*Driv*ing Innovation in Crisis Management for *E*uropean *R*esilience

# D34.1 – Conceptual Approach to resilience of local governments

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# List of Acronyms

| Abbreviation / acronym | Description |
|---|---|
| UNISDR | The United Nations Office for Disaster Risk Reduction |
| FEMA | American Federal Emergency Management |
| PCS | Plan communal de sauvegarde |
| ADM | Adaptive Delta Management |

# Project Description

**DRIVER evaluates emerging solutions in three key areas: civil society resilience, responder coordination as well as training and learning.**

**These solutions are evaluated using the DRIVER test-bed. Besides cost-effectiveness, DRIVER also considers societal impact and related regulatory frameworks and procedures. Evaluation results will be summarised in a roadmap for innovation in crisis management and societal resilience.**

**Finally, looking forward beyond the lifetime of the project, the benefits of DRIVER will materialize in enhanced crisis management practices, efficiency and through the DRIVER-promoted connection of existing networks.**

**DRIVER Step #1: Evaluation Framework**

- **Developing test-bed infrastructure and methodology to test and evaluate novel solutions, during the project and beyond. It provides guidelines on how to plan and perform experiments, as well as a framework for evaluation.**
- **Analysing regulatory frameworks and procedures relevant for the implementation of DRIVER-tested solutions including standardisation.**
- **Developing methodology for fostering societal values and avoiding negative side-effects to society as a whole from crisis management and societal resilience solutions.**

**DRIVER Step #2: Compiling and evaluating solutions**

- **Strengthening crisis communication and facilitating community engagement and self-organisation.**
- **Evaluating emerging solutions for professional responders with a focus on improving the coordination of the response effort.**
- **Benefiting professionals across borders by sharing learning solutions, lessons learned and competencies.**

**DRIVER Step #3: Large scale experiments and demonstration**

- **Execution of large-scale experiments to integrate and evaluate crisis management solutions.**
- **Demonstrating improvements in enhanced crisis management practices and resilience through the DRIVER experiments.**

**DRIVER is a 54 month duration project co-funded by the European Commission Seventh Framework Programme (FP7/2007-2013) under grant agreement no. 607798.**

# Executive Summary

**This document is the first deliverable (D34.1) that is written within WP34 of the DRIVER project, addressing the resilience of local governments towards disasters. Moreover, it is part of the DRIVER sub-project SP3, which focuses on civil society resilience and the role of stakeholders not directly dedicated to crisis management activities. Therefore, the local governments to be investigated within this work-package can be understood as one of the key stakeholders to be addressed by SP3.**

**WP34 aims to develop a methodology for local governments to assess their resilience towards disasters. In this context, it is necessary to understand the basic concept of disaster risk management and the respective roles of local governments within this process. Further, existing methods need to be analysed before developing the DRIVER framework, building a concept that includes best practices and improves identified gaps. On this basis, it is possible to define a performance model, outlining a set of key parameters and processes to be performed by local governments in order to be as resilient as possible. Therefore this work-package addresses two ACRIMAS needs of utmost importance: a) Analytic support to capacity building; and b) Understanding the relief effort as a whole.**

**All these steps are building the basis for the DRIVER assessment tool and will be outlined in this document. While the disaster risk management concept and the government roles are described in chapter 2, the subsequent chapter 3 contains the analysis of existing frameworks for resilience assessment. Chapter 4 then begins with the definition of the resilience performance model for local governments.**

**Finally, this document provides a first insight in the assessment tool to be developed, matching the existing methods, including their gaps and well working aspects, with the defined performance model. The herewith-presented four phases approach should be understood as a first version of the future framework. The assessment method will be further developed and repeatedly tested during the lifetime of the project. Therefore, the next development step will be presented in the upcoming deliverable D34.2 (M24), already including the knowledge from a set of end-user tests to be performed within experiment E34.1. A first fully operational version will be presented in the subsequent deliverable D34.3 (M36), still allowing methodological adjustments.**

# 1 Introduction

During centuries, cities were, on the one hand, the symbol of protection for people living inside, symbol of order and rationality with police, administration, rules and justice as symbol of control over nature. On the other hand, cities have to cope with specific hazards such as fires, famines, epidemics and natural hazards such as earthquakes or volcanic eruptions [2]. The industrialisation led to the disappearance of famines and most epidemics and man-made risks such as fires are nowadays considered as accidents and no more as disasters. Nevertheless, industrialisation caused the emergence of megacities and consequently increased the interconnectivity between industrial systems, which led to the emergence of new types of disasters such as systemic risks.

Resilience appears as a new paradigm for disaster management, with new expectations such as considering potential systemic or global risks, extending the scope of disaster management stakeholders including citizens and civil societies, increase capacities to respond to unforeseen situations, etc. In this document, definition of resilience provided by UNISDR will be used as reference: The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions [3].

Improvement of cities disaster resilience requires the interaction between two approaches. The first is a top down approach, according to which governments are expected to design proper disaster resilience mechanisms such as regulation and inspection regimes, and assign tasks to each level of responsibility. The second follows a bottom up approach, where local governments, citizens, communities, business, non-profit organisations share tasks to increase their risks culture and capacities to prevent, respond and recover from their occurrence [4].

WP 34 is dedicated to the development of a methodological guideline aiming at assessing and enhancing the performance of local governments in the context of disaster resilience, which is easy to handle and applicable by all types of cities. Further WP34 aims to realise a set of experiments to validate the method. The proposed methodology aims at representing the diversity of works and projects conducted in the context of city resilience to disasters by integrating different methods developed throughout Europe, the United States, Australia and New Zealand into one DRIVER approach.

D34.1 aims at describing the theoretical framework around the concept of city resilience and, on that basis, offers first insights into the DRIVER method in development as well as its associated guidelines even though the final assessment tool will be strongly end-user oriented and therefore will not include the theoretical framework outlined.

The deliverable is structured into three main sections. The first section is dedicated to the description of the resilience of cities towards disasters and to the role of local governments within disaster management. The second section outlines the results of the analysis of existing tools for resilience assessment for cities. The last section presents the first version of the DRIVER solution for supporting the management of the contribution of local government to societal resilience to disasters.

# 2 City resilience to disasters and the role of local government

Resilience is an integrative concept that became prominent in 21st centuries scientific thinking and was included on the political agendas. It encompasses two main ideas: response to stressful events and sustainability of systems in coping with stressful events [5]. D31.21 provides a detailed insight in the conceptual background and the history of resilience.

The work conducted in WP34 focuses on the role of local governments in city resilience, including resilience of local government themselves when disasters occur. It is defined as the ability of a system, community or society exposed to hazards to be able to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions [3].

Local government refers to the sphere of local authority activity, the internal organisation of local government and the legal, financial and political process [6]. Governance is understood as the sphere of public debate, partnership, interaction, dialogue and conflict introduced by local citizens and organisations. On the other side local government and those governed are referring to the interaction between government and governance.

In fact, disaster risk management is a complex problem for local governments [45]. They have to find solutions that would prevent disasters as well as prepare the population, infrastructures and goods for responding and recovering to disasters. While considering social and economic development of their cities with trying applying generic regulations to the specific characteristics of their territory and stakeholders [7]. Local government are considered as one of key actors for disaster risk reduction and management by international agencies such as UNISDR who define requirements that are progressively integrated in the regulation systems of countries. At the same time, testimonies of local government representative demonstrate the complexity of their role in disaster risk reduction.

This section thus aims at defining and illustrating key concepts related to city resilience on the one hand and the role of local governments on the other. This section is organized in two parts. While the first part presents the international perspective on disaster resilience and the role of local governments, the second part illustrates the five phases of city resilience with the contribution of local governments using empirical examples.

## 2.1 Resilience to disasters

The emergence of the concept of resilience to disaster as an evolution of disaster risk management is the result of an analogy process of the use of the resilience concept in ecology for structuring the enhancement of policies, practices and results of disaster risk management with overcoming consequences of the increase of the complexity of socio-technical systems and urban areas. This

section aims at describing the diversity and the complexity of capacities associated to resilience to disasters and more specifically local capacities to be performed or monitored by local government.

The first part is related to the presentation of conceptual approaches related to resilience. The second part is dedicated to the description of requirements provided by international texts. The last part aims at synthesising capacities associates to resilience to disasters.

### 2.1.1 From crisis management to resilience to disasters

Crisis management is generally studied in three, four or five phases. Each phase relates to actions to be performed before the crisis, during or after the crisis. Before the crisis is a time of normality, routines where potential source of crisis have to be searched, surveys has to be conducted to analyse the territory and the response capacities, actions has to be conducted to minimize the occurrence of crisis, decrease their impacts and increase the potential of response. When a crisis occurs, it's a time for operational actions, emergency response, for containment and damage limitations as well as crisis response management. When the crisis is finished, it is time for recovery, restoration and learning [8][9][10][11][12]. Crisis management activities are based on risk modelling. Risk refers to hazards (likelihood and characteristics of the occurrence of a natural process or phenomenon that can produce damage), Exposure (people and assets (property, infrastructure, etc.) subject to the hazards damaging impacts) or vulnerability (potential for harm to the city and related to physical assets) and to consequences (result of the hazard event) [13].

The concept of resilience emerges progressively in the crisis management domain. First reason was that no one could know and predict all the potential risks and impact. All considered and managed risks are selected by the means of rational and irrational criteria. But even within the science community there is rarely a consensus regarding potential risks and accompanied problems [14]. Consequently, risk management practices have to be completed by strategy of resilience aiming to find coping mechanisms that help to deal with unanticipated threats and to bounce back [15]. Second reason was that resilience is associated to positive outcome such as bouncing back, success as the contrary of risks that is more negative as associated to loss, damages, etc. Finally, resilience can be associated to a response of cities weaknesses such as inadequacies between land use planning results with risks and vulnerabilities, failures of built environment, an inadequate management or monitoring of infrastructure, failure in hazard mitigation, emergency response or stakeholder involvement [16].

Resilience became a paradigm for structuring disaster management and assessing the maturity of organisational and urban capacities to adapt to the occurrence of disasters. Coafee and Lee propose a four waves model for describing the evolution of the resilience paradigm applied to disaster management [16]. This model can be considered as a model of maturity for urban resilience by considering four vectors of improvement: more proactive behaviours, increase of the understanding of socio technical complexity of the city, more governance integration, increase of the involvement of communities. The first level corresponds to city deploying barriers for absorbing shocks, focussing on infrastructure robustness and redundancy. The second level refers to city integrating ability to respond and absorb shocks in their planning system and policy priorities and performing preventive actions such as population information and preparation. The third level corresponds to cities where

actors of the society (business, communities and government) develop ability to prevent and to prepare to disasters and embed resilience in within everyday activities. The fourth level corresponds to the integration of innovative technologies such as big data or social media within the different activities related to resilience.

From disaster risk management to the resilient smart cities, the concept of resilience shapes solutions for enhancing cities adaptive capacities with considering the enhancement of actors' internal capacities and their abilities to coordinate and cooperate with each other.

### 2.1.2 International frameworks for enhancing cities resilience to disasters

Resilience has been adopted as a keyword in different international frameworks aiming at supporting the increase of local, regional, national and international capacities to respond and recover from disasters. The HYOGO Framework for Action 2005-2015, the Sendai Framework for Disaster Risk Reduction 2015–2030 or the ten essentials actions for local governments to make cities resilient are three examples of frameworks aiming at structuring the enhancement of cities resilience to disasters.

The HYOGO Framework for Action 2005-2015 is an initiative of the United Nations Office for Disaster Risk Reduction (UNISDR) for building the resilience of nations with regards of the evaluation of the results of the application of the International Strategy for Disaster Reduction initiated in 1999 [17]. This framework aims at enhancing legal and policy frameworks; improve knowledge, methodology and technology for risk identification, assessment, monitoring and early warning; knowledge management and education on disaster risks; capacities to reduce underlying risk factors; preparedness capacities for effective response and recovery.

Five priorities of actions structured in the framework are: 1) Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation; 2) Identify, assess and monitor disaster risks and enhance early warning; 3) Use knowledge, innovation and education to build a culture of safety and resilience at all levels; 4) Reduce the underlying risk factors; 5) Strengthen disaster preparedness for effective response at all levels [17].

In 2015, results of the assessment of the application of the HYOGO framework were used to define the SENDAI Framework for Disaster Risk Reduction 2015–2030, which was adopted at the Third United Nations World Conference on Disaster Risk Reduction [18]. It defines four priorities to be implemented within and across sectors by states at local, national, regional and global levels: 1) understanding disaster risk; 2) strengthening disaster risk governance to manage disaster risk; 3) investing in disaster risk reduction for resilience; 4) enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction.

In addition of the HYOGO and SENDAI framework, UNSIDR proposed ten essentials for local government with the perspective of enhancing local resilience [19]. Essentials are related to 1) Implication of citizen and civil society for reducing disaster risk, 2) budget and incentives to invest in reducing disaster risk, 3) the management of data on hazard and vulnerability, 4) critical infrastructures resilience, 5) safety of schools and health facilities, 6) building regulations and land use-planning principles, 7) Education program and training on disaster risk reduction, 8) Ecosystems, natural buffers and climate change, 9) Early warning systems and emergency management capacities, 10) needs of citizen at the centre of reconstruction programs.

### 2.1.3 A model of disaster risk resilience capacities

**In order to discuss the contribution of local government to disaster resilience, a model constituted of five separate though correlated key functions is proposed. The definitions of the five phases are:**

- **Disaster risk assessment. Identification, analysis and evaluation of disaster risks and vulnerabilities.**
- **Disaster risk mitigation and prevention. Actions taken before a disaster to decrease vulnerability, primarily through measures that reduce causalities and exposure to damage and disruption or that provide passive protection during disasters.**
- **Disaster preparedness. Actions taken to bolster emergency response capabilities including warning systems, evacuation routes, supply chains and communication procedures established prior to disaster and emergency events.**
- **Disaster response. Actions taken immediately before, during and after a disaster to save lives remove destruction and minimize damage.**
- **Disaster recovery. Short-term activities to restore vital support systems as well as the long-term activities to rebuild properties and social and economic functions (Boin, Comfort and Demchak).**

**The following sections describe the outlined key functions of disaster resilience.**

#### 2.1.3.1 Disaster risks assessment

**The first step of the disaster resilience process is dedicated to the identification, the analysis and the evaluation of disaster risks.**

**Risks are usually associated with downside or bad outcomes but in some contexts they are associated with opportunities to gain [20]. The ISO 31000 norm defines risks as the effect of uncertainty on objectives and specifies that an effect can be understood either as a positive and/or as a negative deviation from the expectation. Objectives can have different aspects (such as financial, health and safety, and environmental goals) and can apply to different levels (such as strategic, organization-wide, project, product and process) [13].**

**In the context of disaster resilience, four dimensions are generally considered to describe disaster risks [21]: hazards, exposure, vulnerability and consequences:**

- **Hazards refer to the likelihood and characteristics of the occurrence of a natural process or phenomenon that can produce damage.**
- **Exposure refers to people and assets (property, infrastructure, etc.) subject to the hazards damaging impacts. Exposure is calculated from data about the people (demography) and the assets (e.g. value, location, and physical dimensions)**
- **Vulnerability is the potential for harm to the city and related to physical assets (building design and strength), social capital (community, structure, trust, facility network, etc.) and also to how sensitive a population may be to a hazard or to a disruption caused by the hazard.**
- **Consequences are the result of the hazard event, impacting the exposure in a region or** community, taking into account the degree of the community's vulnerability.

Various conceptual frameworks aim at describing the different functions related to risk management including risk assessment. As a result, attempts to make different conceptual frameworks comparable led to the formulation of standards. Two examples are of relevance in this context: the International Risk Governance Council (IRGC) risk governance framework and the ISO 31000 norm.

The International Risk Governance Council defines risk governance as "Identification, assessment, management and communication of risks in a broad context. It includes the totality of actors, rules, conventions, processes and mechanisms and is concerned with how relevant risk information is collected, analysed and communicated, and how management decisions are taken. It applies the principles of good governance that includes transparency, effectiveness and efficiency, accountability, strategic focus, sustainability, equity and fairness, respect for the rule of law and the need for the chosen solution to be politically and legally feasible as well as ethically and publicly acceptable". Risk assessment is one of the key functions structuring risk governance with risk appraisal, risk management and risk communication [22].

One definition of risk assessment is the process of identifying hazards and accessing severity. The ISO 31000 norm considers three processes for assessing risks [13]:

- Risk identification. Aim of this process is to generate a comprehensive list of risks based on those events that might create, enhance, prevent, degrade, accelerate or delay the achievement of objectives or be at the origin of unwanted consequences.
- Risk analysis. Provides an input to risk evaluation and to decisions on whether risks need to be treated, and on the most appropriate risk treatment strategies and methods. Risk analysis can also provide an input into making decisions where choices must be made and the options involve different types and levels of risk.
- Risk evaluation. Assist in making decisions, based on the outcomes of risk analysis, about which risks need treatment and the priority for treatment implementation.

Disaster risk assessment at the city level has to consider three specific dimensions: hazard exposure, physical vulnerability and social vulnerability [21].

Hazard exposure refers to geographic characteristics of potentially exposed sites and to related hazard impacts. Dimensions such as flood zones, coastal erosion and accretion, seismic hazards and fault lines, hazardous material sites, areas with high quantities of chemicals that are ignitable, reactive, corrosive or toxic, wildfire risk areas, drought-affected zones, probability of severe weather, landslide risk, sea level rise, fog rise, avalanche risk zones or regular avalanche tracks, etc. can be considered during analysis. Description of hazard exposure can be done including the nature of the hazard, historical precedents, characteristics of the hazard, and the effects of the hazard. Geographical maps and geographical information system (GIS) tools can be used for understanding, analysing, visualizing and communicating risks.

Physical vulnerability refers to the susceptibility to damages and losses based on the interaction between exposures and physical characteristics. Three kinds of information are particularly important when it comes to physical vulnerability:

- Nature or characteristics of physical infrastructures. Factors susceptible to increase or decrease impacts of the hazards to which they are exposed (nature of construction, location of critical facilities, homes and business, etc.).

- **Presence of critical infrastructures in hazardous areas. Indeed, critical infrastructure vulnerability affects disasters response and recovery activities and resources on various levels. Examples of critical infrastructures are: roads, bridges, dams, levees, power supply infrastructures and grids, oil and gas, water, phone and Internet, hospitals, schools, fire stations, police stations, emergency shelters, key commercial and industrial buildings, etc.**
- **Protection of the natural environment (wetlands, freshwater source, large stand of trees, oyster reefs, coral reefs, conservation areas, dunes and barriers islands, etc.) indeed produces environmental services that, in turn, can reduce physical vulnerability (natural basins for water drainage for example). Moreover, they also serve as economic drivers (fishing, hunting, agriculture, recreation, tourism, etc.).**

**Finally, social vulnerability refers to the capacity of a person or a group to anticipate, cope with, resist and recover from the impact of a disaster. Disasters are not equal-opportunity events; different groups are affected in different ways. Vulnerable people are less likely to have access to both information and resources that would allow them to anticipate and respond to a real or perceive threat (warnings to evacuate, seek shelter, etc.). Not all citizens have access to the same information or will react in the same way. Examples of factors that can be used to evaluate social vulnerability are: household structure, socioeconomic status, gender, race and ethnicity, age, tenure, urban or rural, special needs populations, employment status, etc.**

#### 2.1.3.2 Disaster risk mitigation and prevention

**Risk treatment or mitigation/prevention refers to the actions taken before a disaster to eliminate or reduce the intensity of the impact of hazardous events, and to decrease vulnerability. This is performed primarily through measures that reduce causalities and exposure to damage and disruption or that provides passive protection against the impact of disasters (implementation and enforcement of building standards, environmental protection measures and resource management practices, etc.)**

**The ISO 31000 norm defines risk treatment as a process to modify risks. A four steps process with seven examples of output options is proposed. The phases of the process are: (a) assessing a risk treatment; (b) deciding whether residual risk levels are tolerable or not; (c) if not tolerable, generating a new risk treatment; and (d) assessing the effectiveness of that treatment. The options proposed are: avoiding the risk by deciding not to start or continue with the activities that strengthen risks; taking or increasing the risk in order to pursue an opportunity; removing the risk source; changing the likelihood; changing the consequences; sharing the risk with another party or parties (including contracts and risk financing); and retaining the risk by informed decision.**

**Mitigation is defined as efforts undertaken before an event to reduce or eliminate the risks for hazards that may affect human life and properties [21]. Mitigation practices can be structural-based with the deployment of physical barriers (dams, levees or seawall for examples) or non-structural based with intangible barriers (land-use planning policies, learning from experience of the past, etc.) [22][23].**

The American Federal Emergency Management Agency (FEMA) proposes actions such as hazard source control (strategies designed to control the source and spread of the hazard consequences), community protection works (large engineered structures designed to protect area from hazard agents), land uses practices (development regulations and zoning approaches designed to keep development out of hazard areas), building construction and content practices (building codes and special utility codes designed to lessen structural damage due to flooding and high winds, etc.).

Strengthening buildings and infrastructures exposed to hazard, avoiding hazard-prone area actions and maintaining protective features of the natural environment actions can also be considered as mitigation actions [24].

Three types of city disasters risk mitigation approaches can be considered [22]:

- Location-based mitigation. Avoid hazards through land use planning or resettlement.
- Structural-based mitigation. Increase resistance by hazard proofing buildings, retrofitting, and refinement building codes.
- Fiscal-based mitigation. Risk financing and transfer mechanisms.

Location-based disasters risk mitigation aims to guide the location of population and assets in safe areas where disaster impacts are low or inexistent. Two measure types can be used: land use planning and building in redundancy. Disaster risk oriented land use planning aims at identifying safest areas in order to prioritize immediate investments in urban development and infrastructure projects. Map representations of disaster risk areas provide information on the location, type, design, quality, and timing of future developments. Adoption of a strategy of redundancy of critical infrastructures aims to enhance the reliability of key facilities by duplicating them in a geographically dispersed manner. Having two water tanks or water treatment plants of medium size rather than a big one will decrease vulnerability of the city to outages.

Structural-based mitigation aims at managing forces and energy of disaster threats. Resisting force strategies are based on structural bracing, frames or shear walls while reducing force strategies are based on base isolation or enhancement of structural damping approaches, minimizing building vulnerabilities to disasters. Definition of land use regulation and building codes considering disaster risks allow to structure strategies of replacing building stock with new structures and retrofitting of critical infrastructures.

Fiscal – based mitigation aims at selecting a set of financial instruments in order to enable mitigation activities among affected citizens. Instruments such as ex-ante financing mechanisms (budget reserve, contingent credit lines, etc.) or transfer mechanisms (risk insurance, risk pools, weather derivatives, catastrophe bonds, etc.) can be used. During recovery and reconstruction phases governments generally mobilize funds through deficit-spending, tax increase, spending cuts, and loans.

#### 2.1.3.3 Disaster preparedness

Disaster preparedness refers to actions taken to support emergency response capabilities including warning systems, citizen education, evacuation routes, supply-chains and communication procedures established prior to disasters and emergency events.

The term preparedness process refers to "pre-impact activities that establish a state of readiness to respond to an extreme event that could affect the community" [23]. The preparedness process aims to have policies and organisational structures, trained responders and protected facilities in place before a disaster occurs [4]. Therefore, the preparedness phase focuses on preparing for the next disaster. Typical preparedness activities include disaster and evacuation planning, training and exercises as well as stockpiling of supplies [22].

Preparedness activities performed by the local government can be: developing plans for activating and coordinating emergency response organisation, devising standard operating procedures to guide organizations in performing their emergency response, training personnel in the use of their procedures, conducting drills and exercises and critically evaluating performance, stockpiling resources such as protective equipment for emergency workers and medical supplies for the injured, assembling resources needed during an emergency [24].

Plans, procedures and resources are designed to support timely and effective emergency response on the one hand and on the other hand to guide disaster recovery processes [23]. Preparation plans are structured with information about agencies involved in preparedness, existing response and recovery plans, emergency operations and recovery operation plans (exemplary content: role of each agency, resources needed such as facilities, trained personnel, equipment, materials and supplies and information) as well as training, drill, and exercises [23].

#### 2.1.3.4 Disaster Response

Disaster response refers to actions taken immediately before, during and after a disaster to save lives, clear debris and minimize damage. Response activities start with the detection of the event and end with the stabilisation of the situation. A set of potential response activities could include securing the impacted area, warning the population, evacuating the threatened or affected area, conducting search and rescue for the injured, providing food and emergency medical care and sheltering evacuees and other victims [23].

The objectives during the response phase are the capacities for administrative and governing elites to avert or contain the threat, to minimise the damage, and to prevent critical systems from breaking down [4].

During the disaster response phase, a set of problems can emerge: deep uncertainty as to the causes of the event and the immediacy of the necessary response strategies, time pressures and uncertainty hampering communication and coordination among actors involved in the response network or the capacity to mobilise rapid response operations [4].

The efficiency of the response process depends on the efficiency of the actions taken previously in the mitigation/prevention and preparedness phases as well as on the investment in the resources, on the implemented training measures and the ability of agents to decide and act during urgent and/or unexpected situations [4] [25][26].

When disasters occur, response is based on a multi-layer process (local level, department level, zonal level and national level). In France, local governments have the role of director of emergency response and inter-linking agency with all other levels. All layers apply plans defined during the disaster preparedness phase. Nevertheless, application of plans is not the same issue if people are at

local level or at national level. Lessons learned after Lothar and Martin storms that affected parts of France and Germany in December 1999 severely, demonstrate that at national and zonal levels, the application of the plans went smoothly and at local and departmental level, on the contrary, the application of plans was not possible. Actors had difficulties to communicate and coordinate with each other to respond to all the damage caused by the storms [27].

Once the situation is stabilised, the recovery processes can start, usually motivated by a desire for a quick return to a normal situation.

