

The resilient city – state of the art

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During the pandemic, the discussion about the resilience of our social system and especially of Austrian cities and municipalities is increasingly becoming the focus of political and social discourse. This working document provides a first overview of the state of scientific discussion on urban resilience, existing literature, research projects and planning tools with a focus on the local level.

I Starting point of resilience in cities?

1 Fundamentals of resilience (state of the art)

1.1 The term resilience

Resilience generally describes **power of resistance**, i.e., the **strength to cope with crisis situations**. The term originally comes from physics or materials science and describes the nature of certain elements that jump back to their original form even after extreme external influences. From the 1950s, the concept of resilience was¹ adopted in child psychology and later in pedagogy: the "resilient person".² In connection with the global economic and ecological crises of the last two decades, the topic of resilience has gradually come to the fore (keyword: civil protection). At the latest with the onset of the COVID-19 pandemic, the resilience debate is increasingly being conducted in politics and administration and has become an integral part of socio-political discourse. In the consulting industry, for example, strengthening personal and entrepreneurial resilience is increasingly becoming a field of activity.

In resilience research, there are many different definitions and concretizations of "resilience", depending on which discipline uses the term. As examples, some general definitions of resilience are given below:

«A system is resilient if it can adjust its functioning prior to, or following events (changes, disturbances, and opportunities), and thereby sustain required operations under both expected and unexpected conditions. Resilience is something a system does, and not something a system has. Resilience is a characteristic of a system's performance or behavior. This characteristic cannot be reduced to, substituted by, or explained by a single 'internal mechanism' or ability. »³

"Resilience is defined as the ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a potentially hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions"⁴

"Resilience as a capacity to absorb disturbances, to change, yet to retain essentially the same function and structure without crossing the threshold to a different system behavior"⁵

¹ https://www.resilienz-akademie.com/resilienz/#Resilienz_Definition_in_der_VUCA-Welt

² Cf. [https://de.wikipedia.org/wiki/Resilienz_\(psychology\)](https://de.wikipedia.org/wiki/Resilienz_(psychology)): History of resilience

³ Hollnagel, E., Nemeth, C. P. & Dekker, S. (Eds.): Remaining sensitive to the possibility of failure. Resilience Engineering Perspectives, vol. 1. Aldershot, UK: Ashgate, 2008.

⁴ Lavell, A., M. Oppenheimer, C. Diop, J. Hess, R. Lempert, J. Li, R. Muir-Wood, and S. Myeong: Climate change: new dimensions in disaster risk, exposure, vulnerability, and resilience. In: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA, 2012, pp. 25-64.

⁵ Walker, Brian, Salt, David: RESILIENCE thinking – Sustaining Ecosystems and People in at Changing World, 2006.

In the different disciplinary uses, there are three central overarching factors relating to the disturbing event and the temporal demarcation:⁶

1. Relation to **abruptly occurring** adverse disorder
2. **Exogeneity** of the disorder (see section Potential threats/disturbances)
3. **Differentiation between resilience and prevention** (see ChapterII.2 Instruments to strengthen resilience)

Figure 1 Disciplinary use of the concept of resilience

TABLE 1: Individual disciplines' use of resilience as a concept

Discipline	Physics	Engineering/technology	Ecology	Sociology/disaster management/politics	Psychology
Definition(s)/particularities	Capacity of a material to absorb energy Property of returning to original form after an elastic deformation	Stability near a point of equilibrium Resilience as a generally static concept Resistance of systems to shocks (resistance capacity) Capacity of technical systems, in the case of partial failure, to avoid complete failure	Capacity to absorb shocks and retain relationships within the system Buffer capacity to absorb (external) disruptions (similar to the resistance concept) Probability of persistence Degree of self-organizational capacity within a system Reorganization with retention of original structures/identity (retention of qualitatively similar status)	Maintenance of essential functions in case of catastrophe (without external aid) Capacity to adapt existing resources/capabilities to new conditions Degree to which a system is capable of expanding learning and adaptation abilities Goal: acceptable level of (institutional) functionality	Positive adaptation/development despite "high-risk-patient status," trauma or chronic stress Constant development despite adverse factors of influence Behavior conforming to laws despite adverse socioeconomic factors (forensics)
Resilience measurement & dimensions	Amount of absorbable energy Duration before recovering original form	Duration before reaching original equilibrium Low extent of effect	Magnitude of shock before a tipping point is reached Time before recovery of previous state	Relative: avoidance of potential catastrophic consequences Retention of social order/ quality; social networks	Resilience as ex ante non-observable characteristic Retention of mental health
Literature examples	Bodin and Wiman 2004, Martin 2012	Thalmayr 2015, Martin 2012, Rose 2007	Holling 1973, CARRI 2013, Klein et al. 2003	Godschalk 2003, Klein et al. 2003, Perrings 2006, UNISDR 2005	Windle 2011, CARRI 2013, Deutsches Resilienz Zentrum o.D.
Relevance/relationship to economics	Equilibrium perspective for dynamic economic systems makes little sense			Positive: social dimension (adaptation, learning capacity, social capacity) Political, economic and cross-regional factors are poorly differentiated	Positive: strong focus on adaptation to crises in the field of psychology In economics, more ex ante clarity with regard to resilience-promoting factors

Source: Brinkmann Henrik, Harendt Christoph, Heinemann Friedrich, Nover Justus: Economic Resilience - Key Concept for a New Economic Policy Model?, Inclusive Growth for Germany No. 11, Bertelsmann Foundation (ed.), Gütersloh 2017, p.10.

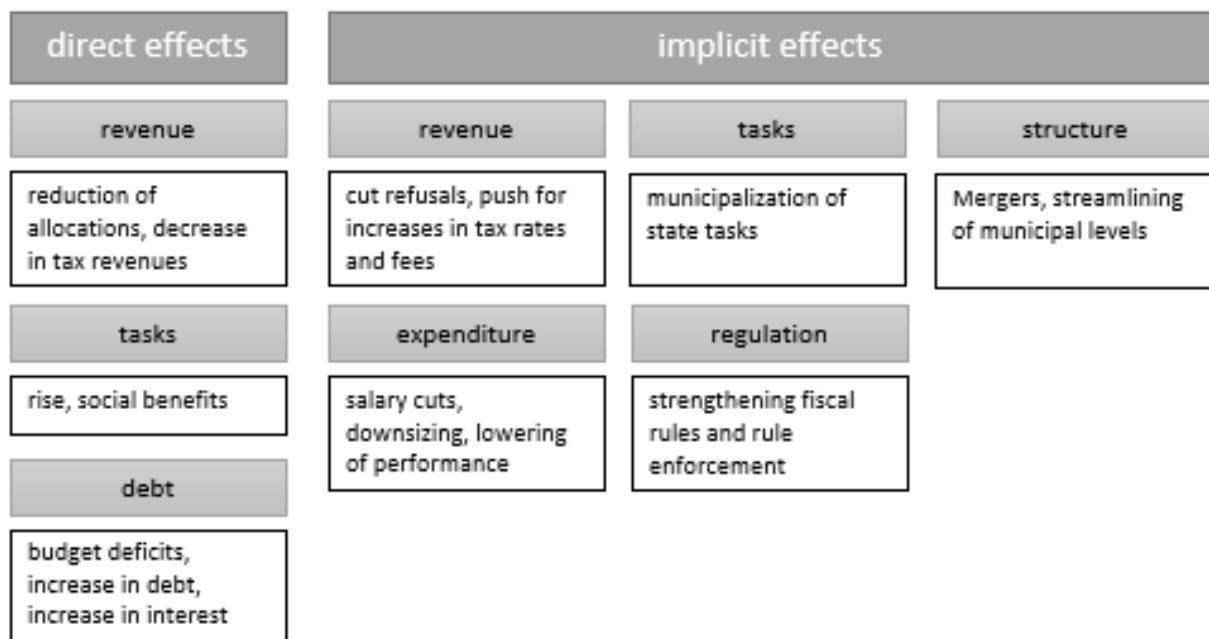
⁶ Brinkmann Henrik, Harendt Christoph, Heinemann Friedrich, Nover Justus: Ökonomische Resilienz - Schlüsselbegriff für ein neues wirtschaftspolitisches Leitbild?, Inklusives Wachstum für Deutschland Nr. 11, Bertelsmann Foundation (editor), Gütersloh 2017.

