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Security and resilience — Urban resilience — Framework and principles

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 292, *Security and resilience*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

The justification for a global set of standards for achieving urban resilience is clear: urban areas, the engines of economic growth, are projected to provide the living and work environment for two-thirds of the global population of close to 10 billion by 2050. Urban disasters have an increasingly costly local, regional, national and global socio-economic impact. For example, disaster events in the past decade alone have claimed over a million lives, affected more than 2,5 billion people and caused over $1 trillion in economic loss.

By engaging all stakeholders in resilience efforts, urban areas have the ability to harness transformational change and improve the lives of their inhabitants. This has been acknowledged by the global community as an essential aspect of the United Nations (UN) 2030 Agenda for Sustainable Development[1)] through agreements such as the Sustainable Development Goals (SDGs), New Urban Agenda[2)], Paris Agreement[3)] and Sendai[4)] Framework. However, urban areas tend to lack the capacity to operationalize these alone and fully harness change. One approach to addressing this and ensuring implementation of the 2030 Agenda is through holistic and multi-stakeholder resilience-building.

Resilience offers a crucial meeting point among different yet essentially similar paradigms in urban development. Enhancing resilience can reduce risks by increasing capacities, and addressing vulnerabilities, thereby supporting effective and forward-thinking responses. Building urban resilience seeks the betterment of people, specifically those in vulnerable situations in urban areas.

The proposed framework for urban resilience presented in this document was developed in response to demand arising from urban areas in all parts of the world for support to make them safer and more resilient to all manner of hazards, risks, weaknesses and vulnerabilities. It was developed to provide local governments and relevant stakeholders with analytical tools to measure urban resilience and develop relevant actions.

The framework aims to transform urban areas into better places to live by improving capacities to prepare, respond and recover from all potential shocks, stresses and challenges, leading the area towards resilience. The framework views urban resilience as a hub for transversal aspects including risk reduction, sustainability, development and governance. It achieves this by understanding and measuring resilience, in any human settlement in any circumstance or context. Furthermore, the framework provides an approach for building resilience baselines (or "profiles"), prepares guidelines in the use of the diagnostic and action-planning tools, and advises on constant real-time monitoring.

The early stages of development of this framework involved extensive testing and modelling in urban areas all over the world, and the refinement and improvement of data acquisition, use and application. The approach is to establish a building resilience baseline (or profile), based on metrics that can evaluate the various dimensions of urban resilience and capture the system's weaknesses, vulnerabilities and strengths. Then to develop concrete and prioritized actions to address risk and build-in resilience. The framework follows a multi-sectorial, multi-shocks and stresses, and multi-scales approach, built on the understanding that urban areas function as urban systems, integrated and interdependent, regardless of their size, culture, location, economy and/or political environment.

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1) In 2015, countries adopted the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs).

2) The New Urban Agenda was adopted at the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) in Quito, Ecuador, on 20 October 2016. It was endorsed by the United Nations General Assembly at its sixty-eighth plenary meeting of the seventy-first session on 23 December 2016. The New Urban Agenda represents a shared vision for a better and more sustainable future. If well-planned and well-managed, urbanization can be a powerful tool for sustainable development for both developing and developed countries.

3) The Paris Agreement is a global landmark agreement, signed in December 2015, for combating climate change effects. Its central aim is to strengthen the global response to the threat of climate change.

4) The Sendai Framework was adopted by UN Member States on 18 March 2015 at the Third UN World Conference on Disaster Risk Reduction in Sendai City, Miyagi Prefecture, Japan. The framework for 2015–2030 was developed to better assist governments, at the national and local levels, in addressing disaster risk reduction and resilience-building.

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The implementation process for the framework is shown in Figure 1.

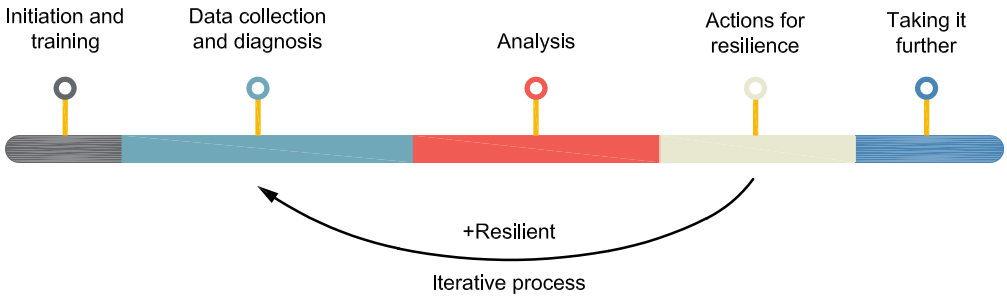

Figure 1 — Implementation process

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Security and resilience — Urban resilience — Framework and principles

1 Scope

This document describes a framework and principles that are coherent with the 2030 Agenda for Sustainable Development, including the New Urban Agenda, Paris Agreement and Sendai Framework, that can be applied to enhance urban resilience. This document proposes the use of metrics and models as the framework upon which to structure urban resilience to assist local authorities and other urban stakeholder's efforts to build more resilient human settlements.