#### 2.1.3.5 Disaster recovery

Disaster recovery includes both the short-term activities to restore vital support system as well as the long-term activities to rebuild properties and social as well as economic functionalities [24].

Short-term recovery refers to the restoration of access to an affected area, reestablishment of economic activities (commercial and industrial), provision of temporary housing, clothing, and food for the victims, restoration of critical infrastructure, restoration of essential government or community services. Long-term recovery refers to rebuilding housing, rebuilding major structures (buildings, roads, bridges, dams, etc.), revitalizing the economic system.

Recovery can be analysed in two phases: restoration and reconstruction [28]. Specifically, restoration refers to the activities that bring structurally sound, economically repairable facilities back to pre-disaster level of functionality and aesthetics, usually beginning a few days after an event, when people can safely enter damaged facilities. Restoration decision making and planning is based on safety. If restoration is not possible, facilities that are unsafe and not repairable might be reconstructed.

Post disaster reconstruction differs from traditional reconstruction activities because they are often executed faster than usual. Further, the equipment might be modified to be more adapted to the situation, specific techniques will be required to perform demolition of damaged or submerged facilities or returning the damaged mechanical-electrical equipment to full service.

Learning lessons about the causes and the effects of decisions and actions conducted before and during disasters must be defined and diffused. Accountability processes have to be established in order to make public or private agencies accountable if they have not applied mandatory mitigation, prevention and preparation actions.

How a local government represents its constituents and the decisions it makes play a central role in the recovery trajectory of individual households [29]. For example, in communities where a disaster destroys a significant amount of affordable housing, the local government can help to determine whether, and where, housing will be rebuilt through such actions as applying (or not applying) for federal recovery money or through changes in land-use to allow the development of replacement housing in less vulnerable areas. The size of the local government and the services it offers can be important indicators of its capacity to manage the complex task of recovery. Local governments with pre-existing expertise in key recovery areas such as community planning, social services, or housing development are able to act more quickly and with less reliance on outside resources than those without this background or experience. It turns out that higher citizen participation resulted in higher trust towards the government in the recovery process. Studies of post-disaster recovery have shown

that participation in recovery decision-making has multiple benefits for disaster-affected households and improves recovery overall [30][31]. The households that had closer relationships with their public officials, were engaged more robustly in the recovery planning process, were more satisfied with the performance of their local officials in recovery, and were able to leverage their social capital more effectively to receive non-monetary sources of aid and assistance. The capacity of local governance institutions has also played an important role in the speed of recovery, particularly for households living in small towns or rural (unincorporated) areas. Communities who engaged in citizen-based recovery planning process are tackling a broader range of recovery issues and projects than those who did not.

Next sections will be dedicated to the discussion of the specificities of cities resilience to disasters and to the contribution of local government.

## 2.2 The local government perspective

The perspective of local government in disaster resilience is discussed with considering three dimensions. First dimension is related to a discussion of the complexity of the role of local government in disaster resilience. The second dimension is dedicated to a set of examples of local government practices. Third dimension presents testimonies of local government representatives about disaster risk resilience.

### 2.2.1 The complexity of the role of local government in disaster resilience

For local governments, city resilience is not only a question of rebuilding and restoring essential services; it is rather a question of legitimacy [1]. Disaster consequences firstly demonstrate the incapacity of local governments to protect citizens. They have the opportunity to observe decisions and actions of local governments and eventually decide upon a political change. Local government rhetoric during and after disasters is never free from politics, self-interest or contention. Moreover, city resilience depends on the national perspective and more particularly national prestige as well as desire to maintain and re-establish standing in the community. Local governments are public organisations that in time of disaster are the first to be affected and the last to be out crisis and destruction. The complexity of local government in disaster resilience is discussed with considering two dimensions. The first one is local government as an organisation facing to disasters. The second is local government as local authorities responsible of a territory.

As all organisations they have to be able to face to expected and unexpected situations with developing risks management strategy for events that can be foreseen and resilience management strategies for events that can't be foreseen [15]. Local government have to be a resilient organisation, being able to achieve its core objectives in the face of adversity with reducing vulnerabilities and improving the ability and speed to manage effectively crisis [32]. They have to develop capacities such as precaution with failures and errors, management of incorrect simplified interpretations, capacity to have and share a good overview of situations, capacity to be ready to cope with unanticipated risks, to adapt to changed conditions and to bounce back after unexpected

situations with considering expertise instead of hierarchies [26], capacities to know how to respond to regular and irregular disruptions and disturbances, capacities to anticipate developments, threats and opportunities, capacity to monitor long or short-term threats covering both, risks and threshold values inherent to the system and to the environment and capacity to learn from positive and negative experiences [34].

More than organisations, local governments are local authorities responsible of the order of a territory composed of public and private organisations and citizens. These actors use to not consider disaster as they don't believe the possibility of their occurrence and believe that government will rescue and manage disorders in order to restore their capacities to achieve their goals [35]. Consequently local government have to develop local authorities resilience capacities: innovation, management of risks, strategic leadership, and enhancement of the involvement of civil society [36]. Local governments have to support local economic development with meeting local needs, encourage innovation, and remove uncertainties. Managing risks refers generally to emergency planning and natural or industrial hazards management, it aims to also integrate the management of public and private risk management activities. Leadership is a key issue for developing resilience. Local government have to influence the development of a resilience territory and influence all the actors to integrate resilience in their organisations. Nevertheless in a term of crisis, leadership is complicated and can generate defence mechanisms and encourage the avoidance of responsibility. Involvement of civil society is important in order to have public, private actors and citizens collaborating in the different resilience tasks.

The literature and empirical data reveal that local governments are facing a number of challenges in contributing to making cities resilient to disasters [33]. Some of the issues that have emerged are inadequate financial and human resource capabilities; a lack of knowledge of disaster risks and vulnerabilities; the need for long-term political commitment; a lack of focus on pre-disaster planning; inadequate legislative authority; a lack of clear-cut responsibilities and coordination among agencies; and a lack of involvement in major development activities, physical planning and regulation of land use. It is important to address these challenges faced by local governments in creating a disaster resilient built environment in a holistic manner to ensure effective disaster risk reduction within cities. Empowerment of local governments is proposed as a way of responding to the aforementioned challenges faced by local governments in their attempt to make cities resilient to disasters. Therefore, empowerment of local governments is proposed by developing the organisational capacities and reforming the governance, related to a way in which local government is established. In doing so, local governments can effectively contribute to making their cities more resilient to disasters. Hence, it is intended to develop a framework to empower the local governments to make cities resilient to disasters within the context of the built environment.

### 2.2.2 Local government practices

**This sections aims at presenting a set of examples of programs or initiatives. They have an illustrative purpose and should not be understood as representative at all.**

#### 2.2.2.1 French "Plan de prévention des risques"

**The local government is one of the key actors for conducting disaster risk assessment. Indeed, local governments, with a participatory approach, must conduct hazard identification, exposure and associated physical and social vulnerability analysis with stakeholders such as critical infrastructure owners, hazardous infrastructure owners, civil society, etc. This necessity was currently also addressed by the European Commission, making multi-hazard risk assessment obligatory for member states until the end of 2015 [37][38].**

The French "plan de prevention", as in many other countries, aims at defining rules for building in **risks prone areas. Plans exist for natural, technological, mining and marine submersion hazards. Based on the results of the risk assessment and the identification of exposures, areas are defined with different rules for building depending on the level of risk (cf. Figure 1):**

- **Areas where is not possible to build anything,**
- **Areas where it is possible to build but with the realisation of some prescriptions,**
- **Areas where it is possible to build without any prescriptions.**

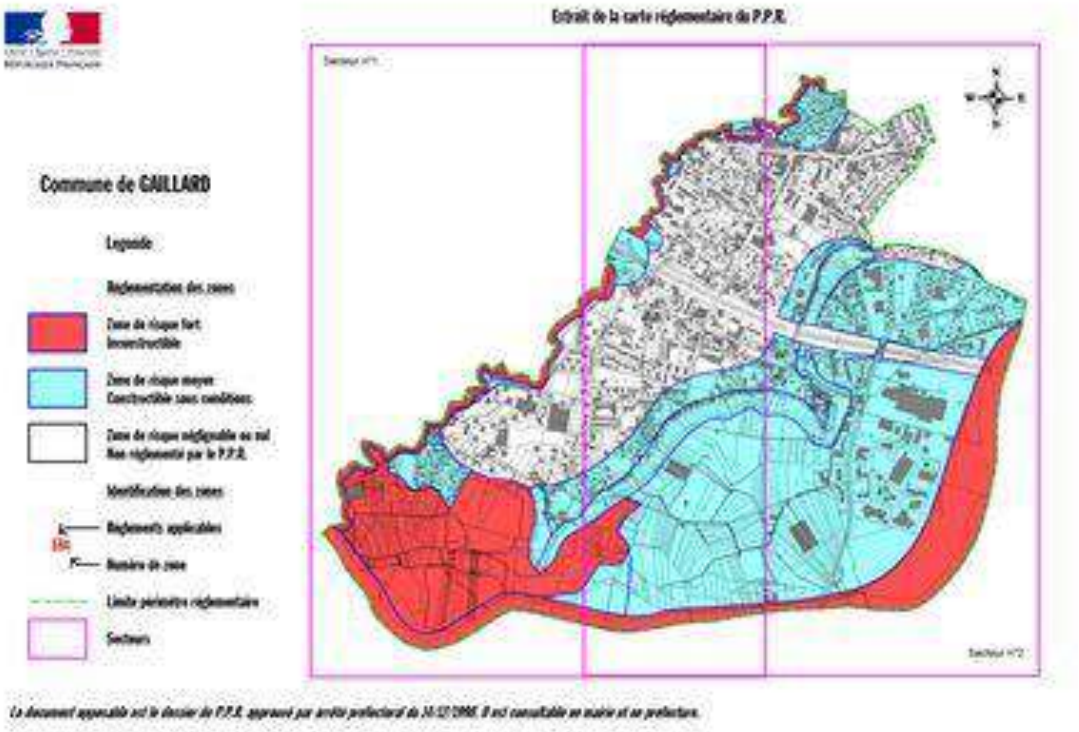


Figure 1: Example of PPR map with different type of areas.

#### 2.2.2.2 French "Plan communal de Sauvegardes"

French mayors are obliged to define a "Plan communal de sauvegarde" (PCS), describing behaviour **to be adopted by local governments and stakeholders when a disaster occurs. PCS is constituted of forms describing actions to be performed when specific situations occur. The forms cover the different missions of local governments during the response and recovery phases [39].**

**In the PCS, during the response phase, roles of local governments are defined as follows:**

- **Assess the situation: what's happening on the ground? Possible developments?**
- **Alert: the emergency services, the prefecture, the population concerned.**
- **Mobilize: municipal teams to ensure quick action.**
- **Implement security: take part in the establishment of security perimeters, dissemination, instructions and the evacuation of the population if necessary, etc.**
- **Host and supplies: preparing municipal buildings to accommodate persons displaced, etc.**
- **Inform authorities: stay in touch with the prefecture.**
- **Communicate: participation in the ongoing public information process, answer media requests, etc.**

**During the recovery phase local government roles are defined as:**

- **Assess the damage, assess needs and define priorities.**
- **Restore infrastructures: roads, networks, schools, etc.**
- **Rehouse victims over a longer period if necessary, etc.**
- **Support the victims: information, setting up meeting points, orientation, etc.**
- **Facilitate administrative procedures: financial aid, replacing lost personal documents, insurance statements, etc.**
- **Assist in the recovery of economic activities, etc.**

**PCS is generally structured in four sections. While the first section describes disaster risks and associated vulnerabilities, the second section presents the organisation of the local government response process (process description, social structure, local government task description, alert organisation, organisation of population support). Third section is related to human and technical resources. Fourth section describes crisis directory, actions forms, maps, model of documents and exercises).**

#### 2.2.2.3 French "Document d'Information Communal sur les Risques Majeurs"

French DICRIM "Document d'Information Communal sur les Risques Majeurs" **aims at supporting the development of a culture of risk awareness by describing hazard risks and associated consequences, events that happen in the city and actions to be performed in case of occurrence. DICRIM has to be written by local governments (city mayor in France) and are made available at the city hall.**

**The French c**ity of Nice, for example, published two DICRIM documents, a "normal" one and one **adapted especially for kids [40][41].**

**The normal DICRIM is structured with ten sections. First section is dedicated to generic information about hazard risks, associated policies and preventive plans illustrated with a map (cf. Figure 2) and information about alert signals.**

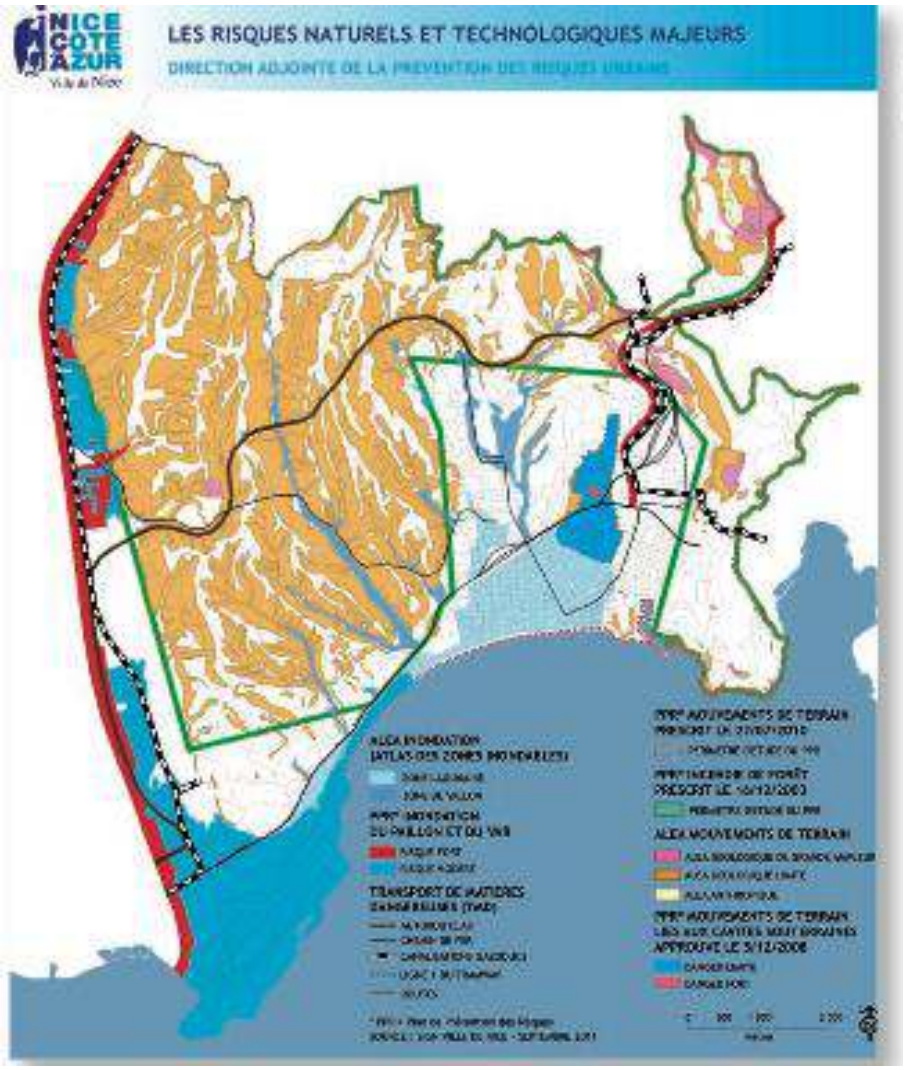


Figure 2: City of Nice prevention plan map [40]

**Then seven sections describe specific risks (flooding, forest fire, earthquake, landslides, meteorological events, hazardous material transport, and hazardous facilities). For each type of risk a definition is given, the specific exposure of Nice towards the risk is presented and illustrated on a map, city policies are presented. Besides, instructions regarding the application of protective measures before, during and after a crisis event are explained. The last two sections are dedicated to generic practical information and useful telephone numbers (fire brigades, emergency services, city police, national police, airport, energy providers, hospitals, etc.) as well as Internet websites.**

**The DICRIM adapted to kids describes the same hazards and associated recommended actions in a kid-friendly format. Risks are illustrated with pictures, maps and simple descriptions. Quizzes**

**complete the description in order to interact with kids and make them learn the information (cf. Figure 3).**


Figure 3: City of Nice flooding risk description for kids [41]

#### 2.2.2.4 Evolution of planning paradigm

**Hurricane Katrina in New Orleans in August 2005 and the following period had a major impact on the consciousness of the industrialised nations and caused the questioning of existing approaches of flood risk management from protection-based to adaptation-based strategies.**

**In Europe, there was a paradigm shift from a perspective based on the belief that natural phenomena could be controlled by technical means (Dykes, dams, water retention infrastructure, etc.) to a perspective understanding that risk management strategies are not sufficient to contain the ever-growing rise in adverse consequences associated with hazards (between 1980 and 2000). Flood management, for example, can be at the origin of side effects such as the creation of conditions where people forget the lessons learned from past experiences or develop excessive sense of confidence. Also, building dams along rivers may secure one city but could worsen the situation for regions and cities located downstream. This encourages uncertain economic rationality and effectiveness, relentless urban densification in areas with protection and the recurring difficulty of areas to manage, maintain, monitor and ensure the longevity of protective infrastructures. Consequently new approaches of risk management emerge in to order make cities less vulnerable, more robust and more resilient [42].**

**With the perspective of considering uncertainties related to the impact of climate change on flooding risks, the Netherlands adopted an innovative program named Delta Program on flood risk management [43]. This program aims to structure short-term and medium-term flood risk preventive measures, considering uncertainties with the so-called Adaptive Delta Management (ADM) approach. This approach links short term decisions with long terms flood risks management tasks, incorporating flexibility in possible solution strategies, working with multiple strategies which may be alternated, linking different investment agendas. Adaptation tipping points (ATP) are structuring the management of adaptation plans. The flood risk management objectives are oriented towards these thresholds if no longer supporting adaptation pathways have been defined. Adaptation pathways are used in long term planning because they provide insight into possible options, lock-in and path dependencies and give the flexibility needed to adapt to a wide range of future developments.**

**The Adaptive Delta Management approach has been used to refine the Dordrecht city flood risk management mitigation plan [43]. Dordrecht is a city of 120.000 inhabitants located on an island surrounded by a set of rivers and canals. The flood risk mitigation strategy of Dordrecht was based on making improvements to dykes and replacing storm surge barriers that were evaluated as below standards. Application of ADM is based on the identification on a set of uncertainties related to changes in future sea levels, river discharge and soil subsidence, change of regional population and economic values. A new strategy has been defined based on three layers: protection from flood through dykes, limiting the impact of flood through urban planning and limiting the impact of flood through emergency management. One key consequence of the definition of the new plan is the decision to build a new flood defence barrier to replace the existing dyke in design it in order to have no visual impact on the historic town centre.**

**The city of Rotterdam also updates its flood risks mitigation program with the help of the ADM approach [44]. Water was an opportunity of growth for Rotterdam, actually the water system is complex and fragile and flood risk mitigation is the result of a complex governance structure. Rotterdam flood risk adaptation strategy emerges on the hypothesis of the increase of cloudbursts, storm surges and extreme period of drought and is based on four principles: optimise the robustness of the existing system, adapt when necessary, link with urban dynamics and create added value. One of the actions resulting from the application of the plan is the design and construction of a water square aiming to increase the knowledge regarding technical aspects of storing water in the public realm and also to deliver insights towards the community such as citizen involvement, innovative financial arrangements and communication.**

### 2.2.3 Local government representative testimonies

**This section is dedicated to the presentation of the design and of the results of a set of interviews aiming to illustrate the complexity of the contribution of local government to urban resilience.**

#### 2.2.3.1 Interviews Design Report

**Within task 34.1 a set of interviews was foreseen in order to explore and improve the understanding of the perception and needs of local governments in order to improve the resilience of their cities. Therefore,** local governments' representatives, which are mostly in charge of high responsibility

tasks, were surveyed. The interviews include their understanding of the difficulties and needs for managing and improving their contributions in the prevention, preparation, response and recovery phases. In the following section the interview results, which built the foundation for the developed assessment tool, will be outlined. As well as all other experiments the subsequent interviews follow the DRIVER six-step approach.

Objectives of the interviews were to understand the perception of disaster resilience among local governments' representatives. It also includes their understanding of the difficulties and needs for managing and improving their contribution in the prevention, preparation, response and recovery phases. Therefore the interviews are based on the following research question:

- Are local governments in need of support to assess their vulnerability towards disasters?

Based on this research question, the interviews pursued the following hypothesis: There is a need for a comprehensive assessment tool for local governments regarding their resilience against crisis.

Questionnaire based interviews were used to collect necessary information about the requirements and needs of local government representatives. Therefore, a questionnaire was prepared covering the topics of the survey. The questionnaire was applied either directly (face to face with the interviewee) or indirectly (exchanges by emails) with an open answering scheme in order to gather diversified data basis.

In order to gather the aspired extensive knowledge the following interviews were conducted:

- Crisis manager at the regional council, Germany
- Head of the Civil Protection Department of a medium size city, France
- First representative responsible for safety and security issues of a small city, France

The crisis manager at the regional council (Germany) was selected due to his expertise regarding the requirements related of scientific research and crisis management in general.

The head of the "Civil Protection, Hygiene Healthiness" Department of a medium size city has been selected as a relevant person to be interviewed since he participated the audit of the Pôle Risques assessment framework presented in the next section.

Five cities in the area of Sophia-Antipolis have been contacted in order to conduct an interview. Only one city responded positively to the request. After a general introduction of the DRIVER project, aims of the study were explained.

A guideline has been developed to structure the realisation of the interviews, which purpose was to capture the representation of local government's representatives about five thematic themes:

- Local government disaster resilience context. The interviewee defines the global context of disaster resilience (definition of disaster resilience, disasters that occurred in the past, hazards identified and risks associated).
- Local government role, organisation and needs during the disaster <u>prevention</u> phase. Description of the role of local government in disaster prevention, concrete actions, resources allocated, competencies and training programs, communication and

coordination with citizens, state representatives, critical infrastructures, business companies, civil society, media, trade-offs with other functions, etc.)

- Local government role, organisation and needs during the preparation phase. Description of the role of local government in disaster preparation, concrete actions, resources allocated, competencies and training programs, communication and coordination with citizens, state representatives, critical infrastructures, business companies, civil society, media, trade-offs with other functions, etc.)
- Local government role, organisation and needs during the response phase. Description of the role of local government in disaster response, concrete actions, resources allocated, competencies and training programs, communication and coordination with citizens, state representatives, critical infrastructures, business companies, civil society, media, improvisation, endurance, etc.)
- Local government role, organisation and needs during the recovery phase. Description of the role of local government in disaster recovery, concrete actions, resources allocated, competencies and training programs, communication and coordination with citizens, state representative, critical infrastructures, business companies, civil society, media, trade-offs with other functions, etc.)

In order to avoid possible language barriers, the interviews in France were conducted in French. Therefore, the questionnaire was translated into French and afterwards into English. This enabled an easy comparison of the gathered information by every involved partner.

#### 2.2.3.2 Interview Result Report

The interview with the German crisis manager was conducted in English and in written form. The two interviews in France, with the head of the civil protection of a medium size city and the first representative responsible for safety and security issues of a small city, have been conducted in French and in writing. The questionnaire was provided as a document and sent via email. The answering was also done in writing and sent back via email.

The overall analysis of the expert interviews was taken into account for the further development of the aspired solution. Therefore, the needs of the participants regarding a resilience assessment tool were filtered and reprocessed. As a result, it was stressed that a comprehensive and detailed questionnaire should be built on the disaster management cycle (prevention, preparation, response, recovery). Furthermore, the tool should enable local governments to raise awareness of risks and risk exposure, which a city or region is facing. This needs to be done in a holistic way. For that reason, there must be a linkage between different sectors and stakeholders within the local government. To satisfy all the requirements of a holistic approach towards resilience, weaknesses and gaps should be pointed out in a simple way. Also, the repeatability and comparability of the assessment tool has to be established in order to ensure the objectivity of the assessment.

The analysis of the interview with the head of the civil protection of a French medium size city has illustrated a classical situation in France: there are few resources on the subject and the quality of the actions of the city comes from a motivated binomial between a technical agent and a

representative. However the level of qualification of these human resources is generally high. Even if a city safeguard plan (PCS) exists, its real integration into local government processes relies on the good will and motivation of this binomial. The short time political horizon does not allow placing disaster management in a visible position in the political agenda. The capacity to create and maintain transversal links between services on this subject remains difficult.

The analysis of the interview with the first representative responsible for safety and security issues of a small size city in France showed, that their perception is, that the city is not exposed to specific risks. Nevertheless, the city manages critical services such as water and sanitation consequently. The city assesses them as prepared to maintain and restore these services in case of a disaster. Prevention, preparation and respond processes were implemented with the different mandatory plans related to disaster management:

- Document of information of the population on risks (DICRIM)
- City safeguard plan (PCS)
- Population protection plan (PFMS)

The analysis of the interview identified two principal issues related to resilience management. The first one is how to construct a realistic situation of a disaster occurring in the city? The second difficulty is how to decide to invest money and time in a situation that might never will occur, during a period of budget restriction. The implication and the information of all stakeholders, the definition of concrete, easy to learn and applicable procedures, the integration of psychological cells and training of key actors with a specific program are success criteria for a resilience management program. Two factors for failure are identified: the theoretical program and insufficient information.

As conclusion of the analysis of the interviews, different aspects should be taken into account, to create a solid basis for the questionnaires of the aspired solution. The main point was the adaptation to the disaster management cycle. Therefore, the questionnaire was divided into the four phases of disaster management (prevention, preparation, response, recovery). This approach aims at a comprehensible structure, which leads to a usable and feasible solution. Furthermore, the questionnaires should be thematically structured into main topics within each phase. These three interviews also underlined the hypothesis that the political structure and the disaster culture of a country do influence the perception of a desired solution and consequently the characteristics (method, indicators, results, etc.) of the solution itself.