1.2 On economic resilience

*"Economic resilience is the ability of an economy to take preparatory measures for crisis management, to mitigate the immediate consequences of crises and to adapt to changing conditions."*⁷

Any crises arising from external factors (natural disasters, pandemics, waves of refugees, economic crises, etc.) always has **strong consequences for finances**. As a rule, these are immediately impactful for the public sector, as tax revenues fall on the one hand, especially during economic crises, and, on the other hand, expenditure on social benefits and economic aid increases.

Figure 2 Effects of economic crises on municipal finances



Source: Geißler, René, Wortmann, Markus: Auswirkungen der Finanzkrise auf die kommunalen Ebene Europas, In: Verwaltung & Management 27, 2021 p.3–12.

2 Resilient Cities – Models of Urban Resilience

2.1 What does resilience mean for cities?

In the context of cities and municipalities and public administration, the concept of resilience is primarily related to disaster management. In addition to governance, resilience management also includes other disciplines such as technical, economic, ecological, and social resilience.

⁷ Brinkmann Henrik, Harendt Christoph, Heinemann Friedrich, Nover Justus: Ökonomische Resilienz - Schlüsselbegriff für ein neues wirtschaftspolitisches Leitbild?, Inklusives Wachstum für Deutschland Nr. 11, Bertelsmann Foundation (editor), Gütersloh 2017, p.13.

The OECD defines resilient cities as "... Cities that have the ability to absorb, recover and prepare for future shocks (economic, environmental, social & institutional). Resilient cities promote sustainable development, well-being and inclusive growth."⁸

"Urban resilience means... to anticipate, prevent, absorb and recover from shocks and stresses, in particular those brought about by rapid environmental, technological, social and demographic change, and to improve essential basic response structures and functions."⁹

According to Newman, who has studied long-term global processes such as climate change or peak oil, resilient cities have the ability to respond to the associated changes and manage negative events and stress through innovative problem solving^{10, 11}

In a study commissioned by the City of Vienna in 2018, the Competence Center "Urban Innovation Vienna" continues: "Resilient cities and municipalities can respond adequately to environmental, social and economic challenges. They must be able to compensate for or prevent negative effects on the population or municipal systems. This requires municipalities and cities to think systemically, adapt their understanding of good governance accordingly and adapt planning practices that are not sustainable. In addition, resilience in cities is promoted above all through the appropriate adaptation of infrastructure systems and services."¹²

Strengthening urban resilience must therefore be understood as a **multidimensional task** that requires a **holistic, cross-level, and cross-disciplinary approach**, similar to the 2030 Agenda with its SDGs or integrated Smart City and Smart Region approaches.

In connection with integrated Smart City approaches, the KDZ-Centre for Public Administration Research identified the "**strong city**" as a central area of activity of the Smart City Wien Framework Strategy (SCWR). The common and the common good come first and social balance forms the foundation for security in all situations. These core values are reflected in the decision-making and processes. The SCWR's long-term perspective supports viable and sustainable solutions. Adaptability and resilience on the one hand and flexibility – where necessary – on the other hand allows the city to react appropriately to new challenges.¹³

⁸ OECD: Better Policies for better Lives: Resilient cities; <https://www.oecd.org/regional/resilient-cities.htm>

⁹ ICLEI: THE ICLEI MONTRÉAL COMMITMENT AND STRATEGIC VISION 2018-2024, BUILDING A SUSTAINABLE URBAN WORLD, Bonn 2018, p.10.

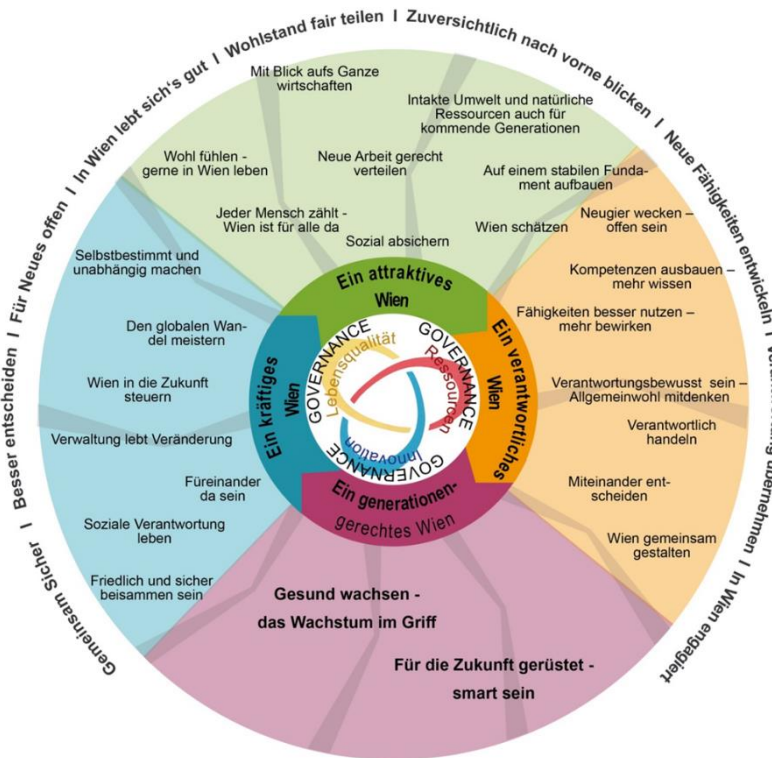
¹⁰ See <https://de.wikipedia.org/wiki/%C3%96lf%C3%B6rdermaximum>

¹¹ Devecchi Lineo Umberto Haßheider Eva-Maria: Resiliente Gemeinden in der Modellregion Bodensee, Internationale Bodenseehochschule (IBH), 2020, p.8.

¹² urban_innovation_vienna, a Company of Wienholding: Resilient Cities 2018, Study commissioned by the City of Vienna MA18 - Urban Development and Planning, Vienna 2018, p.4.

¹³ KDZ-Centre for Public Administration Research: Public Value der Smart City Wien Rahmenstrategie: Für ein attraktives, verantwortliches, kräftiges und generationengerechtes Wien. Studie im Auftrag der Stadt Wien MA18 - Stadtentwicklung und Stadtplanung, Vienna 2017

Figure 3 Public Value of the Smart City Wien Framework Strategy (german language)



KDZ: Own presentation 2017

The core competencies of resilience are **robustness** and **adaptability**. **Crisis-proof municipalities and cities are: "Adaptive – robust – redundant – flexible – innovative – inclusive"**.¹⁴ Robustness is required in the implementation of coping mechanisms (redundant systems and back-ups). The municipalities must be flexible enough to react quickly to unforeseeable events. It is therefore important to proactively plan for active adaptability. In addition, the inclusive approach involving all population groups (participation) to promote social cohesion is also seen as a central component for resilient governance processes.¹⁵

2.2 Models and international programs to strengthen urban resilience

Urban resilience as an integral part of the New Urban Agenda and the SDGs:

The concept of urban resilience is closely linked to the global agreements on the New Urban Agenda 2016 and the 2030 Agenda for Sustainable Development with its 17 Sustainable Development Goals (SDGs) in 2015. Several of the 17 SDGs and their 169 subtargets contain **direct links to civil protection** and resilience: According to a study by the UN Office for Disaster

¹⁴ OECD: Better Policies for better Lives: Resilient cities; <https://www.oecd.org/regional/resilient-cities.htm>

¹⁵ urban_innovation_vienna, a Company of Wienholding: Resilient Cities 2018, Study commissioned by the City of Vienna MA18 - Urban Development and Urban Planning, Vienna 2018, p.4.

Risk Reduction¹⁶, a total of 23 targets relate directly to disaster control and resilience. ¹⁷ **Urban resilience** is especially addressed in Goal **11 - Make cities and human settlements inclusive, safe, resilient, and sustainable**.

