

CEN

CWA 17300

WORKSHOP

AGREEMENT

ICS

English version

City Resilience Development - Operational Guidance

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COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

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Introduction

This CEN Workshop Agreement (CWA) is based on the results of the Smart Mature Resilience (SMR) research project, funded under the Horizon2020 framework programme of the European Union. SMR was a multi-disciplinary research project working for more resilient cities in Europe. As Europe's cities continue to grow, there is an urgent need for far-reaching and holistic approaches to enhance their capacity to resist, absorb, adapt to and recover from the potentially critical effects of climate change. Furthermore, today's high level of interdependence among cities and their systems can lead to cascading effects and crisis escalation from local to regional, national or even international level. This is the main reason why cities should not be considered as isolated entities in the resilience-building process. Supporting and building key resilient cities across Europe will create a strong *European Resilience Backbone* for all of Europe's cities, helping them support each other in overcoming future challenges.

Within the SMR project, researchers and representatives from cities came together to develop, implement and validate a city-focused European Resilience Management Guideline (ERMG) – this Guideline served as the basis for the operational framework defined in this document. This framework serves to direct available resources towards defined goals, while at the same time ensuring transparency and democratic principles for city resilience development and planning. Five strategic resilience-building tools are used in five operational steps, thus forming an iterative, systematic resilience-building process in which cities can begin at different starting points, depending on their resilience maturity. The cities can then improve their resilience maturity throughout the process.

The five operational steps of the framework are:

- 1) Baseline review;
- 2) Risk awareness;
- 3) Resilience strategy;
- 4) Implementation and monitoring;
- 5) Evaluation and reporting.

The framework includes a holistic approach to city resilience development, and refers to the five tools developed in the SMR project:

- Maturity Model (MM);
- Risk Systemicity Questionnaire (RSQ);
- Resilience Information Portal (RP);
- City Resilience Dynamics Tool (CRD); and
- Resilience Building Policies tool (RBP).

The tools were co-created with municipal employees and consultants from several European cities. This co-creational approach enabled the identification of requirements and an understanding of the expectations cities have regarding an integrated resilience management.

CWA series – City Resilience Development

The CEN Workshop Agreement is part of the *City Resilience Development* standards series, which intends to support cities in becoming more resilient against various kinds of threats. The series consists of the following other two CWAs:

- CWA 17301:2018 City Resilience Development – Maturity Model; and
- CWA 17302:2018 City Resilience Development – Information Portal.

The CWA on Operational Guidance is the overarching document that refers to the CWA 17301:2018 *City Resilience Development - Maturity Model*, CWA 17302:2018 *City Resilience Development - Information Portal*, as well as to other supporting tools.

International initiatives on city resilience

Taking into consideration international initiatives such as the *United Nations Sustainable Development Goals* (specifically Goal 11), the *Sendai Framework for Disaster Risk Reduction 2015-2030*, and the *Paris Climate Agreement of 2015*, it is important for cities to work on resilience in coordinated action, with the ultimate goal of creating a resilient city. By implementing actions in this field a city will be able to respond to the above-mentioned initiatives because city resilience:

- supports livelihoods and improves the quality of life;
- enhances poverty reduction;
- enhances land use planning that integrates disaster risk assessment;
- helps to manage and protect (critical) infrastructures;
- promotes the continuous productivity of development investments;
- promotes education and capacity building among the population;
- protects housing and ensures social and economic stability; and
- supports social equality and security.

United Nations Sustainable Development Goal 11

The *United Nations Sustainable Development Goal 11* aims to "make cities and human settlements inclusive, safe, resilient and sustainable". The target for 2030 is to ensure access to safe and affordable housing. The indicator that measures progress toward this target is the proportion of urban population living in slums or informal settlements. Between 2000 and 2014, the proportion fell from 39% to 30%. The absolute number of people living in slums went from 792 million in 2000 to an estimated 880 million in 2014. Movement from rural to urban areas has accelerated as the population has grown and better housing alternatives are available [1].

Sendai Framework for Disaster Risk Reduction 2015-2030

The *Sendai Framework for Disaster Risk Reduction 2015-2030* was adopted by the UN Member States on the 18th of March 2015 at the third UN World Conference on Disaster Risk Reduction in Sendai, Japan. The Sendai Framework is a 15-year, voluntary, non-binding agreement which recognizes that although the state plays a primary role in reducing disaster risks, that responsibility should be shared with other stakeholders, including local governments. It aims for the substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries [2].

Paris Climate Agreement of 2015

The *Paris Climate Agreement* is an agreement within the United Nations Framework Convention on Climate Change (UNFCCC) dealing with greenhouse gas emissions mitigation, adaptation, and finance starting in the year 2020. The language of the agreement was negotiated by representatives of 196 parties at the 21st Conference of the Parties of the UNFCCC in Paris and was adopted by consensus on 12 December 2015. As of May 2018, 195 UNFCCC members have signed the agreement, and 177 have become party to it. The Agreement has the long-term goal of keeping the increase in global average temperature to well below 2°C above pre-industrial levels, and aims to limit the increase to 1,5°C, since this would significantly reduce risks and the impacts of climate change [3].

Importance of city resilience at local level

A resilient city is a city that:

- is prepared to identify, resist, absorb, adapt to and recover from any shock or chronic stress while maintaining its essential functions;
- involves all stakeholders, especially citizens, in disaster risk reduction through co-creation processes;
- reduces vulnerability and exposure to natural and man-made disasters while managing to thrive;
- increases its capacity to respond to climate change challenges, disasters, shocks, and other unforeseen chronic stresses, through enhanced emergency preparedness.

The following figure shows the relationship of resilience to climate change adaptation, mitigation and disaster risk reduction illustrating the fact that resilience leads to sustainable development in cities, towns and municipalities. To do this, cities need to safeguard and protect their (critical) infrastructures and assets, while also dealing with pressing chronic stresses that are related to societal issues connected to social dynamics.

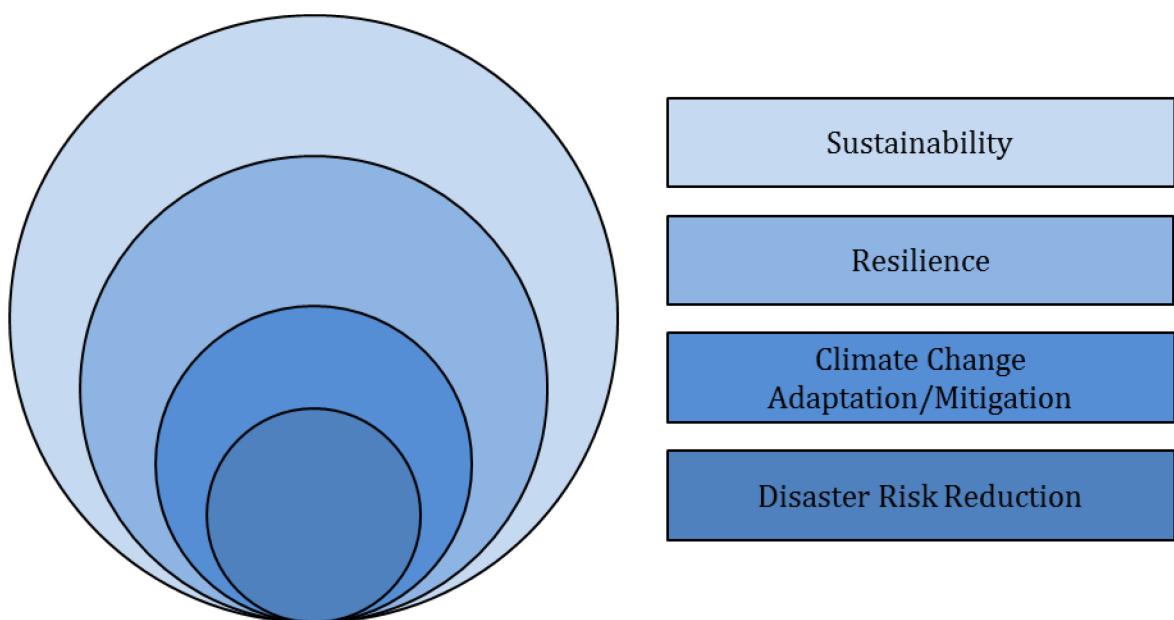


Figure 1 — Relation of resilience to sustainability, climate change adaptation/mitigation and disaster risk reduction [4]

Challenges to sustainability and resilience management in cities

Cities, and thereby their local governments, are confronted daily with the same challenges to sustainability and resilience management. Cities could face the following challenges:

- lack of data availability;
- lack of knowledge on the costs and benefits of adaptation and resilience activities at local or regional level;
- lack of indicators that measure the success of these activities;
- absence of coordination between the different tiers of governance;
- lack of cross-silo collaboration;
- failure to gain political commitment and secure mandate for action;
- difficulties in gaining financing for relevant projects; and
- failure of mainstreaming resilience into traditional city practices.

In practice, cities are political organizations. They need to regularly plan their activities, engage with citizens and provide them with public services. Therefore, a detailed planning approach is needed which considers the political element, involves stakeholders and follows up on communication for resilience-building activities.

Work with municipal employees and consultants at local level throughout the SMR research project has shown that, when dealing with cities, managing tasks individually and sectorally is often inefficient and leads to increased workload and weak results.

Benefits of using this document

The use of this document will improve the channelling of resources towards defined goals, and ensure commitment and accountability in decision-making, thus helping cities to meet the challenges described above. By using an integrated, systematic approach to city resilience development, any inefficiency due to running several parallel management systems and processes will be replaced by robustness and sustainability.

Re-organizing and integrating existing practices, plans and strategies under one guiding principle for resilience planning processes will systemize work, boost efficiency and provide a multitude of positive outcomes. These will include:

- greater awareness regarding city resilience and sustainability;
- improved support for decision-making at local level in cities;
- increased transparency and advanced monitoring;
- enhanced trust in local and regional governance;
- activation and mobilization of citizens through co-creation activities;
- contribution to a sustainable and resilient economy and society that respects the environment;
- better perspectives for bottom-up, inclusive resource governance at local level;
- mainstreaming of resilience strategies into local plans; and
- prioritization of interventions when evaluating potential impacts.

Document structure

This document first discusses the strategic governance awareness that needs to be considered before implementing the proposed framework. The framework itself is then described: For each of the five steps, a brief description is given, the requirements for successful implementation are laid down, and recommendations for implementation are given. Tools which should be used in each step are also listed, with each tool being described in more detail in the Annexes. Finally, good practices taken from real life show how the Operational Guidance framework could be implemented at city level and the document concludes with a list of potential stakeholders who should be involved in each iteration.

1 Scope

This CEN Workshop Agreement (CWA) defines an operational framework for cities which will provide guidance on local resilience planning and support their efforts in building resilience.

This document is intended to be used by policy and decision-makers at city level and councilors working on climate change adaptation and resilience in their city, as well as by any other city stakeholder working on resilience (for example, but not limited to: critical infrastructure managers, service providers, emergency services, the media, civil society associations, non-governmental organizations, academic and research institutions as well as consultancies).

2 Normative references

The following documents are referred to in the text in such a way that some or all their content constitutes requirements of this document.

CWA 17301:2018 *City Resilience Development – Maturity Model*

CWA 17302:2018 *City Resilience Development – Information Portal*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

cascading effect

failure in one system causes failures in another system

Note 1 to entry: This failure is due to interdependencies between different urban technical networks considered to be critical in the risk context.

3.2

case study

description of an actual situation, commonly involving a decision, a challenge, an opportunity, a problem or an issue

3.3

chronic stress

slow-moving disasters that weaken the fabric of a city

EXAMPLE High unemployment, overtaxed or inefficient public transportation system, endemic violence or chronic food or electric and water shortages.