# 3 Improving the role of local governments in disaster resilience: comparing 7 frameworks

Local governments are one of the key contributors to disaster resilience [17]. They play a central role in coordinating and sustaining a multi-level, multi-stakeholders platform to promote disaster risk reduction in the region or for a specific hazard, they effectively engage local communities and citizens within disaster risk reduction activities and to link their concerns with government priorities, they strengthen their own institutional capacities and implement practical disaster risk reduction actions and they devise and implement innovative tools and techniques for disaster risk reduction, which can be replicated elsewhere or scaled up nationwide.

In order to have an efficient contribution to disaster resilience, local governments should have defined a management process with specific policies, performance indicators, accountabilities, responsibilities and dedicated resources for implementing, assessing and enhancing resilience to disasters. The assessment of the effectiveness and the efficiency of the different tasks related to disaster resilience and the implementation of improvement actions allows the deployment of a continual improvement process of the contribution of local government to disaster resilience.

Frameworks have been developed for the assessment of the resilience performance of different types of systems: organisations, communities, cities, territories organisational resilience, community resilience, cities resilience, territorial resilience and local government resilience. A study has been conducted in line with the perspective of designing an integrated framework grounded on strengths of existing frameworks. The study aims at identifying differences and similarities of existing frameworks and identifying strength and weaknesses. Results of the study are a set of lessons learned aiming to structure the design of the integrated framework.

Four parts structure this section. The first part presents the methodology followed for collecting and analysing the framework. Selected frameworks are presented in the second part. The third part describes a synthesis of the results gained from the analysis process. The fourth part is related to the lessons learned for structuring the design of an integrated framework for supporting the management of the contribution of local governments to disaster resilience.

## 3.1 Methodology

The purpose of the study is to analyse existing frameworks in order to identify lessons learned for designing an integrated solution supporting the management of the contribution of local governments to disaster resilience.

Three phases structured the methodology that was followed conducting this study. The first phase was dedicated to the collection and the selection of frameworks to be studied. The second phase consisted of the definition and the application of a set of criteria for analysing the frameworks. The last phase aimed at deducing a set of lessons from the results of the analysis.

The following sections are dedicated to the description of the processes followed for achieving these three phases.

### 3.1.1 Frameworks collection and selection

Different frameworks where developed to support the management of resilience. A first literature review conducted the identification of a set of performance models, indicators or frameworks. These frameworks are related to cities' resilience, coastal resilience, communities' resilience, organisational resilience, infrastructure resilience, socio-technical resilience, project resilience, etc. They focus on topics such as disasters, extreme events, climate change, food security, flooding, sustainable development, etc.

In order to select a reasonable set of relevant frameworks to conduct the study a set of rules has been followed:

1. Select existing frameworks dedicated to local government contribution to disaster resilience.
2. Select existing frameworks dedicated to local government and considering disaster resilience as one of the topic of analysis.
3. Select existing frameworks dedicated to disaster resilience and considering local government as one of the dimension of their scope.
4. Select existing frameworks that can be applied to local government contribution to disaster resilience.

### 3.1.2 Frameworks analysis process

The central aim of the analysis is to identify the key characteristics of each method, and therefore to build a basis for structuring the design of the DRIVER framework for assessing local governments` resilience towards disasters. With that perspective four general criteria are proposed:

- Context of the method. Generic information about the method, such as the responsible developing organisation, reason for and time of development, date of the actual version, central aims, targeted user group, nature of the method (paper guideline, software, book, etc.).
- Content and theoretical background. Information about theoretical foundation (key definitions, theories, generic methodologies, legal or normative frameworks, etc.) that structures both the definition of the indicators and the choice of methods and tools proposed for data collection and analysis processes.
- Methodological guidelines and technological support. Information about the different steps that structure the method (aims of each phase of the method, stakeholders, procedure, effort, generic versus specific, supports, etc.) in general and on key steps in particular: data collection, assessment and transfer of results.
- Results. Information about the nature of results and the potential application for improving crisis management activities (nature of the results, aims, target, usability, etc.).

Based on these criteria an analysis grid was developed and has been used for the analysis of the different methods (compare Annex 1).

### 3.1.3 Lessons learned deduction

With the perspective of grounding the design of an integrated framework dedicated to the management of the contribution of local government to disaster resilience, the third part of the study aims to deduct lessons learned. Lessons learned will be identified about:

- Aims of the framework. Lessons related to the objectives of framework and to results obtained after its application.
- Composition of the framework. Lessons related to the different components (guideline, tools, etc.) that will constitute the framework.
- Performance model. Lessons related to the different topics, sub-topics and performance indicator considered by the frameworks.
- Methodological guideline. Lessons related to the different phases that have to constitute the methodology of the methodology of application of the framework.

## 3.2 Frameworks

The application of the first phase of the methodology conducted to the selection of seven frameworks (cf. Table 1.). Following sections are dedicated to their description.

| Framework name | Design by |
|---|---|
| Local Government Self-Assessment Tool | UNISDR |
| Morgenstadt city insights | Fraunhofer |
| Community Disaster Resilience Scorecard | TORRENS Resilience Institute |
| Regional Disaster Resilience guide for action plan | The Infrastructure Security Partnership |
| Benchmark resilience tool | Resilient Organisations research programme |
| City resilience framework | Rockefeller Foundation – ARUP |
| Risk management of local government assessment tool | Pole Risques, Primo and IPGR |

Table 1: List of frameworks selected

### 3.2.1 UNISDR Local Government Self-Assessment Tool

The Local Government Self-Assessment Tool (LG-SAT) for Disaster Resilience is an initiative of the International Strategy for Disaster Reduction (UNISDR) supporting local governments in implementing the HYOGO Framework for Action 2005-2015.

The tool defines a basic set of challenging areas, names according objectives for governments and describes ten essential thematic fields of action in the context of disaster resilience.

Basically, the LG-Sat tool consists of a questionnaire of forty-one questions supporting the assessment of the level of progress of the outlined ten essentials in a city (cf. chapter 2.1.2), allowing for an estimation of the general level of local disaster resilience. Herein, five levels of progress are considered:

- Comprehensive achievement has been attained, with the commitment and capacities to sustain efforts at all levels.
- Substantial achievement has been attained, but with some recognised deficiencies in commitment, financial resources or operational capacities.
- There is some institutional commitment and capacities to achieving DRR, but progress is not comprehensive or substantial.
- Achievements have been made but are incomplete, and while improvements are planned, the commitment and capacities are limited.
- Achievements are minor and there are few signs of planning or forward action to improve the situation.

### 3.2.2 Fraunhofer Morgenstadt city insights (M:CI) project

The Morgenstadt: City of the future is an initiative of high-ranked partners from a range of industry sectors, leading-edge sustainable cities, and Fraunhofer research institutes. The initiative aims at identifying, developing and implementing socio-technical innovations and lighthouse projects to give an answer to future cities challenges such as the reduction of energy and resource consumption while enhancing the liveability and prosperity of a city.

The project tackles three main objectives:

- Understanding what makes sustainable urban systems successful in order to shape those systems in the future.
- Helping cities to develop in a more sustainable way and helping businesses to understand and access sustainable cities as future markets.
- Accelerating the global transition of sustainable urban systems.

Network members share four important convictions:

- Sustainable cities are key to a sustainable future. To create a liveable future, we must create intelligent, CO2 neutral cities that effectively make use of energy and resources and provide a high quality living for everyone.

- **Technical, organisational, and financial innovations are the key to creating sustainable cities. Effective, transformational solutions for clean, efficient, and liveable cities emerge where innovative technologies are combined with mind-set shifts, new management and organisational structures, as well as sound creative business models.**
- **Interdisciplinary collaboration lies at the heart of urban innovation.**
- **Sustainable innovations must be rooted in collaborative processes that facilitate out-of-the-box thinking and enable active work at interface points between sectors and disciplines.**

**A set of 300 indicators had been defined distinguishing between** "pressure indicators" (intensity of change drivers), "state indicators" (status of the city system) and "impact indicators" (consequences **for people and environment). The process of indicator development was based on a model of eight main urban system functions considered as relevant drivers for sustainable cities: urban production and logistic systems, urban energy systems, urban building systems, urban mobility systems, urban governance systems, urban ICT systems, urban water infrastructure and security systems. For each system players, processes, business models, technologies and users were considered and analysed.**

**Since resilience is one of the analysed key areas of the sustainable development, defined indicators as well as identified impact factors or action fields could support the development of the WP34 resilience assessment tool to be developed.**

### 3.2.3 Torrens Community Disaster Resilience Scorecard

**Torrens Community Disaster Resilience Scorecard was developed in 2009 by TORRENS Resilience Institute to support the Australian National Strategy for Disaster Resilience. The method focuses on community resilience and addresses four key dimensions: Community connectedness, available resources, risk and vulnerability as well as planning and procedures. A methodological guideline with four steps is proposed based on the organization of three workshops. Letters of invitation, meeting schedules and the list of indicators is provided.**

**Twenty-two indicators structure the framework, while four of them are related to the local government perspective and are therefore highlighted here:**

- **Level of communication between local governing body and population.**
- **Extent and level of engagement of households within the community in planning for disaster response and recovery.**
- **Comprehensiveness of the local infrastructure emergency protection plan (e.g., water supply, sewerage, power system).**
- **Engagement of all educational institutions (public/private schools, all levels including early child care) in emergency preparedness education.**

### 3.2.4 TISP Regional Disaster Resilience guide for action plan

The Infrastructure Security Partnership (TISP) was established in 2001 as a non-profit partnership offering a forum for developing practices and policies for the protection of US's critical infrastructures. Four goals structure TISP activities. The first one is to be the leader in infrastructure resilience. The second is to foster public- and private-sector collaboration. The third is to serve as a clearinghouse for knowledge, skills and education and the fourth to contribute to benchmarking and development of performance measures.

TISP developed a guide for setting up action plans for assessing and enhancing disaster resilience. The guide focuses on fourteen areas (Characterization of the regional all-hazards threat environment, Infrastructure dependencies and interdependencies identification and associated significant vulnerabilities and consequences for regional resilience, Regional resilience roles, responsibilities, authorities, and decision-making, Risk assessment and management, Alert and warning, two-way information sharing, and situational awareness, Regional response challenges, Recovery and long-term restoration challenges, Continuity of operations and business, Specialized sector-specific regional disaster resilience needs—cyber security, process control and IT systems, transportation, energy, water and wastewater systems, dams and levees, hospitals and healthcare, and air and seaport resilience, Human factors, community issues and education, Legal and liability issues, Public information and risk communications, including media, Exercises and training, Determining regional resilience financial and other resource needs

For each area, priorities issues, needs, short-term, medium term and long term recommended actions are provided.

### 3.2.5 Resilient Organisations research programme's benchmark resilience tool

Resilient Organisations is a multi-disciplinary team of over 35 researchers, representing a synthesis of engineering, science and business leadership aiming at the transformation of organisations, enabling them to successfully overcome major disruptions, avoid chronic dysfunction, build robust partnerships and to prosper.

A framework aiming to assess the resilience of organisations was developed. It is based on three key dimensions: Leadership and Culture; Networks and Change Ready Processes that build Business as Usual effectiveness as well as robust and agile response and recovery from crises.

For the Leadership and Culture dimension the following indicators are considered: leadership, staff engagement, situational awareness, decision-making and innovation and creativity. For the Network dimension the indicators to be considered are: effective partnerships, leveraging knowledge, breaking silos and internal resources. For the Change Ready Processes dimension the considered indicators are: unity of purpose, proactive posture, planning strategies and stress testing plans.

### 3.2.6 Rockefeller Foundation – ARUP city resilience framework

Rockefeller Foundation developed several programs for enhancing cities, organisations and communities to develop and enhance their resilience capacities.

Rockefeller Foundation collaborates with ARUP in conducting research in the field of city resilience. They defined a set of key indicators for resilient cities, further structured in twelve dimensions (Minimal human vulnerability; Diverse livelihoods and employment; Adequate safeguards to human life and health; Collective identity and mutual support; Social stability and security; Availability of financial resources and contingency funds; Reduced physical exposure and vulnerability; Continuity of critical services; Reliable communications and mobility; Effective leadership and management; Empowered stakeholders; Integrated development planning).

### 3.2.7 Pôle Risques assessment framework

Pole Risques, together with Primo (http://www.primofrance.org/) and IPGR (http://ipgr.fr/) developed a method aiming to assess and improve the risk management and insurance policy of local governments. This tool also aims at developing a culture of risk management at the city level and at certifying the quality and efficiency of the implementation of the risk management system of a local government.

The method has been developed for local governments, with the support of the French ministry for the Environment and sustainable development. However, this method is based on an external audit and therefore requires an auditor to be applied. The method provides a systemic approach, supporting cross-sectoral and cross-department analysis, which in turn contributes to highlight the other initiatives undertaken by the local government.

The method is organized in 4 sections: Governance, Risk management, Identification and characterization of the risks, risk management system.

## 3.3 Results of the analysis of the framework

For each framework, the assessment grid (cf. Annex 1) has been filled by the DRIVER Consortium partners. A synthesis of results is presented in the following sub-chapters, while the completed assessment grids can be found in the annex (cf. Annex 2 and 3).

### 3.3.1 Context of the methods

The first dimension analysed is the general context of the method and their development, considering the type of organisation who developed the framework, objectives and motivation of the development, target group and resources needed to apply the framework. Besides the Resilient Organisations research programme's benchmark resilience tool that was published in 2004, all other frameworks were published between 2009 and 2014.

Public bodies (UNISDR and Pôle Risques), foundations (Rockefeller foundation), research's centres (Fraunhofer institutes, TORRENS resilience institute, University of Canterbury), and a collective of professional and public bodies (TISP) developed the selected frameworks. One framework was developed by the United-Nations, while the other frameworks were designed in New-Zealand,

Australia, United-States, Germany and France. Therefore, all frameworks have a specific spatially shaped conception of resilience management.

Motivations and objectives that drive development of the different frameworks are quite similar. A need to raise awareness on the issue of disaster risk management and resilience, to increase the engagement and investment on disaster risk management at the local level and to support the identification of key actors and actions that contribute to the resilience of the city and to provide a snapshot of key measures contributing to resilience. The Fraunhofer city of the future method has a higher and more general objective: to develop a model for a sustainable urban development strategy considering interdependences between the different sectors of city management and in particular disaster risk management. The foreseen target groups and end-users of all frameworks are local governments and all public and private agencies contributing directly or indirectly to the resilience of the cities.

All the frameworks require around 1 to 4 dedicated researchers/city-workers to conduct the analysis. One critical dimension within all frameworks is the necessity to interact with all city stakeholders contributing to its resilience, which includes the organization of consecutive working sessions with representatives of all services and organisations implicated in disaster resilience.

The duration of the assessment differs widely among the frameworks. Some require only one day or less, while others ask for 3 meetings over a 4-6 week period each year and some other last around 6 months. The analysis of the context of the different frameworks presents similarities between motivation, objectives, or targeted public, while the duration of the application varies from a framework to another. The next section is dedicated to the comparison of the content and the theoretical background of the frameworks.

### 3.3.2 Content and theoretical background

The second dimension is related to the analysis of the content and theoretical background of the different methods, considering key concepts and associated models, theories and legal background, indicators and data management methods.

The frameworks are based on a certain theoretical foundations such as good practices or legal frameworks. The following table (cf. table 2.) presents all frameworks and their theoretical backgrounds.

| Framework | Theoretical background |
|---|---|
| UNISDR Local Government Self-Assessment Tool | The Hyogo framework for actions and more specifically on ten essentials for making cities resilient |
| Fraunhofer Morgenstadt city insights (M:CI) project | A catalogue of 280 good practices and reports of studies of six-leading cities |
| Torrens Community Disaster Resilience Scorecard | Australia National Strategy for Disaster Resilience |

| | |
|---|---|
| TISP Regional Disaster Resilience guide for action plan | Disaster resilience, for regions and communities defined as "the capability to prepare for, prevent, protect against, respond to or mitigate any anticipated or unexpected significant threat or event, including terrorist attacks, to adapt to changing conditions and rapidly recover to normal or a `new normal´, and reconstitute critical assets, operations, and services with minimum damage and disruption to public health and safety, the economy, environment, and national security." |
| Resilient Organisations research programme's benchmark resilience tool | Theories on non-technical skills for disaster management |
| Rockefeller Foundation – ARUP city resilience framework | City resilience defined as "capacity of cities to function, so that the people living and working in cities-particularly the poor and vulnerable-survive and strive no matter what stresses or shock they encounter". |
| Pôle Risques assessment framework | French legal, normative and regulatory framework regarding risk management and urban planning<br>ISO 31000 (2009) Risk management norm |

Table 2: Theoretical foundation of resilience frameworks

All frameworks mainly try to understand city resilience on the basis of qualitative indicators covering different topics associated to resilience. These indicators are related to personal and collective capacities of local government teams involved in disaster resilience, to the structure and organisation of disaster resilience in the city considering internal relationships but also interactions with external stakeholders, to outcomes of disaster resilience actions on risks, risks perception, reliability of cities and essentials facilities reliability, etc.

The majority of indicators are related to prevention (31 indicators) and preparedness (16 indicators) topics, response (9 indicators) and recovery (8 indicators), functions are not covered that well. Different approaches are proposed for data collection, analysis and aggregation. The main data collection techniques proposed are: estimation of qualitative indicators with working groups, interviews, focus groups and document analysis. The data analysis and aggregation processes are not as detailed outlined as the data collection processes. They include the comparison of the development of indicator results from one assessment to another, social network analysis and cluster analysis, summing up the values assessed of each theme, considering weight coefficients.

### 3.3.3 Methodological guidelines and technological support

The third dimension is related to the phases that structure the assessment processes of the different frameworks, trying to evaluate the contribution of local governments to the cities' resilience.

All the methods studied are generic and can be applied directly. The method developed by Pôle Risques depends on the French regulatory system and would therefore require a lot of adaptation to be applied in other countries.

All methodological guidelines have some key steps in common:

- The decision to conduct a resilience assessment needs to be taken by the local authorities, assigning clear instructions and responsibilities for the application of the different phases.
- The assessment requires comprehensive planning, organisation and performance expertise and therefore demand a certain amount of workload (document analysis, individual and collective interviews, tabletop exercises, workshop moderation, etc.).
- Assessment process and gap analysis.
- A clear presentation of the results towards the participating stakeholders, as well as to the all affected local actors (e.g. the civil society).

The TISP framework adds an additional key step, aiming to define, experiment and validate an action plan to improve identified gaps and to define a strategy to apply the action plan. The application of the frameworks is usually supported by presentation brochures, paper versions of questionnaires with additional descriptions of indicators, indices including metrics, templates for planning, feedback and recommendations, software based solutions with excel or online tools.

### 3.3.4 Results

The fourth dimension is related to the study of results provided by the application of the different frameworks and to the potential contribution of those results for local governments.

The results provided at the end of the application of the frameworks are filled out questionnaires, lists of gaps and in one case of action plans. Usually the outcomes are presented in a textual way, using graphs and reports. A certification is associated to the Pôle Risques method with the delivery of a label "Territorial risks management for resilient territories".

The usability of the frameworks for decision making and real world operations in order to improve the government's contribution to cities resilience has to be verified during experimentations and not been done yet. While all frameworks seem to be suitable to create and strengthen a culture towards resilience to disasters in cities, only those frameworks proposing action plans seem to be able to support decisions and actions.

## 3.4 Lessons learned for the design of an integrated framework

Results on the analysis of the frameworks have been used to identify a set of lessons learned about aims, composition, performance model and methodological guidelines for an integrated framework for local government resilience management.

### 3.4.1 Aims of the framework

The results of the application of the integrated framework need to be relevant for local governments improving their performance in disaster resilience.

Based on the existing framework these results therefore should consist of:

- Performance indicators evaluation. Each assessment will be based on a performance model corresponding to the entirety or to a specific part of the global performance model. The first result is a qualitative value for each indicator of the performance model.
- Evaluation report. A report presenting performance indicators values and additional context aiming to support readers in understanding the motivation of the evaluation. Furthermore, a set of concluding remarks for action plan phase should be included.
- Plan of actions. A set of concrete follow-up actions to be performed, including all short and medium term objectives addressing the enhancement of gaps or the protection good practices.

The results have to be tangible for local government decision-makers and practitioners as well as usable in order to perform concrete and efficient changes, aiming to improve the cities' disaster resilience.

### 3.4.2 Composition of the framework

The integrated framework should be constituted of several components:

- Flyer describing the framework. A short document presenting the key information related to the framework in order to inform local government and stakeholders of the characteristics of the framework.
- Methodological guideline. A medium size document describing in a simple way the different phases to be applied for applying the framework and obtaining the final results.
- Tools for supporting data collection, analysis and visualisation. A toolbox aiming to support the application of the framework, it could be simple spreadsheets or advanced software.
- Lessons learned from the application of the framework. A set of description of results and testimonies of the application of the framework in representative cases in order to demonstrate the relevance of its application for local governments.

### 3.4.3 Performance model

The performance model derived from the different frameworks has therefore to be based on the concept of resilience of cities towards disasters and the concept of resilience of organisations. The Integration of the concept of sustainable cities, as considered by the Morgenstadt: City Insights has to be addressed. If resilience is one of the similarities between the different frameworks, it doesn't refer to exactly the same topics from one framework to another. Accordingly, the theoretical background of the proposed method has to be structured with the four key capacities of city

resilience to disasters (prevent, prepare, respond and recover) then, other resilience perspectives should be considered as secondary dimension in relevant capacities. For example, the resilience perspective of the Resilient Organisations "resilience benchmark tool" framework (leadership, situation awareness, decision making, proactive posture, etc.) might be considered as a secondary dimension of the capacity to respond.

### 3.4.4 Methodological guideline

In order to design the proposed framework, a set of methodological and technological characteristics to be considered was identified. These characteristics are based upon the analysed frameworks and aim to be applicable for all kinds of cities (small, medium, large, etc.) and to offer a large degree of liberty to users, allowing for a high adaptability for specific local contexts and objectives. In this context the following characteristics have been determined:

- The methodological guideline has to support three key processes: performance assessment, identified gaps enhancement and good practices preservation.
- The methodological guideline has to be adaptable to the diversity of cities (small, medium, large, etc.).
- The methodological guideline has to provide support for short, medium and long duration studies.
- The methodological guideline has to support long term monitoring by allowing periodical assessments, comparing results of different assessments.
- The methodological guideline has to support studies considering the entire performance model and studies considering parts of the performance model.
- The methodological guideline has to facilitate the integration of the framework into the daily practices of the local government.

The guideline definition of the proposed framework will consider this set of characteristics.

All existing frameworks include a data collection phase for performance assessment, while some, such as the TISP framework, have an additional process related to the definition of corresponding actions plans. The design of the proposed framework will consider both of these identified phases.

Further, it was noticed that assessment frameworks should provide technological support in order to help users in applying the methodological guideline, such as:

- Description of the performance model. The performance model is the key component of the framework. It describes the necessary key features for local governments in order to work effectively towards the resilience of cities to disasters. Description will be the basis of the definition of performance indicators and associated assessment and enhancement processes.
- Description of the methodological guideline. Different steps of the method have to be described in considering aims, inputs and outputs, methods and tools that can be used to support their realisation.

- **Generic data collection support sheets. Generic indicators, interviews, focus group or observation guidelines aiming supporting users performing data collections and analysis processes.**

# 4 DRIVER framework for assessing and enhancing the contribution of local government to disaster resilience

**This chapter describes the DRIVER framework for local government disaster resilience assessment, building its main concept on the existing frameworks outlined in chapter 3 and targeting the governmental activities towards disasters as defined in chapter 2.**

**The DRIVER framework for local government disaster resilience assessment aims at establishing a common understanding of the local situation among relevant stakeholders; determining responsibilities for disaster management processes; directly addressing organisational processes with the help of action plans; advocating for an adequate and comprehensive allocation of resources, and establishing internal and external communication processes.**

## 4.1 Context and structure of the framework

### 4.1.1 Scope and objectives

**The local government resilience assessment framework is dedicated to people in charge of the monitoring and enhancement of city resilience capacities including prevention, preparation, response and recovery phases. Therefore, the end-user of the method could be a local government representative for internal audits, external consultants, or any other individual or organisation engaged in the disaster management process for external audits.**

**The local government resilience assessment framework aims to firstly promote the emergence of a** culture of resilience by creating a common understanding of people and local government's **organizations about resilience to disasters and secondly to support the assessment and the enhancement of the contribution of local government to the resilience of cities to disasters in a systematic and structured manner. It can be implemented in all organisations of the local government with considering all phases of disaster resilience or can be used in only one organisation with only considering its tasks and responsibilities.**

### 4.1.2 Benefits

**The local government resilience assessment framework is directed at and serves the following target groups:**

#### 4.1.2.1 Potential benefits for local government organizations

**The framework provides a standardized guideline to facilitate the development of a culture of disaster resilience inside organisations and between all local government organisations involved in**

disaster resilience activities. By using a standardized approach, the assessment and the enhancement of tasks performance can be optimized and lessons learned from one organisation can benefit to other organisations. Good practices can be shared and promoted inside the organisation and between all the organisations.

#### 4.1.2.2 Potential benefits for employees in local government organizations

The framework supports the identification of difficulties in the accomplishment of disaster resilience related tasks and processes and the definition of enhancement strategies aiming to solve them. Consequently, employees of local government organisations will have their tasks recognized by the organisation and their competences and working environment improved by the implementation of actions plan.

#### 4.1.2.3 Potential benefits for cities

The use of the framework by all local government organisations of a city will facilitate the interaction between all the actors during non-crisis and crisis times and will benefit to all the actors in the city (citizens, private organisations, etc.). Moreover, cities will be able to demonstrate their efficiency and their willingness to improve disaster resilience to the state.