In the scientific debate, it is therefore also controversial to what extent the concept of resilience¹⁸ is more promising than that of sustainability, since it is judged on the one hand as "the better model" and as "more concrete, greener and less arbitrary".¹⁹ On the other hand, resilience is often already presented as an integrated indicator of sustainability.²⁰ The resilience of a system – a city – as a central prerequisite for sustainability.

From the multitude of different concepts and programs for "Resilient City on an International Level", two initiatives are briefly presented below.

100 Resilient Cities Program (Resilient Cities network)²¹

Since 2013, the *100 Resilient Cities* network initiatives have been supporting the creation of resilience strategies, the appointment of resilience contracts and the implementation of projects in their member communities.

In the *City Resilience Framework* (CRF), **4 resilience dimensions** are defined, each with 3 central factors²²:

- ❑ **Leadership and strategy:**
 - strengthening leadership and effective management within government and civil society,
 - stakeholder involvement (well-informed, involved citizens) and
 - integrated long-term planning (coordination of sectoral strategies and individual projects with the urban strategy).
- ❑ **Health and well-being:**
 - access to necessary resources to meet basic needs/daily needs,
 - livelihood opportunities and access to work, and
 - securing public health care.
- ❑ **Economy and society:**
 - committed communities that stick together,
 - social stability, security and justice based on an all-encompassing, inclusive approach of the legal system, and
 - economic prosperity.
- ❑ **Infrastructure and environment:**
 - protection of natural and man-made goods,
 - maintenance of critical infrastructures and
 - reliable information and communication infrastructures and mobility.

¹⁶ These can be found in SDGs 1 – End poverty, 2 – Zero hunger, 3 – Ensure health and well-being, 4 – Quality education, 6 – Clean water and sanitation, 9 – Industry, innovation and infrastructure, 11 – Sustainable cities and communities, 13 – Climate action, 14 – Life in the water and 15 – Life on land.

¹⁷ UNISDR: Disaster risk reduction and resilience in the 2030 Agenda for Sustainable Development, 2015.

¹⁸ Schramm, Matzinger, and Forschungsverbundd Networks, Resiliency - Conceptual potentials for social-ecological urban and infrastructure research. Research Associationd Networks (ed.), Berlin 2020.

¹⁹ Hummel, Diana: Von der Nachhaltigkeit zur Resilienz? Der Diskurs in Ökologie und Umweltpolitik, In: medico international: Fit für die Katastrophe? Kritische Anmerkungen zum Resilienzdiskurs im aktuellen Krisenmanagement. Gießen 2017, p. 109-123.

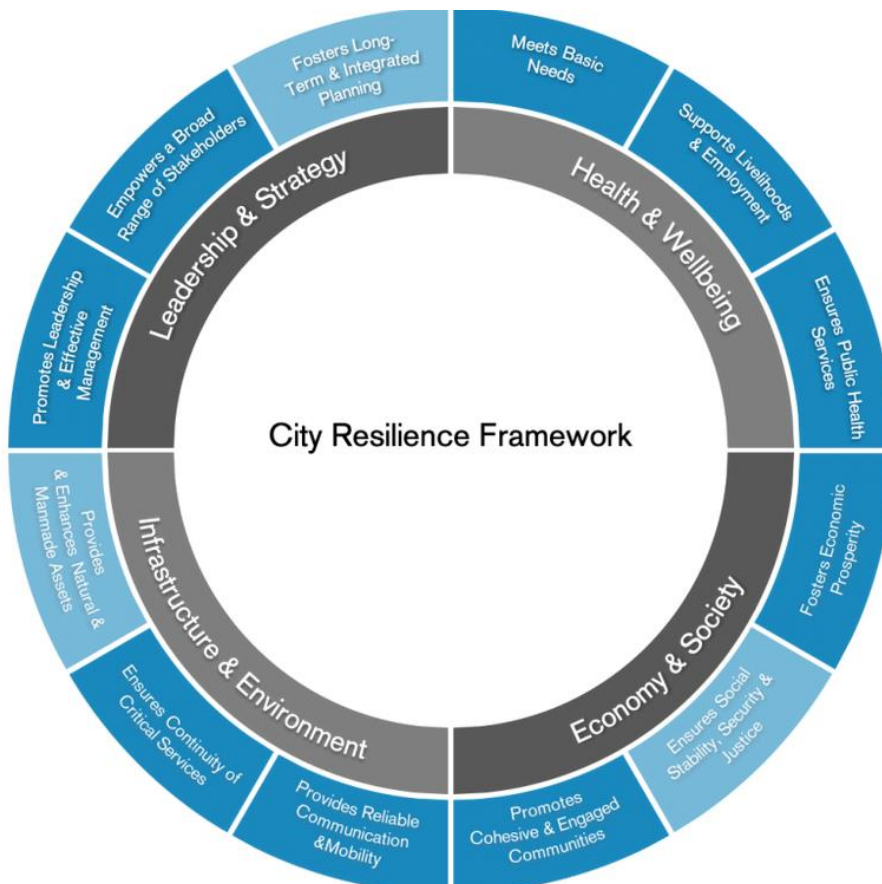
²⁰ Little et al.: Assessing and Enhancing Environmental Sustainability – A Conceptual Review. Environmental Science & Technology, Vol. 50, No. 13,

²¹ <https://resilientcitiesnetwork.org>

²² urban_innovation_vienna: Resilient Cities 2018, Studie im Auftrag der Stadt Wien MA18 - Stadtentwicklung und Stadtplanung, Vienna 2018 p. 9f.

Resilient urban systems in this model are characterized by 7 central characteristics: **reflective, rich in ideas, inclusive, integrative, robust, redundant, and flexible.**

Figure 4 Model of the City Resilient Framework



Source: <https://resilientcitiesnetwork.org/programs/resilient-cities-shaping-a-digital-world/>

The OECD's resilience model

The OECD also pursues a holistic approach to resilience and has developed its own program for cities.

This includes:

1. The **Resilient Cities Model**
2. A **set of indicators** to measure urban resilience²³
3. **Guidelines for Risk Governance**: Recommendations for the development of an integrated, multi-risk-related and participatory strategy for managing resilience risks

²³ OECD: Figueiredo, L., Honeys, T.Schumann, A.: Indicators for Resilient Cities, OECD Regional Development Working Papers No. 2, 2018.

4. **Case studies** of selected cities: Antalya and Bursa in Turkey, Belo Horizonte in Brazil, Cardiff in the UK, Kobe and Kyoto in Japan, Lisbon in Portugal, Oslo in Norway, Ottawa in Canada and Tampere in Finland.

The OECD's resilience model is also based on **four dimensions**, each with specific objectives²⁴:

- Economy** (diversity and innovation)
- Society** (inclusion and cohesion)
- Governance** (long-term vision, sufficient resources, cooperation with other levels of administration, participatory leadership)
- Environment** (sustainable urban development and adequate, resilient infrastructures)

Figure 5 The 4 dimensions of urban resilience in the OECD model

<p>Economy</p> <ul style="list-style-type: none"> • A diverse number of industries • A dynamic economy to generate growth • Conditions allow innovation to take place • People have access to employment, education, services, skills training. 	<p>Governance</p> <ul style="list-style-type: none"> • Clear leadership and management • Strategic and integrated approaches are taken by leaders • Public sector has the right skills • Government is open and transparent
<p>Society</p> <ul style="list-style-type: none"> • Society is inclusive and cohesive • Citizens' networks in communities are active • Neighbourhood is safe • Citizens enjoy healthy lives 	<p>Environment</p> <ul style="list-style-type: none"> • Ecosystem is sound and diverse • Infrastructure can meet basic needs • Adequate natural resources are available • Coherent policy towards land use