This document is primarily intended for use by organizations with responsibility for urban governance. However, it is equally applicable to all types and sizes of organizations that represent the community of stakeholders noted above, and in particular those organizations that have a role in urban planning, development and management processes in urban areas around the world.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 22300, *Security and resilience — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 22300 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
access
ability of the rights-holders to use or benefit of a certain service or product

Note 1 to entry: Restrictions can be caused by distance to the source (e.g. water supply network does not reach a certain neighbourhood) or unaffordability (e.g. service is too costly for a certain household or group of people), among other reasons.

3.2
basic social services
set of services delivered in education, health and social areas, as a means to fulfil basic needs

3.3
biodiversity
variability among living organisms from all sources including, land, marine and other aquatic *ecosystems* (3.13) and the ecological complexes of which the organisms are part

Note 1 to entry: This includes diversity within species, between species and of ecosystems. Biodiversity is thus not only the sum of all ecosystems, species and genetic material, but rather represents the variability within and among them.

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Note 2 to entry: Biodiversity can also be referred to as "biological diversity".

[SOURCE: Chan L. et al., 2014, adapted]

3.4
challenge
contextual or environmental change that has the potential to impact upon the ability and capacity of an *urban system* (3.27) to address emerging risks and opportunities

3.5
civil society
wide range of individuals, groups of people, networks, movements, associations and organizations that manifest and advocate for the interests of their members and others

Note 1 to entry: It can be based on philanthropic, cultural, religious, environmental or political values and convictions.

Note 2 to entry: This definition excludes for-profit companies and businesses, academia and all government-dependent entities.

3.6
civil society organization
CSO
formal association in which society voluntarily organizes around shared interests

Note 1 to entry: It includes political, cultural, environmental and faith-based organizations, as well as non-profit and nongovernmental organizations.

Note 2 to entry: CSOs are institutionalized organizations, bearing some form of legal status, that represent particular groups of society and are involved in service delivery.

3.7
coverage
capacity of the *duty-bearer* (3.11) to provide a service or product

Note 1 to entry: It can be influenced by financial capacity, geospatial setting, and the normative and institutional frameworks.

3.8
critical facility
physical structure, network or other asset that provide services that are essential to the social and economic functioning of a community or society

[SOURCE: UNISDR, 2017, modified — The term "critical facility" has replaced "critical infrastructure".]

3.9
decentralized authority
local authorities, distinct from the state's administrative authorities, that have a degree of self-government, elaborated in the framework of the law, with their own powers, resources and capacities to meet responsibilities, and with legitimacy underpinned by representative, elected local democratic structures that determine how power is exercised and that make local authorities accountable to citizens in their jurisdiction

[SOURCE: UCLG, GOLD I, 2008, adapted]

3.10
disaster risk reduction
policy aimed at preventing new and reducing existing disaster risk and managing residual risk, all of which contribute to strengthening *resilience* (3.19) and therefore to the achievement of sustainable development

[SOURCE: UNISDR, 2017, modified — "policy" has replaced "Disaster risk reduction is".]

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3.11
duty-bearer
individual who has a particular obligation or responsibility to respect, promote and realize *human rights* (3.15), and to abstain from human rights violations

Note 1 to entry: The term is most commonly used to refer to State actors, but non-State actors can also be considered as duty-bearers.

Note 2 to entry: Depending on the context, individuals (e.g. parents), local organizations, private companies, aid donors and international institutions can also be duty-bearers.

[SOURCE: UNICEF]

3.12
economic diversity
extent to which economic activity of a given defined geography is distributed among a number of categories such as industries, sectors, skill levels and employment levels

3.13
ecosystem
dynamic complex of plant, animal, and micro-organism communities and their non-living environment (e.g. soil, air, sunlight) interacting as a functioning unit of nature

Note 1 to entry: Everything that lives in an ecosystem is dependent on the other species and elements that are also part of that ecological community.

[SOURCE: ISO 14055-1:2017, 3.1.1, modified — "(e.g. soil, air, sunlight) interacting as a functioning unit of nature" has replaced "interacting as a functional unit" and Note 1 to entry has been added.]

3.14
ecosystem services
benefit people obtain from *ecosystems* (3.13)

Note 1 to entry: These include: provisioning services such as food, water, timber and fibre; regulating services that affect the climate, floods, disease, waste generation and water quality; cultural services that provide recreational, aesthetic and spiritual benefits; and supporting services such as soil formation, photosynthesis and nutrient cycling.

[SOURCE: ISO 14055-1:2017, 3.1.2, modified — Note 1 to entry has been revised and expanded.]