### 4.1.3 Basis and sources of the framework

The method presented in this document is the result of a collaborative process conducted within the context of the European project DRIVER. It is based on the analysis and the integration of seven existing frameworks, which are:

- How To Make Cities More Resilient - A Handbook For Local Government Leaders (LG-SAT tool).
- MORGENSTADT / CITY OF THE FUTURE
- TORRENS Community Disaster Resilience Scorecard Toolkit
- TISP Regional Disaster Resilience Guide for Developing an Action Plan
- Resilient Organisations Resilience Benchmark Tool
- Rockefeller foundation and ARUP City Resilience Framework
- Pôle Risque Territorial risk management label

### 4.1.4 Structure of the framework

The framework presents a set of steps to be conducted in order to assess a set of key elements regarding the role, activities and processes to be performed by local governments during the disaster resilience phases as well as a defined action plan aiming to improve deficiencies and highlight good practices. During the initial phase of the method city-specific characteristics need to be considered in order to somehow adapt the method as well as the resulting proposed action plans towards the local needs. This way, all types of cities can apply the method.

The complete process model is only needed in case of the first implementation in a city. The local government resilience assessment framework consists of six phases:

1. Resilience context: Identification of context serving as a starting point for activities in resilience management
2. Resilience roadmap: Plan activities in resilience management in order to meet the strategic targets
3. Resilience model: Select, modify and elaborate the model of local government capacities contributing to societal resilience
4. Resilience performance assessment: Measure resilience performance in order to identify needs and gaps
5. Resilience enhancement: Build and develop action plans for enhancing resilience performance
6. Synthesis: provide reports and shared results of the study

| 1. | 2. | 3. | 4. | 5. | 6. |
|---|---|---|---|---|---|
| 1.1. Contextual requirements<br>Description of the context of application of the framework<br>1.2. Scope of the study<br>Description of targeted organisations and topics<br>1.3. Objectives of the study<br>Objective to be achieved by the application of the framework | 2.1. Activities definition<br>Activities are derived from the objective of application of the framework<br>2.2. Activities specification<br>Project-oriented specification of content and activities<br>2.3. Activities agreement<br>Activities agreed with all stakeholders in written form | 3.1. Resilience management system model<br>Define the model of the resilience management system<br>3.2. Prevention capacity model<br>Define the model of the capacity of prevention<br>3.3. Preparation capacity model<br>Define the model of the capacity of preparation<br>3.2. Respond capacity model<br>Define the model of the capacity to respond<br>3.3. Recovery capacity model | 4.1. Data collection<br>Workshops are organised to collect the data required by the assessment process<br>4.2. Performance assessment<br>The resilience performance including good practices and weak points is assessed for each capacity<br>4.3. Results validation<br>Stakeholders | 5.1. Actions plan definition<br>Workshops aiming at the definition of actions plan are organised with stakeholders<br>5.2 Action plan validation<br>Stakeholders validate actions plan | 6.1. Final results validation<br>Final results are presented to stakeholders and the final report is validated<br>6.2 Final results communication<br>Results are communicated internally and externally |

Table 3: Structure of the framework

## 4.2 Resilience context

**Launching the a**ssessment process aims at enhancing local government's disaster resilience **performance, it is necessary to provide a definition of the context of the framework. The result of this phase is constituted by the context, the scope and objectives of the study. In order to accomplish this phase and to define the context of the framework, a set of steps needs to be executed.**

### 4.2.1 Contextual requirements

The purpose of this step is to describe the local government's disaster resilience context, including **local government structure, tasks and processes map, and disaster risk profile.**

**A network of organisations responsible for different tasks and processes constitutes the local government. The mapping of this network and the identification of the different tasks and processes related to the different phases of disaster resilience (prevention, preparation, respond and recovery management) are proposed.**

**This mapping is completed by the disaster profile of the territory concerned by the study. Lessons learned from past events, risk and vulnerability mapping eventually completed by scenarios, official preventive document constitutes this profile.**

### 4.2.2 Scope of the study

**The purpose of this step is to define the scope of the study with considering organisational boundaries on one side and thematic boundaries on the other side.**

**Organisational boundaries are related to the list of organisations or services of the local government concerned by the study. For example, the study might consider only services of the municipality or these services and organisation responsible for water distribution. Thematic boundaries are related to the set of capacities to be considered by the study. For example, a study might cover only the capacity to prevent disaster risks or the four capacities of disaster resilience or a set of subtopics from each capacity.**

### 4.2.3 Objectives of the study

**The purpose of this step is to define the field objectives to be supported by local government resilience management. This involves identifying the abilities, which can be enhanced through utilising resilience management and that are needed in the field for the organization to be able to address specific disaster resilience tasks and processes.**

## 4.3 Resilience roadmap

**The second module of the framework consists of a resilience roadmap that defines how the project associated with the assessment and enhancement of the contribution of local government to disaster resilience is executed, monitored, controlled and closed. To some extent, the process described below is similar to that of a generic project management process. The different steps can be adapted to the context of the application of the framework.**

**The roadmap aims to:**

- Establish and share all management information important to be known with the project's **relevant stakeholders,**
- **Indicate the processes to be applied in the resilience management project to all relevant stakeholders, and**
- **Assign the different actors of the project the roles and tasks to be performed.**

**The resilience roadmap is elaborated by the project manager or by the management team. The editorial work of the document is progressive. Several feedback loops will be required to take into account the different perspectives and stakeholders of the project.**

**Four key steps are relevant for the definition of the resilience roadmap:**

- **Step 1. Derive an initial resilience roadmap with the contextual objectives. Here, the purpose and scope of assessment of the local government resilience capacities should be taken as the starting point. Different topics of the resilience roadmap are defined and a first version is proposed based on the information provided by the module on the resilience context and the contextual objectives.**
- **Step 2. Specify and prioritize resilience capacities assessment and enhancement activities with the relevant departments of the organization. A first description of the different activities is provided by means of individual and/or collective interviews.**
- **Step 3. Defined by the different activities of the resilience assessment project. Activities are specified in considering, among other topics, the levels, the time frame, the validity, the resources, the responsibilities, the processes and tasks.**
- **Step 4. Validate the resilience roadmap in cooperation with relevant decision-makers. The resilience roadmap has to be fixed in written form and agreed with the relevant decision-makers (e.g. directors or division managers).**

**The following section provides a detailed description of how an organization can achieve to implement the four steps.**

### 4.3.1 Resilience assessment and enhancement activities

**The first step of the process defining the resilience roadmap aims to outline the structure of the roadmap document and to provide the first version of it based on the content and output of the** framework's first step **- the resilience context module.**

#### 4.3.1.1 Define the content of the resilience roadmap

**The resilience roadmap describes the rules and the methods supporting the achievement of the objectives of local government contribution to disaster resilience management. In establishing efficient and systematic processes and methods the resilience roadmap is a document, which is** critical for an organization's successful contribution to disaster resilience management and can be **broken down into nine key chapters:**

- **Project description. The context of the competence management project, issues and objectives for each actor in crisis management, constraints (technical, actors, regulations, delays, milestones, organizations), deliverables (format, rules), initial budget.**
- **Project organization. Actors (competences, names, roles, links, impact on the project, expectations, validation criteria), organization chart, project management, decisional circuits, instance of supervision.**
- **Project planning and tasks. Phases and milestones of the competence management project (scheduling, duration, hypothesis, technical organization.**
- **Quality. Roles and responsibilities, insurance quality, control quality (process and output).**
- **Communication. Communication plan (which information of the competence management process for whom and when), support change, constraints and hypothesis.**
- **Management procedures. Meetings (dates, project phase, minutes), change management procedures, documentation management.**
- **Risks management. Risk identification, risk analysis, frequency gravity matrix definition.**
- **Performance indicators. Quantitative and qualitative competence management measures, definitions, shapes, frequencies, gap analysis.**
- **Lessons learned. Thematic, dimensions to improve, dimensions that function correctly.**

**Optionally, factors such as specific legislation or guidance material, business risks and contractual obligations should be taken into account.**

**The choice of the chapters, size and level of details of the content of the competence roadmap depends on the complexity of the competence management project.**

#### 4.3.1.2 Provide a first version of the resilience roadmap

**A preliminary version of the resilience roadmap has to be produced by the project leader starting with information described in the contextual objectives eventually completed with other contextual information such as enterprise environmental factors (governmental or industry standards, organizational structure, culture, management practices, and sustainability, infrastructure and personnel administration, etc.) or organizational process assets (standardised guidelines, work instructions, proposal evaluation criteria and performance measurement criteria, change control procedures, historical information and lessons learned knowledge base).**

**At the end of this first phase, a first version of the resilience roadmap is available. This version will be completed by means of a set of workshops with the relevant departments of the local government.**

#### 4.3.1.3 Resilience management activity specification

**In order to complete the preliminary version of the resilience roadmap, a set of workshops is organized with the relevant departments of the local government. Objectives of workshops are to collect information that will support the definition of the final resilience roadmap. Several actions are proposed to structure this process:**

- **Define targets and topics of the workshops. Contextual objectives and the preliminary resilience roadmap are used to firstly identify the different departments to be contacted for participating in the process of assessing and enhancing the contribution of local government to disaster resilience. Secondly, topics are defined for collecting information about different resilience capacities to be addressed.**
- **Organize workshops with organisations and services. Individual and/or collective interviews of the representative of relevant organisations and services are organized following the targets and topics identified in the precedent phase.**
- **Analyze and organize data collection. Results of workshops are analyzed and organized to support the definition of the content of the resilience roadmap.**

**At the end of this process information that will be used to define the content of the resilience, a roadmap has been collected and organized. Finally, the content of the different sections of the resilience roadmap has to be finalized, in particular, the work breakdown structure, the schedule baseline, the cost baseline and the responsibility matrix.**

#### 4.3.1.4 Define the work breakdown structure

**The work breakdown structure is a hierarchical decomposition of the total scope of work to be carried out by the project team to accomplish the assessment and enhancement of the contribution of local government to disaster resilience capacities project.**

**The work breakdown structure allows to:**

- **Identify all the activities to be planned,**
- **Elaborate the budget, duration and quality of the project,**
- **Supervise the realisation of the different activities of the project.**

#### 4.3.1.5 Define schedule baseline

**The schedule baseline is the approved version of a schedule model for the competence management process. The scheduling model presents linked activities with planned dates, duration milestones, and resources. At a minimum, it includes a planned start and planned finish date for each activity. A defined target start and target finish for each activity may be defined. The scheduling model can be presented in tabular form, it is more often, and presented graphically, using different formats such as bar charts, Gantt charts and milestone charts.**

#### 4.3.1.6 Define cost baseline

**The cost baseline of a competence management process is the approved version of the time-phased project budget.**

**Main components of a project budget and cost baseline is:**

- **Activity costs estimates for the various project activities along with any contingency reserves.**
- **The cost of activities is aggregated into their associated work packages costs.**
- **The cost of work packages is aggregated into control account.**
- **Summation of the control accounts makes up the cost baseline.**
- **Management reserves are added to the cost baseline to produce the project budget.**

**In order to provide the cost baseline, a four-phases-method to setup competence management processes is proposed:**

1. **Define precisely the target of the cost evaluation.**
2. **Search in the organization data, equivalent tasks or activities achieved in a project of the past. Identify associated real cost, date, the location of the realisation and elements related to the size of the task.**
3. **Consider the real cost of the task and apply some corrective coefficients related to the size ratio of the task, of the evolution of economic conditions between the time the task have been performed and now and to the location where the task has been realized.**
4. **Evaluate the sum of all the estimations.**

#### 4.3.1.7 Responsibility assignment matrix

**The responsibility assignment matrix lists and characterises the persons involved in the planned tasks of the competence management project. The decision to assign a team member as a contributor on a work package must be validated by the hierarchical person in charge.**

### 4.3.2 Resilience management agreement

**The last phase of the process is dedicated to the validation of the resilience roadmap. Three phases have to be considered:**

- **Identify all the decision-makers and inform them about the resilience roadmap.**
- **Update the resilience roadmap in considering their feedbacks if any.**
- **Once the definitive final resilience roadmap is ready, ask every decision-maker to sign or confirm it.**

## 4.4 Resilience model

The third module of the framework consists of the definition of the performance model, to be considered as a reference model for local government capacities contributing to societal resilience. The performance model will structure the application of the different phases of the method. An assessment process can consider the entire performance model or some specific sections. The context of application and available resources can impact the selection of a set of topics.

An example of performance model derived from the ISO 31000 norm and performance considered by the different frameworks analysed is proposed. The model is constituted of two parts. The first part is related to a management system dedicated to resilience management and the second Is related to different capacities of societal resilience.

### 4.4.1 Resilience management system model

The success of disaster resilience management will depend on the effectiveness of the management framework providing the foundations and arrangements that will embed it throughout the local government organization at all levels. The framework assists in managing disaster resilience effectively through the application of the disaster resilience management process at various levels and within specific contexts of the local government organization. The framework ensures that information about disaster resilience derived from the disaster resilience management process is adequately reported and used as a basis for decision-making and accountability at all relevant local government organizational levels.

This section describes the necessary components of the framework for managing disaster resilience and the way in which they interrelate in an iterative manner. They are the result of a process aiming to integrate performance indicators identified in the existing frameworks analysis (cf. chapter 3) and an adaptation of ISO 31000 structure (cf. Figure 4).

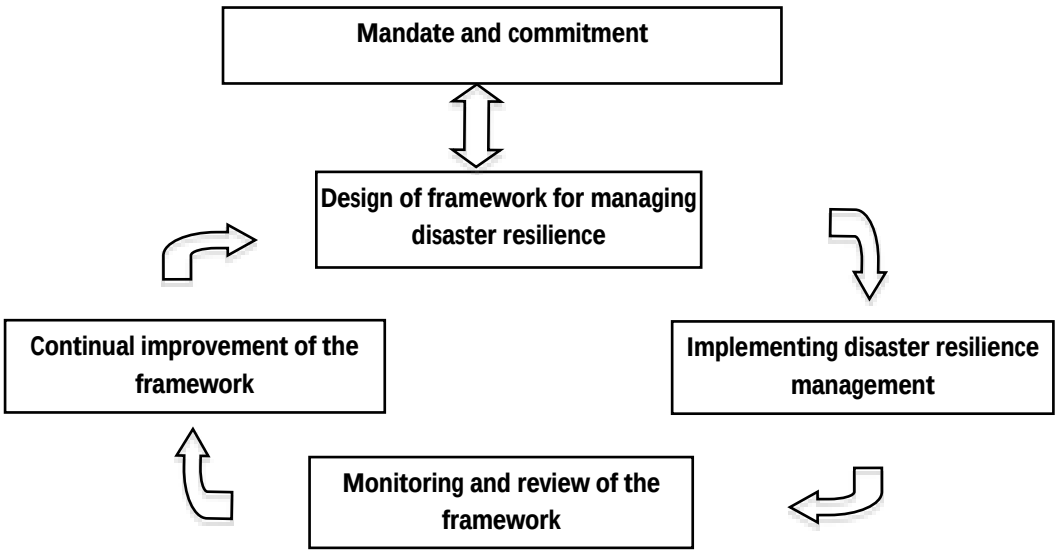


Figure 4: Relationship between the components of the framework for managing disaster resilience

This framework is not intended to prescribe a management system, but rather to assist the local government organization to integrate disaster resilience management into its overall management system. Therefore, local government organizations should adapt the components of the framework to their specific needs. All components of this performance model for managing disaster resilience will be outlined in depth within the next five sub-chapters.

#### 4.4.1.1 Mandate and commitment

The introduction of disaster resilience management and ensuring its ongoing effectiveness require a strong and sustained commitment of the local government organisation, as well as strategic and rigorous planning to achieve commitment at all levels. The managing teams should, therefore:

- Define and endorse the disaster resilience management policy;
- Ensure that the local government organisational culture and disaster resilience management policy are aligned;
- Determine disaster resilience management performance indicators that align with performance indicators of the organization;
- Align disaster resilience management objectives with the objectives and strategies of the organisation;
- Ensure legal and regulatory compliance;
- Assign accountabilities and responsibilities at appropriate levels within the organisation;
- Ensure that the necessary resources are allocated to disaster resilience management;
- Communicate the benefits of disaster management to all stakeholders; and
- Ensure that the framework for managing disaster resilience continues to remain appropriate.

#### 4.4.1.2 Design of the framework for managing disaster resilience

The design of the framework for managing disaster resilience requires performing the following steps:

- Understand the local government organization and its context
- Establish disaster resilience management policy
- Manage accountability
- Integrate disaster resilience management into organisational processes
- Manage resources
- Establish internal communication and reporting mechanisms
- Establish external communication and reporting mechanisms

#### 4.4.1.3 Implementing disaster resilience management

The implementation of disaster resilience management requires the following actions to be performed:

- Implement the framework for managing disaster resilience
- Implement the disaster resilience management process
- Monitor and review the framework

#### 4.4.1.4 Continuous improvement of the framework

Based on results of monitoring and reviews, decisions should be made on how the disaster resilience management framework, policy and plan can be improved. These decisions should lead to improvements in the organization's management of disaster resilience and its disaster resilience management culture.

### 4.4.2 Societal resilience model

In order to contribute to the disaster resilience, the resilience towards disasters should be:

- An integral part of management,
- Embedded in the culture and practices, and
- Tailored to the business processes of the organization.

It comprises the activities described in the following sections and shown in Figure 5.

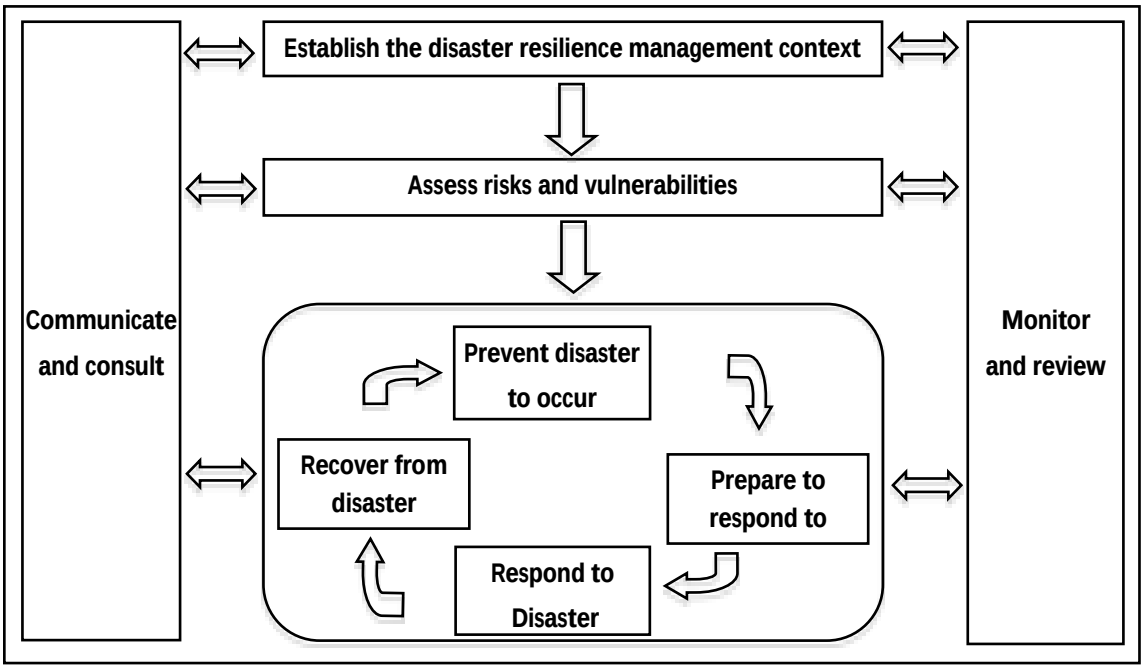


Figure 5: Disaster Resilience process

#### 4.4.2.1 Communicate and consult

**Communication and consultation with external and internal stakeholders should take place during all stages of the disaster resilience management process.**

**Therefore, plans for communication and consultation should be developed at an early stage. These should address issues relating to the disaster, its causes, its consequences (if known), and the measures being taken to treat it. Effective external and internal communication and consultation should take place to ensure that those accountable for implementing the disaster management process and the stakeholders understand the basis on which decisions are made, and the reasons why particular actions are required.**

**Communication and consultation should facilitate truthful, relevant, accurate and understandable exchanges of information, taking into account confidential and personal integrity aspects.**

To be effective and contribute to a city's development and safety, managing disaster risk and **understanding the potential threats of complex events requires a holistic approach and must include the involvement of local government decision makers, city officials and departments, academia, business and citizens groups.**

#### 4.4.2.2 Establish the context

**By establishing the context, the local government articulates its objectives, defines the external and internal parameters to be taken into account when managing disaster resilience, and sets the scope and disaster resilience criteria for the remaining process. While many of these parameters are similar to those considered in the design of the disaster resilience management framework, when establishing the context for the disaster resilience management process, they need to be considered in greater detail and particularly how they relate to the scope of the particular disaster resilience management process.**

**Local governments require capacities and mechanisms to access and manage resources, including for** disaster risk reduction, as part of the city's vision, mission and strategic plans. Resources can come **from city revenues, national disbursements and allocations to sectoral departments, public-private partnerships and technical cooperation, and from civil society and external organisations.**

**Local government should, therefore:**

- **Establish the external context**
- **Establish the internal context**
- **Establish the context of the disaster resilience management process**
- **Establish a legislative framework for resilience and disaster risk reduction**
- **Coordinate all emergency services within the city**
- **Create alliances and networks beyond the city**
- **Invest in risk reduction measures and awareness campaigns**
- **Ensure a budget for preparedness and response**
- **Put in place incentives for risk reduction and penalties**
- **Improve economic performance**

#### 4.4.2.3 Assess risks and vulnerabilities

**Unless cities have a clear understanding of the risks they face, planning for meaningful disaster risk reduction may be ineffective. Risk analysis and assessments are essential prerequisites for informed decision making, prioritizing projects, planning for risk reduction measures and identifying high-, medium- or low-risk areas, according to their vulnerability and the cost effectiveness of potential interventions. A well-maintained database of disaster losses and a Geographic Information System to map hazards, vulnerabilities, the exposure of people and assets and capacities will provide the foundation for the risk assessment.**

**Local government should, therefore:**

- **Determine the nature and extent of disaster risk**
- **Disseminate risk information and apply to development decisions**

#### 4.4.2.4 Prevent disasters to occur

**Not all hazards are destined to cause disasters. Pre-emptive measures can help to avoid the disruption, incapacitation or destruction of networks, grids and infrastructure, which can cause severe social, health and economic consequences. Collapsed buildings are the greatest cause of mortality during earthquakes. Poorly planned roads or insufficient drains cause many landslides. Lifelines such as roads, bridges and airports, electric and communications systems, hospital and emergency services and energy and water supplies are essential for a city to function during a response to a disaster.**

**Countries and cities will have safer infrastructures when standards are in place through building codes and regulations. The application of construction codes and mechanisms for planning and monitoring the use of city land is a valuable way to reduce disaster vulnerability and risk from extreme events such as earthquakes, floods, fires, the release of hazardous materials and other phenomena. It is the responsibility of local authorities to monitor their application, compliance and follow-up.**

**Schools and health facilities provide essential social services. As such, special attention must be paid to their safety and risk reduction efforts must focus on ensuring they can continue providing services when most needed.**

**Ecosystems serve as protective buffers against natural hazards. They increase the resilience of communities by strengthening livelihoods and the availability and quality of drinking water, food supplies and other natural resources. Through the process of urban expansion, cities transform their surrounding environment and often generate new risks. The urbanization of watersheds can modify hydrological regimes and destabilize slopes, increasing hazards such as floods and landslides. Maintaining a balance between human actions and ecosystems is an excellent strategy for reducing risk and contributing to resilience and sustainability.**

**Local government should, therefore:**

- **Strengthen protective infrastructure**
- **Protect critical infrastructure**

- **Develop resilient new infrastructure**
- **Enforcement of and compliance with risk-sensitive building codes and regulations**
- **Develop city and land use planning based on risk assessments**
- **Upgrade informal settlements and promote safe construction of non-engineered buildings**
- **Build local capacities and strengthen participation in urban planning and land use**
- **Keep schools and health facilities operating and functional**
- **Raise awareness of the impact of environmental change and degradation of ecosystems on disaster risk**
- **Promote green growth and ecosystem protection in planning for sustainable livelihoods and development**
- **Establish alliances with environmental managers and the private sector**
- **Strengthen existing ecosystem management instruments or establish them where they do not exist**

#### 4.4.2.5 Prepare to respond to disaster

**If citizens are to take part in the collective responsibility of creating disaster-resilient cities, training, education and public awareness are critical (these must also be incorporated into all Ten Essentials). The entire community must know about the hazards and risks to which they are exposed if they are to be better prepared and take measures to cope with potential disasters. Awareness, education and capacity building programmes on disaster risk and mitigation measures are key for mobilizing citizen participation in the city's disaster risk reduction strategies.**

**Well-conceived emergency preparedness and response plans not only save lives and goods, they often also contribute to resilience and post-disaster recovery by lessening the impact of a disaster. Preparedness efforts and early warning systems help ensure that cities, communities and individuals threatened by natural or other hazards can act in sufficient time and appropriately to reduce personal injury, loss of life and damage to property or nearby fragile environments. Sustainability can be achieved if the community itself and local authorities understand the importance of and need for local emergency preparedness and response.**

**Local government should, therefore:**

- **Raise public awareness in the city**
- **Integrate disaster risk reduction into formal education programmes**
- **Develop risk reduction training and capacity building at the city level**
- **Establish city-wide disaster safety initiatives**
- **Strengthen and improve preparedness**
- **Create or improve an accessible multi-hazard early warning system**
- Upgrade the city's emergency response services
- **Develop table top exercises and periodic drills**
- **Plan for recovery before disaster happens**

#### 4.4.2.6 Respond to disaster

**In order to respond, the local government must first detect that something has happened, then identify the event and recognize it as being so serious that a response is necessary, and finally know how to respond and be capable of responding. Responses must furthermore be both timely and effective so that they can bring about the desired outcome before it is too late.**

**Local government should, therefore:**

- **Manage adaptive capacity of the organisation created by its leadership and culture.**
- **Manage internal and external relationships fostered and developed by your organisation that it can leverage when needed.**
- **The plan was undertaken and direction established to enable the organisation to be change ready.**

#### 4.4.2.7 Recover from disaster

**Cities are built by many entities over decades or centuries and are hence difficult to rebuild in a short period of time. There is a continuous tension between the need to rebuild quickly and to rebuild as safely and sustainably as possible. Well-planned and participatory recovery and reconstruction process help the city to reactivate itself, restore and rebuild its damaged infrastructure and recover its economy, empowering citizens to rebuild their lives, housing and livelihoods. Reconstruction must begin as soon as possible; in fact, cities can foresee needs, establish operational mechanisms and pre-assign resources before a disaster. Leadership, coordination and obtaining money are key.**

**Local government should, therefore:**

- **Recognize the relevance of priority services and operations after a disaster**
- **Consider recovery as a part of disaster reduction plans and public policies**
- **Include the affected population in the definition of needs**
- **Consider recovery as an opportunity to build back better and improve development**
- **Seek resources, strengthen alliances and ensure sustainability**

#### 4.4.2.8 Monitoring and review

**Both monitoring and review should be a planned part of the disaster resilience management process and involve regular checking or monitoring. It can be periodic or ad hoc.**

**Responsibilities for monitoring and review should be clearly defined.**

**The local government's monitoring and review processes should encompass all aspects of the disaster resilience management process for the purposes of:**

- **Ensuring that controls are effective and efficient in both design and operation;**
- **Obtaining further information to improve risk assessment;**
- **Analysing and learning lessons from events (including near-misses), changes, trends, successes and failures;**

- Detecting changes in the external and internal context, including changes to disaster risk criteria and the disaster risk itself which can require revision of risk treatments and priorities; and
- Identifying emerging risks.

