p>
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

Table 6.1.2. Features of the Evacuation Challenge game

The Evacuation Challenge Game can be used to increase empathy among civil protection professionals. The game presents challenges of disaster response and evacuation in a culturally and linguistically diversified environment. Participants take on the roles of citizens and rescue team members. Several participants are bound by 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 actions should be adjusted to meet the needs of people with disabilities.

Cultural Memory game

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

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

Name	Aid workers, local communities, NGOs, youth, disaster managers
Benefits	<p>The game helps players understand the role of the memory of past disasters and recognize its signs.</p> <p>Players learn why being prepared is so important and where they can find information about that.</p> <p>The game encourages reflection on previous disasters in the areas of participants</p>
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

Table 6.1.3. Features of the Cultural Heritage game

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

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

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

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

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

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

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

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

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

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

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

6.1.3. How to use games and policy exercises

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

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

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

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

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

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

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

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

Authors: Alessandro Pagano, Raffaele Giordano

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

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

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

6.2.1. Mapping the network of interactions

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

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

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

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

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

The following table shows the meta-matrix approach.

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

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

Table 6.2.2 Agent x Agent matrix

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

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

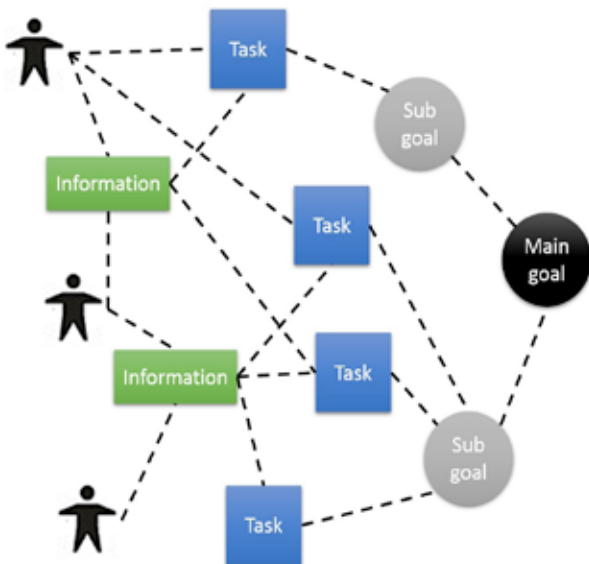


Figure 6.2.1. Fuzzy Cognitive Map describing the individual's understanding of the connections between goal-task-information-agents

	I1	I2	I3	...	I _n
A ₁	K ₁₁	K ₁₂	K ₁₃	...	K _{1n}
A ₃	K ₂₁	K ₂₂	K ₂₃	...	K _{2n}
A ₃	K ₃₁	K ₃₂	K ₃₃	...	K _{3n}
...
A _n	K _n	K _n	K _n	...	K _{nn}

Table 6.2.3 Knowledge network matrix for the i-th agent

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

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

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

The interactions with the other agents can be activated through both

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

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

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

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

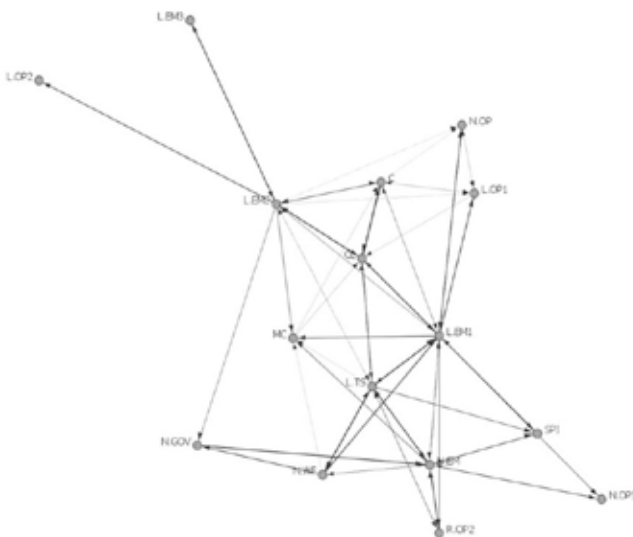


Figure 6.2.2. Map of the Agent x Agent interactions taking place during the flash flood emergency management in Lorca

