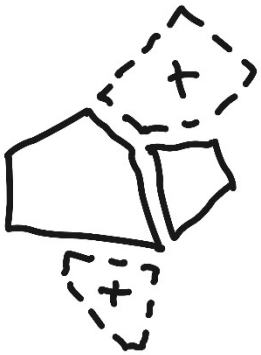
Attachment WP 1: Toolbox

REDUNDANCY



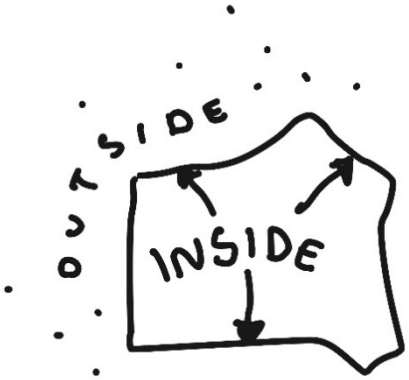
WHAT DOES THE URBAN RESILIENCE PRINCIPLE „REDUNDANCY“ MEAN?

Same functions are provided multiple times, so that spare capacities are kept free to be able to react to unforeseeable risks and access them if necessary. The focus of this principle is on securing basic functional conditions in the case of an emergency.

HOW TO ACHIEVE IT?

URBAN STRUCTURE	**Identify, check and preserve spatial back-ups** Back-up areas are reserved and held back so that they can be accessed in an emergency. Depending on their type and location, these areas can be used temporarily until an emergency arises.
MOBILITY	**Double-structures for multiple evacuation-routes** Alternative supply routes and redundant road networks minimize the impact of extreme events. They offer alternatives for partially blocked or damaged road networks until they are restored.
OPEN SPACES	**Redundant retention areas** Natural open space structures must be protected as redundant retention areas, for example to provide sufficient space for flooding in the event of flooding and thus protect inhabited areas.
SAFETY	**Implementation of multiple power supply circuits** A city's power supply is divided into several redundant circuits. In the event of damage, the other circuits compensate for deficits. Sufficient spatial separation of the structures is important in this case. Example: A city has multiple power sources, such as solar, wind, and traditional power plants, to ensure continuous electricity supply even if one source fails. **Providing of neighborhood-level shelters and caches of food and water**

EFFICIENCY



WHAT DOES THE URBAN RESILIENCE PRINCIPLE „EFFICIENCY“ MEAN?

Spatial functions are planned in a spatially efficient manner or embedded in existing structures, resulting in efficient spatial structures.

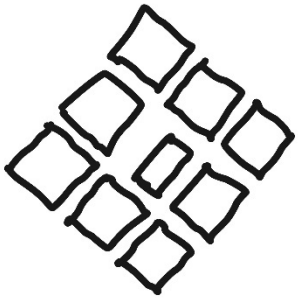
HOW TO ACHIEVE IT?

URBAN STRUCTURE	**Development of compact, green and mixed-use quarters** Efficient cities and quarters focus on compact, green and mixed-use planning. Inner development is preferred to outer development to create clear settlement boundaries and a clear “inside” and “outside”. The premise of compact cities and quarters not only enables a higher density and the strengthening of urban spaces, but also the protection of natural resources in the surrounding area and the avoidance of urban sprawl. Despite the desired urban density with a mix of uses, short distances, easily accessible quarter services and, above all, easily accessible green spaces must be developed and guaranteed as a stable framework for residents. Toolbox for compact, green and mixed-use quarters - Clear distinction between inside and outside: prioritizing inner development to avoid urban sprawl in the countryside - Densification within existing urban structure - Dense structures for resource- and space-saving development **Climate-sensitive densification within the quarter** Urban densification can offer great potential for sustainable urban development if a climate-friendly design and approach to development are considered. In principle, the focus is on densifying existing neighborhoods to conserve space and resources. There are various approaches to densification: Adding stories and extensions to existing buildings, closing block edges or densifying block interiors. Larger-scale developments can be achieved through the conversion and restructuring of existing quarters or areas. To avoid negative climatic consequences when densifying, the following points, among others, should be considered. Toolbox for climate-sensitive densification within the quarter - Optimized openings of blocks to climate-relevant open spaces - The orientation of new buildings is designed for climatically relevant functions - Degree of sealing is kept low in new developments