The progress in implementing risk treatment plans provides a performance measure. The results can be incorporated into the organization's overall performance management, measurement and external and internal reporting activities.

The results of the monitoring and review process should be recorded and externally and internally reported as appropriate, and should also be used as an input to the review of the disaster resilience management framework.

#### 4.4.2.9 Recording the risk management process

Risk management activities should be traceable. In the risk management process, records provide the foundation for improvement in methods and tools, as well as in the overall process.

Decisions concerning the creation of records should notably take into account:

- The organization's needs for continuous learning;
- Benefits of re-using information for management purposes;
- Costs and efforts involved in creating and maintaining records;
- Legal, regulatory and operational needs for records;
- Method of access, ease to retrieve and store media;
- Retention period; and
- the sensitivity of the information.

## 4.5 Resilience performance assessment

The fourth phase of the process consists of the application of roadmap phase and is dedicated to the assessment of the resilience performance as defined in the precedent phase. The three main steps of this phase are data collection, performance analysis and result validation.

### 4.5.1 Data collection

The data collection process aims at collecting information required to proceed the performance assessment. First, assessment materials need to be defined and then the workshops shall be organised.

Different approaches can be used for data collection. It can be based on a documents analysis, individual or collective interviews, questionnaires, observation, etc.

The preliminary phase includes a design phase for assessment materials (questionnaires, observation grids, interview guidelines, etc.). The assessment materials are defined under consideration of the topic description and generic description provided by the definition phase.

Within phase 2, two types of workshops need to be performed: one opening workshop and a set of data collection workshops.

The opening workshop aims at presenting the global context of the assessment to all participants and to support the organisation of the following data collection workshops. The team leader and the working team will be introduced to the stakeholders; the general context of disaster resilience explained and the specific objectives of the assessment are described. Further, all upcoming phases and workshops will be described and scheduled in cooperation with the stakeholders.

### 4.5.2 Performance assessment

The performance assessment aims at evaluating the different topics addressed by the assessment including the analysis the results of the data collection phase with the support of the assessment scale and the performance model. The assessment process can result in two potential outcomes:

- First, the stakeholders could share a similar point of view on a specific topic; an evaluation result can, therefore, be defined easily.
- Secondly, the stakeholders' point of views can diverge; resulting in an open evaluation result being subject to a debate during a validation workshop.

At the end of this phase, a preliminary version of the report will be written. This report will contain the following information:

- Synthesis of the content of the report.
- Description of the context of the framework methodology and assessment (aims, organisation, working team, etc.)
- Description of the data collection process.
- Description of preliminary results of the data collection process.

### 4.5.3 Result validation

The preliminary report will be discussed during a performance validation workshop. During this workshop, performance indicators values are presented to the stakeholders. If stakeholders disagree with some results, their observation is considered and if required results are refined.

## 4.6 Resilience enhancement

This phase of the process consists of the definition of an action plan aiming to enhance gaps identified and preserve good practices. The definition process of the plan is structured in two tasks.

### 4.6.1 Actions plan definition

The first task aims to define in cooperation with the stakeholders a set of short and medium term actions in order to overcome identified gaps of specific topics as well as to preserve satisfactory results and to define a preliminary version of actions plan.

A first set of cooperative workshops will be organised in order to firstly define gaps and good practices requiring actions, and further to identify short term and medium term actions aiming to enhance or preserve the identified aspects.

Based on this information, an initial plan of actions will be defined by the working team with defining key components (context, objectives, action list, responsible, resources, schedule, criteria of success, etc.).

### 4.6.2 Action plan validation

The second phase aims to validate the plan of actions with all involved stakeholders. The preliminary plan of actions will be discussed and adapted to the stakeholders and the working team will develop the final plan.

## 4.7 Synthesis

The last phase consists of editorial tasks regarding the final report, a final presentation of the assessment results for the involved as well as for all other affected stakeholders and supporting measures for the organisation of the application of the plan of actions.

# 5 Conclusion

**This deliverable aimed at the establishment of a theoretical and methodical basis for the DRIVER framework for local government disaster resilience assessment to be developed within WP34. Therefore, the deliverable consecutively outlined the basic concept of disaster risk management and the respective roles of local governments within this process, already existing methods of resilience assessment and a DRIVER resilience performance model, finishing with the design of the DRIVER methodology.**

**In this context, chapter two provided an insight in the main agenda of disaster management referring to the Hyogo Framework for Action and five priority actions also to be addressed within the DRIVER framework (chapter 2.1). Moreover, chapter 2.2 linked the five key functions of local governments within disaster resilience management defined by the UNISDR to the DRIVER framework, allowing an integration of relevant aspects into the methodology.**

**Further, existing methods for resilience assessment were analysed in order to be able to develop an own framework, that includes discovered best practices and improves identified gaps (chapter 3). Therefore, chapter 3.1 started with a description of the context of the previously identified seven tools. In a next step all these tools were analysed on the basis of a criteria catalogue (chapter 3.2 and Annexes 1 & 2). Further, all parameters of the tools which are addressing the key functions of local governments identified in chapter 2, were collected and categorized according to the four phases of disaster resilience management: preparation, prevention, response and recovery (Annex 3). Herewith it was possible to match the best practices of all different tools in respect to all resilience management phases as it is foreseen for the DRIVER framework too.**

**The DRIVER framework methodology was developed and outlined in chapter 4, including a general description of its context and structure (chapter 4.1) and a description of the phases that constitute the framework (chapter 4.2 to chapter 4.7).**

**The resulting first version of the DRIVER framework for local government disaster resilience assessment will be presented in the upcoming deliverable D34.2 (M24).**

**The assessment method will be further developed and repeatedly tested during the lifetime of the project. Therefore the next development step will already include the knowledge gained in a set of end-user tests to be performed in experiment E34.1. A first fully operational version, also including lessons learned of an even more profound end-user workshop with the tool, will be presented in the subsequent deliverable D34.3 (M36), still allowing methodological adjustments. Finally, it is foreseen to apply the tool within the preparation phases of the DRIVER joint experimentation as well as the final demo.**

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# Annex 1. Criteria for the comparison of the local government resilience assessment frameworks

**One of the key objectives of WP34 is to develop a first prototype of a framework for assessing and supporting the improvement of local government resilience to disasters. As a central requirement of the DRIVER approach the framework will integrate the experience of existing similar projects and approaches developed in Europe and in other areas of the world. With that objective, a set of existing methods has been identified.**

**The Analysis of the methods aims to identify similarities and differences between characteristics of these methods such as aims, scope, type of indicators, data collection methods, indicators assessment process, nature of the results, etc. In order to achieve this target a set of indicators is proposed to structure the analysis of the methods as well as the design of the framework to be developed within DRIVER.**

This Annex section aims to present the criteria's selected and the associated grid of analysis.

## 5.1 List of criteria

**Aims of the analysis are to identify the key characteristics of each method and to structure the design of the Driver framework for assessing local government resilience. With that perspective four key criteria are proposed:**

- **Context of the method. Generic information about the method, such as who developed it, why and when the method has been developed, , date of the actual version, aims, targeted user group, nature of the method (paper guideline, software, book, etc.).**
- **Content and methodological theoretical background. Information about theoretical foundation (Key definitions, theories, generic methodologies, legal or normative frameworks, etc.) that structure both the definition of the indicators and the choice of methods and tools proposed for data collection and analyses processes.**
- **Methodological guidelines and technological supports. Information about the different steps that structure the method (aims of each phase of the method, stakeholders, procedure, effort, generic versus specific, supports, etc.) in general and on key steps in particular: data collection, assessment and transfer of results.**
- **Results. Information about the nature of results of the method and the potential application for improving crisis management (nature of the results, aims, target, usability, etc.)**

**Based on these criteria a set of analysis grid is proposed and described in the next section.**

## 5.2 Method analysis grids

**For each criterion, an analysis grid is proposed. All grids should be filled for each analyzed resilience assessment tool. Grids will afterwards also support the definition of the proposed Driver method characteristics.**

### 5.2.1 Context of the method

**The following table (cf. Table 4), is related to the general context of the method and should be filled for each analysed resilience method.**

| Name of the method: | | Written by : | | Update date : | |
|---|---|---|---|---|---|
| **1. Context of the method** | | | | | |
| 1 | Who developed the method? | | | | |
| 2 | Objectives of the method? | | | | |
| 3 | Who is supposed to use the method? | | | | |
| 4 | For which reasons the method has been developed? | | | | |
| 5 | Scope of application (territorial oriented? Risk oriented? Resilience oriented? ) | | | | |
| 6 | When does the first version of the method have been produced? | | | | |
| 7 | Actual version of the method and date of release? | | | | |
| 8 | How many people are needed to apply the method? | | | | |
| 9 | What are the key quantitative indicators of the method? | | | | |
| 10 | What are the key qualitative indicators of | | | | |

| Name of the method: | | Written by : | | Update date : | |
|---|---|---|---|---|---|
| **1. Context of the method** | | | | | |
| | the method? | | | | |
| 11 | Knowledge necessary to apply the method? | | | | |
| 12 | Average duration of the application of the method? | | | | |
| 13 | Support materials? | | | | |

Table 4: Description forms of context of resilience assessment methods

### 5.2.2 Content and methodological theoretical background

The following table (cf. Table 5), is related to the general context of the method and should be filled for each analysed resilience method.

| Name of the method: | | Written by : | | Update date : | |
|---|---|---|---|---|---|
| **2. Content and methodological theoretical background** | | | | | |
| 1 | Key concepts and associated models and theories of the method | | | | |
| 2 | Background legal frameworks or norms | | | | |
| 3 | Data collection methods | | | | |
| 4 | Data analysis methods | | | | |
| 5 | Data aggregation method | | | | |

Table 5: Description forms of theoretical background of resilience assessment methods

### 5.2.3 Methodological guideline and supports

The following table (cf. Table 6), is related to methodological guidelines and technological supports of the method and should be filled for each analysed resilience method.

| Name of the method: | | Written by : | | Update date : | |
|---|---|---|---|---|---|
| **3. Methodological guideline and technological supports** | | | | | |
| 1 | Can the method be applied directly or does an adaptation is necessary? | | | | |
| 2 | Title and objectives of the different phases of the method | | | | |
| For each phase of the method | | | | | |
| 3 | Prerequisite | | | | |
| 4 | Inputs from other phases | | | | |
| 5 | Results of the realization of the phase | | | | |
| 6 | Procedure | | | | |
| 7 | Support provided by methods or tools | | | | |
| 8 | Resources | | | | |
| 9 | Average time / effort | | | | |
| For data acquisition process | | | | | |
| 10 | Nature of information collected | | | | |
| 11 | Procedures | | | | |
| 12 | Sources of information | | | | |
| 13 | Technological support | | | | |
| 14 | Average time / effort | | | | |
| For indicators assessment | | | | | |
| 15 | Method of assessment | | | | |
| 16 | Procedures | | | | |
| 17 | Rules | | | | |
| 18 | Technological support | | | | |
| 19 | Average time/effort | | | | |

Table 6: Description forms of methodological guideline of resilience assessment methods

### 5.2.4 Results

**The following table (cf.Table 7), is related to results characteristics of the method and should be filled for each analysed resilience method.**

| Name of the method: | | Written by : | | Update date : | |
|---|---|---|---|---|---|
| **4. Results characteristics** | | | | | |
| 1 | Nature of the result | | | | |
| 2 | Format | | | | |
| 4 | Procedures | | | | |
| 5 | Technological support | | | | |
| 6 | Diffusion of the results | | | | |
| 7 | Usability for decision and action | | | | |
| 8 | Usability for improving disaster management (prevention, preparation, crisis management, recovery) | | | | |
| 9 | Usability for improving the role of local government in disaster management | | | | |

Table 7: Description forms of result characteristics of resilience assessment methods

### 5.2.5 Synthesis

**The following table (cf. Table 8), is related to a synthesis of characteristics of the method that could/should be considerate in the Driver**

| Name of the method: | | Written by : | | Update date : | |
|---|---|---|---|---|---|
| **6.Synthesis** | | | | | |
| **1** | **Context of the method** | | | | |
| **2** | **Content and methodological theoretical background** | | | | |
| **4** | **Methodological guideline and supports** | | | | |
| **5** | **Results** | | | | |

Table 8: Description forms of the synthesis of the analysis of resilience assessment methods

# Annex 2. Results of the application of the grid to the different frameworks

## UNISDR Local Government Self-Assessment Tool

### Context of the method

**The following table (cf. Table 9) is related to the general context of the method.**

| Name of the method: LG-SAT (Full Name: Local Government Self-Assessment Tool) | | Written by : Willi Wendt (USTUTT) | Update Date: 22.01.2015 |
|---|---|---|---|
| **Context of the method** | | | |
| 1 | Who developed the method? | UNISDR (The United Nations Office for Disaster Risk Reduction) | |
| 2 | Objectives of the method? | The main purpose of the LGSAT is to (source LG-SAT Tool Overview):<br>• Help local governments to engage with different stakeholders to map and understand existing gaps and challenges in disaster risk reduction in their city or locality.<br>• Set a baseline and develop status reports for cities and municipalities that have committed to the Making Cities Resilient Campaign and its Ten Essentials.<br>• Complement information gathered through the national Hyogo Framework for Action monitoring system (HFA Monitor) by providing local-level information. Cities can choose to share their results with national HFA focal points as part of the national reporting process. | |
| 3 | Who is supposed to use the method? | Local governments and supporting agencies of disaster risk management | |
| 4 | For which reasons the method has been developed? | "Demand for more active engagement and investment in disaster risk reduction at the local level." (source "A practical guide to local HFA) | |
| 5 | Scope of application (territorial oriented? Risk oriented? Resilience oriented? ) | Oriented towards the Disaster Risk Reduction activities of a local territory/ entity | |
| 6 | When does the first version of the method have been produced? | First cycle of Self-Assessment started in 2011. | |

| Name of the method: LG-SAT (Full Name: Local Government Self-Assessment Tool) | Written by : Willi Wendt (USTUTT) | Update Date: 22.01.2015 |
|---|---|---|

| Context of the method | | |
|---|---|---|
| 7 | **Actual version of the method and date of release?** | **A second cycle should have been performed between 2013 and 2014 in order to establish a constant monitoring of the key factors. The methodology is the same.** |
| 8 | **How many people are needed to apply the method?** | The UNISDR states: "the most critical element of an effective review process is to get the relevant actors involved" and that **the success of** the review in disaster risk reduction depends on "the full engagement **of multiple actors from within the government and the whole** community". (source A practical guide to Local HFA)<br>**Therefore the number of participants as well as their background depends strongly on the selection process of the specific community.**<br>**Named main actors to be included: government authorities, civil society organizations, local academia, the business community and community-based organizations, with the support of national entities as needed. The involvement of civil society organizations and community-based organizations is indicated as essential to the success of this process. (source Tool Overview)** |
| 9 | **What are the key quantitative indicators of the method?** | **No quantitative indicators included** |
| 10 | **What are the key qualitative indicators of the method?** | **41 key questions of ten essential thematic fields need to be answered by the participants.**<br>The ten essential thematic fields are: "Organization and coordination", "budgeting", "prepare and share risk assessment", "risk reducing infrastructure", "safety of schools and health facilities", "risk compliant building regulations and land use planning", "education programs and training", "Ecosystems protection and natural buffers", "Early warning systems and emergency management" and "participation of the affected population" |
| 11 | **Knowledge necessary to apply the method?** | **The leading government agency should know and understand the publicly available information. Using the digital or offline questionnaire the tool does not request specific knowledge. Given the described group of participants, it can be expected that all participants will have at least basic knowledge or experiences regarding the local disaster risks. Some questions might require background knowledge, which should be provided for all participants (either through other participants or the leading agency).** |
| 12 | **Average duration of the application of the method?** | **The pure assessment process seems to be realizable in a single work shop (1 Day?). Nevertheless, this process would require sufficient relevant information, giving all the participants the necessary** |

| Name of the method: LG-SAT (Full Name: Local Government Self-Assessment Tool) | | Written by : Willi Wendt (USTUTT) | Update Date: 22.01.2015 |
|---|---|---|---|
| **Context of the method** | | | |
| | | information to support the decision/assessment process.<br>Additionally, it is suggested to repeat the methodology in order to constantly monitor the situation. | |
| 13 | Support materials? | Questionnaire is provided and can be filled out digitally or offline. The online version allows to monitor the results and to compare results with other agencies.<br>There exists no support material regarding the organization or implementation of the assessment process itself (e.g. how to reach all necessary actors, how to compose work groups or to gather and provide necessary basic information). | |

Table 9: LG-SAT context

### Content and methodological theoretical background

The following table (cf. Table 10), is related to the theoretical background of the method.

| Name of the method: LG-SAT | | Written by : Willi Wendt (USTUTT) | Update date : 22.01.2015 |
|---|---|---|---|
| **Content and methodological theoretical background** | | | |
| 1 | Key concepts and associated models and theories of the method | To improve the resilience of a city/ local entity through a cooperative assessment process integrating all relevant/ affected actors. The improvement will be achieved by enhancing the knowledge of all participants regarding local resilience aspects/ factors. Therefore, the tool focusses on knowledge building and does not provide solutions in order to deal with specific gaps. Moreover it is based on a sole qualitative approach, not including any measurable indicators.<br>Further it is foreseen to repeat the process in intervals (recommended 2 year intervals) in order to be able to monitor the current state as well as the progress made.<br>The tool is "generic in nature and developed in a way that is suitable for most local contexts; however, local governments may decide to carry out the progress review process in a manner suitable to their own circumstances." | |
| 2 | Background legal frameworks or norms | There are no legal frameworks at hand. Local institutions are free to do it if they want.<br>We are not aware of any national regulation prescribing the implementation of the LG-SAT tool. | |
| 3 | Data collection methods | As this method is focusing on qualitative indicators, the participants are asked to estimate/ assess the level of progress for all questions. The levels | |

| Name of the method: LG-SAT | Written by : Willi Wendt (USTUTT) | Update date : 22.01.2015 |
|---|---|---|
| **Content and methodological theoretical background** | | |

| | | |
|---|---|---|
| | | are defined as follows (source Tool Overview) : |

| Level of progress | DESCRIPTION OF LEVEL OF PROGRESS FOR OVERALL RANKING FOR EACH QUESTION (add comments on context and challenges) |
|---|---|
| 5 | Comprehensive achievement has been attained, with the commitment and capacities to sustain efforts at all levels. |
| 4 | Substantial achievement has been attained, but with some recognized deficiencies in commitment, financial resources or operational capacities. |
| 3 | There is some institutional commitment and capacities to achieving DRR, but progress is not comprehensive or substantial. |
| 2 | Achievements have been made but are incomplete, and while improvements are planned, the commitment and capacities are limited. |
| 1 | Achievements are minor and there are few signs of planning or forward action to improve the situation. |

| | | |
|---|---|---|
| 4 | Data analysis methods | The only analysis happens during the assessment process by determining the level of progress regarding a question. No analysis methods for post-processing are foreseen. The involved agencies need to analyze the outcome on their own.<br>The only additional options concern the comparison between assessment results of different application processes. The online- version of the tool makes it possible to compare the results from one year to the other one. Again leaving the applicant with the task to interpret the changes and to draw conclusions. |
| 5 | Data aggregation method | As above, there are aggregation methods included. |

Table 10: LG-SAT theoretical background

### Methodological guideline and support

The following table (cf. Table 11), is related to methodological guidelines and technological support of the method.

| Name of the method: LG-SAT | | Written by : Willi Wendt (USTUTT) | Update date : 21.01.2015 |
|---|---|---|---|
| **5. Methodological guideline and technological supports** | | | |
| 1 | Can the method be applied directly or is an adaptation necessary? | The method can be applied by all cities as it is. | |
| 2 | Title and objectives of the different phases of the method | Even though the method only addresses the assessment process itself three main phases seem to be relevant:<br>1. Identification of relevant participants/ actors in the field of disaster risk reduction<br>2. Application of assessment<br>3. Transfer of results to the actors activities<br>The following description will concentrate on phase 2, which is described by the methodology, drawing links to the other two named phases. | |
| For each phase of the method | | | |
| 3 | Prerequisite | The application process is dependent on the choice of actors to be involved. Besides that no other prerequisites need to be fulfilled. Even the online registration is not required, since an offline version of the assessment method is available. Nevertheless, a registration to the web-site and the online-tool would allow comparing results from different assessment processes. | |
| 4 | Inputs from other phases | A group of concerned actors, which can contribute to the knowledge gaining process. | |
| 5 | Results of the realization of the phase | Common understanding of all involved actors on existing gaps and challenges in disaster risk reduction in their city or locality. --> main goal of the methodology | |
| 6 | Procedure | A group of actors answers 41 questions regarding the level of progress on specific aspects of local resilience regarding disaster risk reduction. It is neither stated how this process should look like nor is outlined if all questions should be discussed by all participants or if thematic groups should be formed. | |
| 7 | Support provided by methods or tools | As mentioned above under point 6, the method does not assist the applying government agency within the preparation, implementation and evaluation of the method and the received results. | |
| 8 | Resources | Time of organizers and participants as well as a well-trained process moderator should be enough. Each agency willing to use the assessments output needs to consider additional efforts for the internal analysis process regarding possible implications for the own work, since this is not provided by the method. | |
| 9 | Average time / effort | If well prepared, the assessment should be doable in a one day workshop. However, two days would allow deeper discussions and | |

| Name of the method: LG-SAT | Written by : Willi Wendt (USTUTT) | Update date : 21.01.2015 |
|---|---|---|

| 5. Methodological guideline and technological supports | | |
|---|---|---|
| | | better insights in all thematic fields addressed by the method.<br>Additionally the workshop needs to be organized (e.g. identifying participants, organizing location) as well as structured respecting the procedures to achieve the assessment. The workload to be expected from the second task could be minimized, if the methodology would provide some support. The same applies to the knowledge transfer from the assessment output to the actual working fields of the participants. In order to really use the output, different steps are necessary which could be easily supported by a few pre-structured strategies.<br>Finally it is foreseen to repeat the assessment in certain intervals (recommended: each 2 years). |
| For data acquisition process | | |
| 10 | Nature of information collected | Only qualitative assessments of the participants. |
| 11 | Procedures | Questionnaire guided discussions in roundtables. |
| 12 | Sources of information | Knowledge of participants in their respective area of expertise (e.g. crisis communication, disaster relief, resource management or knowledge on local construction or conditions). |
| 13 | Technological support | If wanted, the fixed values can be entered directly into an online version of the tool. The results of different assessment processes can be included. Both things can be done offline too. |
| 14 | Average time / effort | Same as Question 9 in the methodology part. |
| For indicators assessment | | |
| 15 | Method of assessment | Same as 10. |
| 16 | Procedures | Same as 11. |
| 17 | Rules | Collaborative decision on each question. |
| 18 | Technological support | Same as 13. |
| 19 | Average time/effort | Same as 9 and 14. |

Table 11: LG-SAT methodological guideline

### Results

The following table (cf. Table 12), is related to results characteristics of the method.