3.4

city

local unit based on administrative boundaries within a metropolitan area

3.5

CITY

human settlement formed by a central area, neighborhoods and suburbs reciprocally connected but not necessarily coincident with administrative boundaries, and inclusive of all the urban stakeholders that play key roles in its functioning

Note 1 to entry: The units of analysis in the SMR project are entities that were referred to as CITIES (upper case). Each of the CITIES is analysed from the perspective of service to its citizens and metropolitan area, with the critical infrastructures (CIs) located in or operationally involved in the area, and their functional roles as part of Europe's multi-level governance. Connections and comparisons between the CITIES are developed to form a common frame of reference, to facilitate communication and knowledge sharing between the CITIES as the project moves towards developing a nexus of resilient cities in Europe.

3.6

city operator

organization that has the responsibility to deliver an ongoing operational service for the city

Note 1 to entry: A city operator can be a privately or publicly owned entity. City operators can be operating in just one city or in several cities; some could even be international enterprises. Non-governmental organizations (NGO) normally do not have a responsibility, even though the city depends on their existence and deliveries.

EXAMPLE Energy company, waste management, financial services.

3.7

city resilience

the ability of a city or region to resist, absorb, adapt to and recover from acute shocks and chronic stresses to keep critical services functioning, and to monitor and learn from on-going processes through city and cross-regional collaboration, to increase adaptive abilities and strengthen preparedness by anticipating and appropriately responding to future challenges

3.8

climate change

change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer

[SOURCE: DIN SPEC 35810:2014-11, definition 3.2]

EXAMPLE: Flooding, heat and cold waves, high winds, marine storm surges, sea level rise, drought, pest, wildfires or pollution.

3.9

crisis

unstable condition involving an impending abrupt or significant change that requires urgent attention and action to protect life, assets, property or the environment

[SOURCE: ISO 22300:2018-02, definition 3.59]

Note 1 to entry: Crises are related to stress situations that can evolve to emergencies.

EXAMPLE Terrorists holding employees hostage.

3.10**crisis management**

holistic management process that identifies potential impacts that threaten an organization and provides a framework for building resilience, with the capability for an effective response that safeguards the interests of the organization's key interested parties, reputation, brand and value-creating activities, as well as effectively restoring operational capabilities

[SOURCE: ISO 22300:2018-02, definition 3.60]

3.11**critical infrastructure**

a system, service or asset, which can be physical or virtual

Note 1 to entry: Critical infrastructures are complex socio-technical systems in which the components are particularly interdependent. Interdependencies also exist between different critical infrastructures. All these interactions may imply many failures caused by cascading effects in the risk context. Critical infrastructures are vital for the welfare of society, since a disruption and its cascading effects can have a negative impact on the health, security, safety and economic well-being of citizens and on the effective functioning of the government.

EXAMPLE Critical infrastructure failures could be transportation disruptions, blackouts, water supply unavailability, drainage insufficiency, gas shortages, chemical or nuclear accidents and telecommunication troubles.

3.12**disaster**

situation where widespread human, material, economic or environmental losses have occurred which exceeded the ability of the affected organization, community or society to respond and recover using its own resources

[SOURCE: ISO 22300:2018-02, definition 3.69]

Note 1 to entry: Crisis with a bad ending.

EXAMPLE Employees killed in a terrorist hostage situation.

3.13**emergency**

unforeseen or unplanned situation, which has life-threatening or extreme loss implications and requires immediate attention that is directly given

[SOURCE: modified ISO 22300:2018-02, definition 3.77]

EXAMPLE Child falls into a fast running river.

3.14**hazard**

source of potential harm

[SOURCE: ISO 22300:2018-02, definition 3.99]

Note 1 to entry: A hazard poses no risk, if there is no exposure to that hazard.

Note 2 to entry: A natural hazard is a sub category of a hazard.

3.15

iteration

process of going through all five steps of the Operational Guidance framework

Note 1 to entry: Should be done at least once per maturity stage.

3.16

local government

government unit having a local sphere of competence

3.17

maturity

level of gain after a maturation period

3.18

policy

set of recommendations/activities related to a particular purpose

3.19

resilience action plan

detailed plan outlining actions needed to reach one or more resilience goals

3.20

resilience strategy

plan to achieve a long-term or overall resilience objective

[SOURCE: modified ISO 9000:2015-09, definition 3.5.12]

3.21

risk

event that is expected to create a stress or shock to the system of interest often thought of in terms of the extent of its impact and the probability of occurrence

EXAMPLE A city is subject to unacceptable increases in air pollution, loneliness among the elderly or an increased number of elderly suffering from dementia.

3.22

risk assessment

overall process of risk identification, risk analysis and risk evaluation

[SOURCE: ISO 22300:2018-02, definition 3.203]

3.23

risk register

tool to briefly describe or name each identified risk and record the impact (or consequence) if event occurs and the probability or likelihood of its occurrence

Note 1 to entry: The risk score or risk rating for each risk is the multiplication of probability and impact.

3.24

shock

sudden event that is not periodic and which threatens a city and requires immediate attention that cannot be given directly

EXAMPLE Earthquakes, floods, disease outbreaks and terrorist attacks.

**3.25
social issues**

problem that affects a substantial number of entities within a society

EXAMPLE Social unrest, elderly population, social cohesion, social alienation, inequalities, community integration, health, immigration, organized crimes or terrorism.

**3.26
stakeholder**

person, group or organization with an interest (stake) in the behavior, decisions, and policies of the city – stakeholders presume they may be affected by these, and they may have the power to affect them

EXAMPLE Local, regional and national government, European policymakers, emergency services, critical infrastructure providers, public-private partnerships, non-governmental organizations, volunteers, media, citizens, international organizations, academic and scientific entities.

**3.27
stakeholder map**

determination and visualization of the connections between persons or organizations that can affect, be affected by, or perceive themselves to be affected by a decision or activity

**3.28
sustainability**

ability of a system to be maintained for the present and future generations

[SOURCE: EN 16627:2015-06, definition 3.62]

**3.29
threat**

potential cause of an unwanted incident, which can result in harm to individuals, a system or organization, the environment or the community

[SOURCE: ISO 22300:2018-02, definition 3.259]

EXAMPLE Breakdown of a sewage system.

**3.30
vulnerability**

intrinsic properties of something resulting in susceptibility to a risk source that can lead to an event with a consequence

[SOURCE: ISO Guide 73:2009, definition 3.6.1.6]

4 Strategic governance awareness

This clause describes how a city can develop strategic thinking through understanding the fundamental drivers of the resilience-building process and through challenging conventional thinking on resilience.

This clause covers the cultivation of strategic thinking within a city to understand the fundamental drivers of the resilience-building process and to challenge conventional thinking about it.

Facts regarding cities and resilience

- Cities are growing and are drivers of the world's economy. They are centers of population, business, and culture, as well as factors for risks and opportunities.
- The complex and interdependent systems within cities which enable everyday life can fail or be compromised when disasters or shocks occur. This disrupts people's lives and livelihoods.
- Large numbers of people may be affected when a disaster or shock impacts a city. In our global, interconnected world, impacts of a disaster in one part of the world can rapidly spread to another.
- Disasters or shocks can have human and economic costs, but all too often they disproportionately affect the poorest, the vulnerable and the most disadvantaged.
- As cities develop, there may be a price on their success, including: informal settlements, congestion and air pollution, affordability of housing and concentrations of poverty. Thinking about resilience as cities develop and grow can help to mitigate this.
- Resilience attracts investment because the city is then seen as a secure place to invest.
- Citizens, students, businesses and investors need to know that a city is the place where they can live, work, study and invest; being resilient to climate change and other risks relating to critical infrastructure or social dynamics, is a key part of this.
- Resilience helps cities continue to thrive in times of change, challenge and disruption.
- Resilience forces cities to understand the hazards they face and then reduce the exposure and vulnerability of their communities to the impacts of those hazards.

The following actions, when performed, indicate that a city has started to develop a strategic thinking on resilience. The basic requirements, which can also be partially found in CWA 17301:2018 *City Resilience Development – Maturity Model* are the following:

- The city has established a working team/transdisciplinary group responsible for resilience issues.
- The city has performed, at least once, a detailed stakeholder mapping that covers a variety of sectors relating to resilience.
- The city has assessed and managed, at least once, a wide range of risks, including shocks and chronic stresses. The city has listed existing plans and response mechanisms to these risks and has developed additional procedures for managing shocks and chronic stresses.
- The city has developed plans to monitor its critical infrastructures and sectors related to resilience.
- The city is engaged or involved in a project or network working on resilience.
- The city has developed a common understanding of the resilience approach among stakeholders.
- The city has informed, at least once, citizens about volunteering opportunities in the local community.
- The city has assessed current initiatives and funding opportunities for resilience development.
- The city has a public website (independent or connected to the municipality's website) with emergency information.
- The city has established strategic agreements for cooperation/collaboration with stakeholders (private companies, critical infrastructure providers, NGOs etc.) relevant to resilience.

5 Operational Guidance framework for city resilience development at local level

5.1 General

This Operational Guidance framework provides assistance to municipal employees and consultants in assessing a city's (local) resilience status. It consists of five steps that are to be repeated in regular cycles; typically these cycles would be repeated annually, but this is subject to specific city needs. Full iteration shall be required once per political cycle or after an election period – unless evaluation of achievements and results at the end of an annual cycle suggests reconsideration.

This document lays down the requirements for the successful implementation of each step of the framework. Additional recommendations for ensuring the best implementation of the proposed activities are also given. Finally, the tools that can be used in each step are briefly described, focusing on the connection of each tool to the step's requirements and recommendations. Annex D gives several examples of how the Operational Guidance framework has been implemented at city level. It gives practical information on how to use the tools in each step.

The five steps to be implemented in a full iteration are:

- 1) Baseline review;
- 2) Risk awareness;
- 3) Resilience strategy;
- 4) Implementation and monitoring;
- 5) Evaluation and reporting.

The following aspects are to be maintained throughout each step:

- A comprehensive, targeted organizational set-up, including the formation of teams, sub-teams and working groups that have well-defined objectives and clear tasks and responsibilities. This set-up will enhance fair and appropriate governance, oversight and assurance and transparent resourcing and financing.
- Continuous communication and engagement with stakeholders, including the general public, through citizen associations and activated citizens.