	- Building structures are climate-friendly designed **Development of short-distance-quarters** Short distances in everyday life lead to less dependence on motorized transport and reduce local CO2 emissions. Short distances are made possible above all by offering everyday goods at short distances in quarters - such as the Parisian model of the 15-minute city.
MOBILITY	**Integration of climate-friendly mobility** Short distances within the city reduce motorized private transport, strengthen the public transport and open up opportunities to redistribute existing areas, thereby giving pedestrians and cyclists more space and designing street spaces in a climate-friendly way. <u>Toolbox for integration of climate-friendly mobility</u> - Combination of slow mobility and heat relief - Space-saving mobility infrastructure with low sealing - Continuously shaded networks of primary foot- and cycle paths
OPEN SPACES	**Climate-friendly design of public spaces** Public urban spaces are places for residents of a quarter to spend time, meet and exchange with others. It is therefore particularly important to design these spaces in a climate-friendly way so that, in addition to increasing the quality of stay, they can also respond to the consequences of climate change. <u>Toolbox for climate-friendly design of public spaces</u> - Integration of blue-green-gray infrastructure - Shaded public spaces - Water-sensitive design - Cooling and tangible water elements - Unsealed surfaces **Development of climate-friendly open space systems** To respond to climate extremes as efficiently as possible, existing open spaces must be protected, developed further, put into context and made accessible - they thus become a coherent system. <u>Toolbox for the development of climate-friendly open space systems</u> - Protection of air induction passages - Establishing and optimizing connectivity and accessibility to higher-level green spaces - Protection and development of green spaces - Greenery of courtyards **Sponge city principle: retaining and using rainwater as a resource** The efficient use of resources can also be achieved by utilizing rainwater by circulating it within the urban system using the sponge city principle. Water

	as a resource can thus be managed decentrally, seeped away, stored and used for evaporation on hot days. Toolbox for implementing the sponge city principle - Maintaining and creating retention areas - Using rainwater harvesting and greywater recycling to reduce reliance on the main water supply and manage water resources sustainably - Storing rainwater and using it for evaporation and infiltration

ROBUSTNESS



WHAT DOES THE URBAN RESILIENCE PRINCIPLE „ROBUSTNESS“ MEAN?

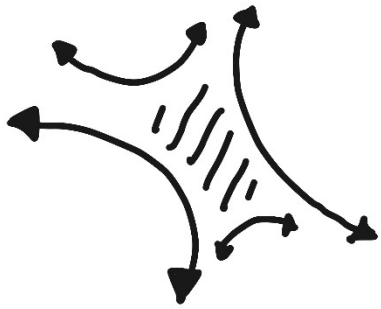
Robust systems take precautions, are self-sufficient in an emergency and overcome crises independently. They have the ability to withstand the effects of extreme conditions and avoid catastrophic collapse of the city due to the failure of a single element by anticipating system failures and taking precautions to maximize predictability and safety

HOW TO ACHIEVE IT?

URBAN STRUCTURE	**Strengthening the building stock to create stable urban structures** To create stable and robust urban structures, framework conditions must be established that clarify the basic urban structure, architectural characteristics or structural features of a city or neighborhood. <u>Toolbox for creating stable urban structures</u> - Defining spaces and building stocks due to ownership and responsibility - Development of robust typologies **Urban identity as a strength** The architectural heritage of cities creates a sense of identity for its inhabitants and is an important symbol of continuity and stability, even in times of crisis. It must be protected as a cultural backbone. <u>Toolbox for strengthening urban identity</u> - Urban and architectural heritage is protected and preserved as a cultural asset - Historically significant buildings are subject to special protection - Cautious design of historically significant zones in a city **Self-sufficiency through circular quarters**

	Circular cities and quarters strengthen local markets and self-sufficiency by activating local production. This leads to the strengthening of regional supply networks, which ensure a self-sufficient supply of everyday goods in the event of a crisis.
MOBILITY	**Clear hierarchies of streetscapes and squares**
OPEN SPACES	**Preserving landscape heritage** **Development of open spaces into a robust framework of a city/quarter** **Development of urban-/vertical agriculture**
SAFETY	**Developing and maintaining a safe grid of reachable shelter and bunker** Continuously maintaining and strengthening bomb shelters and underground bunkers to ensure long-term protection for civilians during ongoing conflicts. **Providing of neighborhood-level shelters and caches of food and water**

FLEXIBILITY



WHAT DOES THE URBAN RESILIENCE PRINCIPLE „FLEXIBILITY“ MEAN?

Flexible systems can change, evolve and adapt to changing circumstances.

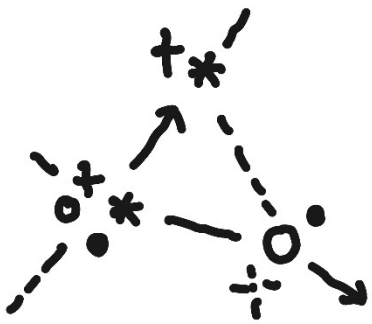
HOW TO ACHIEVE IT?