| Name of the method: LG-SAT | | Written by : Willi Wendt (USTUTT) | Update date : 21.01.2015 |
|---|---|---|---|
| **Results characteristics** | | | |
| 1 | Nature of the result | The filled out questionnaire is the result. It is pointed out that it should be made available to all involved agencies/ participants. There are no further indications, what the actors should or can do with this output. | |
| 2 | Format | Filled out questionnaire. | |
| 4 | Procedures | There are no procedures foreseen to transfer the assessment output to an useable result format for any target group. The main is to develop a common knowledge; therefore each actor is constrained to think about consequences for his own activities. | |
| 5 | Technological support | The results can be entered in the online tool making them available for all participants with access. Further, the progress regarding the assessed factors would be visible, if successive assessments would be documented. | |
| 6 | Diffusion of the results | Dependent on the applying government agency. The agency decides how it makes the outcomes available. While the participating actors should be included in the dissemination of knowledge, the online tool allows a transfer to national governments as well as to the national HFA (Local Self-Assessment of Progress in Disaster Risk Reduction) review processes. | |
| 7 | Usability for decision and action | Needs to be discussed! Since there are no transfer strategies provided, this will depend on each assessment group and/or actor. | |
| 8 | Usability for improving disaster management (prevention, preparation, crisis management, recovery) | The LG-SAT tool addresses particularly a common understanding of gaps and challenges in disaster risk reduction. Therefore the process should build knowledge of all participating agencies.<br>Nevertheless, it's questionable that the assessment results feed into actual disaster risk reduction processes, since the output of the tool is not comparable to a to-do-handbook and therefore does not provide any advice on the inclusion and application of the assessment results.<br>Rather, if the tool is applied every two years (as recommended), the respective agencies and actors can review the efforts they invested in order to improve the capacities. Therefore the tool can be used as a monitoring system for the systems quality and the effectiveness of improvement measures. | |
| 9 | Usability for improving the role of local government in disaster management | Despite the questionable use for actors of the crisis reduction process, the method seems to be more useful for government agencies involved in these activities. They will be able to understand in which process parts they need to provide more efforts and which seem to be covered.<br>Nevertheless, the respective governance agencies need to draw their own conclusions of the assessment process and develop | |

| Name of the method: LG-SAT | Written by : Willi Wendt (USTUTT) | Update date : 21.01.2015 |
|---|---|---|
| Results characteristics | | |
| | | independently strategies to face existing gaps. This process is not supported by the method. As mentioned above, the tool is able to monitor the effects of measures undertaken.<br>Additionally, governance agencies could use the outcomes to demand for more support in the disaster risk reduction process. Especially when the results shared with the help of the platform (e.g. with the responsible national government) indicating big gaps regarding the financial support to face relevant crisis or disasters. |

Table 12: LG-SAT result characteristics

### Synthesis

The following table (cf. Table 13), is related to a synthesis of characteristics of the method that could/should be considered in the Driver framework.

| Name of the method: LG-SAT | | Written by : Willi Wendt (USTUTT) | Update date : 21.01.2015 |
|---|---|---|---|
| Synthesis | | | |
| 1 | Context of the method | The method aims to help local governments engaging with different stakeholders to map and understand existing gaps and challenges in disaster risk reduction in their city or locality. | |
| 2 | Content and methodological theoretical background | The approach focusses on a knowledge building process throughout the participants and does not provide solutions in order to deal with specific gaps. Moreover it is based on a sole qualitative approach, not including any measurable indicators. | |
| 4 | Methodological guideline and supports | The methodical guideline concentrates on a set of 41 questions of 10 thematic fields which should be answered within the assessment process. No other support material regarding the organization, implementation or evaluation of the method and its output is provided. | |
| 5 | Results | The results seem to be useful and relevant especially for the applying government agencies in order to get a better understanding of all relevant actors. Since a guidance regarding the organization and implementation of the method is missing, the DRIVER project and WP34 in particular could provide some strategies.<br>Moreover, since WP34 aims to support governance agencies in their efforts to deal with local disasters, the DRIVER assessment method to be developed should provide some guidance on the evaluation of the results from the government perspective. | |

| Name of the method: LG-SAT | | Written by : Willi Wendt (USTUTT) | Update date : 21.01.2015 |
|---|---|---|---|
| Synthesis | | | |
| | | Especially it should concentrate on strategies helping government agencies to transfer the outputs into activities improving the situation. | |

Table 13: Synthesis of the analysis of LG-SAT

## Fraunhofer Morgenstadt city insights project

### Context of the method

The following table (cf. Table 14), is related to the general context of the method.

| Name of the method: M:CI (Full Name: Morgenstadt: City Insights) | | Written by : Willi Wendt, Sven Dübner (USTUTT) | Update date : 11.02.2015 |
|---|---|---|---|
| Context of the method | | | |
| 1 | Who developed the method? | 12 Fraunhofer Institutes | |
| 2 | Objectives of the method? | The m:ci (Morgenstadt: city insights) project analysed innovative best practice projects worldwide, which had positive impact on the sustainable and resilient development of the respective city.<br>The main purpose of the M:CI is to (source MCI-FinalReport):<br>• identify the status quo and establish a starting point for the research and development of innovations for urban systems<br>• develop a systematic understanding of the investigated cities based on the analyzed best practices and describe a generalized fundamental model of the urban city system of the future based on the investigated cities<br>• focus on core aspects of sustainability as follows:<br>  ○ reduction of resource consumption per capita<br>  ○ careful handling of raw materials and environment<br>  ○ reduction of energy consumption per capita<br>  ○ reduction of emissions (CO2, other climate gases like methane, or toxic substances)<br>  ○ reduction of social imbalances<br>  ○ meet security of supply<br>  ○ creation of stable, long-term-oriented economic structures<br>  ○ increase of social well-being and life expectancy<br>  ○ increase of human health<br>  ○ increase of health of urban ecosystems<br>  ○ increase of resilience of physical infrastructures and | |

| Name of the method: M:CI (Full Name: Morgenstadt: City Insights) | Written by : Willi Wendt, Sven Dübner (USTUTT) | Update date : 11.02.2015 |
|---|---|---|

| Context of the method | | |
|---|---|---|
| | | social networks with regard to adverse events (of catastrophic dimension) as well as developments of radical change<br>○ decrease of the societal and physical vulnerabilities of urban societies with regard to multiple man-made and naturally caused hazards<br>• create the City of the Future (Zero Emissions, Full Resilience, Maximum Liveability, Innovation Leadership) |
| 3 | Who is supposed to use the method? | Any City |
| 4 | For which reasons the method has been developed? | To develop a consistent model for a sustainable urban development strategy that takes not just one sector into account but all, especially interdependent connections between the sectors |
| 5 | Scope of application (territorial oriented? Risk oriented? Resilience oriented? ) | Orientated on the city with their urban surrounding region (territorial) |
| 6 | When has the first version of the method been produced? | Phase I (analysis) of »Morgenstadt: City Insights« took place from June 2012 until October 2013<br>scope: understanding sustainable urban systems |
| 7 | Actual version of the method and date of release? | Phase II (explore) takes place from January 2014 till now<br>scope: creating sustainable urban systems for the future (based on results of phase I) |
| 8 | How many people are needed to apply the method? | An adequate city analysis will need at least 3 to 4 dedicated researchers (depending on the city size), visiting the target city and conducting various workshops with responsible/ involved actors of best practices. |
| 9 | What are the key quantitative indicators of the method? | Each of the eight sectors proposes a final set of quantitative indicators. Even though some sectors mention the lack of usability of various indicators.<br>»urban water infrastructure«, Production & Logistics, Mobility, Building, Energy, Security, ICT, Governance |
| 10 | What are the key qualitative indicators of the method? | Each of the eight sectors uses a final set of qualitative indicators.<br>Qualitative indicators are used where a quantitative comparison was not feasible.<br>»urban water infrastructure«, Production & Logistics, Mobility, Building, Energy, Security, ICT, Governance |

| Name of the method: M:CI (Full Name: Morgenstadt: City Insights) | | Written by : Willi Wendt, Sven Dübner (USTUTT) | Update date : 11.02.2015 |
|---|---|---|---|
| **Context of the method** | | | |
| 11 | Knowledge necessary to apply the method? | It can be expected that all participants will have at least basic knowledge or experiences regarding the eight contained sectors. Some methods might require essential background knowledge. | |
| 12 | Average duration of the application of the method? | There is no average duration of the application of the method. The duration depends on the city size and the involved research partners. The city visits of phase 1 lasted 2 weeks. Nevertheless, preparation and post-processing will need at least the same time each, if it's wished to create useful results. | |
| 13 | Support materials? | Guiding questionnaire for expert interviews, online tool for information collecting | |

Table 14: M:CI context

### Content and methodological theoretical background

The following table (cf. Table 15), is related to the theoretical background of the method.

| Name of the method: M:CI (Full Name: Morgenstadt: City Insights) | | Written by : Willi Wendt, Sven Dübner (USTUTT) | Update date : 11.02.2015 |
|---|---|---|---|
| **Content and methodological theoretical background** | | | |
| 1 | Key concepts and associated models and theories of the method | • Best-Practice-Catalogue (Screening over 280 Good-Practices, Studies, City Rankings etc.)<br>• City Reports for six leading cities (Best Practices, success factors, indicators, strategies, aims, measures, actors)<br>• System model for city evaluation (Sustainability Indicators, Key action fields, impact factors) | |
| 2 | Background legal frameworks or norms | There are no legal frameworks at hand. Local institutions are free to do it if they want. | |
| 3 | Data collection methods | Interviews with experts, literature review on selected indicators, certain new indicators are proposed in order to analyze cities more effectively in the future (final report phase 1) | |
| 4 | Data analysis methods | Social Network Analysis and Cluster Analysis on key action fields and best practices | |
| 5 | Data aggregation method | Social Network Analysis and Cluster Analysis on key action fields and best practices | |

Table 15: M:CI theoretical background

### Methodological guideline and support

**The following table (cf. Table 16), is related to methodological guidelines and technological support of the method.**

| Name of the method: M:CI (Full Name: Morgenstadt: City Insights) | | Written by : Willi Wendt, Sven Dübner (USTUTT) | Update date : 11.02.2015 |
|---|---|---|---|
| **Methodological guideline and technological support** | | | |
| 1 | Can the method be applied directly or does an adaptation is necessary? | The method can be applied by all cities as it is. | |
| 2 | Title and objectives of the different phases of the method | 1. m:ci phase I: scope: understanding sustainable urban systems (2012-2013)<br>2. m:ci phase II: scope: creating sustainable urban systems for the future (2014-2015)<br>3. m:ci phase III: transfer/ scaling: Implementation support, new research topics (2016-20..) | |
| For each phase of the method --> Respecting the fact that this method is not assessment oriented the phase description seems not to be relevant | | | |
| 3 | Prerequisite | A lot of time and manpower to prepare and conduct everything, certain scientific background (state of the art knowledge) | |
| 4 | Inputs from other phases | No information | |
| 5 | Results of the realization of the phase | No information | |
| 6 | Procedure | No information | |
| 7 | Support provided by methods or tools | No information | |
| 8 | Resources | No information | |
| 9 | Average time / effort | No information | |
| For data acquisition process | | | |
| 10 | Nature of information collected | No information | |
| 11 | Procedures | No information | |
| 12 | Sources of information | No information | |
| 13 | Technological support | No information | |
| 14 | Average time / effort | No information | |
| For indicators assessment | | | |
| 15 | Method of assessment | No information | |

| Name of the method: M:CI (Full Name: Morgenstadt: City Insights) | Written by : Willi Wendt, Sven Dübner (USTUTT) | Update date : 11.02.2015 |
|---|---|---|

| Methodological guideline and technological support | | |
|---|---|---|
| 16 | Procedures | No information |
| 17 | Rules | No information |
| 18 | Technological support | No information |
| 19 | Average time/effort | No information |

Table 16: M:CI methodological guideline

### Results

The following table (cf. Table 17), is related to results characteristics of the method.

| Name of the method: M:CI (Full Name: Morgenstadt: City Insights) | Written by : Willi Wendt, Sven Dübner (USTUTT) | Update date : 11.02.2015 |
|---|---|---|

| Results characteristics | | |
|---|---|---|
| 1 | Nature of the result | Various city reports, Cross-analysis reports (overall and for all sectors) |
| 2 | Format | Textual reports |
| 4 | Procedures | The network partners are developing solutions in phase II based on the results of phase I, including proposed procedures and processes |
| 5 | Technological support | Implementation of solutions in phase II will directly supported by various technical and scientific partners |
| 6 | Diffusion of the results | Networking of all partners. Competition for city analysis, giving cities the chance to apply for an analysis to be performed by the m:ci network, helping to identify strengths and weaknesses. |
| 7 | Usability for decision and action | Very usable output due to the projects strategic focus, but we don't have an assessment tool here… |
| 8 | Usability for improving disaster management (prevention, preparation, crisis management, recovery) | Quite usable if a city likes to implement best practice solution identified within the project. Furthermore key action fields and impact factors have been identified, potentially strengthening the city in the context of disaster management. |
| 9 | Usability for improving the role of local government in disaster management | Additionally, key action fields, strategies and impact factors for improved government engagement have been identified. |

Table 17: M:CI result characteristics

### Synthesis

The following table (cf. Table 18), is related to a synthesis of characteristics of the method that could/should be considered in the Driver framework.

| Name of the method: M:CI (Full Name: Morgenstadt: City Insights) | | Written by : Willi Wendt, Sven Dübner (USTUTT) | Update date : 11.02.2015 |
|---|---|---|---|
| Synthesis | | | |
| 1 | Context of the method | No resilience assessment context!<br>Identification of key factors for the development of the sustainable city of the future. Implementation of key actions with industry and city partners. | |
| 2 | Content and methodological theoretical background | No information | |
| 4 | Methodological guideline and support | No information | |
| 5 | Results | No information | |

Table 18: Synthesis of the analysis of M:CI

## Torrens Community Disaster Resilience Scorecard

### Context of the method

The following table (cf. Table 19), is related to the general context of the method.

| Name of the method: TORRENS Community Disaster Resilience Scorecard | | Written by : Eric Rigaud | Update date : 02/15 |
|---|---|---|---|
| Context of the method | | | |
| 1 | Who developed the method? | TORRENS Resilience Institute (Australia) | |
| 2 | Objectives of the method? | Measure community disaster resilience | |
| 3 | Who is supposed to use the method? | Community leader responsible for disaster risks management | |
| 4 | For which reasons the method has been developed? | Provide a point-in-time snapshot of key measures important to resilience, providing guidance on aspects of community life that should receive attention in order to increase resilience and strengthen resilience over time. | |

| Name of the method: TORRENS Community Disaster Resilience Scorecard | | Written by : Eric Rigaud | Update date : 02/15 |
|---|---|---|---|
| **Context of the method** | | | |
| 5 | Scope of application (territorial oriented? Risk oriented? Resilience oriented? ) | Community resilience | |
| 6 | When does the first version of the method have been produced? | 2009 | |
| 7 | Actual version of the method and date of release? | 2009 | |
| 8 | How many people are needed to apply the method? | A Scorecard Working Group of 10 to 15 individuals, including some local government officials and a number of people recognized as leaders by groups within the community. | |
| 9 | What are the key quantitative indicators of the method? | No quantitative indicators included | |
| 10 | What are the key qualitative indicators of the method? | Community connectedness, Available resources, planning and procedures, risk vulnerability | |
| 11 | Knowledge necessary to apply the method? | Local government disaster risk culture, knowledge about community, capacity to encourage discussion, ability to negotiate agreement among those with divergent viewpoints; ability to keep the group on track within the expected deadline. | |
| 12 | Average duration of the application of the method? | 3 meetings (initial orientation meeting, scoring meeting, final review meeting) over 4-6 weeks each year | |
| 13 | Support materials? | Assessment grid | |

Table 19: TORRENS Community Disaster Resilience Scorecard context

### Content and methodological theoretical background

The following table (cf. Table 20), is related to the theoretical background of the method.

| Name of the method: TORRENS Community Disaster Resilience Scorecard | | Written by : Eric Rigaud | Update date : 02/15 |
|---|---|---|---|
| **Content and methodological theoretical background** | | | |
| 1 | Key concepts and associated models and theories of the method | Community will prove resilient in the event of a severe emergency or disaster when members of the population are connected to one another and work together, so that they are able to:<br>• function and sustain critical systems, even under stress;<br>• adapt to changes in the physical, social or economic environment;<br>• be self-reliant if external resources are limited or cut off; and<br>• learn from experience to improve over time. | |
| 2 | Background legal frameworks or norms | Australia National Strategy for Disaster Resilience | |
| 3 | Data collection methods | Working groups | |
| 4 | Data analysis methods | Discursive agreement on how to score each indicator | |
| 5 | Data aggregation method | No information | |

Table 20: TORRENS Community Disaster Resilience Scorecard theoretical background

### Methodological guideline and support

The following table (cf. Table 20), is related to methodological guidelines and technological support of the method.

| Name of the method: TORRENS Community Disaster Resilience Scorecard | | Written by : Eric Rigaud | Update date : 02/15 |
|---|---|---|---|
| **Methodological guideline and technological support** | | | |
| 1 | Can the method be applied directly or does an adaptation is necessary? | Method is generic and can be applied directly. | |
| 2 | Title and objectives of the different phases of the method | 1/ Decide to complete the scorecard<br>2/ Select participants<br>3/ Set up and schedule meetings<br>4/ Score | |

| Name of the method: TORRENS Community Disaster Resilience Scorecard | Written by : Eric Rigaud | Update date : 02/15 |
|---|---|---|

| Methodological guideline and technological support | | |
|---|---|---|
| For each phase of the method | | |
| 3 | Prerequisite | 1/ Know the scorecard<br>2/ Know community representatives<br>3/ Available location, stakeholder's contact information<br>4/ Meeting schedule |
| | Inputs from other phases | 1/ None<br>2/ Official letter, deadline<br>3/ List of participants<br>4/ Meetings agenda |
| 5 | Results of the realization of the phase | 1/ None<br>2/ Official letter, deadline<br>3/ List of participants<br>4/ Meetings agenda |
| 6 | Procedure | No information |
| 7 | Support provided by methods or tools | 1/ Sample letter of invitation to the scorecard working group / working group chair<br>3/ Sample agendas for working group meetings<br>4/ scorecard (22 questions) |
| 8 | Resources | No information |
| 9 | Average time / effort | 3 meetings of approximately 2 hours over 4-6 weeks |
| For data acquisition process | | |
| 10 | Nature of information collected | No information |
| 11 | Procedures | For each question on the Scorecard, the Scorecard Working Group must agree on a score, ranging from 1 (quite un-resilient, or in the red zone) to 5 (very resilient, the green zone). Where the item depends on reported statistical information such as the census, it is a matter of identifying the most current data and circling the score that best represents the local situation. For quite a few of the items, however, a consensus judgment is called for. The Working Group Chair must ensure that alternative perspectives on the score are expressed, and discussion is allowed before determining the score. After completing a first draft of the Scorecard the Working Group members are asked to rethink the scores and even discuss them with friends and colleagues before the final score is assigned. |

| Name of the method: TORRENS Community Disaster Resilience Scorecard | | Written by : Eric Rigaud | Update date : 02/15 |
|---|---|---|---|
| **Methodological guideline and technological support** | | | |
| 12 | Sources of information | Participants knowledge | |
| 13 | Technological support | Paper grid | |
| 14 | Average time / effort | 1 meeting of 2 hours | |
| For indicators assessment | | | |
| 15 | Method of assessment | Collective agreement | |
| 16 | Procedures | No information | |
| 17 | Rules | No information | |
| 18 | Technological support | For each indicator a scale (1-5) and some indication (for example: don't know, consultation, engagement, collaboration, active participatory, etc.) is provided (Scorecard) | |
| 19 | Average time/effort | 1 meeting of 2 hours | |

Table 21: TORRENS Community Disaster Resilience Scorecard methodological guideline

### Results

The following table (cf. Table 22), is related to results characteristics of the method.

| Name of the method: TORRENS Community Disaster Resilience Scorecard | | Written by : Eric Rigaud | Update date : 02/15 |
|---|---|---|---|
| **Results characteristics** | | | |
| 1 | Nature of the result | Four indicators with a three level score (red, yellow, green)<br>22 sub indicators ranked from 1 to 5 | |
| 2 | Format | Filled out questionnaire | |
| 4 | Procedures | Agreement of the different stakeholders | |
| 5 | Technological support | Assessment grid | |
| 6 | Diffusion of the results | Depends of local government | |
| 7 | Usability for decision and action | To be verified during experimentation | |
| 8 | Usability for improving disaster management (prevention, preparation, crisis management, recovery) | The four indicators are related to the context of disaster management and can be used to improve disaster management activities. | |

| Name of the method: TORRENS Community Disaster Resilience Scorecard | | Written by : Eric Rigaud | Update date : 02/15 |
|---|---|---|---|
| Results characteristics | | | |
| 9 | Usability for improving the role of local government in disaster management | The method is focusing on local community resilience; some sub indicators can be used directly and others indirectly with some adaptation to be used for improving local government resilience. | |

Table 22: TORRENS Community Disaster Resilience Scorecard results characteristics

#### Synthesis

The following table (cf. Table 23), is related to a synthesis of characteristics of the method that could/should be considered in the DRIVER framework.

| Name of the method: TORRENS Community Disaster Resilience Scorecard | | Written by: Eric Rigaud | Update date: 02/15 |
|---|---|---|---|
| Synthesis | | | |
| 1 | Context of the method | The method was developed in 2009, by TORRENS Resilience Institute to support the Australian National Strategy for Disaster Resilience. | |
| 2 | Content and methodological theoretical background | The method focuses on community resilience and addresses four key dimensions: Community connectedness, available resources, risk and vulnerability as well as planning and procedures. | |
| 4 | Methodological guideline and support | A methodological guideline with four steps is proposed based on the organization of three workshops. Letters of invitation, meeting schedules and the list of indicators is provided. | |
| 5 | Results | The method focuses on community resilience and addresses four key dimensions: Community connectedness, available resources, risk and vulnerability and planning and procedures. For each indicator a set of sub indicators are used for the assessment. | |

Table 23: Synthesis of the analysis of TORRENS Community Disaster Resilience Scorecard

### TISP Regional Disaster Resilience guide for action plan

#### Context of the method

The following table (cf. Table 24), is related to the general context of the method.

| Name of the method: Regional Disaster Resilience: A RDR Guide for Developing an Action Plan | Written by : Eric Rigaud | Update date : 02/2015 |
|---|---|---|

| Context of the method | | |
|---|---|---|
| 1 | Who developed the method? | The Infrastructure Security Partnership (TISP) was created shortly following the tragic events of September 11, 2001 by 11 professional and technical organizations and federal agencies. As a non-profit partnership, TISP serves as a national asset to facilitate dialogue on domestic infrastructure security and all hazard related disaster resilience issues and offers sources of technical support and comment on public policy related to the security of the nation's built environment.<br>Today, TISP has a diverse group of members representing nearly two million individuals and companies involved in the planning, design, construction, and operation of infrastructure. This growing membership includes local, regional, state, federal, and foreign agencies; professional associations and industry trade groups; engineering, architecture, and construction firms; codes and standards organizations; educational institutions and universities; planners and economic developers; infrastructure owners and operators; manufacturers and other providers of products and services. |
| 2 | Objectives of the method? | A beneficial and usable tool that enables practitioners and experts from government, the private sector, and other interested organizations to develop and operationalize an actionable strategy and ongoing process to collectively improve capabilities to withstand major events and disasters in today's complex and interdependent world. |
| 3 | Who is supposed to use the method? | The RDR Guide is designed for use by any practitioner or expert who wishes to improve the capabilities of their organization or community to withstand major incidents or disasters. Typical users include local officials—city and county emergency managers, public health officers, community planners; state officials - emergency management and homeland security directors; energy, transportation management, and environmental protection officials; utility and business owners and operators interested in improving security outside their "fencelines"; businesses that want a better understanding of economic impacts from high-probability threats; schools and other academic institutions, community organizations, and special interest groups—faith-based organizations and non- profits serving people in need or having other community health and safety missions. |
| 4 | For which reasons the method has been developed? | No information |
| 5 | Scope of application (territorial oriented? Risk oriented? Resilience oriented? ) | The RDR Guide can be used by local emergency management officials to spearhead development of a multi-jurisdiction emergency preparedness plan or a state homeland security official to convene critical infrastructure owners and operators to gain understanding of state-wide interdependencies and help meet infrastructure protection goals. Public health officials and healthcare organizations |

| Name of the method: Regional Disaster Resilience: A RDR Guide for Developing an Action Plan | Written by : Eric Rigaud | Update date : 02/2015 |
|---|---|---|

| Context of the method | | |
|---|---|---|
| | | can use the RDR Guide to develop community health resilience action plans. The RDR Guide can also be employed to look at regional resilience specific to particular infrastructures or interests. Likewise, the RDR Guide can be used to examine resilience needs associated with a particular threat, for example from cyber attacks and disruptions, a bio-attack, or radiological incident. |
| 6 | When does the first version of the method have been produced? | 2004 |
| 7 | Actual version of the method and date of release? | 2011 |
| 8 | How many people are needed to apply the method? | A cross-sector, multi-disciplinary work group of key stakeholder organization (30-50 organisations) |
| 9 | What are the key quantitative indicators of the method? | There are no quantitative indicators |
| 10 | What are the key qualitative indicators of the method? | ▪ Characterization of the regional all-hazards threat environment<br>▪ Infrastructure dependencies and interdependencies identification and associated significant vulnerabilities and consequences for regional resilience<br>▪ Regional resilience roles, responsibilities, authorities, and decision-making<br>▪ Risk assessment and management<br>▪ Alert and warning, two-way information sharing, and situational awareness<br>▪ Regional response challenges<br>▪ Recovery and long-term restoration challenges<br>▪ Continuity of operations and business<br>▪ Specialized sector-specific regional disaster resilience needs—cyber security, process control and IT systems, transportation, energy, water and wastewater systems, dams and levees, hospitals and healthcare, and air and seaport resilience<br>▪ Human factors, community issues and education<br>▪ Legal and liability issues<br>▪ Public information and risk communications, including media<br>▪ Exercises and training<br>▪ Determining regional resilience financial and other resource needs |
| 11 | Knowledge necessary | No information |

| Name of the method: Regional Disaster Resilience: A RDR Guide for Developing an Action Plan | | Written by : Eric Rigaud | Update date : 02/2015 |
|---|---|---|---|
| Context of the method | | | |
| | to apply the method? | | |
| 12 | Average duration of the application of the method? | No information | |
| 13 | Support materials? | No information | |

Table 24: RDR guide for developing an action plan context

### Content and methodological theoretical background

The following table (cf. Table 25), is related to the theoretical background of the method.