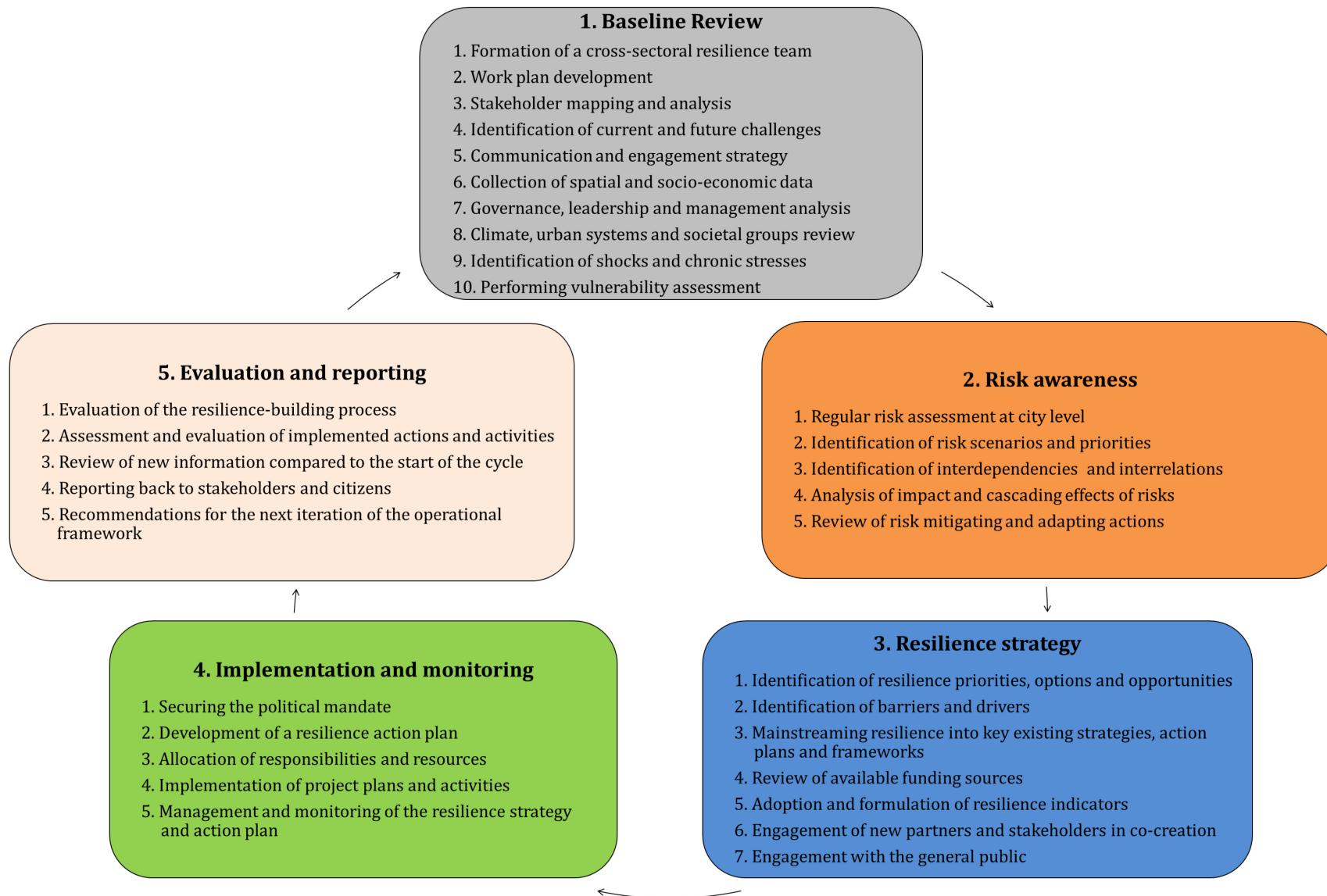
These two aspects should always be considered as a fundamental part of the process. A comprehensive organizational set-up and continuous communication are key components that need to be defined from the beginning of the cycle. It is also important to carefully plan who is involved in the process, what their responsibilities are and how they can contribute or influence decisions taken in the resilience-building process. Identifying and reaching out to as many actors and stakeholders as possible - who are directly or indirectly involved in activities related to resilience - will ensure the work is a common interest and thereby more likely to succeed.

In addition, a well-functioning organizational setup for the Operational Guidance framework will have a decisive impact on the success of the entire undertaking. Cooperation with stakeholders should always be considered as an element, and for this reason, the proposed framework suggests using an Information Portal (see CWA 17302:2018 *City Resilience Development – Information Portal*) as a tool for communication and engagement throughout most of the operational steps, customizing and varying it as needed.

In each of the five steps of the Operational Guidance framework, one or more of the following five tools support the development of city resilience:

- Maturity Model (MM);
- Risk Systemicity Questionnaire (RSQ);
- Resilience Information Portal (RP);
- City Resilience Dynamics Tool (CRD); and
- Resilience Building Policies tool (RBP).

Figure 2 shows the activities that are included in each step of the Operational Guidance framework. The figure illustrates the information elaborated in the chapters below.

**Figure 2 — Activities within the Operational Guidance framework**

5.2 Operational step 1 - Baseline review

5.2.1 Description

The first step in operationalizing resilience is the assessment of the present resilience condition of a city, performed by its local government. The local government creates an assessment framework that later serves as the basis for setting priorities and targets for the co-creation of the resilience strategy and the resilience action plan, as well as for monitoring progress by making use of indicators for resilient cities. It also involves an analysis of the challenges and pressures that have led to the current situation, as well as the impacts those pressures have on various parts of the society, economy and environment, and the policies and measures already in place.

5.2.2 Requirements

For the implementation of the operational step *Baseline review*, the following requirements shall be applied:

1) Formation of a cross-sectoral resilience team

The city engages in the formation of a team who works in the resilience-building process and who will be responsible for all topics, issues and challenges related to resilience. The team is also being responsible for mainstreaming resilience into traditional city practices. The resilience team takes on ownership and is thereby accountable for the resilience strategy development.

The baseline review is a regularly performed action conducted by the cross-sectoral resilience team. It determines the geographical and thematic scope of the Operational Guidance framework, setting its boundary conditions.

2) Work plan development

The team is responsible for developing a work plan with clear targets, milestones and planned actions and activities, and will lead in the co-creation of the resilience strategy. The work plan defines administrative and project management related processes, which are normally accepted and performed in the city.

3) Stakeholder mapping and analysis

The city, through the resilience team, engages in a comprehensive stakeholder mapping and analysis. Annex E presents in detail the stakeholders involved in each iteration of the framework.

4) Identification of current and future challenges

The city, through the resilience team, reaches consensus in identifying and prioritizing current and future challenges, based on previous experience, historical data and existing reports on climate change and sustainability.

5) Communication and engagement strategy

Following the stakeholder mapping, the team develops a communication and engagement strategy that is to be followed throughout the operational steps. All relevant stakeholders for the resilience-building process are mapped and ideally contacted to create momentum for resilience and ensure future mainstreaming into traditional city practices. This includes the city administration's dialogue with the population on resilience-building. The local government, including all relevant departments and municipal staff, identifies and promotes communication and engagement, as well as the economic strategy of the city, including assessment of financing and funding opportunities.

6) Collection of spatial and socio-economic data

Available data on all relevant aspects of sustainability and resilience is collected and structured. Even if all the data (quantitative or qualitative, i.e. spatial data, data on economic and social conditions or demographic data) cannot be delivered during the first cycle, it still serves for identifying gaps.

7) Governance, leadership and management analysis

Key statutory duties, requirements and existing frameworks that are of relevance for resilience are mapped. All data regarding significant aspects, emerging issues and trends, as well as political priorities in the city's sustainability and resilience agenda, departments and involved external organizations are collected. The resilience of key infrastructures is assessed - largely desktop-based, but also supplemented by interviews conducted with the relevant officers in the municipality (see Annex B).

8) Climate, urban systems and societal groups review

Available data relating to the city's climate, systems and societal groups is collected and structured. The main aspects that are to be taken into account in performing this activity are: demography, economy, climate, land use, mobility, waste and water. This consideration will provide a wider perspective of different issues that could be included in the *Baseline review*.

9) Identification of shocks and chronic stresses

The city identifies shocks and chronic stresses, as well as existing, future and expected challenges. When new information, technology and tools are added to the resilience-building process, further support is needed in order to ensure that new technologies are transferred as context-appropriately as possible and to facilitate further external support through network-building.

10) Performing vulnerability assessment

The city assesses existing and available tools to perform a vulnerability analysis, considering the adoption of new tools that will be identified. The city also assesses the resources that will be needed to perform a vulnerability analysis.

5.2.3 Recommendations

For the optimal implementation of the operational step *Baseline review*, the following recommendations should be taken into account:

- The *Baseline review* should be renewed at least once in a political cycle, or more often if the evaluation either suggests significant deviation from targets or surrounding conditions have changed substantially as new trends and information have emerged.
- The *Baseline review* should promote cross-sectoral cooperation involving external stakeholders (city operators) and especially citizens in evaluating the resilience maturity status of the city.
- The city should ideally engage in the appointment of a sub-team in the cross-sectoral working group to perform regular baseline assessment, regardless of political changes or other challenges, and continuously update the existing data where necessary.
- The *Baseline review* should evaluate how the various tools that are used for vulnerability analysis contribute to the resilience-building process and complement each other.

- The *Baseline review* should identify to what extent current resilience-building activities contribute to the city's overall strategy and future ambitions, and/or where activities should be targeted in the future.
- The city's political leadership should be included in the approval of the resilience assessment to ensure successful advocacy, city resilience championing, and visibility for the resilience strategy (see subclause 5.4). By ensuring early support by the political leadership, resilience will be recognized in the city strategy and included in the planning of budgets and resources.

5.2.4 Supporting tools

The *Maturity Model* (MM) (see CWA 17301:2018 *City Resilience Development – Maturity Model*) should be used to identify the present resilience maturity stage of the city, as it provides a common understanding of the resilience-building process. When using the MM, cities are asked to evaluate their current status of resilience. The model then helps to identify the correct activities to implement in order for the city to evolve and move to the next maturity stage.

The MM thereby helps cities to assess their resilience status and to identify the ideal path for the evolution of the resilience-building process from an initial stage to a more advanced stage, going through a number of intermediate stages. It enables, on a strategic level, the development of an assessment of a city's current resilience status identifying areas of improvement. Based on this initial assessment, a city should use the MM to guide the definition of the resilience strategy to increase their resilience level. The main goal of the MM is to provide an optimum path to increase the resilience level of cities. The MM also aids reflection since it provides a holistic overview of the resilience-building process and helps end-users to understand resilience as a multidimensional objective.

5.3 Operational step 2 – Risk awareness

5.3.1 Description

The second step in operationalizing resilience is to create awareness around the risks the city is facing. Understanding the risk landscape is crucial, and this step thus involves performing a regular risk analysis to appreciate the uncertainties that are of greatest priority to a city. Stakeholders need to be especially involved in this step to ensure that a wide perspective is taken with respect to the types of risks a city faces. Awareness is greatly enhanced when stakeholders consider the complex consequences that arise when there is an interaction between risks. Before performing this step, the resilience team reviews relevant risk registers to learn about shocks and chronic stresses which have been identified in previous situations or by other teams (e.g. national risk register, emergency planning community risk register or corporate risk register).

The purpose of a risk assessment is to:

- ensure resilience-building activities are relevant to the city context;
- ensure the appropriate and proportionate investment of resources;
- better understand the exposure and vulnerability of the city to different;
- identify common consequences so that capabilities can be developed that will address the impacts of many risks.

In addition to the regular risk assessment that cities are to perform, this step should also involve a tool to help understand the interconnections between risks. This will ensure that the dynamic nature of risks is considered because the city will move beyond a more traditional approach to understanding individual risks and will explore how these risks are interrelated.

5.3.2 Requirements

For the implementation of the operational step *Risk awareness*, the following requirements shall be applied:

1) Regular risk assessment at city level

The city, through the resilience team, conducts a risk assessment of the perils that the city faces, while also involving relevant stakeholders. Input of scientific and technical knowledge is essential. The city either relies on existing partnerships with academic institutions, or builds new ones, and also involves research organizations, specialists in the city, and active citizen associations.

2) Identification of risk scenarios and priorities

The resilience team that works on developing the resilience strategy meets the stakeholders who play a key role in the development of the resilience strategy to discuss different risk scenarios for the city. They identify those risk scenarios that are of greatest priority. The consequences of these risk scenarios are discussed and prioritized, and potential mitigation actions are considered. The process may highlight areas where further experts need to be consulted in order to be able to judge whether some risk scenarios are of concern to the city.

3) Identification of interdependencies and interrelations of risks

The resilience team identifies interdependencies between risks, explores vicious cycles and conducts monitoring activities of the impact of risks as well as vicious cycles.

4) Analysis of impact and cascading effects of risks

The resilience team reviews and analyses the impact that risks, cascading effects of risks and vicious cycles have on the city's systems. The resilience team develops its own methodology or adopts established methods to analyse cascading effects of risks. Vicious cycles of risks are also identified through an experience-driven and impact-based approach

5) Review of risk mitigating and adapting actions

The resilience team reviews risk-mitigating actions and starts developing individual strategies. There may be many different owners of the risks and not all will lie within the governance of the city.

5.3.3 Recommendations

For the optimal implementation of the operational step *Risk awareness*, the following recommendations are made:

- The resilience team should bring together a multi-disciplinary group to share knowledge about risks, including the output from normal risk assessments, and to promote a systems perspective about risks through discussing risk interdependencies and the relevant consequences.
- The *Risk Systemicity Questionnaire* (RSQ) should be used to promote dialogues on awareness of risk systemicity and to emphasize engagement with stakeholders, by inviting them to participate in multi-disciplinary working groups.
- This step should be performed when significant new risks or challenges appear that change the city risk environment.