URBAN STRUCTURE	**Development of polycentric structures** Polycentric structures can function independently and autonomously in an emergency and cover daily needs at a local level. They guarantee decentralized supply and form the anchors of a quarter in their individual centers. <u>Toolbox for the development of polycentric structures</u> - Equip and develop quarter centers as anchors of a neighborhood with everyday amenities - Polycentric structures are embedded in a hierarchical network of different scales

	- Ensure decentralized supply **Planning flexible building structures and transforming existing ones** Flexible building structures can respond better to changing conditions in the living and working conditions. A flexible, small-scale, subdivided building structure enables small-scale mixed use and opens spaces for experimentation and appropriation. Vacant buildings offer space for temporary use and conversion of existing buildings. <u>Toolbox for flexible building structures</u> - Parcel out blocks into small sections - Activate vacancies through pop-ups, conversion and temporary use - Transformation of socialistic structures into hybrid blocks - Transforming conflict-loaded urban and architectural heritage into new typologies
OPEN SPACES	**Flexible design of public spaces** Public spaces must meet a wide variety of requirements and should therefore be developed flexibly in terms of their design. Opportunities for flexible design lie above all in the conversion of parking spaces and the use of mobile street furniture. The flexible design of public spaces can enhance the quality of stay, allow temporary use, but also quickly make room for transportation or evacuation in an emergency. <u>Tools for flexible public spaces</u> - Mobile urban furniture for a more flexible design of public squares, streets and green spaces - Transforming parking spaces into parklets **Diverse scales of public spaces** Diverse scales of public spaces make it possible for different user groups to come together and run together with the development of polycentric structures. Overarching public spaces accommodate a broad public and have a representative effect. Smaller public spaces spread across the city have a primarily local impact, forming subordinate supply centers that cover daily needs and provide neighborhood hubs that strengthen social cohesion.
SAFETY	**Implementation of multiple critical infrastructures** Establish modular / decentralized infrastructures (water, electricity, gas or telecommunications networks) to prevent cascading incidents. **Qualifying suitable building structures to shelters** In the case of extreme emergencies, a selected building stock should be flexibly converted into emergency shelter and made accessible. <u>Tools for qualifying existing building stocks to shelter</u> - Making existing infrastructures accessible as safe spaces: metro, existing bunkers, basements of public buildings - Transformation of publicly accessible buildings into shelter in case of emergency

	- During an unexpected attack, a city quickly converts schools and community centers into emergency shelters and medical facilities to accommodate displaced residents

DIVERSITY



WHAT DOES THE URBAN RESILIENCE PRINCIPLE „DIVERSITY“ MEAN?

Urban systems are less vulnerable to disruptions when different alternatives and choices are provided. Diversity enables a faster response to crises and the ability to adapt to new conditions.

HOW TO ACHIEVE IT?

URBAN STRUCTURE	**Establish multifunctional and diverse (sub-) centers** A multifunctional polycentric structure enables good accessibility to all necessary functions within a small, easily accessible radius and reduces dependencies in the case of a disruption. Typological diversity also makes it possible to develop different residential concepts and strengthen a diverse neighborhood. <u>Toolbox for creating diverse (sub-) centers</u> - Mix of typologies - Active first-floor-zones - Integrate new usage concepts in the quarter: Third places (combinations of business, culture, education and participation)
MOBILITY	**Mixed-used mobility-hubs in different scales** Mobility hubs are, on the one hand, parking garages that have easily accessible locations and can accommodate stationary traffic from public spaces. At the same time, they should be able to accommodate other functions to provide sustainable and long-term added value for the neighborhood beyond their actual purpose. They can be designed on different scales. <u>Toolbox for mixed-used mobility-hubs</u> - Combination of a wide range of mobility services with additional service facilities: Parcel, energy or recycling stations - Accommodation of social and cultural facilities for community activities and neighborly encounters - Productive mobility hubs through commercial or craft uses

	- Using the roof surfaces of mobility hubs as retention roofs for a better urban climate - Accommodating energy or food production on the roof surfaces **Diverse and integrated mobility-mix** Provide a diverse and integrated mobility mix by optimizing public transport, footpaths and cycle paths as well as sharing concepts: If one of the transport fails, there are sufficient options to switch to.
OPEN SPACES	**Development of diverse designed public spaces** Diversely designed public spaces can respond to different requirements - it is particularly important that they are easily accessible and equipped with green spaces and shaded areas to offer sufficient capacity for recreation during extreme events such as heat-stress or pandemics.
SAFETY	**Development of safe-hubs** The concept of mobility hubs can be further developed into safe hubs, which are primarily intended for cases of disaster. It is important to plan for basic care and protection in the case of an acute disaster. <u>Toolbox for safe-hubs</u> - Integration of shelters - Provide electricity and water for short-term stays - Ensure good accessibility for all **Decentralization of critical infrastructures ensures a supply network despite isolated outages**