| Name of the method: Regional Disaster Resilience: A RDR Guide for Developing an Action Plan | | Written by : Eric Rigaud | Update date : 02/2015 |
|---|---|---|---|
| Content and methodological theoretical background | | | |
| 1 | Key concepts and associated models and theories of the method | Disaster resilience, for regions and communities, refers to the capability to prepare for, prevent, protect against, respond to or mitigate any anticipated or unexpected significant threat or event, including terrorist attacks, to adapt to changing conditions and rapidly recover to normal or a "new normal," and reconstitute critical assets, operations, and services with minimum damage and disruption to public health and safety, the economy, environment, and national security. | |
| 2 | Background legal frameworks or norms | No information | |
| 3 | Data collection methods | Workshops, interviews | |
| 4 | Data analysis methods | No information | |
| 5 | Data aggregation method | No information | |

Table 25: RDR guide for developing an action plan theoretical background

### Methodological guideline and support

The following table (cf. Table 26), is related to methodological guidelines and technological support of the method.

| Name of the method: Regional Disaster Resilience: A RDR Guide for Developing an Action Plan | Written by : Eric Rigaud | Update date : 02/2015 |
|---|---|---|

| Methodological guideline and technological support | | |
|---|---|---|
| 1 | Can the method be applied directly or does an adaptation is necessary? | No information |
| 2 | Title and objectives of the different phases of the method | 1: Key Stakeholder Engagement<br>Identify and convene a broad representative range of experts, emergency management, public health, and other government agencies and private and non-profit stakeholders to join in an initiative to develop a disaster resilient region. Within this broad stakeholder community, invite the "core" organizations that have the most significant roles or functions in assuring disaster resilience be part of a work group to provide oversight and direction for the Action Plan development through meetings and conference calls.<br>2: Workshops<br>Develop and conduct one to two educational/training workshops to allow stakeholders to explore significant issues and provide guidance and insights from experts on priority issues for incorporation into the Action Plan.<br>3: Baseline Assessment & Gap Analysis<br>Conduct a baseline assessment (gap analysis) assessing existing resilience and response capabilities and recovery needs.<br>4: Initial Action Plan<br>Develop the initial draft Action Plan framework from results of the preceding activities using the stakeholder-validated focus areas and priority issues.<br>5: Tabletop Exercise<br>Plan and conduct a tabletop exercise with a scenario selected and designed by the stakeholder work group members to illuminate gaps or areas for improvement in the Action Plan.<br>6: Post-Exercise Action Plan Workshop<br>Hold a post-exercise Action Plan Development Workshop to enable stakeholders to examine and prioritize findings and recommendations in the exercise report and information from other relevant activities for incorporation into the Action Plan.<br>7: Final Action Plan<br>Coordinate and finalize the Action Plan with the core stakeholder group.<br>8: Action Plan Strategy<br>Develop an Action Plan Implementation Strategy of prioritized activities that includes lead and participating organizations for respective projects, creation of work groups to define project |

| Name of the method: Regional Disaster Resilience: A RDR Guide for Developing an Action Plan | | Written by : Eric Rigaud | Update date : 02/2015 |
|---|---|---|---|
| Methodological guideline and technological support | | | |
| | | requirements, determine milestones, funding requirements, and sources of technical and other assistance. (See the TISP RDR Guide Toolkit for an Action Plan Implementation Template that can be used for this purpose). | |
| For each phase of the method | | | |
| 3 | Prerequisite | None | |
| 4 | Inputs from other phases | 1: None<br>2: List of stakeholders<br>3: List of participants<br>4: List of gaps<br>5: Initial action plan, list of participants<br>6: Initial action plan, list of participants<br>7: Workshops results<br>8: Action plan | |
| 5 | Results of the realization of the phase | 1: List of stakeholders<br>2: Disasters resilience context<br>3: List of gaps<br>4: Initial action plan<br>6: Action plan refined<br>7: Final action plan<br>8: Disaster resilience improvement | |
| 6 | Procedure | 2: Workshops<br>3: Workshops<br>4: Tabletop exercise | |
| 7 | Support provided by methods or tools | List of indicators<br>List of recommended actions | |
| 8 | Resources | None | |
| 9 | Average time / effort | Application of the method requires different workshops and working steps, The estimated time to apply the full process is approximately one year. | |
| For data acquisition process | | | |
| 10 | Nature of information collected | Qualitative information related to the different topics | |

| Name of the method: Regional Disaster Resilience: A RDR Guide for Developing an Action Plan | | Written by : Eric Rigaud | Update date : 02/2015 |
|---|---|---|---|
| **Methodological guideline and technological support** | | | |
| 11 | Procedures | Open source information, stakeholder survey, focus groups, and interviews. | |
| 12 | Sources of information | Participatory culture, document analysis | |
| 13 | Technological support | Description of indicators | |
| 14 | Average time / effort | One or two educational workshops as well as different assessment and gap analysis workshops | |
| For indicators assessment | | | |
| 15 | Method of assessment | None | |
| 16 | Procedures | None | |
| 17 | Rules | None | |
| 18 | Technological support | None | |
| 19 | Average time/effort | None | |

Table 26: RDR guide for developing an action plan methodological guideline characteristics

### Results

The following table (cf. Table 27), is related to results characteristics of the method.

| Name of the method: Regional Disaster Resilience: A RDR Guide for Developing an Action Plan | | Written by : Eric Rigaud | Update date : 02/2015 |
|---|---|---|---|
| **Results characteristics** | | | |
| 1 | Nature of the result | List of gaps and action plan | |
| 2 | Format | Action plans | |
| 4 | Procedures | None | |
| 5 | Technological support | List of recommended actions | |
| 6 | Diffusion of the results | Stakeholders groups are asked to disseminate within their networks. | |
| 7 | Usability for decision and action | The aimed Action plans are supposed to support change project management | |
| 8 | Usability for improving disaster management (prevention, | Action plan aims at improving disaster management at the regional scale | |

| | | |
|---|---|---|
| | preparation, crisis management, recovery) | |
| 9 | Usability for improving the role of local government in disaster management | The local government is one of the key stakeholders and action plans should improve the role of local governments. |

Table 27: RDR guide for developing an action plan results characteristics

### Synthesis

The following table (cf. Table 28), is related to a synthesis of characteristics of the method that could/should be considered in the Driver framework.

| Name of the method: Regional Disaster Resilience: A RDR Guide for Developing an Action Plan | | Written by : Eric Rigaud | Update date : 02/2015 |
|---|---|---|---|
| Synthesis | | | |
| 1 | Context of the method | The method was developed in 2006, updated and expanded in 2011. Aim is to enable practitioners and experts from governments, the private sector, and other interested organizations to develop and operationalize an actionable strategy and ongoing process to collectively improve capabilities to withstand major events and disasters. | |
| 2 | Content and methodological theoretical background | The method is based on 14 key indicators of regional disasters resilience which is defined as the capability to prepare for, prevent, protect against, respond to or mitigate any anticipated or unexpected significant threat or event, including terrorist attacks, to adapt to changing conditions and rapidly recover to normal or a "new normal," and reconstitute critical as- sets, operations, and services with minimum damage and disruption to public health and safety, the economy, environment, and national security. | |
| 4 | Methodological guideline and support | TISP framework is composed of a list of indicators, an 8 step methodological guideline and a list of recommended actions. Recommendations are proposed to support the application of the method. | |
| 5 | Results | Results of the method are a list of gaps and a plan of actions aiming to improve regional disaster resilience. | |

Table 28: Synthesis of the analysis of RDR guide for developing an action plan

## Resilient organisations research program benchmark resilience tool

### Context of the method

**The following table (cf. Table 29), is related to the general context of the method.**

| Name of the method: Resilient Organisations Resilience Benchmark Tool | | Written by : Eric Rigaud | Update date : 02/2015 |
|---|---|---|---|
| **Context of the method** | | | |
| 1 | Who developed the method? | Resilient Organisations Research Programme at the University of Canterbury in New Zealand, a public-good research programme based in New Zealand.<br>ResOrgs is a collaboration between top New Zealand research universities, particularly the University of Canterbury and the University of Auckland. They are funded by the Natural Hazards Research Platform and supported by a diverse group of industry partners and advisors.<br>It's a multi-disciplinary team of over 35 researchers, representing a synthesis of engineering, science and business leadership aimed at transforming organisations so they can successfully survive major disruptions, avoid chronic dysfunction, build robust partnerships, and prosper. | |
| 2 | Objectives of the method? | To help measure the resilience of an organisation, to monitor progress over time, and to compare resilience strengths and weaknesses against other organisations within your sector or of a similar size. | |
| 3 | Who is supposed to use the method? | Representative of the applying organisation | |
| 4 | For which reasons the method has been developed? | No information | |
| 5 | Scope of application (territorial oriented? Risk oriented? Resilience oriented? ) | Organisation resilience (Business continuity) | |
| 6 | When does the first version of the method have been produced? | 2014 | |
| 7 | Actual version of the method and date of release? | 2014 | |

| Name of the method: Resilient Organisations Resilience Benchmark Tool | | Written by : Eric Rigaud | Update date : 02/2015 |
|---|---|---|---|
| **Context of the method** | | | |
| 8 | How many people are needed to apply the method? | 1 | |
| 9 | What are the key quantitative indicators of the method? | none | |
| 10 | What are the key qualitative indicators of the method? | (1) Leadership and Culture;<br>(2) Networks and<br>(3) Change ready processes that build business as usual | |
| 11 | Knowledge necessary to apply the method? | Background on human and organization factors, knowledge about the organization | |
| 12 | Average duration of the application of the method? | Survey will take approximately 20-30 minutes to complete. | |
| 13 | Support materials? | Questionnaire | |

Table 29: Resilient Organisations resilience benchmark tool context

### Content and methodological theoretical background

The following table (cf. Table 30), is related to the theoretical background of the method.

| Name of the method: Resilient Organisations Resilience Benchmark Tool | | Written by : Eric Rigaud | Update date : 02/2015 |
|---|---|---|---|
| **Content and methodological theoretical background** | | | |
| 1 | Key concepts and associated models and theories of the method | Leadership, staff engagement, situation awareness, decision making, innovation and creativity, effective partnerships, leveraging knowledge, breaking silos, internal resources, unity of purpose, proactive posture, planning strategies, stress testing plans, crisis experience | |
| 2 | Background legal frameworks or norms | No information | |
| 3 | Data collection methods | Qualitative questionnaire | |
| 4 | Data analysis methods | No information | |
| 5 | Data aggregation method | No information | |

Table 30: Resilient Organisations resilience benchmark tool theoretical background

### Methodological guideline and support

**The following table (cf. Table 31), is related to methodological guidelines and technological support of the method.**

| Name of the method: Resilient Organisations Resilience Benchmark Tool | | Written by : Eric Rigaud | Update date : 02/2015 |
|---|---|---|---|
| **Methodological guideline and technological support** | | | |
| 1 | Can the method be applied directly or does an adaptation is necessary? | Method can be applied directly | |
| 2 | Title and objectives of the different phases of the method | Completing the questionnaire | |
| For each phase of the method | | | |
| 3 | Prerequisite | No information | |
| 4 | Inputs from other phases | No information | |
| 5 | Results of the realization of the phase | Indicators evaluated | |
| 6 | Procedure | No information | |
| 7 | Support provided by methods or tools | Indicator grid | |
| 8 | Resources | No information | |
| 9 | Average time / effort | 20-30mn | |
| For data acquisition process | | | |
| 10 | Nature of information collected | General information about organization and indicators value | |
| 11 | Procedures | No information | |
| 12 | Sources of information | No information | |
| 13 | Technological support | Paper form | |
| 14 | Average time / effort | No information | |
| For indicators assessment | | | |
| 15 | Method of assessment | No information | |
| 16 | Procedures | No information | |

| Name of the method: Resilient Organisations Resilience Benchmark Tool | | Written by : Eric Rigaud | Update date : 02/2015 |
|---|---|---|---|
| **Methodological guideline and technological support** | | | |
| 17 | Rules | No information | |
| 18 | Technological support | No information | |
| 19 | Average time/effort | No information | |

Table 31: Resilient Organisations resilience benchmark tool methodological guideline

### Results

The following table (cf. Table 32), is related to results characteristics of the method.

| Name of the method: Resilient Organisations Resilience Benchmark Tool | | Written by : Eric Rigaud | Update date : 02/2015 |
|---|---|---|---|
| **Results characteristics** | | | |
| 1 | Nature of the result | Indicator values | |
| 2 | Format | Filled out questionnaire | |
| 4 | Procedures | No information | |
| 5 | Technological support | No information | |
| 6 | Diffusion of the results | No information | |
| 7 | Usability for decision and action | No information | |
| 8 | Usability for improving disaster management (prevention, preparation, crisis management, recovery) | Indicators are related to organization resilience. The method provides an evaluation of the organization resilience profile. It can be applied to all organizations of a territory. | |
| 9 | Usability for improving the role of local government in disaster management | Local government can apply this tool to improve its organizational resilience. | |

Table 32: Resilient Organisations resilience benchmark tool result characteristics

### Synthesis

**The following table (cf. Table 33), is related to a synthesis of characteristics of the method that could/should be considered in the Driver framework.**

| Name of the method: Resilient Organisations Resilience Benchmark Tool | | Written by : Eric Rigaud | Update date : 02/2015 |
|---|---|---|---|
| **Synthesis** | | | |
| 1 | Context of the method | The Resilient Organisations "resilience benchmark tool" aims at **helping to measure the resilience of an organization, to monitor progress over time, and to compare resilience strengths and weaknesses against other organizations within same sector or of a similar size.** | |
| 2 | Content and methodological theoretical background | **The audit is based on a set of human and organizational factors associated to the resilience of the organization of investigation.** | |
| 4 | Methodological guideline and support | **The method is structured in a set of questions referring to the different indicators and to general information about the respective organization and the risks it is facing.** | |
| 5 | Results | **Result of the application of the method is a resilience profile consisting of the evaluation results of the different indicators.** | |

Table 33: Synthesis of the analysis of Resilient Organisations resilience benchmark tool

## Rockefeller Foundation – ARUP city resilience framework

### Context of the method

**The following table (cf. Table 34), is related to the general context of the method.**

| Name of the method: City Resilient Framework | | Written by : Alice CLEMENCEAU | Update date : JAN 2015 |
|---|---|---|---|
| **Context of the method** | | | |
| 1 | Who developed the method? | **Arup International Development – with financial support from the Rockefeller Foundation** | |
| 2 | Objectives of the method? | **The objective is to set up an index that not only measures and compares cities based on the available data, but also helps cities better understand and assess their own resilience. Whereas the framework is already published, the index is currently being developed.** | |
| 3 | Who is supposed to | **The primary audience shall be municipal governments, but it can serve** | |

| Name of the method: City Resilient Framework | | Written by : Alice CLEMENCEAU | Update date : JAN 2015 |
|---|---|---|---|
| **Context of the method** | | | |
| | use the method? | to support dialogue between other stakeholders contributing to enhancing resilience. | |
| 4 | For which reasons the method has been developed? | The method has been developed to answer the following question: what and who makes a city resilient and not just liveable now or sustainable for the long term? It aims at providing a comprehensive framework including physical assets, policies, social capital, and institutions. | |
| 5 | Scope of application (territorial oriented? Risk oriented? Resilience oriented? ) | Resilience oriented | |
| 6 | When does the first version of the method have been produced? | The framework has been published in April 2014 and the related index is currently under development. | |
| 7 | Actual version of the method and date of release? | April 2014 | |
| 8 | How many people are needed to apply the method? | Not clear yet, but probably a substantial number as the method covers a very broad range of issues. | |
| 9 | What are the key quantitative indicators of the method? | The framework relies on qualitative indicators. The index will also provide quantitative indicators (metrics). | |
| 10 | What are the key qualitative indicators of the method? | They are performance indicators, not describing actions, but rather the outcome of actions.<br>Leadership and strategy (knowledge)<br>- effective leadership and management<br>- empowered stakeholders<br>- integrated development planning<br>Health and wellbeing (people):<br>- minimal human vulnerability<br>- livelihoods and employment<br>- safeguards to human life and health<br>Economy and society (organization)<br>- finance including contingency funds<br>- social stability and security<br>- collective identity and mutual support | |

| Name of the method: City Resilient Framework | | Written by : Alice CLEMENCEAU | Update date : JAN 2015 |
|---|---|---|---|
| **Context of the method** | | | |
| | | **Infrastructure and environment (place)**<br>- reliable mobility and communications<br>- continuity of critical services<br>- reduced physical exposure | |
| 11 | Knowledge necessary to apply the method? | Knowledge about social sciences research methods (to conduct workshops, interviews, focus groups). | |
| 12 | Average duration of the application of the method? | No indication about that, but it might be long given the broad scope of the method. | |
| 13 | Support materials? | The related index with metrics is being prepared at the moment. | |

Table 34: City Resilient Framework context

### Content and methodological theoretical background

The following table (cf. Table 35), is related to the theoretical background of the method.

| Name of the method: City Resilient Framework | | Written by : Alice CLEMENCEAU | Update date : JAN 2015 |
|---|---|---|---|
| **Content and methodological theoretical background** | | | |
| 1 | Key concepts and associated models and theories of the method | **Progressive urban thinking & Living laboratories**<br>**Definition of city resili**ence: "capacity of cities to function, so that the **people living and working in cities-particularly the poor and vulnerable-** survive and strive no matter what stresses or shock they encounter". **Broad understanding of resilience: critical lens to consider climate change, financial shock, terrorism, slow-moving chronic stress.**<br>**This method follows a system-based approach, where the city is considered as a system of system (including both social and physical** systems): "complex systems that are constantly adaptin**g to changing** circumstances".<br>"Resilience focuses on enhancing the performance of a system in the **face of multiple hazards, rather than preventing or mitigating the loss** of assets due to specific events".<br>**The method also applies a performance-based approach, which is interested to address the interdependency, power dynamics and scale questions.**<br>**The method focuses on 8 functions that are critical for a city to be resilient: deliver basic needs; safeguard human life; protects, maintains, and enhance assets, facilitates human relationships and identity; promote knowledge; defend the rule of law, justice and** |

| Name of the method: City Resilient Framework | | Written by : Alice CLEMENCEAU | Update date : JAN 2015 |
|---|---|---|---|
| Content and methodological theoretical background | | | |
| | | equity; support livelihoods; stimulate economic prosperity.<br>The method considers 7 qualities of resilient systems: reflective, robust, redundant, flexible, resourceful, inclusive, and integrated.<br>The method has been developed through 3 phases: literature study, case studies and fieldwork.<br>This framework was tested by cities and proven useful for participating in the 100 Resilient Cities Challenge. | |
| 2 | Background legal frameworks or norms | None particularly | |
| 3 | Data collection methods | Not explicit at this stage, but it probably includes workshops, interviews, and focus groups. | |
| 4 | Data analysis methods | Not very detailed yet. But it can be understood that each of the 12 indicators (which are subdivided in a lot of sub indicators and variables) is tested against each of the identified qualities (reflective, robust, redundant, flexible, resourceful, inclusive, and integrated). | |
| 5 | Data aggregation method | Not clear yet. However, it is explained that the relative importance of the indicators depends on the urban context and the challenges the city faces. | |

Table 35: City Resilient Framework theoretical background

### Methodological guideline and support

The following table (cf. Table 36), is related to methodological guidelines and technological support of the method.

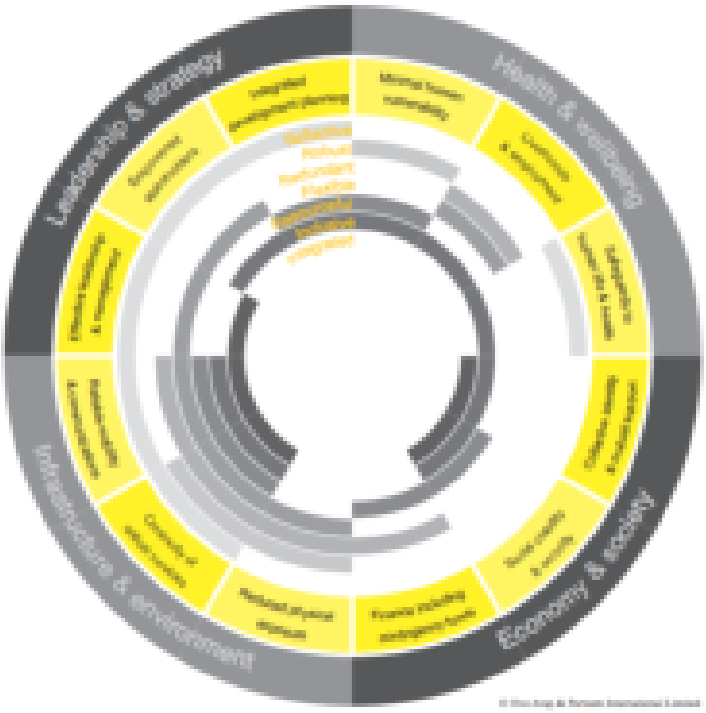
| Name of the method: City Resilient Framework | | Written by : Alice CLEMENCEAU | Update date : JAN 2015 |
|---|---|---|---|
| Methodological guideline and technological support | | | |
| 1 | Can the method be applied directly or does an adaptation is necessary? | The publication of the index is necessary to apply the method, as so far only the indicators are described and not the data acquisition, analysis and aggregation methods.<br>Among the 6 cities studied to develop the framework, none is a European city. | |
| 2 | Title and objectives of the different phases of the method | Not detailed as yet. | |
| For each phase of the method | | | |
| 3 | Prerequisite | No information | |

| Name of the method: City Resilient Framework | | Written by : Alice CLEMENCEAU | Update date : JAN 2015 |
|---|---|---|---|
| **Methodological guideline and technological support** | | | |
| 4 | Inputs from other phases | No information | |
| 5 | Results of the realization of the phase | No information | |
| 6 | Procedure | No information | |
| 7 | Support provided by methods or tools | No information | |
| 8 | Resources | No information | |
| 9 | Average time / effort | No information | |
| For data acquisition process | | | |
| 10 | Nature of information collected | No information | |
| 11 | Procedures | It is an auto-assessment, but the procedures are not detailed yet. | |
| 12 | Sources of information | No information | |
| 13 | Technological support | No information | |
| 14 | Average time / effort | No information | |
| For indicators assessment | | | |
| 15 | Method of assessment | No information | |
| 16 | Procedures | No information | |
| 17 | Rules | No information | |
| 18 | Technological support | No information | |
| 19 | Average time/effort | No information | |

Table 36: City Resilient Framework methodological guideline

### Results

The following table (cf. Table 37), is related to results characteristics of the method.

| Name of the method: City Resilient Framework | | Written by : Alice CLEMENCEAU | Update date : JAN 2015 |
|---|---|---|---|
| **Results characteristics** | | | |
| 1 | Nature of the result | A circular graph, depicting the three layers of the City Resilience Framework – categories, indicators and qualities. | |
| 2 | Format |   | |
| 4 | Procedures | Not clear yet. | |
| 5 | Technological support | Not clear yet. | |
| 6 | Diffusion of the results | It is up to the city. But it is not clear yet how wide they will disseminate the results, notably if they intend to use it to discuss with external stakeholders. Reports and publications available on Rockefeller foundation website. | |
| 7 | Usability for decision and action | The graph illustrates the strengths and weaknesses in a two dimensional way: by indicator and by "quality". It is easy to identify in which domains efforts are needed. However, more details are needed to set up an action plan. For this method to be useful for decision and action, the variables and metrics that result in the City Resilience Index are necessary. This would enable cities to carry out an objective assessment of their resilience and measure progress against an initial baseline. | |
| 8 | Usability for improving disaster management (prevention, | Not very high as it seems that this framework does not pursue an operational aim, rather it looks like a tool to support and reinforce a culture of resilience at city level. It can be expected that this will change with the release of the resilient city index. | |

| Name of the method: City Resilient Framework | | Written by : Alice CLEMENCEAU | Update date : JAN 2015 |
|---|---|---|---|
| Results characteristics | | | |
| | preparation, crisis management, recovery) | | |
| 9 | Usability for improving the role of local government in disaster management | This method makes stakeholders reflect upon their role, capacities and responsibilities in disaster management. | |

Table 37: City Resilient Framework results characteristics

### Synthesis

The following table (cf. Table 38), is related to a synthesis of characteristics of the method that could/should be considered in the Driver framework.

| Name of the method: City Resilient Framework | | Written by : Alice CLEMENCEAU | Update date : JAN 2015 |
|---|---|---|---|
| Synthesis | | | |
| 1 | Context of the method | The method was developed to help cities to better understand and assess their own resilience. | |
| 2 | Content and methodological theoretical background | The method relies both on a system-based approach and a performance-based approache. It tests 12 performance indicators against 7 qualities (reflective, robust, redundant, flexible, resourceful, inclusive, integrated). The method has been developed through 3 phases: literature study, case studies and fieldwork. | |
| 4 | Methodological guideline and support | The Resilient city index is being developed at the moment. It will provide a methodological guideline and support. | |
| 5 | Results | The framework can be used to facilitate a common understanding of resilience amongst diverse stakeholders. It can also be used to identify where there are critical gaps, where action and investment to build resilience will be most effective, or where deeper analysis or understanding is required. The final layer will be the variables and metrics that result in the City Resilience Index. This will enable cities to carry out an objective assessment of their resilience and measure progress against an initial baseline. | |

Table 38: Synthesis of the analysis of City Resilient Framework

## Pôle Risques assessment framework

### Context of the method

The following table (cf. Table 39), is related to the general context of the method.