- The resilience team should ensure that the dynamic nature of risks at local, regional and even national level is considered, taking account of a systems perspective.

Risk awareness is an important part of risk mitigation. Therefore, providing information to citizens about risks should be perceived as an important part of risk mitigation. The resilience team should organize workshops or discussion sessions that will involve citizens and raise their risk awareness.

5.3.4 Supporting tools

The *Risk Systemicity Questionnaire* (RSQ) should be used to identify and prioritize risk scenarios, where interdependencies between risks are shown to lead to networks of risks, including vicious cycles, and to review and prioritize mitigation and adaptation actions.

The RSQ is a Microsoft Excel-based tool that presents a range of risk scenarios that may occur in a city and asks users to consider the relative likelihood of these risk scenarios occurring in their city. Users are expected to use the RSQ as a group to promote discussion and awareness about the interconnections between risks across multiple stakeholders. The risks that are presented encompass ten topics and are considered as networks of interrelated risks. These networks of risks are presented as risk scenarios, some of which result in vicious cycles. Users progress through the tool by completing questions asking them to consider whether defined risks scenarios are likely to occur in their cities. Based on the responses to the questions, participants are provided with a prioritization of the risk scenarios for their city. In addition, users can access policy recommendations that may be used to address those risk scenarios that are of the greatest threat to the city. The questionnaire is to be used by groups of users with diverse areas of expertise so that it can prompt valuable discussions during which different stakeholders' experiences can be combined to determine a city's priorities; this will enable them to anticipate and appropriately respond to future challenges. For more information about the RSQ, see Annex A.

5.4 Operational step 3 – Resilience strategy

5.4.1 Description

In the third step, the resilience team develops a resilience strategy which will include a detailed resilience action plan. The strategy and plan both aim towards preventing and mitigating risks as well as strengthening economic, social and climate resilience. The resilience team utilizes the supporting tools to customize aspects of the resilience strategy to the city's unique challenges. The resilience strategy is an ambitious vision and includes proposals by stakeholders as well as achievable and practical aims.

5.4.2 Requirements

For the implementation of the operational step *Resilience strategy*, the following requirements shall be applied:

- 1) Identification of resilience priorities, options and opportunities

This process involves the identification and definition of resilience priorities, options and opportunities linked to shocks and chronic stresses, while at the same time mainstreaming resilience into existing plans and projects.

- 2) Identification of barriers and drivers

The resilience team engages a wide team of municipal employees and stakeholders in the identification of barriers and drivers for the resilience-building process at city level. This process will make the greatest contribution to resilience if co-benefits are emphasized, thus promoting an

efficient use of resources. The team should also take cross-sectoral aspects into consideration, and identify the qualities of a resilient system.

3) Mainstreaming resilience into key existing strategies, action plans and frameworks

The resilience team mainstreams resilience and the resilience-building process into existing strategies, draft action plans and existing frameworks on other topics like smart cities, sustainability or sustainable mobility. This should only be done when the existing situation is relevant and linked to the identified shocks and chronic stresses from the *Baseline review* (operational step 1) or to the vicious cycles of risks from the *Risk awareness* (operational step 2).

4) Review of available funding sources

This process is not linear, but iterative, and is carried out across different timescales, with the city continuously collecting information, data and tools, synthesizing results and cross-evaluating them. During this process the city reviews the available funding sources and opportunities, and estimates the financial resources needed for the creation of a resilience strategy.

5) Adoption and formulation of resilience indicators

The resilience team adopts existing - or formulates new - resilience indicators and city metrics that will be used for the evaluation and reporting of the implemented activities in the *Evaluation and reporting* (operational step 5).

6) Engagement of new partners and stakeholders in co-creation

The resilience team brings in new partners and stakeholders from across the city to engage in the co-creation process. Stakeholders, including politicians and citizens are consulted as part of the strategy development and drafting process.

7) Engagement with the general public

The resilience team engages with the general public to get feedback. This is also done by making use of the *Resilience Information Portal* (RP). For further information see CWA 17302:2018 *City Resilience Development – Information Portal*.

5.4.3 Recommendations

For the optimal implementation of the operational step *Resilience strategy*, the following recommendations are made:

- The resilience strategy should be approved by the city mayor or his/her equivalent to ensure it has top-level buy-in and a mandate for its delivery.
- The resilience team should follow EU directives on open data, while collecting and sharing data among its departments.
- The resilience team should mainstream resilience and create a resilience culture among citizens and stakeholders. From the very beginning of the cycle, but most importantly during the *Baseline review* (operational step 1), it is important to carefully plan who is involved in the process, what their responsibilities are and in what and how they can contribute or influence decisions taken for the creation of the resilience strategy and for the development of the resilience-building process. Identifying and reaching out to as many actors and stakeholders as possible who are directly or indirectly involved in activities related to resilience will increase the resilience strategy outreach and will facilitate securing political mandate for its implementation.

- The resilience team should organize open consultation meetings and workshops for the development and internal evaluation of the resilience strategy, before its release and for awareness-raising.
- The resilience team should learn from good practices and especially from challenges that other cities have faced. When using the *Resilience Building Policies tool* (RBP) the resilience team should not only replicate, but mainly adapt and improve existing cases studies.
- Communication between departments and between the city and its stakeholders should be improved and data belonging to the municipality should be shared between departments.

5.4.4 Supporting tools

The *Resilience Information Portal* (RP) and the *Resilience Building Policies tool* (RBP) should be applied.

The *Resilience Information Portal* (RP) should be used not only to create the necessary momentum for the expected release and adoption of the resilience strategy among citizens, but also to reinforce the importance of the resilience-building process and to achieve the necessary political commitment. The RP serves as a toolbox that can complement and enhance the platforms and software that cities already have in place. It allows cities to internally or publicly display data that is already available to the city as it applies to resilience, vulnerability and crisis situations. The portal allows different levels of users to contribute information to a given city context. It also offers added value not otherwise available to cities, because although the cities have multiple platforms in place in their municipalities for internal communication, the wealth of information available on these platforms is not integrated, streamlined or fully utilized. The portal should be used to raise awareness about the resilience-building process. It will also reinforce the creation of strategic partnerships and disseminate the resilience strategy (as early as during its development). A city can use CWA 17302:2018 *City Resilience Development – Information Portal* to set up its own information portal.

The *Resilience Building Policies tool* (RBP) provides a database of good practices from other European cities, along with information about what worked well and what did not work well in the implementation of similar policies in other cities. The users should therefore use these lessons learnt for the benefit of the city, to avoid mistakes and guide the implementation of the resilience strategy in a more effective manner. The RBP is an extension of the MM. It combines customized ways to view policies contained in the MM with detailed information and examples from case studies detailing policy implementation in partner cities, as well as references of sources to case studies from other cities around the world. The tool provides a comprehensive reference centre for high-level strategic managers in cities as well as municipal staff tasked with implementing the policies that have been planned. It comprises illustrative real case studies of policy implementation in cities while it includes references to other sources that provide details of case studies of policy implementation at local level. Additionally it provides a practical point of reference for cities considering the implementation of related policies and illustrative details for the policies that are included in the MM and the CRD. The RBP can be conveniently navigated via a dedicated website that also comes in a wiki format, and invites cities to upload their own case studies to be part of a European resilience culture. For more information about the RBP, see Annex B.

5.5 Operational step 4 – Implementation and monitoring

5.5.1 Description

In the fourth step, the resilience strategy and resilience action plan are implemented, and all implemented actions and activities are continuous monitored. The main objective of this step is to improve the way the city functions in terms of resilience building and long-term sustainability.

Implementation is a demanding task in terms of organization and coordination of all parallel actions included in the resilience strategy, and aims at responding to the identified risks at city level. Turning measures outlined in the resilience action plan into projects requires proper project planning, including the development of a work plan, and a definition of roles and responsibilities for individual actions.

Implementation requires the development and prioritization of actions, organizational set-up and, above all, the communication of actions and stakeholder involvement. The step includes the drawing up of concrete project plans, the development and reinforcement of strategic partnerships, and the practical implementation of plans and projects. At the same time, the implementation of the resilience strategy and its resilience action plan is to be monitored in order to measure and report the results. Results should also be reported to the relevant politicians and stakeholders, especially those who were actively involved in the co-creation process that was used to develop and deliver the resilience strategy.

5.5.2 Requirements

For the implementation of the operational step *Implementation and monitoring*, the following requirements shall be applied:

1) Securing the political mandate

The city secures the political mandate needed for the implementation of the resilience strategy, which will help to secure funding and resources for the implementation of the action plan. The city networks with politicians and stakeholders based on the communication and engagement strategy.

2) Development of a resilience action plan

The resilience team develops a resilience action plan based on the resilience strategy developed during operational step 3 (*Resilience strategy*), including resilience-related activities and a prioritization of the activities within the plan.

3) Allocation of responsibilities and resources

Responsibilities and available resources are allocated for each activity in the resilience action plan. The resilience team performs continuous revision as well as possible adaption of the available resources and personnel during implementation of the actions.

4) Implementation of project plans and activities

The resilience team proceeds with the initiation and implementation of projects based on the identified and prioritized actions, with the support of the affected stakeholders (e.g. critical infrastructure providers).

5) Management and monitoring of the resilience strategy and action plan

Partners and stakeholders (also from regional and national level) monitor the implementation and impact of actions and activities in the resilience strategy. The monitoring process is defined in the resilience action plan so that it is clear what monitoring means for each city. The people responsible for monitoring are included in the resilience action plan.

5.5.3 Recommendations

For the best implementation of the operational step *Implementation and monitoring*, the following recommendations are made:

- A resilience office, based on the resilience team, but enhanced with staff from different departments at city level, should be set up in order to perform and monitor the implementation of

the resilience strategy. The resilience office should be either a whole department (with permanent/full time personnel) or a committee (with city personnel from different sectors or departments that will hold regular meetings). The lack of a resilience office should not hinder the adoption of the Operational Guidance framework.

- The resilience office should promote and reinforce the involvement of politicians when implementing the communication and engagement strategy.
- The political leadership of the city should share ownership for the creation of the resilience office from the start, and should approve the resilience strategy development. The resilience office should consider other cities' actions or ongoing activities related to the actions, and projects to safeguard human and financial resources.
- The resilience office should establish subgroups to carry out actions, preferably with staff from different departments and with the involvement of relevant stakeholders and partners.
- The resilience office should consider different ways of funding and adjustment of funding possibilities.
- Implementation may include advocacy and influencing change at a national level in funding, for example in terms of allocation and the regulatory frameworks.
- Existing systems and tools for implementation and monitoring of actions should be adopted and used.

5.5.4 Supporting tools

The *Maturity Model* (MM) and the *City Resilience Dynamics Tool* (CRD) should be used during this step.

Municipal staff working within the resilience office should regularly consult the *Maturity Model* (MM) to monitor and evaluate the implementation of activities towards increasing resilience maturity. For more information about the MM, see CWA 17301:2018 *City Resilience Development – Maturity Model*.

The *City Resilience Dynamics Tool* (CRD) can be used to test and validate the relationships between the different policies that could, potentially, be included in the resilience strategy of a city, and the impact of those policies in building local resilience. The CRD supports city disaster managers in diagnosing, exploring and learning about the resilience-building process. The CRD also helps cities to understand the priority of the policies included in the MM, and provides a learning environment to better understand how the MM works and how the MM should be implemented. Users begin by calibrating the model, determining the values of the most important parameters of the model. The CRD then runs simulations of the effects of implementing certain policies over a realistic time frame (yearly to a total of 40 years). When users implement the policies in an appropriate and effective order, they achieve more effective results and their resilience level increases towards 100% in each of the resilience dimensions. This helps city disaster managers to explore and learn about the resilience-building process. The CRD encapsulates the most important aspects of the MM and helps to encompass the MM in a training environment where cities to learn about the path towards improving resilience. The tool allows the user to try different policy options, identifying the implications of each option in the resilience improvement process. The tool can also be used as an instrument for debate, and to solve conflicts and disagreements regarding the potential influence and impacts of the implementation of policies at city level. For more information about the CRD, see Annex C.