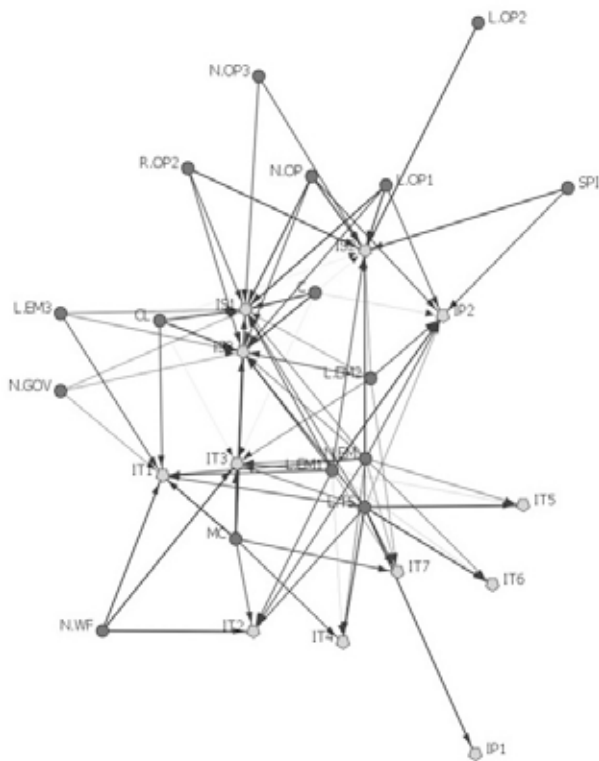


Figure 6.2.3 Map of the Agent x Knowledge network

the interviewees to describe the importance of the connections.

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

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

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

The map demonstrates that there is no exclusivity in the agent-knowledge interactions, namely there is no actor exclusively owning pieces of knowledge. Therefore, cooperation among the different actors is

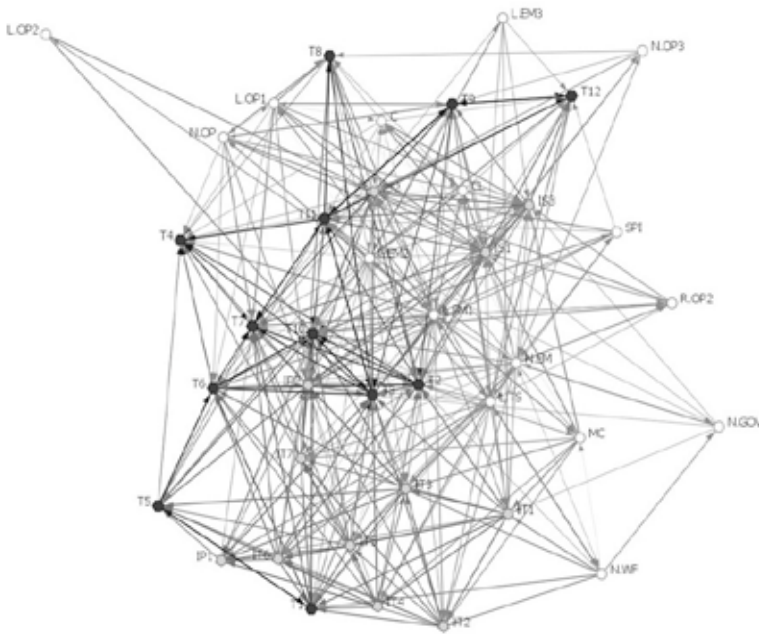


Figure 6.2.4 Network of interaction among Agents, Knowledge and Task according to both experts and local knowledge

crucial to overcome the fractured nature of the information system.

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

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

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

proving the protocol of intervention in case of emergency.