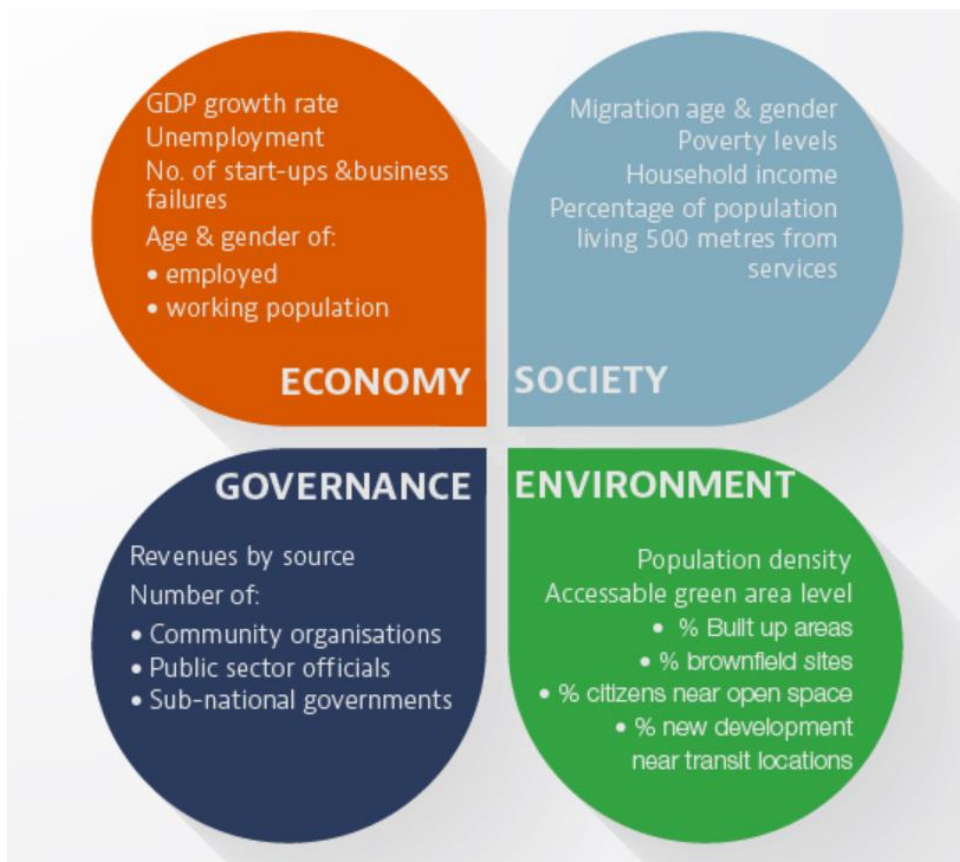
Source: OECD: Better Policies for better Lives: Resilient cities; <https://www.oecd.org/regional/resilient-cities.htm>

Resilient cities are: adaptive – robust – redundant – flexible – imaginative – inclusive

A central element of the OECD model is cross-thematic and cross-departmental cooperation in analysis and concept development as well as the creation of transparency in the decision-making process.

²⁴ OECD: Figueiredo, L., Honeys, T., Schumann, A.: Indicators for Resilient Cities, OECD Regional Development Working Papers No. 2, 2018.

Figure 6 Dimensions and characteristics in the OECD model



Source: OECD: Better Policies for better Lives: Resilient cities; <https://www.oecd.org/regional/resilient-cities.htm>

The "stress test city" and the model of a functioning city²⁵

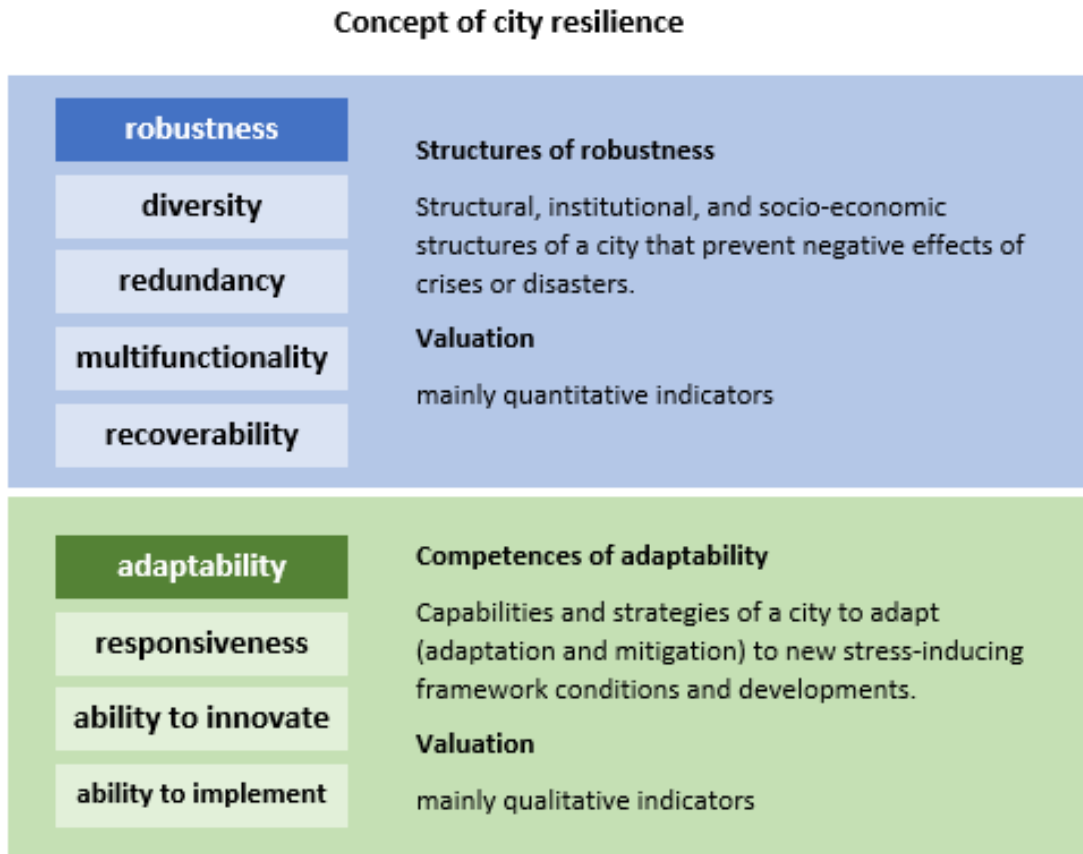
In German-speaking countries, the urban stress test model developed by the German Federal Office for Construction is regarded as a model for studies and projects on urban resilience.

The city stress test is a **strategic test instrument for urban development**, which is intended to help German cities to determine their own position, **vulnerability, exposure and impact**, and to increase their ability to **act and react** in crisis situations.

In the urban stress test, the resilience or resilience of a municipality is primarily determined based on the **robustness of urban structures** and **adaptability** based on urban **strategies and instruments** for adaptation.

²⁵ Deutsches Bundesamt für Bauwesen, Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR): Stresstest Stadt – wie resilient sind unsere Städte? Unsicherheiten der Stadtentwicklung identifizieren, analysieren und bewerten; Bonn 2018.

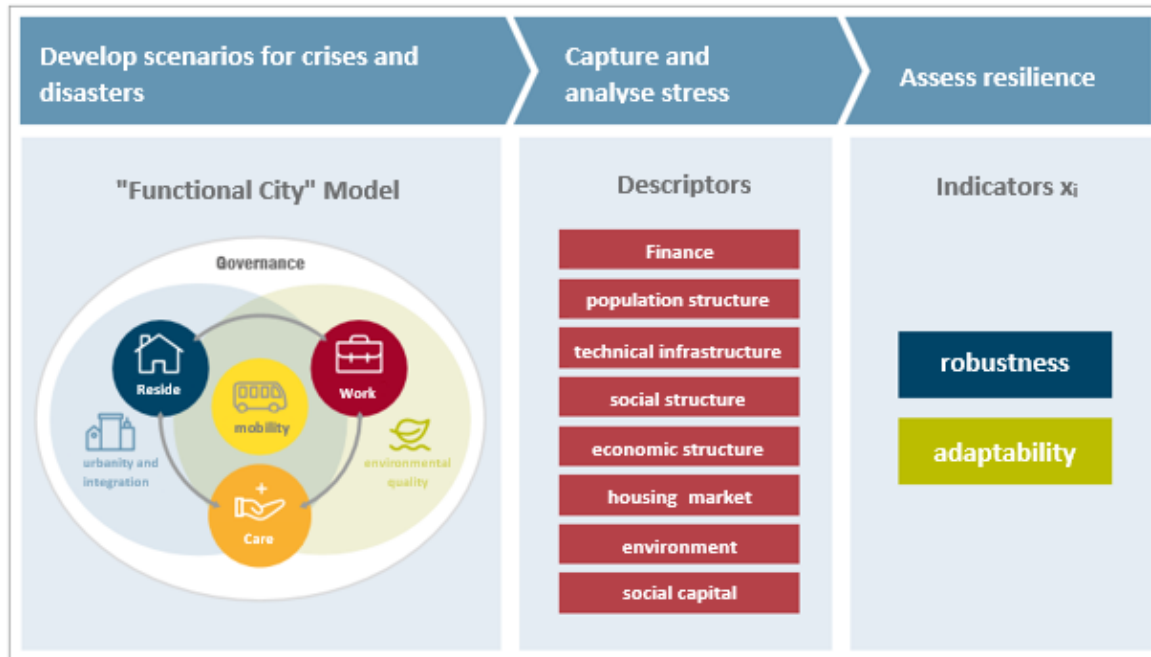
Figure 7 Concept of resilience for the urban stress test