5.6 Operational step 5 – Evaluation and reporting

5.6.1 Description

The fifth and final step is the evaluation of results and an effective process for reporting back to politicians, stakeholders and the general public. Co-creation processes show that keeping stakeholders, including politicians and citizens, thoroughly informed is important and necessary to secure their active participation and involvement.

The last step provides the basis for starting a new iteration of the Operational Guidance framework and another cycle of strategic management and resilience-building activities. It analyses what has happened during the year in order to understand why things succeeded or failed to succeed. It provides the local government, decision-makers and practitioners active in topical themes, with a basis for taking further decisions on the targets, actions and activities for the subsequent year in the resilience-building process. It also provides relevant stakeholders, including the general public, with a report on what the city has done during the cycle and how they have succeeded or failed in fulfilling their resilience targets.

5.6.2 Requirements

For the implementation of the operational step *Evaluation and reporting*, the following requirements shall be applied:

1) Evaluation of the resilience-building process

An internal, independent evaluation of the implementation process and activities is carried out, including monitoring data and referring back to targets set out during operational step 3 (*Resilience strategy*). For this purpose, a clear set of the indicators developed in operational step 3 (*Resilience strategy*) needs to be chosen, adopted and agreed accordingly within the evaluating team.

2) Assessment and evaluation of implemented actions and activities

The evaluation team assesses and evaluates all implemented actions and activities. Emphasis is to be given to specific challenges, shocks and chronic stresses identified during the *Baseline Review* (operational step 1). The evaluation team is not necessarily part of the resilience office/resilience team and, for transparency reasons, the resilience team can outsource the evaluation to external consultants.

3) Review of new information compared to the start of the cycle

The evaluation team analyses new information as compared to the start of the cycle. Data collected through monitoring is used for evaluating both the results obtained through the implementation of the resilience strategy and the resilience action plan and regarding the whole process.

4) Reporting back to stakeholders and citizens

The evaluation team sends reports to stakeholders, especially citizens, in order to keep them informed about the city's progress during the iteration. This can be done using the RBP, for example.

5) Recommendations for the next iteration of the operational framework

The main outcome of the reporting activities is the provision of recommendations for the next iteration of the operational framework.

5.6.3 Recommendations

For the implementation of the operational step *Evaluation and reporting*, the following recommendations are made:

- An evaluation team (not necessarily the resilience office/resilience team) should be created whose main task is to evaluate all the implemented actions and activities.
- The evaluation team should ideally include one member of each of the following groups: municipal employees, stakeholders, consultants, private sector representatives, first responders and citizens.
- Wherever possible, the evaluation team should aim to express the benefits of resilience, and in the long-term, for future iterations, seek to quantify the cost and value added by resilience.
- The evaluation team should use commonly accepted templates for reporting and follow agreed upon guidelines when drafting the evaluation reports.

5.6.4 Supporting tools

The resilience team drafts and uploads onto the *Resilience Building Policies tool* (RBP) detailed case studies as part of reporting back to stakeholders. Therefore, the RBP should be used to share the results of the evaluation with politicians, stakeholders and citizens, as well as with other cities. The RBP can also be used as a means of reporting back to stakeholders through drafting good practices/case studies and publishing them online through the *Resilience Information Portal* (RP).

The *City Resilience Dynamics Tool* (CRD) should be used to evaluate the effectiveness and performance of the implemented policies and to provide a simulation of the results to be compared with those results observed in reality.

5.7 Starting a new iteration

Upon reaching the end of the operational framework, and before starting a new iteration (meaning the process of going through the five steps of the Operational Guidance framework), the *Maturity Model* (MM) is again used by the resilience team to assess the most recent resilience maturity stage the city has reached. For more information about the MM and how it should be used in this case, see CWA 17301:2018 *City Resilience Development – Maturity Model*.

Following the evaluation of the resilience status of the city, the cyclical process starts again, depending on the outcome of the evaluation. If the resilience team considers that the city has moved to the next maturity stage, the iteration should be performed for that stage. If the city has not moved to the subsequent stage, the iteration should be performed in the same stage.

For example, where a city has identified its resilience maturity stage as "Moderate", and having performed the full iteration at least once (making use of the five resilience-building tools) the city's resilience maturity could move to "Advanced". This can be easily identified by making use of CWA 17301:2018 *City Resilience Development – Maturity Model*. If the city resilience maturity has not moved to the advanced stage, another full iteration is needed at the moderate stage.

Annex A

(informative)

Risk Systemicity Questionnaire (RSQ) [5]

Aim of the RSQ

The RSQ supports cities in actively understanding the risk landscape by extending their risk assessment beyond traditional methods through a focus on the interactions between different types of risks. The RSQ has been co-created in close collaboration with representatives of seven European cities, and presents a range of risk "scenarios": perspectives of the future reflecting how one risk might cause others, thus presenting a "scenario" of risks. By exploring a range of risk systemicity scenarios, the user is able to prioritize the high risk areas which may require particular attention. The RSQ enables cities to develop their knowledge of the risk landscape which affects them, thereby developing their resilience.

In contrast to traditional risk registers, the key advantage of using the RSQ is that it promotes a perspective on risks where these risks are not seen as being independent from one another, but as forming complex networks of interdependencies. A particular focus of the RSQ is on scenarios that are vicious cycles – scenarios that escalate and get worse. Such cycles can occur when the interdependencies between risks create feedback loops that reinforce themselves over time. Vicious cycles of risks are notoriously difficult to mitigate.

To tackle the risk systemicity scenarios identified as a priority for a city, the RSQ offers a range of possible mitigation actions – including those tried and tested by at least one of the collaborating cities, as well as suggestions that might be considered. Using the RSQ, groups and individuals are invited to think more intensely about the implications of risk systemicity for their city, and how to deal with its ramifications.

Features of the RSQ

Ten risk topics are covered in the RSQ. Particular risk topics can be selected that are of interest to the group, or all 10 risk topics can be completed. Each of these topics comprises a number of risk scenarios, and the user is asked to consider how likely these scenarios are to occur in their city. Figure A.1 shows information displayed in the RSQ.

There are five possible responses to each scenario:

- Highly probable: Signifying a >60% chance of occurring.
- Probable/possible: Signifying a 20-60% chance of occurring.
- Improbable: Signifying a <20% chance of occurring.
- We don't know: Means that no-one in the city, or in the project team who are the RSQ users, is likely to be able to answer this question.
- I don't know – someone else does: Means that the user does not know the answer to this question, but believes someone else in the city, or on the project team, is likely to be able to answer this question.

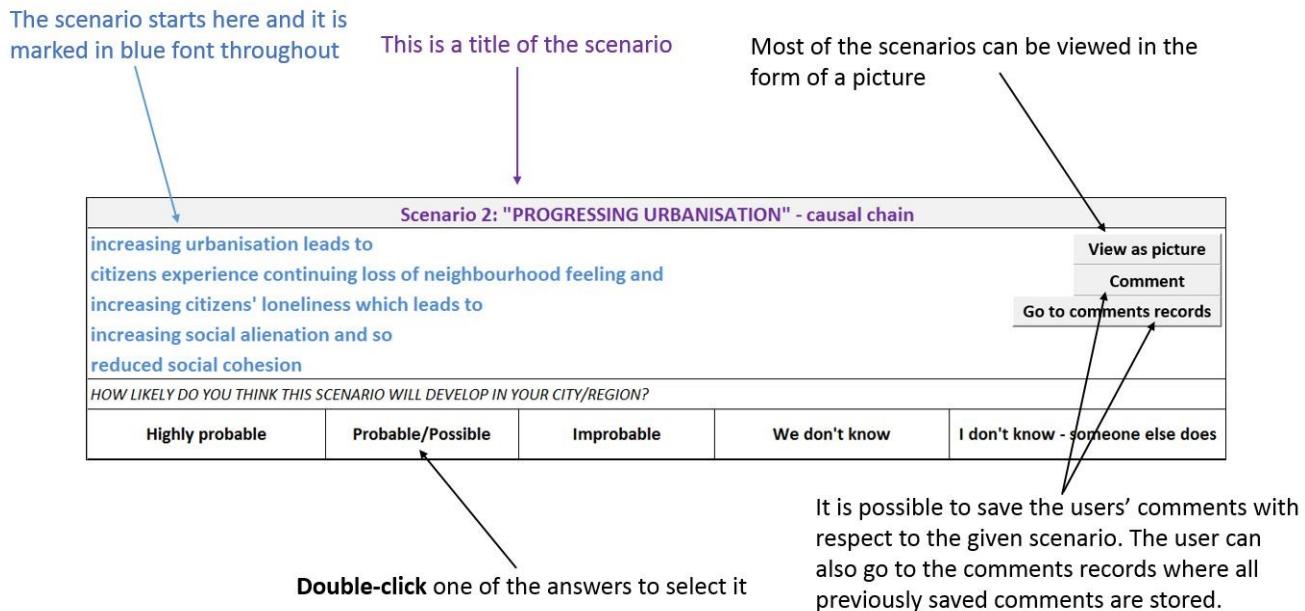


Figure A.1 — Example of a risk scenario in the Risk Systemicity Questionnaire

In addition to reading the risk scenarios as text, a scenario can also be viewed in the form of a picture (by clicking a "View as picture" button). Some of the pictures represent causal chains of risks, while others represent self-reinforcing, vicious cycle.

The "Comment" button allows users to save their comments about the risk scenarios. All comments are stored on a separate page; see button "Go to comments record". Upon completion of a given topic, a portfolio of possible mitigating actions can be viewed for each scenario.

Editing scenarios is possible to tailor scenarios to the context of an individual city. This can be done by: i) editing lines in a scenario without changing the overall logic of a scenario, and ii) copying and pasting a scenario into a comment box and then editing it.

Once the group has agreed upon responses to the risk scenarios, the "Priorities" tab in the RSQ provides a ranking of the completed scenarios according to their assessed priority. This ranking automatically updates itself as new scenarios are completed, and it is not necessary to complete all scenarios. These priorities are based on an analysis of i) the extent of the scenario's ramification, and ii) their impact on key outcomes. They are intended only as a basis of a discussion that leads to a revised set of priorities that take account of local context.

Using the RSQ

- The RSQ is primarily a tool for facilitating group discussions about risk scenarios; it is not a quantitative diagnostic tool.
- It is recommended that notes be taken using the comment box when completing the RSQ as a record of the discussion.
- It is very likely that a group will disagree with some of the scenarios – a focus of the group discussion should be on how appropriate the scenarios are for a particular city context. When a group disagrees with a scenario, it should discuss how that scenario should be presented with respect to their city and edit the scenario or save comments in the comment box. A city may also wish to use the discussions as a prompt to sketch out their own scenarios.

- Some scenarios appear in more than one topic – for example, the same scenario on air pollution may appear under the topic "air pollution" and under the topic "health". It is sufficient to complete the scenario only once – all other "repetitions" of that scenario will be completed automatically, highlighting the systemic nature of risks.
- The main benefits of using the RSQ is in supporting users, and especially user groups, in conducting interdisciplinary conversations about the systemicity of risks faced by their cities – that is, how different types of risks interact with one another. These discussions are further supported by an ability to i) prioritize the risk scenarios, and ii) access suggestions for risk mitigating actions.
- Priorities are suggestions only; where the suggested priorities are based on an analysis of the impact of a scenario within the full context of all scenarios and therefore should be adjusted to the local context of the city.