6.2.2. Analysing the map of interactions

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

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

Table 6.2.4 Graph theory measures for key element detection

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

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

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

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

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

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

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

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

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

6.2.3. Identification of actors

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

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

Table 6.2.7 Roles of different actors in the network

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

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

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

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

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

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

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

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

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

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

6.3. Collaborative learning for DRR

Author: Karina Barquet

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

6.3.1. Implementing collaborative learning

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

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

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

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

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

Table 6.3.1 Questions and key topics relating to culture and DRR

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

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

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

Authors: Elena Lopez Gunn and Manuel Bea

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

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

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

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

Loops and replication

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

- In the second internal replication loop, a single method previously proven in a frontrunner city (first loop) was replicated in another city (Lorca, Dordrecht and London).
- In the third external replication loop, the tools and methods approach was replicated as an integrated process in another city (Valladolid) external to the initial case studies.

6.4.1. Transferability Framework: loops methodological framework

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

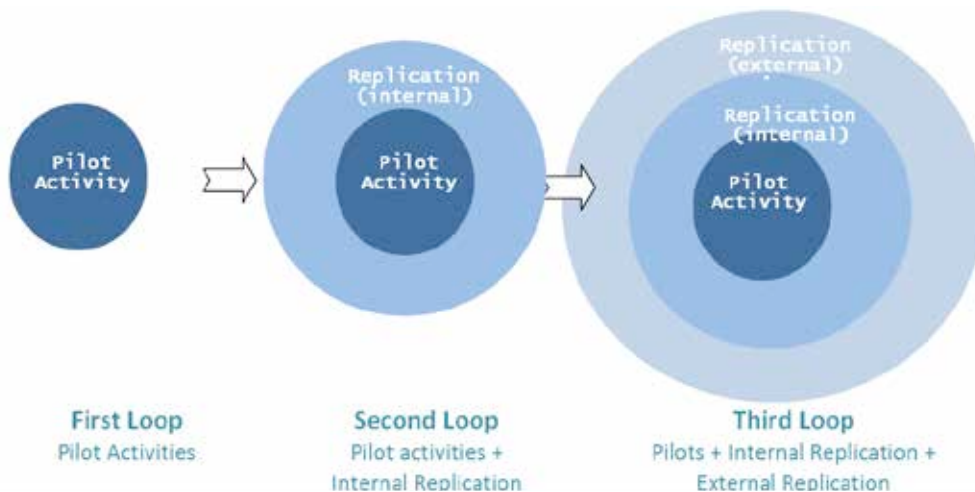


Figure 6.4.1. Replication loops to adapt tools and methods to adopt culture as an asset in DRR

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

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

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

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

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

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

First Replication Loop

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

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

Second replication loop: the “adapt to adopt” approach

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

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



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

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

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

Third replication loop: “the Matrushka” approach

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

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

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

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

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

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

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

Authors: Elena Lopez Gunn, Manuel Bea

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- Target: the first responders with the objective of securing a higher impact by targeting operational users. The goal for this level is to promote involvement into culture as an asset Communities of Practice network. Civil Protection authorities, with competences in urban areas. River Basin Authorities, in cities which may be severely affected by floods are examples of this type of stakeholders.
- Target: other beneficiaries: urban communities and particularly vulnerable groups, researchers and generic policy makers or urban planners. Here, our focus is on increasing understanding and promoting a wider dialogue. Prioritise representatives of cities and municipalities with significant disaster risk and with competences in DRR planning.
- Target: the General public, which may get informed about pilot activities, tools and methods in line with the aim of raising awareness around the potential of culture as a basis for a better disaster preparedness. Groups of stakeholders representing one sub-culture in cities in particular vulnerable groups (e.g. migrants, inclusively oriented DRR) at local, regional or even national scale, and NGOs/voluntary organisations involved in disaster preparedness and response.
- Target: tap into experts like those active in museums, local universities, archives and the academic community of practice engaged on mainstreaming culture into DRR and research in this area, particularly from the perspective of the science-policy interface. For this purpose the idea is to develop a follow up academic book on the topic.

6.5.2. Transnational communities of practice

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

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

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