Source: German Federal Office for Construction, Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR): Stress test city – how resilient are our cities? Identify, analyse and evaluate uncertainties in urban development. Bonn 2018.

The stress test city is based on the **model of the "functional city" with the six basic functions** of living, supply, work, mobility, urbanity, and integration (social) as well as environmental quality (recreation). The functioning of a city can essentially be recorded and determined in more detail via **eight central descriptors** (see figure below).

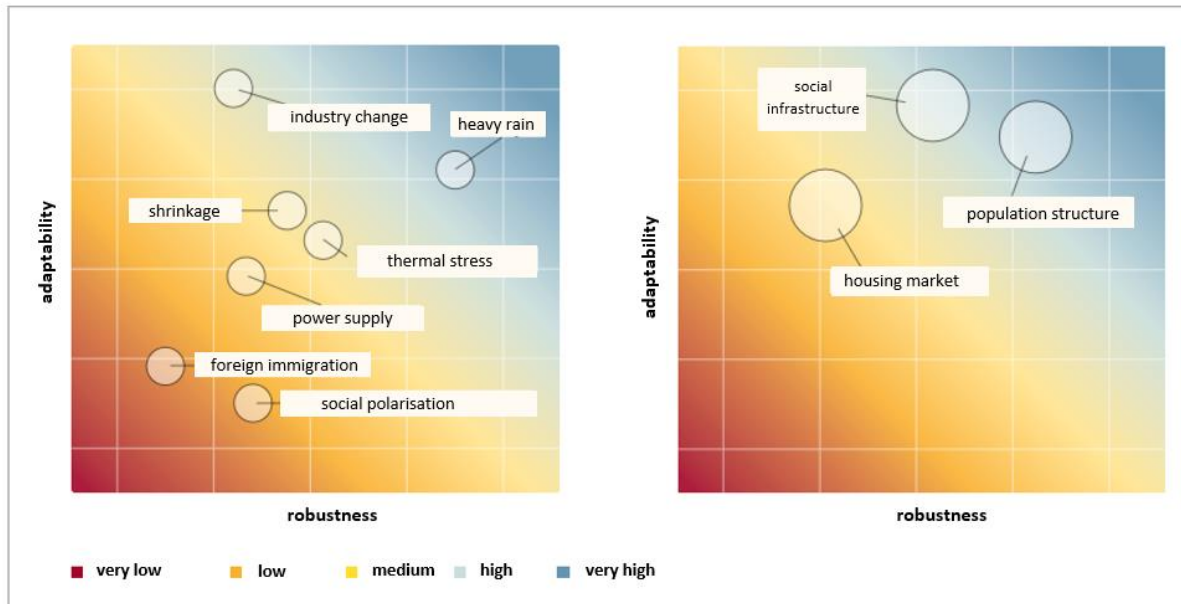
Figure 8 Concept of resilience for the urban stress test



Source: German Federal Office for Construction, Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR): Stress test city – how resilient are our cities? Identify, analyse and evaluate uncertainties in urban development. Bonn 2018.

The city stress test provides a comprehensive **set** of more **than 100 indicators**, based on which the specific characteristics of the respective descriptors in the cities and thus the robustness and adaptability of the cities can be determined in more detail and **finally assessed with the help of a resilience matrix**. The stress test is intended to provide information on whether and to what extent a city is able to maintain its functionality even in the event of negative events, influences and developments and to be able to offer its basic tasks to the population in an appropriate quality. In addition, the resilience discourse can be initiated, and resilience awareness can be increased with the help of the urban stress test.

Figure 9 Exemplary resilience matrices for the stress scenarios (left) and for selected descriptors (right)



Source: German Federal Office for Construction, Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR): Stress test city – how resilient are our cities? Identify, analyse and evaluate uncertainties in urban development. Bonn 2018.

II Measures and activities of cities to strengthen resilience

1 Starting points for strengthening resilience

1.1 Potential threats/disruptions

The concept of urban resilience is mostly based **on exogenous threats** and unexpected events, which can have different natural, technical, economic, or social causes and **threaten the functioning of the urban system**²⁶. In the case of disruptive events, a distinction is made between *shocks* and *stresses*:

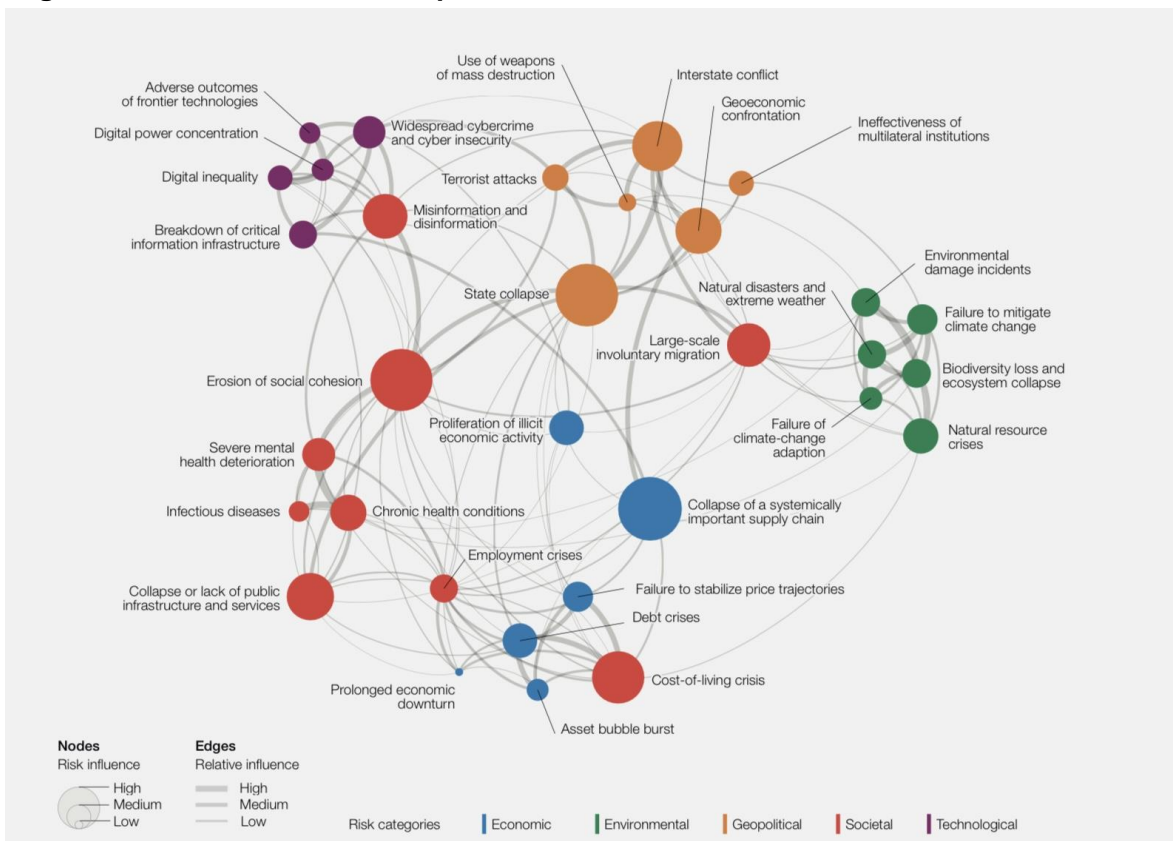
- ❑ **"Shocks"** are sudden and surprising events such as epidemics, floods, winds, landslides, droughts, earthquakes, sudden conflicts or strong economic volatility;
- ❑ **'Stresses'** refers to slower trends that undermine the performance of the urban system and increase the vulnerability of actors within the system. (e.g. lack of resources, demographic changes, climate change, political instability).