Annex B
(informative)

Resilience Building Polices tool (RBP) [6]

Aim of the RBP

The purpose of the RBP is to provide a portfolio of case studies that give detailed examples demonstrating how cities have implemented initiatives to strengthen their city resilience. This will help cities learn from on-going processes through city and cross-regional collaboration. The examples have been chosen because they best exemplify, in a practical way, policies included in the associated MM. Being based on real experiences that describe relevant city contexts, goals, challenges faced by cities, resources required, and the achieved outcomes.

Features of the RBP

The RBP can be accessed on the SMR website and is fully integrated with the online version of the MM – this means that the RBP is designed to be used together with the MM as an extension of the latter. On the introduction page to the RBP, the user is presented with the below information and options.

- The general purpose of the tool and a summary of its features.
- A tool for searching the RBP for key words in the case studies, for example: "flooding".
- Access to the MM from which the cases in the RBP can be navigated according to policy categories.
- The submission of new cases to the RBP.

For example, as seen in Figure B.1, upon clicking on the "Starting" stage, the user can view all of the MM policies under that stage. Those policies which contain corresponding RBP content have an "i" icon in their bottom right corner - by clicking on the policy, the user is shown the relevant case study with the supporting information. Each case study follows a standard structure. Some of the case studies were collected from partner cities of SMR, whilst other case studies were gathered from secondary sources.

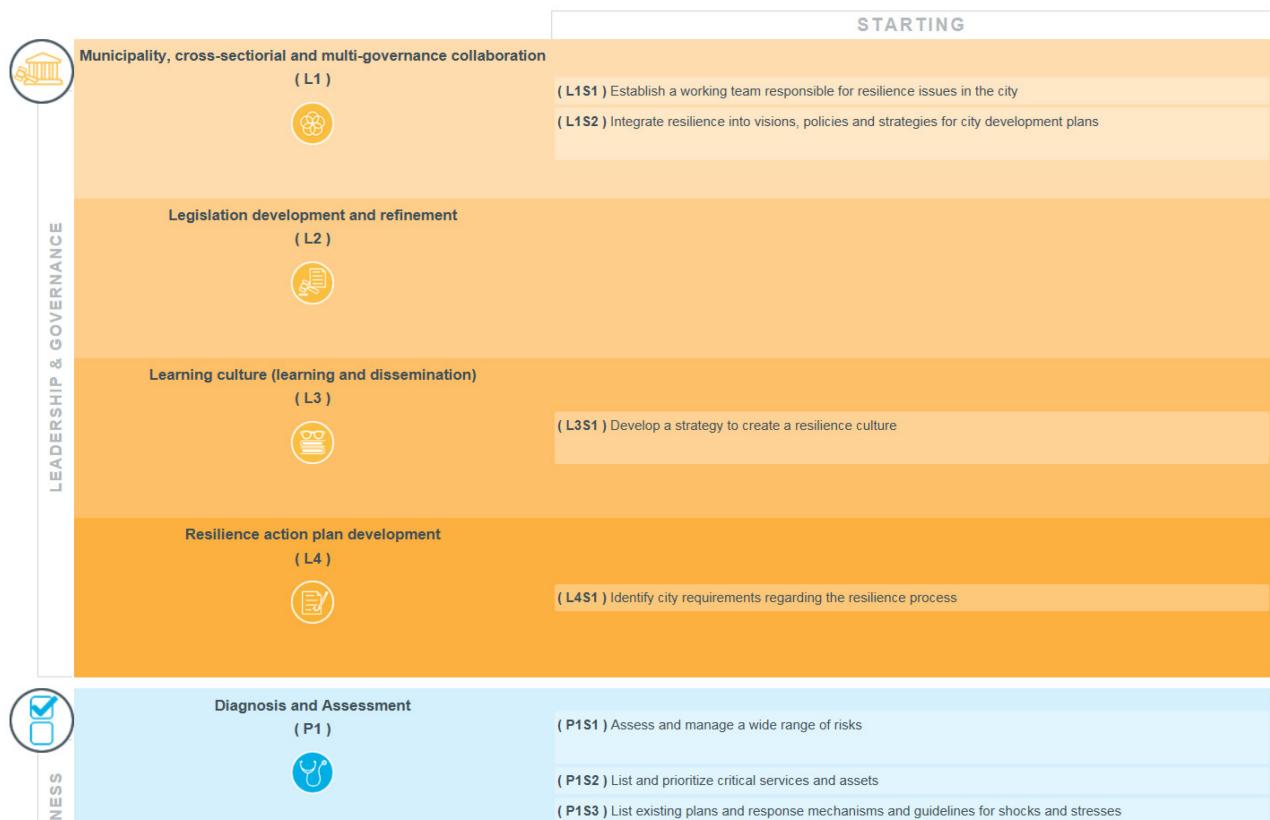


Figure B.1 — Accessing the content of the Resilience Building Policies tool

With this tool users can also submit new case studies to the RBP. This feature is available through the introduction page of the RBP (as explained above). As shown in Figure B.2, cities or other users can submit case studies by subscribing to the SMR website. Users can then login to the SMR Wiki where they can upload their cases. Joining the group is also an opportunity for cities to develop partnerships and collaboration, and to learn from one another's experiences of using the SMR tools.

New case studies can also be added when navigating the MM, and when accessing the policies which currently do not have any existing case studies. The user is then asked to provide the following information regarding the new case study:

- city name;
- contact name;
- title of the case study;
- summary of the case study (no more than 200 words);
- optional photos or video clips; and
- a relevant internet link.

Case study wiki

Cities or other users can submit case studies to this policy. To submit a case study:

- 1) Log in at www.doowikis.com with the account details provided to you by SMR. If you do not have login details, please subscribe by entering your password below.
- 2) While logged in, navigate to a policy page to add your case study!

Email

Subscribe

Figure B.2 — Adding new cases to the Resilience Building Policies tool

Content of the RBP

As Figure B.3 shows, the case studies in the RBP have the same structure.

- Policy description: Describes the MM policy.
- Case studies: Lists relevant case studies from SMR partner cities assigned to that MM policy.
- Additional case studies: Provides a summary of case studies from secondary sources.

For each case study that has been written based on the experience of a SMR partner city, the following information is provided:

- summary of the case study;
- further information:
 - relevant city context – what kind of cities may find this policy of interest;
 - a picture illustrating the case study;
 - goals – what was the initiative in question intended to achieve and how are these goals linked to other policies within the MM;
 - cooperation between stakeholders – how different stakeholders worked together to implement the resilience project in question;
 - outcomes – what was achieved with the resilience project discussed in the case study;
 - resources – the resources that were required to implement the project (note that this information is only available for some cases);
 - other links – links to other resources which can be relevant to the case study;
- indicators which can be used for evaluating the progress of the implementation of the policy.

POLICY L3S1

Develop a strategy to create a resilience culture

Policy description

At this stage, resilience is a new concept to some citizens. This policy lays a framework for creating a resilience culture.

Case studies

Systemic risk assessment: A case study

Summary

This paper reports on a specific case for a large multinational project based organization, one that the authors had been involved with in the analysis of a number of projects that had massive cost overruns. Following these analyses the organization was persuaded of the importance of risk systemicity. The organization therefore engaged the authors to develop a 'Risk Filter'. This filter is a tool for identifying areas of risk exposure on future projects and creating a framework for their investigation. The 'Risk Filter' is now used on all projects ever since its introduction; by the end of May 2003 it had been used by nine divisions, on over 60 major projects, and completed by 450 respondents. It is also used at several stages during the life of a project to aid in the risk assessment and management of each project, and contributes to a project database.

Source: [The Journal of the Operational Research Society](#)

The Stakeholder Focus Groups of Rome

Summary

The efforts of Rome's local government to set a resilience agenda and increase engagement in building community awareness on urban resilience

Further information

Filter policies

 Starting

 Moderate

 Advanced

 Robust

 VerTebrate

 Leadership & Governance

 Infrastructure and resources

 Preparedness

 Cooperation

Indicators

Percentage of local government budget spent on resilience building activities

Figure B.3 — Structure of a policy in the Resilience Building Policies tool

Annex C (informative)

City Resilience Dynamics Model (CRD) [7]

Aim of the CRD

The CRD is a training tool that helps cities explore different strategies regarding the implementation of resilience policies, simulate the results of each strategy and learn about the resilience-building process cities need to follow to improve their resilience level in the most efficient way. The CRD encapsulates the most important aspects of the MM and helps to better understand the functioning of the MM. The CRD can:

- be used as part of strategic planning;
- help cities identify which policies should be implemented in order to develop resilience based on diagnosis and assessment;
- provide a point of reference for self-assessing the effectiveness of resilience development;
- help cities to assess their current resilience level;
- help cities to justify the funding needed for specific measures related to resilience;
- help cities prioritize policy implementation;
- provide a holistic point of view of the policy implementation process; and
- support cities to train and learn about the resilience-building process.

Features of the CRD

The CRD is composed of three steps on three pages:

- Initialization Page: The tool is parameterized to a specific city.
- Simulation Page: The policy implementation strategy is introduced in the tool. Based on the available budget, the user decides where the resources are going to be invested to improve the resilience level of the city.
- Results Page: The indicators will represent the impact of the decisions taken.

User guidance for the CRD

The CRD has a user-friendly interface. Figure C.1 and Figure C.2 show the results page where the effects of the decisions taken are indicated. The points in the figures mean the following:

- Point 1 (see Figure C.1): A pie chart using percentages indicates each policy's implementation level, both actual and effective. The first chart indicates the level of implementation based on the allocated resources. The second chart, the effective implementation level, refers to the real implementation level which depends on the precedence relationships. Based on the other precedence policies implementation level, the real implementation level of the policies will vary. For instance, although some resources have been allocated to develop a policy, if the precedence policies have not been implemented up to a certain level, the effectiveness level of this policy will be zero, even though the actual level will be according to the allocated amount of resources.
- In addition, two time-behavior graphs are shown: one regarding the implementation level of each resilience dimension (see Point 2 Figure C.1) and another related to the allocated budget (see Point 7 Figure C.2). These graphs indicate the effects of the decisions taken over time and allows the user to compare different simulation results at the same time. Similarly to the graphs in Point 2, the "speedometers" in Point 4 (see Figure C.2) show the implementation level of each resilience dimension based on the maturity stages (see CWA 17301:2018). Furthermore, for every four-year simulation, the CRD sends messages if the user is not implementing the policies in the proper order (see Point 3 Figure C.1). The aim of these messages is to train the user to use the resilience building process correctly.
- The CRD always shows the year of simulation, the annual budget and the annual budget that has not been allocated (see Point 5 Figure C.2). Similarly, the user can change the available annual budget during each simulation year, or advance one year or start a new scenario (see Point 5 Figure C.2). To move from the results page shown in Figure C.2 to the resource page where the resource allocation to each policy is made, users use the "Decisions" button (see point 6 Figure C.2).