| Name of the method: Territorial Risks Management Method (Gestion des Risques Territoriau -GRT) | Written by : Alice Clémenceau | Update date : JAN 2015 |
|---|---|---|

| Context of the method | | |
|---|---|---|
| 1 | Who developed the method? | The Pole Risques, together with Primo (http://www.primofrance.org/) and IPGR (http://ipgr.fr/). |
| 2 | Objectives of the method? | Assess and improve the risk management and insurance policy of local governments; and develop a culture of risk management at the city level.<br>Certify the quality and efficiency of the implementation of the risk management system of a local government. |
| 3 | Who is supposed to use the method? | The method has been developed for local governments, with the support of the French ministry for the Environment and sustainable development. However, this method is based on an external audit and therefore requires an auditor to be applied. |
| 4 | For which reasons the method has been developed? | The method has been developed to raise awareness on the issues of risk management and resilience at the local governments level, and encourage the persons in charge to acknowledge their responsibility. Eventually, it aims at decreasing the consequences of the occurrence of a risk and enhances the resilience of local governments.<br>Acknowledging the numerous initiatives that have spread these last years, the GRT method provides a systemic approach, supporting cross-sectoral and cross-department analysis, which in turns contribute to highlight the other initiatives undertaken by the local government. |
| 5 | Scope of application (territorial oriented? Risk oriented? Resilience oriented? ) | Risk oriented |
| 6 | When does the first version of the method have been produced? | 2011 |
| 7 | Actual version of the method and date of release? | 2011 |
| 8 | How many people are needed to apply the method? | - A committee of 3 persons (from the GRT developer organizations) need to determine the eligibility of the request made by the local government<br>- One qualified auditor conducts the analysis<br>- Representatives from the local authority: mayor, director general, legal and financial departments, HR department, agent |

| Name of the method: Territorial Risks Management Method (Gestion des Risques Territoriau -GRT) | Written by : Alice Clémenceau | Update date : JAN 2015 |
|---|---|---|

| Context of the method | | |
|---|---|---|
| | | in charge of risks management, urban planning department, logistics …<br>- Other city stakeholders: schools directors, fire brigade, representatives from the opposition, directors of cultural and sports facilities … |
| 9 | What are the key quantitative indicators of the method? | This method is not based on quantitative indicators and only uses qualitative indicators. |
| 10 | What are the key qualitative indicators of the method? | The qualitative indicators refer to the level of knowledge about an issue or the level of implementation of a measure, or a policy. They are performance indicators. The most important ones are, across the 4 sections Governance; Risk management framework; identification and characterization of the risks; Risk management system (prevention, protection and recovery):<br>- knowledge (none/low/medium/good/up to date)<br>- resources (none/ mutualized/dedicated/dedicated and substantial)<br>- comprehensiveness (none/ small part /medium part/large part/all)<br>- quality (inexistent/weak/strong/strong and regularly improved)<br>- relevance (none/low/medium/high/very high)<br>- openness (none/restricted/open to some/open to all/open to all and possible participation)<br>- planning and implementation (none/ planned/planned and ongoing implementation / planned and implemented/planned and monitored)<br>- accuracy (none/low/medium/good/very good)<br>- frequency (never / rarely / sometimes / frequently / every-time)<br>- timing (never/ after the launch/ during the launch/ in advance)<br>This method also uses aggregated indicators. For instance, if we consider the communication policy, the frequency is mixed with the comprehensiveness of the targeted audience: frequently to most stakeholders / every-time to all stakeholders |
| 11 | Knowledge necessary to apply the method? | Knowledge on local governance, and public administration; legal framework (urban planning) and risk management. When the method was developed, a training session was organized for the auditors. |
| 12 | Average duration of | The whole process takes around 6 months |

| Name of the method: Territorial Risks Management Method (Gestion des Risques Territoriau -GRT) | Written by : Alice Clémenceau | Update date : JAN 2015 |
|---|---|---|
| Context of the method | | |

| | | |
|---|---|---|
| | the application of the method? | |
| 13 | Support materials? | A presentation brochure, an eligibility questionnaire, an excel grid to fill in during the audit, an audit planning template, an audit feedback template |

Table 39: GRT context

### Content and methodological theoretical background

The following table (cf. Table 40), is related to the theoretical background of the method.

| Name of the method: GRT | Written by : Alice Clémenceau | Update date : JAN 2015 |
|---|---|---|
| Content and methodological theoretical background | | |

| | | |
|---|---|---|
| 1 | Key concepts and associated models and theories of the method | Applies the ISO 31000 conceptual approach. The risk management addresses the entire management system that supports the design, implementation, maintenance and improvement of risk management processes.<br>ISO 31000:2009 provides a list on how to deal with risks such as: Avoiding the risk by deciding not to start or continue with the activity that gives rise to the risk, accepting or increasing the risk in order to pursue an opportunity or retaining the risk by informed decision<br>The method is organized in 4 sections:<br>- Governance: it has a broad meaning as it includes the will to act, the resources available, the internal organization and the communication towards and consultation of external stakeholders.<br>- The risk management framework: includes the knowledge of and compliance with the regulatory framework, and the knowledge of the involved stakeholders and their relation to each other.<br>- The identification and characterization of the risks: knowledge of the hazards, and their consequences; risk assessment<br>- Risk management system (prevention, protection and recovery) which is very comprehensive: information, training, monitoring systems, vulnerability reduction measures, chain of command and reference documents, strategy, experience sharing and lessons learned<br>Key concepts:<br>- Systemic approach |

| Name of the method: GRT | | Written by : Alice Clémenceau | Update date : JAN 2015 |
|---|---|---|---|
| **Content and methodological theoretical background** | | | |
| | | - Continuous improvement<br>- External audit (versus auto-assessment) | |
| 2 | Background legal frameworks or norms | French legal, normative and regulatory framework regarding risk management and urban planning<br>ISO 31000 (2009) Risk management norm | |
| 3 | Data collection methods | Interviews, documents analysis | |
| 4 | Data analysis methods | Scoring of the answers to each question, from 0 to 4 according to the level of implementation. | |
| 5 | Data aggregation method | The aggregated score is obtained by summing up the grades granted to each theme (which gathers several questions). The weighting coefficient is not the same for all questions. Indeed, some key questions, and in particular those dealing with regulatory issues, have a higher weight. | |

Table 40: GRT theoretical background

### Methodological guideline and support

The following table (cf. Table 41), is related to methodological guidelines and technological support of the method.

| Name of the method: GRT | | Written by : Alice Clémenceau | Update date: JAN 2015 |
|---|---|---|---|
| **Methodological guideline and technological support** | | | |
| 1 | Can the method be applied directly or does an adaptation is necessary? | This method is generic at the French national scale and it can be applied directly, using the Excel spreadsheet template. However, it requires a lot of adaptation to be applied in other countries, considering the high number of references to the national legal and normative framework. | |
| 2 | Title and objectives of the different phases of the method | 1. Application of the city (letter of intent and eligibility questionnaire). This first step shall demonstrate the willingness of the city to undertake the initiative. The labeling Committee decides on the eligibility of the application.<br>2. Audit by a qualified auditor, using a grid template. This is the central step. It aims at assessing the quality of the risk management system. The auditor sends a report to the labeling committee. The city can respond.<br>3. Decision of the labeling committee to grant the certification.<br>4. Yearly monitoring of the action plan implementation and | |

| Name of the method: GRT | | Written by : Alice Clémenceau | Update date: JAN 2015 |
|---|---|---|---|
| **Methodological guideline and technological support** | | | |
| | | experience sharing | |
| For each phase of the method | | | |
| 3 | Prerequisite | 1. Knowledge that the certification exists<br>2. The city fulfils the eligibility criteria and the auditor follows a training session<br>3. The audit session should be planned so that all the interlocutors are available<br>4. Available human resources to carry out the monitoring | |
| 4 | Inputs from other phases | 1. None<br>2. Eligibility questionnaire & city documentation and regulatory framework<br>3. Audit report, plan and possible comments from the city<br>4. Action plan | |
| 5 | Results of the realization of the phase | 1. Launch of the audit<br>2. Audit report<br>3. Certification and action plan<br>4. Follow up of the progress by the city managers; durability of the certification | |
| 6 | Procedure | 1. Eligibility check<br>2. Filling in of an analysis template (excel spread sheet)<br>3. Committee decision (possibly includes comments from the city)<br>4. Regular monitoring (yearly) | |
| 7 | Support provided by methods or tools | 1. Template of eligibility questionnaire<br>2. Template of analysis grid and automatic calculation of grades<br>3. None<br>4. None | |
| 8 | Resources | For each phase, mainly human resources, described below. | |
| 9 | Average time / effort | 1. 1 day<br>2. 1 to 4 full days of audit (1 auditor full time + around one hour for each interlocutors of the city), depending on the size of the city, and a few days to consolidate the audit report.<br>3. 1 meeting (2 hours approximately)<br>4. Annually, around 2 hours meeting | |
| For data acquisition process | | | |
| 10 | Nature of information collected | Oral and written | |
| 11 | Procedures | An audit planning is provided with the method to accommodate the interview of all involved actors. | |

| Name of the method: GRT | | Written by : Alice Clémenceau | Update date: JAN 2015 |
|---|---|---|---|
| **Methodological guideline and technological support** | | | |
| 12 | Sources of information | City managers and stakeholders involved in city risk management (i.e, schools, industrial plants, fire brigade…)<br>Urban planning documents | |
| 13 | Technological support | An excel spreadsheet (analysis grid) | |
| 14 | Average time / effort | 1 to 4 full days | |
| For indicator assessment | | | |
| 15 | Method of assessment | An assessment template is provided (excel spread sheet), with a list of themes gathering questions.<br>Each question is scored, from 0 to 4 according to the level of implementation. | |
| 16 | Procedures | The assessment template is kept confidential | |
| 17 | Rules | All questions must be answered. If the interlocutor does not have the answer, another stakeholder must provide it. | |
| 18 | Technological support | An excel spread sheet with automatic calculation formula | |
| 19 | Average time/effort | A few days | |

Table 41: GRT methodological guideline

### Results

The following table (cf. Table 42), is related to result characteristics of the method.

| Name of the method: GRT | | Written by : Alice Clémenceau | Update date : JAN 2015 |
|---|---|---|---|
| **Results characteristics** | | | |
| 1 | Nature of the result | A certification is granted for one year (renewable twice). So far 3 cities have been certified (Saint Quentin en Yvelines, Sète, and Tarascon) in 2013. A fourth one is currently ongoing. | |
| 2 | Format | A report is written after the audit presenting the strengths and weaknesses. The city has the possibility to provide comments on this report. | |
| 4 | Procedures | Following the results of the audit, the labeling committee decides whether or not to grant the certification and the number of starts granted. | |
| 5 | Technological support | Based on the excel spread sheet | |
| 6 | Diffusion of the results | The detailed results are not made public, however, a public event is organized to advertise the obtained certification. | |

| Name of the method: GRT | | Written by : Alice Clémenceau | Update date : JAN 2015 |
|---|---|---|---|
| **Results characteristics** | | | |
| 7 | Usability for decision and action | An action plan is drawn from the audit report and its progress is assessed on a yearly basis. | |
| 8 | Usability for improving disaster management (prevention, preparation, crisis management, recovery) | It provides a very complete overview of the actions carried out in risk management and their level of implementation. The fact that the certification is renewed every year pushes the local government to continuously improve their risk management system. Also, the action plan provided by the auditor is a good tool to focus on the relevant actions. | |
| 9 | Usability for improving the role of local government in disaster management | Very good. It raises awareness about disaster management among the local government agents and it provides value and visibility to their work. | |

Table 42: Description forms of result characteristics of resilience assessment methods

### Synthesis

The following table (cf. Table 43), is related to a synthesis of characteristics of the method that could/should be considered in the Driver framework.

| Name of the method: GRT | | Written by : Alice Clémenceau | Update date : JAN 2015 |
|---|---|---|---|
| **Synthesis** | | | |
| 1 | Context of the method | The method was developed in 2011 to help spreading a culture of risk management in local government and highlight good practices. It certifies the quality and efficiency of the implementation of the risk management system. An external auditor applies the method. | |
| 2 | Content and methodological theoretical background | The method applies the ISO 31000 approach and is based on the following key concepts: a systemic approach, continuous improvement, an external audit. The data is gathered from interviews and documents. | |
| 4 | Methodological guideline and supports | The methodological guideline is very detailed (questionnaire, excel spreadsheets and interview planning). This method requires a lot of adaptation to be applied in other countries, considering the high number of references to the national legal and normative framework. | |
| 5 | Results | This method is too recent to be analysed in terms of medium to long-term results. The action plan provided by the auditor is a pragmatic and relevant tool and the yearly monitoring ensures that risk management stays on the agenda of the local government | |

Table 43: Synthesis of the analysis of GRT

# Annex 3. Indicators analysis

| Prevention<br>Actions taken before a disaster to decrease vulnerability, primarily through measures that reduce causalities and exposure to damage and disruption or that provide passive protection during disaster impact. | |
|---|---|
| LG SAT Tool | • Put in place organisation and coordination to understand and reduce disaster risk, based on participation of citizen groups and civil society. Build local alliances. Ensure that all departments understand their role in disaster risk reduction and preparedness.<br>• Assign a budget for disaster risk reduction.<br>• Assess the safety of all schools and health facilities and upgrade these as necessary.<br>• Maintain up to date data on hazards and vulnerabilities.<br>• Prepare risk assessments.<br>• Use risk assessment results as the basis for urban development plans and decisions.<br>• Identify safe land for low income citizens and upgrade informal settlements, wherever feasible Invest in and maintain critical infrastructure that reduces risk, such as flood drainage, adjusted where needed to cope with climate change.<br>• Protect ecosystems and natural buffers to mitigate floods, storm surges and other hazards to which your city may be vulnerable. Adapt to climate change by building on good risk reduction practices.<br>• Ensure that risks assessment results and the plans to support your city's resilience are readily available to the public and fully discussed with them.<br>• Apply and enforce realistic, risk compliant building regulations and land use planning principles.<br>• Provide incentives for homeowners, low income families, communities, businesses and the public sector to invest in reducing the risks they face.<br>• Ensure that education programmes and training on disaster risk reduction are in place in schools.<br>• Ensure that education programmes and training on disaster risk reduction are in local communities. |
| M:CI | • Integrated Risk Management<br>• Flood protection / Coastal protection strategies<br>• Resilience-by-design approaches in critical infrastructure protection |
| TORRENS Community Disaster Resilience Scorecard | • Level of risk and vulnerability in the community |
| Regional Disaster Resilience: A RDR | • Characterization of the Regional All-Hazards Threat Environment<br>• Infrastructure dependencies and interdependencies identification and |

| | |
|---|---|
| Guide for Developing an Action Plan | associated significant vulnerabilities and consequences for regional resilience<br>• Risk assessment and management<br>• Specialized sector-specific regional disaster resilience needs cyber security, process control, and it systems, transportation, energy, water and wastewater systems, dams and levees, hospitals and healthcare, and air and seaport resilience |
| Resilient Organisations Resilience Benchmark Tool | No indicators |
| City Resilient Framework | • Reduced physical exposure and vulnerability<br>• Minimal human vulnerability<br>• Diverse livelihoods and employment<br>• Collective identity and mutual support<br>• Adequate safeguards to human life and health<br>• Availability of financial resources and contingency funds<br>• Social stability and security |
| GRT | • Governance<br>• Risk appreciation<br>• Risk treatment, prevention, protection and review |

| Preparation<br>Actions taken to bolster emergency response capabilities including warning systems, evacuation routes, supplies and communication procedures established prior to disaster and emergency events. | |
|---|---|
| LG SAT Tool | • Install early warning systems |
| M:CI | No indicators |
| TORRENS Community Disaster Resilience Scorecard | • Level of risk and vulnerability in the community<br>• Emergency planning, response and recovery resources available in the community<br>• Procedures supporting community disaster planning, response and recovery |
| Regional Disaster Resilience: A RDR Guide for Developing an Action Plan | • Resilience roles, responsibilities, authorities, and decision-making<br>• Exercises, education, & training<br>• Alert and warning, two-way information sharing, and situational awareness<br>• Public information/risk communications, including media<br>• Legal & liability issues |
| Resilient Organisations Resilience Benchmark Tool | • Unity of Purpose: An organisation wide awareness of what the organisation's priorities would be following a crisis, clearly defined at the organisation level, as well as an understanding of the organisation's minimum operating requirements.<br>• Planning Strategies: The development and evaluation of plans and strategies to manage vulnerabilities in relation to the business environment and its stakeholders.<br>• Stress Testing Plans: The participation of staff in simulations or scenarios designed to practice response arrangements and validate plans.<br>• A strategic and behavioural readiness to respond to early warning signals of change in the organisation's internal and external environment before they escalate into crisis. |
| City Resilient Framework | • Integrated development planning<br>• Empowered stakeholders |
| GRT | • Risk treatment, prevention, protection and review |

| Response<br>Actions taken immediately before, during and after a disaster to save lives, clear debris and minimize damage. | |
|---|---|
| LG SAT Tool | No indicators |
| M:CI | No indicators |
| TORRENS Community Disaster Resilience Scorecard | No indicators |
| Regional Disaster Resilience: A RDR Guide for Developing an Action Plan | No indicators |
| Resilient Organisations Resilience Benchmark Tool | • Leadership: Strong crisis leadership to provide good management and decision making during times of crisis, as well as continuous evaluation of strategies and work programs against organisational goals.<br>• Staff Engagement: The engagement and involvement of staff who understand the link between their own work, the organisation's resilience, and its long term success. Staff is empowered and uses its skills to solve problems.<br>• Situation Awareness: Staff is encouraged to be vigilant about the organisation, its performance and potential problems. Staff is rewarded for sharing good and bad news about the organisation including early warning signals and these are quickly reported to organisational leaders.<br>• Decision Making: Staff has the appropriate authority to make decisions related to their work and authority is clearly delegated to enable a crisis response. Highly skilled staff is involved, or are able to make, decisions where their specific knowledge adds significant value, or where their involvement will aid implementation.<br>• Innovation and creativity: Staff is encouraged and rewarded for using its knowledge in novel ways to solve new and existing problems, and for utilising innovative and creative approaches to developing solutions.<br>• Effective Partnerships: An understanding of the relationships and resources the organisation might need to access from other organisations during a crisis, and planning and management to ensure this access.<br>• Breaking Silos: Minimisation of divisive social, cultural and behavioural barriers, which are most often manifested as communication barriers creating disjointed, disconnected and detrimental ways of working.<br>• Internal Resources: The management and mobilisation of the organisation's resources to ensure its ability to operate during business as usual, as well as being able to provide the extra capacity required during a crisis |
| City Resilient | • Effective leadership and management |

| | |
|---|---|
| **Framework** | |

| **Recovery**<br>**Short-term activities to restore vital support system as well as the long-term activity to rebuild properties and social and economic functioning.** | |
|---|---|
| **LG SAT Tool** | • **After any disaster, ensure that the needs of the affected population are placed at the centre of reconstruction, with support for them and their community organisations to design and help implement responses, including rebuilding homes and livelihoods.** |
| **M:CI** | • **Existing Economic Recovery and Business Continuity Management (BCM)** |
| **TORRENS Community Disaster Resilience Scorecard** | **No indicators** |
| **Regional Disaster Resilience: A RDR Guide for Developing an Action Plan** | • **Public information/risk communications, including Media**<br>• **Recovery and long-term restoration challenges**<br>• **Continuity of operations and business** |
| **Resilient Organisations Resilience Benchmark Tool** | • **Roles are shared and staff is trained so that someone will always be able to fill key roles.**<br>• **Leveraging Knowledge: Critical information is stored in a number of formats and locations and staff has access to expert opinions when needed.** |
| **City Resilient Framework** | • **Continuity of critical services** |
| **GRT** | **No indicators** |

# Annex 4. Local governments interviews

**One of the objectives of WP34 is to understand the perception of disaster resilience among local** governments' representatives. It also includes their understanding of the difficulties and needs for **managing and improving their contribution in the prevention, preparation respond and recover phases. With that perspective a set of interviews will be conducted with representatives of local governments. A guideline has been developed to structure the realisation of the interviews, which purpose is to capture the representation of local** government's representatives about five thematic **themes:**

- **Local government disaster resilience context. The interviewee defines the global context of disaster resilience (definition of disaster resilience, disasters that occurred in the past, hazards identified and risks associated).**
- **Local government role, organisation and needs during the disaster prevention phase. Description of the role of local government in disaster prevention, concrete actions, resources allocated, competencies and training programs, communication and coordination with citizens, state representatives, critical infrastructures, business companies, civil society, media, trade-offs with other functions, etc.)**
- **Local government role, organisation and needs during the preparation phase. Description of the role of local government in disaster preparation, concrete actions, resources allocated, competencies and training programs, communication and coordination with citizens, state representatives, critical infrastructures, business companies, civil society, media, trade-offs with other functions, etc.)**
- **Local government role, organisation and needs during the response phase. Description of the role of local government in disaster response, concrete actions, resources allocated, competencies and training programs, communication and coordination with citizens, state representatives, critical infrastructures, business companies, civil society, media, improvisation, endurance, etc.)**
- **Local government role, organisation and needs during the recovery phase. Description of the role of local government in disaster recovery, concrete actions, resources allocated, competencies and training programs, communication and coordination with citizens, state representative, critical infrastructures, business companies, civil society, media, trade-offs with other functions, etc.)**

**This Annex section aims at presenting interview guideline for each thematic field.**

## 1.1 Introduction and local government disaster resilience context

1. **Name, position, affiliation**
2. **Background to Driver/SP3/WP34**
3. **This demonstration project is focused on the issue of local government resilience to disasters. What does the term local government resilience mean to you?**
4. **In the project we consider within the concept of local government resilience, local government capacities to prevent, prepare for, respond to and recover from a disaster. Five themes will be discussed in this interview: general context of local disaster resilience and the role of local government within disasters prevention, preparation, crisis management and recovery phases.**
5. Let's talk about the disasters your city has experienced. Has your city already experienced **disasters? What kind of disasters were they? What were their causes? Their consequences? How did the local government react? What difficulties were faced? Which actions were efficient and why? Which actions were inefficient and why? What has changed since these events?**
6. **Now think about potential hazards that might affect your city. What kind of hazard might occur according to you? What might be their causes and their consequences? Do you think you are ready to respond to and overcome the event?**

## 1.2 Local government role and need for disaster prevention

7. Prevention refers to "actions taken before a disaster to decrease vulnerabili**ty, primarily through measures that reduce causalities and exposure to damage and disruption or that** provide passive protection during impact". What would you say about the role of local **government in disaster prevention?**
8. **Can you say a few words about past and current prevention programs in your city?**
9. **How is prevention organised in your city? How many people are dedicated to this function?**
10. **How are trained municipal employees? Is there a capacity building model/ method in place?**
11. **Is there communication and collaboration with other stakeholders (citizens, state representatives, critical infrastructures, business companies, civil society, media, etc.)? Can you tell us more about these interactions?**
12. **Is there any compromise between disaster prevention and other functions?**
13. **What are the main difficulties of developing efficient disaster preventive programs?**
14. **What are the key factors of success of disaster preventive programs?**
15. **What are the key factors of failure of disaster preventive programs?**
16. **How do you assess the efficiency of your action in disaster prevention?**
17. **What should be the requirements for designing an efficiency assessment tool dedicated to disaster prevention?**

## 1.3 Local government role and need for disaster management preparation

18. **Preparation refers** to "actions taken to bolster emergency response capabilities including **warning systems, evacuation routes, supplies, and communication procedures established** prior to disaster and emergency events". What would you say about the role of local **government in disaster preparation?**
19. **Can you say a few words about past and current disaster preparation programs in your city?**
20. **How is disaster preparation organised in your city? How many people are dedicated to this function?**
21. **How are trained municipal employees? Is there a capacity building model/ method in place?**
22. **Is there communication and collaboration with other stakeholders (citizens, state representatives, critical infrastructures, business companies, civil society, media, etc.)? Can you tell us more about these interactions?**
23. **Is there any compromise between disaster preparation and other functions?**
24. **What are the main difficulties in developing disaster preparation programs?**
25. **What are the key factors of success of disaster preparation programs?**
26. **What are the key factors of failure of efficient disaster preparation programs?**
27. **How do you assess efficiency of your actions in disaster preparation?**
28. **What should be the requirements for designing an efficiency assessment tool dedicated to disaster preparation?**

## 1.4 Local government role and need for disaster response

29. Response refers to "action taken immediately before, during, and after a disaster to save **lives, clear debris, and minimize damage. Response activities are in general preparedness** plans in action". What would **you say about the role of local government in disaster response?**
30. **Can you say a few words about how your local government responds to a disaster?**
31. **How is disaster management organised in your city? How many people are dedicated to this function?**
32. **How are trained municipal employees? Is there a capacity building model/ method in place?**
33. **Is there communication and collaboration with other stakeholders (citizens, state representative, critical infrastructures, business companies, civil society, media, etc.)? Can you tell us more about these interactions?**
34. **What are the main difficulties of disaster response?**
35. **What are the key factors of success of disaster response?**
36. **What are the key factors of failure of disaster response?**
37. **How do you assess efficiency of your action in disaster response?**
38. **What should be the requirements for designing an efficiency assessment tool dedicated to disaster response?**

## 1.5 Local government role and need for disaster recovery function

39. Recovery refers to "the short term activities to restore vital support systems as well as the long term activities to rebuild properties and social and economic functioning". What would you say about the role of local government in disaster recovery?
40. Can you say a few words about past and current disaster recovery programs in your city?
41. How is recovery organised in your city? How many people are dedicated to this function?
42. How are trained municipal employees? Is there a capacity building model/ method in place?
43. Is there communication and collaboration with other stakeholders (citizens, state representative, critical infrastructures, business companies, civil society, media, etc.)? Can you tell us more about these interactions?
44. Is there any compromise between disaster recovery and other functions?
45. What are the main difficulties in developing efficient disaster recovery programs?
46. What are the key factors of success of disaster recovery programs?
47. What are the key factors of failure of disaster recovery programs?
48. How do you assess efficiency of your action in disaster recovery?
49. What should be the requirements for designing an efficiency assessment tool dedicated to disaster recovery?