²⁶ Cf. urban_innovation_vienna: Resilient Cities 2018, Studie im Auftrag der Stadt Wien MA18 - Stadtentwicklung und Stadtplanung Vienna 2018.

Global Risk Report of the World Economic Forum

The annual report analyzes existing risks and threats in the categories of environment, geopolitics, society, technology and economy. Based on a comprehensive **survey of various stakeholders and institutions**, a **Global Risk Landscape** is created annually, which presents the greatest risks according to their probability and their impact.²⁷

Figure 10 Global Risks Landscape 2023



Source: World Economic Forum: Global Risk Report 2023

In particular, the global risk report discusses **threat scenarios** in connection with **climate change** (e.g., extreme weather events, thermal stress) and environmental damage (e.g., **environmental** disasters, decline in biodiversity, water crises) but also in the field of **technical infrastructures** (e.g., cyber-attack, blackout, etc.) as particularly likely and serious.

Other scenarios considered so far include population development (e.g. shrinkage or external immigration, etc.), social polarization or global financial crises.

Future Shocks – Study of the European Parliamentary Research Service

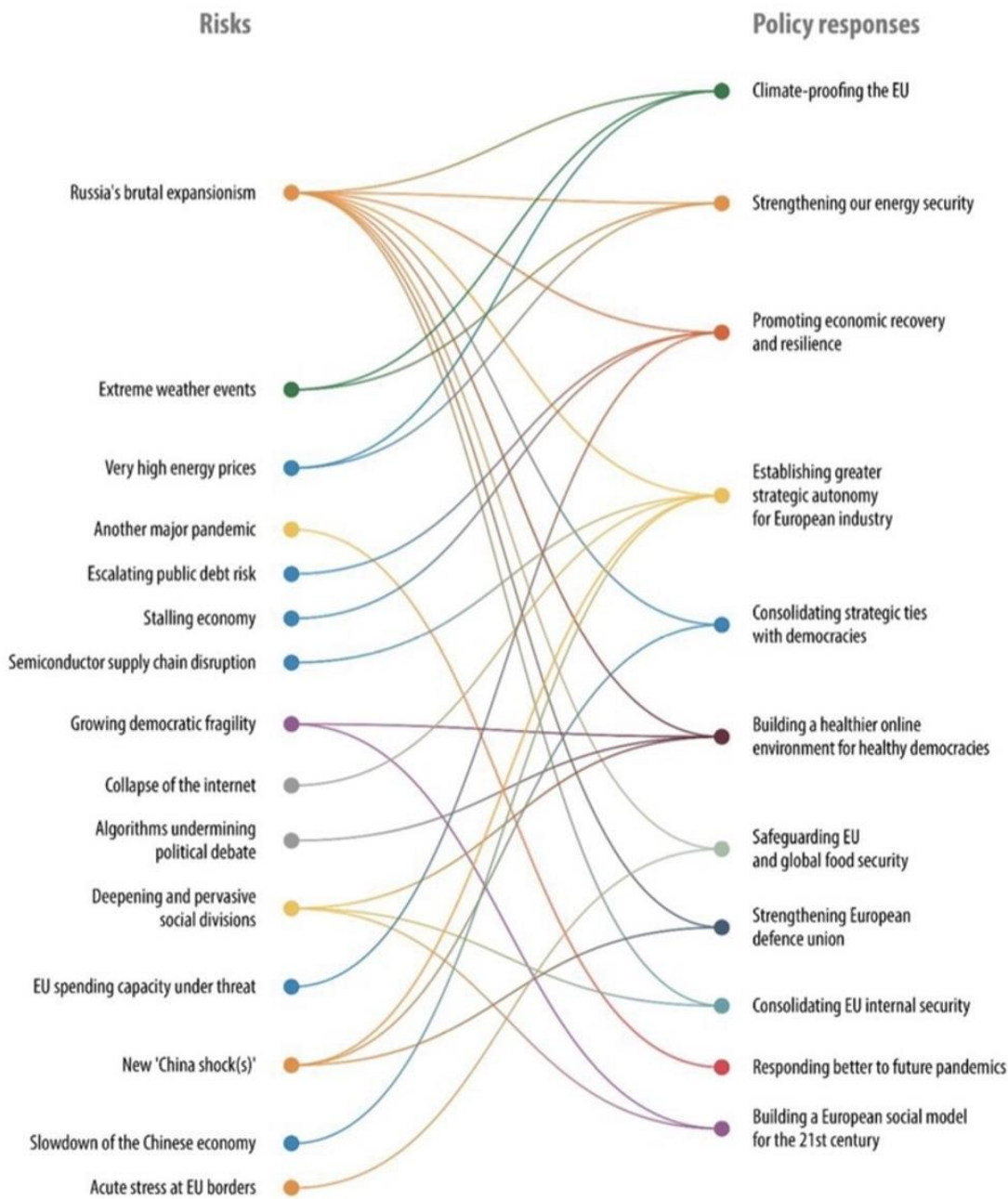
The European Parliamentary Research Service published the study „Future Shocks 2022: Addressing risks and building capabilities for Europe in a contested world“²⁸. It seeks to assess

²⁷ World Economic Forum: The Global Risks Report 2023, Global Risks Perception Survey 2022-2023

²⁸ European Parliamentary Research Service: „Future Shocks 2022: Addressing risks and building capabilities for Europe in a contested world“, Brussels 2022

the risks, capabilities and resilience of the EU system. Furthermore it proposes options for long term policy responses for the main risks like „Russians brutal expansionism“, „Extreme weather events“, „Very high energy prices“, „Another pandemic“, „Escalating public debt risk“, „Stalling economy“, „Supply chain disruption“, „Growing democratic fragility“, „Collapse of Internet“, „Algorithms undermining political debates“, „Deepening social divisions“, „EU spending capacity under threat“, „New China shocks“, „Slowdown of Chinese economy“ or „Acute stress on EU borders“.

Figure 11 Future Shocks 2022



Source: European Parliamentary Research Service: „Future Shocks 2022: Addressing risks and building capabilities for Europe in a contested world“, Brussels 2022

A global health crisis (pandemic), as we are currently experiencing, has received little attention in previous risk assessments for cities. In the **city stress test** of the German Federal Office for Construction, the following **six scenarios** were defined as probable and tested on a pilot basis:

- Climate change
- Demographic change and migration
- Digitization
- Economic slump
- Industry change
- Social polarization