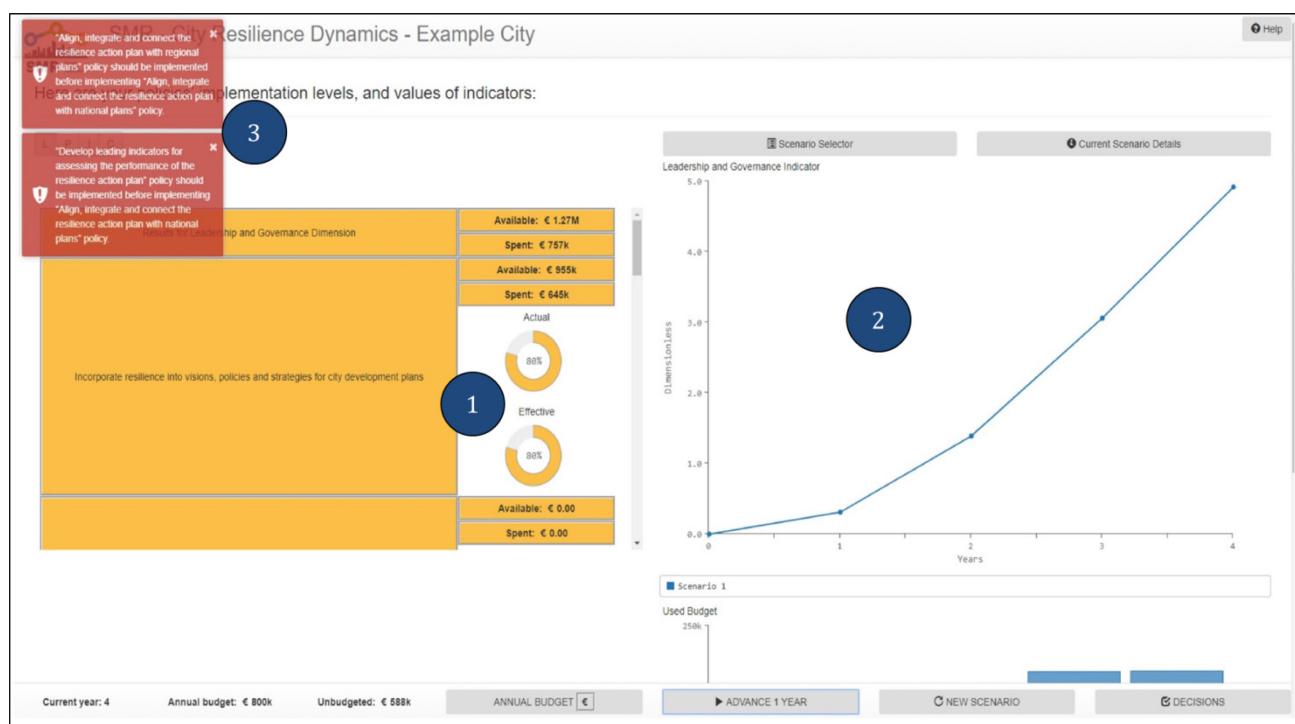


Figure C.1 — CRD result page (1)

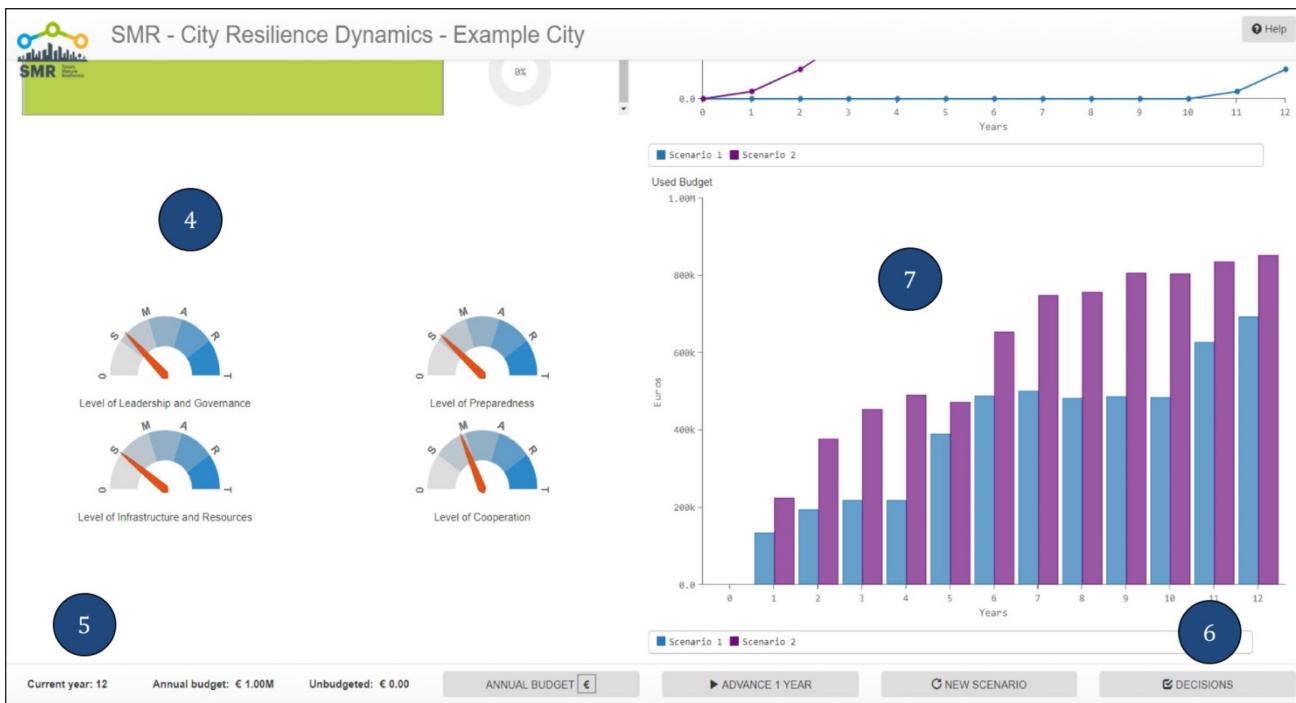


Figure C.2 — CRD results page (2)

Key points when using the CRD

- The user can increase or decrease the annual budget every simulation year.
- The user can parametrize the main parameters of the simulation model: implementation time of the policies, the implementation cost of the policies and the obsolescence time of the policies.
- The values of the main parameters of the model are shown when the mouse is placed over the resilience policies.
- While the simulation is carried out, the user can analyze the results and improve the strategy.
- In the results screen, the actual implementation level of the policies shows how far the policy has been implemented based on the spent budget. The effective implementation level, however, represents how far the actual implementation level of the policy is effective, which depends on whether the precedence policies have been implemented or not.
- Iterative process: The user should adjust the policy implementation decision and analyze the results by switching between screen two (decision screen) and screen three (results screen).
- Pop-up messages appear every four years of simulation to guide the user through the resilience-building process. If the user does not get any message, it means that the user is doing well.
- The tool simulates for 40 years.

Annex D (informative)

Good Practices

The following good practices have been compiled by different cities participating in the SMR project and are based on their specific experiences. They show possible ways of implementing the requirements of each operational step of the framework and can be seen as practical suggestions.

Each good practice consists of a title, the context and a description. Under "Context" the following information is provided:

- size of the city:
 - small-sized city with fewer than 150,000 inhabitants,
 - medium-sized city between 150,000 and 500,000 inhabitants, and
 - large-sized city with more than 500,000 inhabitants;
- challenge: specific city-related challenge that the city addresses with the good practice;
- level of responsibility for the challenge: local, regional, and/or national level.

Operational step 1 – Baseline review

Good practice: City of Rome

Title: Formation of a cross-sectoral resilience team (Resilience Office Set-up)

Context: Large-sized city; governance enhancement; local/regional level

Description of good practice: The city of Rome set up a resilience team. This team is envisaged to be a committee within the municipal administration (i.e. the city council). Its duty is to coordinate and facilitate local policies aimed at urban resilience enhancement. As an example, a governance issue is water management in the watershed, since different authorities are responsible for different tasks (e.g. rivers, minor streams, storm water drainage, or coastal areas) although there are strict interconnections among their competences. The resilience team, in this case, can serve as a link in order to avoid overlappings and interferences. Its structure was formed through existing skilled human resources from local administrations (municipality and the region), research centres and from the private sector (cross-sectoral). Personnel were appointed without further expenditure, with a budget limited to ordinary functioning (overheads, travel).

Good practice: City of Vejle

Title: Stakeholder mapping and analysis

Context: Small-sized city; extreme flooding incident; local level

Description of good practice: The city of Vejle worked with an initial list of stakeholders in the flood-prone area. These stakeholders were: residents, citizen organizations, associations, NGOs, the local sewerage company (Vejle Spildevand), SMEs and other stakeholders. This good practice was prepared by the municipality's technical department and local housing groups. The technical department is also involved in the development of the Vejle Resilience Strategy, and its employees were members of the resilience team.

The first step was the organization of a two-day "meet-and-greet" event with the residents. This involved the setting up of an information stand within the flooded area and a nearby supermarket to facilitate dialogue with the municipality on challenges, problems and opportunities. As a second step, the resilience team organized and conducted a workshop with the involvement of the citizens to inform them on the plan to implement a climate adaptation and flood prevention controlling system in the area. This was supplemented by an exhibition organized by the local environmental museum, which also involved hands-on activities for residents and children attending. This was then followed by another workshop for representatives of the housing authority, NGOs, local SMEs, politicians and personnel of the technical department and the sewerage company, as well as any interested individuals. This was announced in the media to ensure maximum participation. The participants were divided into six groups that tackled different problems in the area. All suggestions were uploaded to a website that was specifically created for the purposes of the project, and this is being updated so the residents can be informed on any developments. Finally, the resilience team visited two high schools located in the area to present the plan and get feedback and suggestions from the students. The results of these workshops were added to the website.

A local adaptation plan (resilience action plan) was thereafter prepared, with a schedule for the implementation of the project and which has already been granted funding. This is a 4-year plan. Meanwhile, stakeholders are updated through the website that was created for this purpose.

Good practice: City of Donostia/San Sebastian

Title: Stakeholder mapping and analysis

Context: Medium-sized city; governance enhancement; local/regional level

Description of good practice: One of the first tasks of the resilience coordination board (resilience team) was stakeholder identification, classification and a reflection of their potential role and integration in the resilience-building process.

Stakeholder mapping is continuously carried out in San Sebastian to obtain a comprehensive picture. It is imperative to define a coordination plan to reach out to a wide range of actors related to city resilience. The involvement of relevant stakeholders in the industrial and tertiary sectors can be facilitated through the involvement of local and regional business associations that support the organization of cross-sectoral workshops. Holding bilateral meetings with key agents of large enterprises as well as local and regional institutions is a powerful and enriching tool throughout this process.

Another successful practice to map and reach stakeholders (particularly citizens) is to make use of their own forums, existing organizations and local networks. For example, the resilience local board (resilience team) of San Sebastian organized intergenerational workshops about climate change with the involvement of the public university, schools (through the Local Agenda 21) and organizations of elderly people.

Operational step 2 – Risk awareness

Good practice: City of Rome

Title: Focus groups on risk awareness – how to implement risk assessment and organize a workshop using the Risk Systemicity Questionnaire

Context: Large-sized city; risk scenario analysis and awareness improvement; local/regional and national level

Description of good practice: The RSQ proved to be a valuable risk assessment tool in Rome. For the first time, various stakeholders were gathered to discuss about a comprehensive risk scenario of the city. The stakeholders involved in the questionnaire were a group of experts belonging to a wide range of city operators (e.g. energy, water, insurance, transportation, health, research, security, civil

protection, and local government). To implement the assessment, the RSQ was first sent to stakeholders, along with a thorough introduction of the SMR project by the municipal administration. Then, two distinct "focus groups" were formed, mixing stakeholders of different competences, to let them discuss and evaluate their subjective risk assessment, thus balancing their vision on risk scenarios. Results are encouraging because many interdependencies among risks (often unexpected) were discovered, giving a well-thought out foundation for the building of resilience policies.

Good practice: City of Donostia/San Sebastian

Title: Risk understanding and awareness among stakeholders

Context: Medium-sized city; governance enhancement; local/regional level

Description of good practice: Risk understanding and awareness among stakeholders is central to building up resilience for the city of San Sebastian. The city believes that resilience-building can be achieved at all levels of governance and engagement, from local administration to citizens. Therefore, the resilience local board (resilience team) of San Sebastian works continuously on risk awareness at different levels.

At strategic and technical levels, the RSQ allowed for a workshop to be conducted, guiding different debates about risks using scenarios, facilitating risk identification and prioritization. The debate generated in the workshop showed possible weaknesses in cross-silo collaboration amongst departments and institutions to the surface. It also supports the identification of different perspectives, risk interdependencies, cascading effects, as well as a holistic understanding of risks and city challenges.

The city of San Sebastian conducted more than one workshop, and the RSQ proved to be highly valuable for building up risk awareness among different local and regional stakeholders. The RSQ proved to be a valuable tool especially for the discussions with citizen groups and associations to identify, define and evaluate local risks. This created a sound basis for resilience understanding between all stakeholder groups.

Operational step 3 – Resilience strategy

Good practice: City of Glasgow

Title: Development of a resilience strategy for the city of Glasgow

Context: Large-sized city; strategy development through participation in an international initiative/programme (100 Resilient Cities, pioneered by the Rockefeller Foundation); local level

Description of good practice: Glasgow has worked with a range of local and national partners in the co-creation of a resilience strategy. A number of independently facilitated workshops brought together a wide variety of agencies with an interest in the resilience agenda from across the city. They included the traditional emergency services, as well as representatives from universities, public health, economic development and the volunteer sector. This process helped partners to define what they understood by the term "resilience" and gave them a sense of ownership in the discussions. These then led to the development of key themes and priorities, which helped to identify the immediate shocks and chronic stresses faced by the city and its people.

The city began this process with a strong focus on adaptation to the local impacts of climate change. Very quickly, however, partners came to the view that a more equal, fairer Glasgow was the basis of a more resilient Glasgow. As a result, a much greater emphasis on the social policy aspects of resilience, and the means of building a more inclusive economy came to the fore. Partners also agreed that resilience could best grow from an ongoing dialogue with local people and set about creating an innovative approach to this. The intention of the partners was to engage with residents in a broad civic conversation about resilience, seeking to move beyond the traditional consultation process to allow for a more dynamic and bottom-up approach. The city did not want just to seek its citizens' views through the medium of an online consultation, but also through connecting with the rich diversity of Glaswegian

voices in face-to-face conversations. These took place through the use of interactive techniques which included street games, participative art and public installations. The Resilient Glasgow team (resilience team) visited 15 locations over 25 days, speaking with over 1,500 people. Amongst these groups were the Glasgow Disability Alliance, West of Scotland Racial Equality Council, Interfaith Glasgow, Glasgow Homelessness Network and the City Mission. Workshops were facilitated using an exercise called "The Glasgow Game", which uses role-play and is designed to explore the complexities of resilience through looking at different future scenarios. More than 1,200 children and young people also took part in the Resilient Glasgow conversation through an art competition, which was designed to explore the qualities and attributes needed for a more resilient future. The wealth and diversity of views gathered from Glasgow's public resilience conversation were used to inform the further development of the city's thinking and the drafting of its resilience strategy. In particular, residents' views confirmed that the broad themes with which the partners had been working were generally the right ones, whilst also setting challenges for further work to give more determinate detail to these themes.

Operational step 4 – Implementation and monitoring

Good practice: City of Rome

Title: Bring in new partners and stakeholders from across the city to engage in co-creation

Context: Large-sized city; vulnerable population (elderly) and social alienation; local level

Description of good practice: In Rome, urban agriculture in abandoned areas used as urban gardens prevents the soil sealing of public green areas. Moreover, it can develop a sense of belonging for the inhabitants, contributing to the security of citizens. It also addresses the issue of loneliness and alienation among the elderly. Regulation of urban gardens was approved for the metropolitan area of Rome in 2015, along with the implementation of three pilot actions, with the support of the ENPI CBC MED Programme (Sidigmed project). More recently, the city of Rome has been awarded an URBACT project aimed at making urban agriculture a valuable and essential element of policy for green urban infrastructures. Geographic information system systems (GIS) are also used as part of the initiative, utilizing data from direct observation on the ground and offering a powerful tool to aid decision-making and co-creation with citizens (i.e. development of a simple app to favor citizen's participation in urban regeneration and reuse of abandoned land for urban agriculture, in line with resilience policies).

Good practice: City of Vejle

Title: Implementation of the resilience strategy – digital sensory spaces for vulnerable children in day care

Context: Small-sized city; vulnerable children and digital media; local level

Description of good practice: As part of the implementation of its resilience strategy, the city of Vejle started working with vulnerable children (e.g. refugee and bilingual children) in day care through co-creation development of a new learning format based on sensory spaces and the use of digital media. The goals were: (i) Giving the participating children a free space to be in so they can develop themselves on their own premises, and ensuring that vulnerable children get access to and learn about digital media. (ii) Through work with digital media and creativity, the children gain extra help with social relationships. (iii) Doing this in a way that the educators themselves participate in developing the content of the learning concept.

To this purpose, an "experimental community" was established consisting of educators, children, researchers and consultants. Together they set up a workshop flow that lasted for one year (kick-off workshop, several micro workshops where experiments were carried out and new ideas developed, and a final workshop). The suggested ideas were tried out in an action-based learning and research setting where everybody was allowed to bring in ideas, new variations of the ideas or comments on the quality of the ideas. The approach was informal, using play as a work form.

The results from the workshops were jointly praised by researchers and consultants and subsequently disseminated through research articles and course descriptions for educators. Finally, the learning

concept (digital media – it's for children) has been incorporated into a municipal learning platform for preschools which is freely accessible, not only for preschools in the municipality of Vejle, but also for municipalities outside Vejle. The learning concept has also been presented at various conferences.

Good practice: City of Bristol

Title: Implementation of project plans and activities (included in the Bristol Resilience Strategy)

Context: Large-sized city; decision making support; strategy development through participation in an international initiative/programme (100 RC); national level

Description of good practice: The *Bristol Resilience Strategy*, launched in December 2016 by elected Mayor Marvin Rees, is a 50-year vision, setting out resilience "pillars" (fair, connected, liveable, agile and sustainable), goals within these pillars, and a suite of 42 transformative actions across the following five headings: People, Place, Organizations, Prosperity and Worth - Regional and Global. Engaging over 1,600 people from across the city, a process of co-creation articulated a distinctively Bristol vision of resilience and forged a shared resilience commitment across the city. The development of a resilience strategy has been the first leg of a long journey towards city resilience. As such, the resilience strategy does not set out a prescriptive implementation and monitoring phase; instead it acknowledges that four elements are key to the next steps.

- 1) Establishing ownership of the resilience strategy within political and technical structures.
- 2) Securing additional resources for leading a resilience programme.
- 3) Developing an investment programme, especially accessing funds through the 100RC platform.
- 4) Carrying on the city conversation with stakeholders.

At the start of the implementation phase, a one-year action plan was developed in partnership with Bristol City Council, the Mayor's Office and 100RC. It was agreed that the programme would focus on a few areas of key mutual priorities (e.g. tackling street homelessness, equality and clean air). This was done so that a positive resilience impact could be demonstrated and communicated early on in the programme. The so-called *Nine Mutual Priority Initiative* strongly focusses on tackling inequality, as this is a top priority for the city under the political and strategic leadership of Mayor Rees.

Overall responsibility for delivering the actions sits with the Chief Resilience Officer (CRO) but the programme is being delivered and supported by a wide range of city stakeholders. The CRO also monitors progress towards delivering the wider resilience agenda, including the 42 transformative actions originally identified in the resilience strategy. The implementation of these actions has been dependent upon clear allocation of ownership, successful collaboration across partners and access to the necessary resources. For example, additional resources were secured from 100RC to deliver a roadmap to tackle street homelessness and from the University of Bristol to develop systems thinking skills and practice in city leaders. For any city, it would not be appropriate, practical or achievable for one person to play an active day-to-day role in the delivery of an entire city resilience action plan. This fact alone reiterates the importance of embedding resilience into governance structures, both within a local authority and across a city. A resilience strategy also needs to be sufficiently flexible to evolve to inevitable change, whether this is brought about through civil emergencies, budgetary cuts or administrative/political change. In Bristol this is demonstrated by the fact that 18 months after releasing the resilience strategy, the work is being used to help shape a One City Plan to align the work of all the key stakeholders in the city around a shared vision.

Operational step 5 – Evaluation and reporting

Good practice: City of Glasgow

Title: Monitoring and collective feedback for the Resilient Glasgow Strategy

Context: Large-sized city; strategy development through participation in an international initiative/programme (100 RC); national level

Description of good practice: Glasgow's resilience strategy was launched by the Leader of the Council on the 1st of September 2016. Since then, the Resilient Glasgow team (resilience team) has completed six monthly progress reports to the 100RC office. The resilience strategy has also been part of the Council's performance management system, which regularly assesses progress towards the key objectives stated. It was felt to be a really important aspect of the resilience strategy's implementation for it to be included in this performance system, as it challenges the council and other city partners to deliver on the actions in the strategy and does not allow momentum to fade in support of its development.

One of the key areas of feedback from partners on the resilience strategy has been a collective wish to ensure that it is more deeply imbedded in the mainstream life of the city's organizations and that it gathers greater prominence in the lives of Glasgow's people. The Resilient Glasgow team has therefore worked to include a strong resilience theme in Glasgow's overarching and multi-sectoral community plan, which has led to the successful outcome of it becoming one of only three key elements of the new community plan, which was adopted late last year by the city's partners. The actions in this plan which relate to resilience will be tracked through a new monitoring and evaluation framework being developed for it, but crucially will also be the responsibility of all of the partners to help deliver.

Annex E

(informative)

Stakeholders involved in each iteration

The MM provides a common understanding of the resilience-building process. Using the MM, cities are asked to consider and assess their current status of resilience. The model then helps them to identify the most appropriate policies to implement in order for the city to evolve and move to the next maturity stage.

The acronym SMART within the MM stands for the five maturity stages which constitute the resilience-building process (S for Starting, M for Moderate, A for Advanced, R for Robust and T for Vertebrate). The cities are able to move through the stages by making use of the Operational Guidance framework and the tools that are recommended for use within the various operational steps. More information can be found in CWA 17301:2018 *City Resilience Development – Maturity Model*.

In each iteration (i.e. the process of going through all five steps of the Operational Guidance framework) a variety of stakeholders are informed, involved and engaged. A full iteration should be completed at least once per maturity stage.

For example, if a city has identified their resilience maturity stage as being moderate, having performed the full iteration at least once (and making use of the five resilience building tools that it involves) potentially the city's resilience maturity will move to the advanced stage. This can be easily identified by using CWA 17301:2018 *City Resilience Development – Maturity Model*. If the city's resilience maturity has not moved to the next stage, another full iteration is needed at the moderate stage.

The following stakeholders should be involved in the following iterations:

- First iteration (Starting stage): Local government, emergency services, critical infrastructures
- Second iteration (Moderate stage): Local government, emergency services, critical infrastructures, public-private companies, NGOs, volunteers, regional government
- Third iteration (Advanced stage): Local Government, emergency services, critical infrastructures, public-private companies, NGOs, volunteers, regional government, media, citizens, academic and scientific entities, national government
- Fourth iteration (Robust stage): Local government, emergency services, critical infrastructures, public-private companies, NGOs, volunteers, regional government, media, citizens, academic and scientific entities, national government, European policymakers
- Fifth iteration (Vertebrate stage): Local government, emergency services, critical infrastructures, public-private companies, NGOs, volunteers, regional government, media, citizens, academic and scientific entities, national government, European policymakers, international organizations

Bibliography

- [1] Sustainable Development Goal 11, Sustainable Development Knowledge Platform (retrieved 2018-06-29), <https://sustainabledevelopment.un.org/sdg11>
- [2] Sendai Framework for Disaster Risk Reduction 2015-2030, UNISDR (retrieved 2018-06-29), <https://www.unisdr.org/we/inform/publications/43291>
- [3] PARIS CLIMATE AGREEMENT U.N.F.C.C.C. (retrieved 2018-06-29), <https://unfccc.int/process-and-meetings/the-paris-agreement/what-is-the-paris-agreement>
- [4] Morchain, Robrecht, 2012, Background paper for Council of Europe's report on Resilient Cities
- [5] RSQ. SMR website (retrieved 2018-06-29), <http://smr-project.eu/tools/risk-systemicity-questionnaire/>
- [6] RBP. SMR website (retrieved 2018-06-29), <http://smr-project.eu/tools/resilience-building-policies/>
- [7] CRD. SMR website (retrieved 2018-06-29), <http://agder-ikt78.uia.no/cityrd45/>