World Risk Report of the German Development Alliance

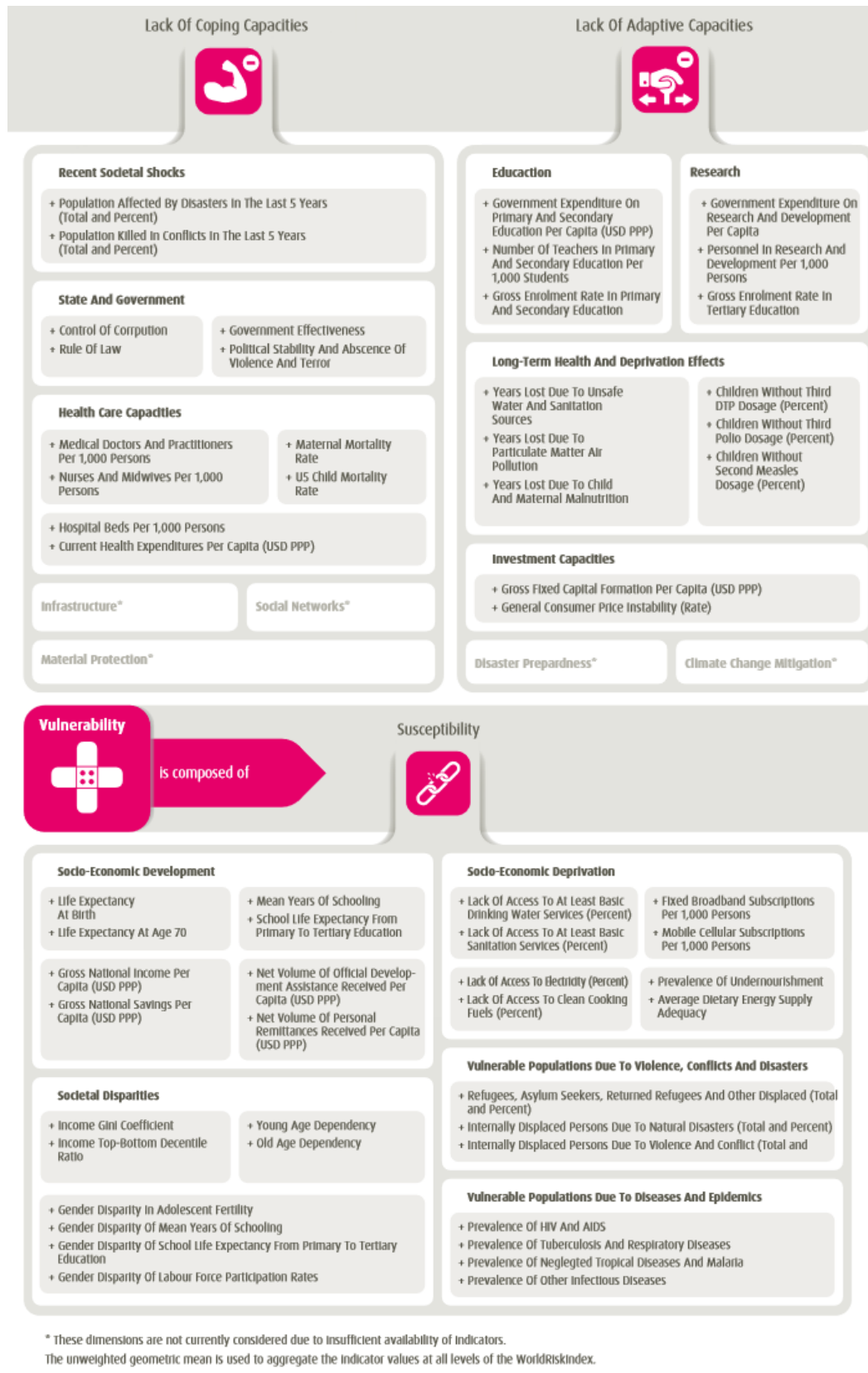
This report focuses on the disaster risk caused by extreme natural events. Every year, a World Risk Index is calculated and published for 181 countries around the world based on selected indicators.²⁹ The country index is calculated by multiplying exposure and vulnerability. The exposure stands for the threat to the population from earthquakes, storms, floods, droughts, and sea-level rise.

Figure 12 Components and indicators of the World Risk Index



²⁹ <https://weltrisikobericht.de/>

MEASURES AND ACTIVITIES OF CITIES TO STRENGTHEN RESILIENCE



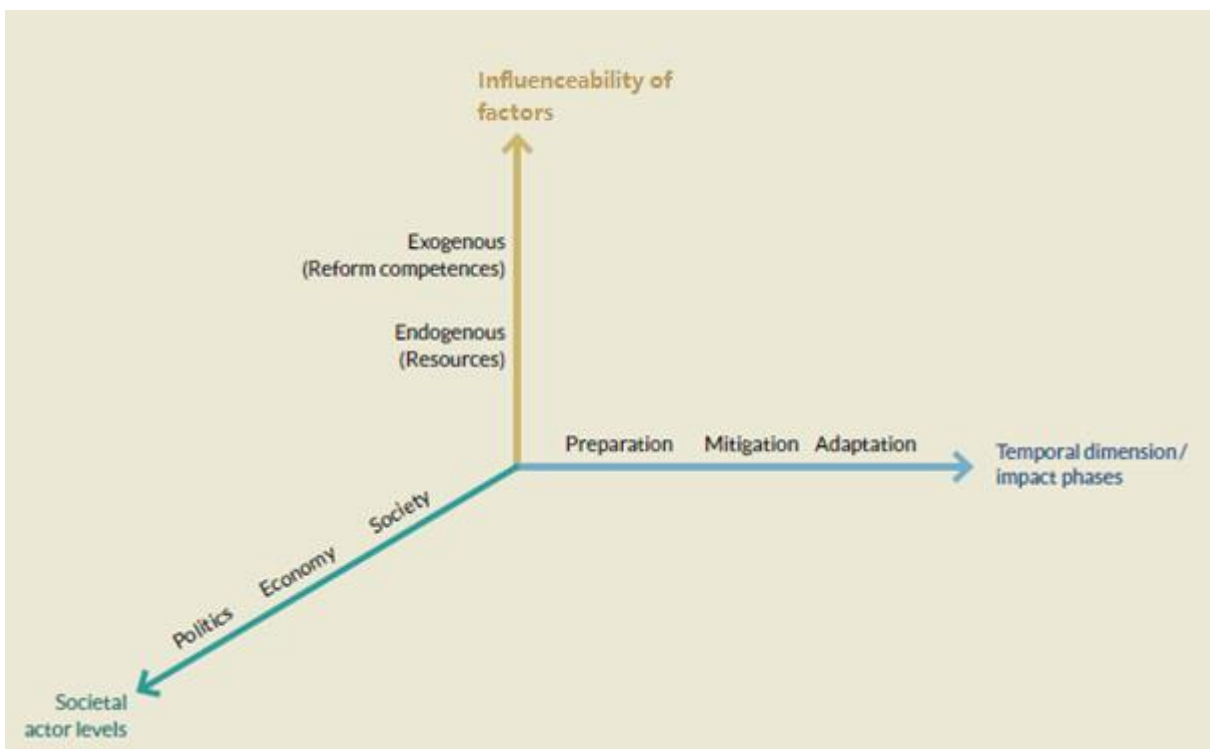
Source: Bündnis_Entwicklung_hilft, RUB (Ruhr University Bochum), IFHV: WorldRiskReport 2022 - Focus: Digitalization, 2022, <https://weltrisikobericht.de>

1.2 Instruments to strengthen resilience

The Bertelsmann Foundation defines the dimensions that an effective **resilience strategy** must target as follows:³⁰

1. Strengthening of existing **crisis processing skills** (influenceability of factors)
2. In-depth consideration of the different **phases of crisis** (temporal dimensions/impact phases) and
3. **Addressing of the different levels** including their interaction (social/actor levels)

Figure 13 Dimensions of a resilience strategy



Source: Brinkmann Henrik, Harendt Christoph, Heinemann Friedrich, Nover Justus: Economic Resilience - Key Concept for a New Economic Policy Model?, Inclusive Growth for Germany No. 11, Bertelsmann Foundation (ed.), Gütersloh 2017, p. 14.

Dimension „Influenceability of factors“:

Regarding the dimension of the influenceability of factors, the following **endogenous starting points and instruments for strengthening resilience at the urban level** (competences) can be mentioned as examples:

- Resilience Strategy
- Data-based risk assessment (impact and vulnerability)
- Resilience management: Development of emergency structures, early warning systems, urban eco-management, etc.

³⁰ Brinkmann Henrik, Harendt Christoph, Heinemann Friedrich, Nover Justus: Economic resilience - a key concept for a new economic policy Model? Inclusive Growth for Germany No. 11, Bertelsmann Foundation (ed.), Gütersloh 2017, p. 14.

- Networking and cooperation, participation
- Action Plan for Resilience
- Monitoring
- Forward-looking zoning planning
- Awareness raising and training (strengthening social capital)
- Financial risk management and insurance
- etc.

Exogenous approaches, on the other hand, provide financial **compensation for strengthening urban resilience from higher levels** (federal states, federal government, EU) such as:

- National Disaster Fund
- Municipal autonomy
- Fiscal equalization instruments (e.g., tax autonomy, transfer relationships, task orientation)
- Instruments for regional compensation (incl. regional funds, municipal structural reform)
- State governance, such as ongoing evaluations, crisis funds or multi-level governance using the example of climate protection
- EU construction plan
- etc.

Dimension „Temporal dimensions/effect phase“:

Disaster management essentially distinguishes between three rough phases:

- emergency aid
- reconstruction
- prevention/precaution

Based on this, the tasks of public administration in **the resilience-cycle** are described as follows:

- Phase 1 (react): Management for crisis and disaster management
- Phase 2 (regenerate): damage repair, restructuring and reorganization
- Phase 3 (prepare-precaution-protect):
 - o Analysis and assessment of resilience (e.g., stress test city) and
 - o Increased adaptability and robustness (e.g., emergency structures, protective measures, compensation mechanisms, etc.)

Figure 14 The Resilience Management Cycle



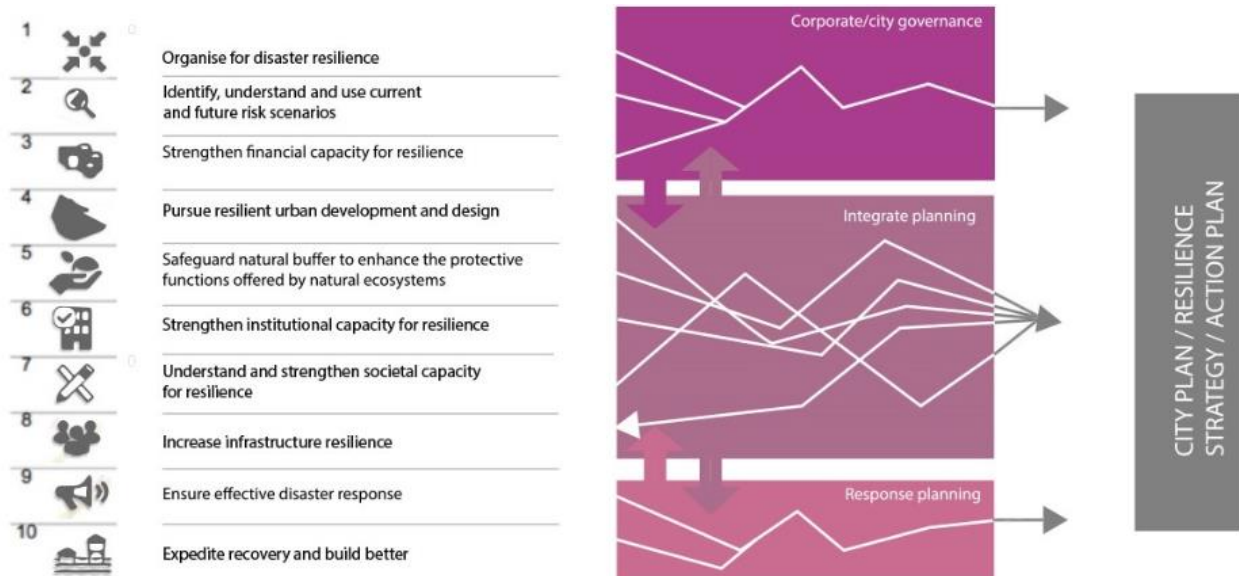
Source: Devecchi, Lineo Umberto, and Eva-Maria Haßheider: Resiliente Gemeinden in der Modellregion Bodensee: Robust und agil durch Partizipation, Internationale Bodenseehochschule (IBH), 2020.

UNDRR: Toolkit: The TEN Essentials for Making Cities Resilient³¹

The toolkit of the UN Office for Disaster Reduction provides an operational framework for the implementation of the Sendai Framework for Disaster Risk Reduction at the local level. The strategic approaches and key measures for the individual areas of intervention are broken down to the local level. However, the focus is on catastrophic events. Other risks and challenges are not considered.

³¹ <https://www.unisdr.org/campaign/resilientcities/toolkit/article/the-ten-essentials-for-making-cities-resilient>

Figure 15 The TEN Essentials for Making Cities Resilient



Source: <https://www.unisdr.org/campaign/resilientcities/toolkit/article/the-ten-essentials-for-making-cities-resilient>.

2 Current studies and activities of the cities

- ❑ urban_innovation_vienna, a company of wienholding: Resilient Cities 2018, Study commissioned by the City of Vienna MA18 - Urban Development and Urban Planning", Vienna 2018
- ❑ Devecchi, Lineo Umberto, and Eva-Maria Haßheider: Das research project Resilient Communities in the Lake Constance Model Region: Robust and Agile through Participation, International Lake Constance University (IBH), 2020.
- ❑ Resilience strategies in selected cities: e.g. Athens, Atlanta, Bristol, Glasgow, Melbourne, Montreal, New York City, Paris, Rotterdam, San Francisco and Sydney.³²
- ❑ The 100 Resilient Cities project.
- ❑ OECD: Case studies "Resilient Cities" (e.g. Antalya, Belo Horizonte, Cardiff, Kyoto, Lisbon, Oslo, Ottawa, Tampere...)
- ❑ EU: URBACT Networks: Resilient Europe: Improving city resilience;³³
- Integrated Action plans for urban resilience of the cities of Rotterdam, Glasgow, Antwerpen, Burgas, Bristop, Potenza, Joannina, Thessaloniki, Katowice, Malmö, Vejle

3 Networks and actors

In addition to the 100 Resilience Cities Network and the OECD Resilience Program, there are **numerous other resilience concepts, models and initiatives** internationally. However, these focus more strongly on individual areas such as resilience to climatic events as a result of climate change, etc. Some of them are listed below **as examples**:

³² See: a urban_innovation_vienna, a company of wienholding: Resilient Cities 2018, Studie im Auftrag der Stadt Wien MA18 - Stadtentwicklung und Stadtplanung", Vienna 2018.

³³ <https://urbact.eu/resilient-europe>

- ❑ European Commission: RESCCUE Project (Resilience to cope with Climate Change in Urban Areas), <https://cordis.europa.eu/project/id/700174/de>, <https://toolkit.resccue.eu/>
- ❑ European Union: URBACT Network Resilient Europe: Improving city resilience, <https://urbact.eu/resilient-europe>
- ❑ UN Habitat: City Resilience Profiling Program (CRPP) with a focus on climate change and natural disasters, <https://unhabitat.org/programme/city-resilience-profiling-programme>
- ❑ UNDP: Community Based Resilience Analysis (CoBRA), focusing on natural disasters and ecological management in African countries, <https://cordis.europa.eu/project/id/700174/de>
- ❑ World Bank: Resilient Cities Program, <https://www.worldbank.org/en/topic/disasterriskmanagement/brief/city-resilience-program>
- ❑ UNDRR (UNISDR): Making cities resilient campaign <https://www.unisdr.org/campaign/resilientcities>
- ❑ ICLEI (International Council for Local Environmental Initiatives) – Local Governments for Sustainability, <https://www.iclei.org>
- ❑ University partnership: HeKris – Challenges of resilience in European cities. National Technical University of Athens – NTUA (Faculty of Architecture) and Leibniz Universität Hannover – LUH (Faculty of Architecture and Landscape), <http://resilient-cities.eu/en/>
- ❑ etc.

Platforms and networking events

- ❑ European Urban Resilience Forum, Sept. 2021, <https://urbanresilienceforum.eu/>
- ❑ European Commission: Urban Data Platform "The future of cities: The resilient city" <https://urban.jrc.ec.europa.eu/thefutureofcities/open-questions#the-chapter>
- ❑ Resilient Cities – The Annual Global Forum on Urban Resilience and Adaptation – is the global platform for urban resilience and climate change adaptation, <https://resilientcities2019.iclei.org/>
- ❑ UN Habitat: Urban Resilience Hub, <https://urbanresiliencehub.org/news/>
- ❑ etc.

III Further information

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