3.15
human rights
rights inherent to all human beings, whatever their nationality, place of residence, sex, national or ethnic origin, colour, religion, language or any other status

Note 1 to entry: People are all equally entitled to their human rights without discrimination.

Note 2 to entry: Human rights are: interrelated, universal and inalienable; interdependent and indivisible; equal and non-discriminatory; and both rights and obligations.

3.16
investment
allocation of resources to achieve defined objectives and other benefits

Note 1 to entry: Investment takes two main forms: direct spending on buildings, machinery and similar assets; and indirect spending on financial securities such as bonds and shares.

[SOURCE: ISO/IEC 38500:2015, 2.13, modified — Note 1 to entry has been added.]

3.17
land tenure
relationship, whether legally or customarily defined, among people, as individuals or groups, with respect to land, determining how land is used, possessed, sold or in other ways disposed

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3.18
participation
informed process of engagement with stakeholders, where key groups actively participate in defining the process and content of policy making

3.19
resilience
ability to absorb and adapt in a changing environment

Note 1 to entry: In the context of *urban resilience* (3.26) the ability to absorb and adapt to a changing environment is determined by the collective capacity to anticipate, prepare and respond to threats and opportunities by each individual component of an *urban system* (3.27).

[SOURCE: ISO 22300:2018, 3.192, modified — Note 1 to entry has been added.]

3.20
risk mitigation
lessening or minimizing of the adverse impacts of a hazardous event

[SOURCE: UNISDR, 2017, modified — The term "risk mitigation" has replaced "mitigation".]

3.21
shock
uncertain, abrupt or long-onset event, that has potential to impact upon the purpose or objectives of an *urban system* (3.27)

3.22
social protection
preventing, managing and overcoming situations that adversely affect people's well-being

Note 1 to entry: It consists of policies and programmes designed to reduce poverty and vulnerability by promoting efficient labour markets, diminishing people's exposure to risks, and enhancing their capacity to manage economic and social risks, such as unemployment, exclusion, sickness, disability and old age.

[SOURCE: UNRISD, 2010, modified — Note 1 to entry has been added.]

3.23
stress
chronic and ongoing dynamic pressure originated within an *urban system* (3.27), with the potential for cumulative impacts on the ability and capacity of the system to achieve its objectives

3.24
urban agglomeration
physical structure and composition of an urban area or continuity of large urban clusters where the built-up zone or population density of an extended city or town area or central place and any suburbs are linked by continuous, connected urban development

3.25
urban open area
vacant areas, public or private, within urban boundaries

Note 1 to entry: Urban open areas are all fringe open spaces and captured open spaces associated within the scope and parameters of the *urban system* (3.27).

Note 2 to entry: State parks, national parks or open areas in the countryside outside the parameters of the urban area are not considered as urban open areas in this document.

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3.26
urban resilience
ability of any *urban system* (3.27), with its inhabitants, in a changing environment, to anticipate, prepare, respond to and absorb *shocks* (3.21), positively adapt and transform in the face of *stresses* (3.23) and *challenges* (3.4), while facilitating inclusive and sustainable development

Note 1 to entry: A more resilient urban system is characterized by its ability to continue through disruption in the short-to-medium term, combined with a capacity to reduce pressures and adapt to changes, risks and opportunities. Urban resilience, therefore, is dependent upon the ability of an urban systems not just to deal with shocks, but also with chronic stresses and challenges.

Note 2 to entry: Urban resilience is dependent upon the individual and collective *resilience* (3.19) of the separate components of a complex urban system. Although a city, town or community within an urban area can individually demonstrate enhanced resilience within its respective boundaries, urban resilience encompasses the broader geographic scope of *urban agglomeration* (3.24). Resilience of an urban system is measured by the capacity for resilience of each individual system component and dependent upon the resilience of the weakest performer among the urban agglomeration within the system scope.

Note 3 to entry: In order to assess, plan and act accordingly in the face of shocks, stresses and challenges, an urban system's capability for resilience should be measured and analysed through qualitative and quantitative data.

3.27
urban system
human settlement, integrated and complex set of system components, characterised by universal and interdependent dimensions: physical, functional, organizational and spatial; comprised of people, processes and assets managed through effective governance mechanisms

Note 1 to entry: Being dynamic, the composition and elements of an urban system changes with time.

Note 2 to entry: Every urban area has characteristics of an urban system, regardless of its size, culture, location, economy and/or political environment.

Note 3 to entry: Characterized as urban systems, urban areas have the objectives of managing the complex interactions and interdependencies among its multiple components, with the purpose of fulfilling a variety of functionalities including social, economic, cultural and environmental.

3.28
vulnerable group
individuals who share one or several characteristics that make them more susceptible to social exclusion and marginalization, have limited opportunities or income, and/or are exposed to a higher risk of suffering abuse (physical, sexual, psychological or financial)

Note 1 to entry: This can include children without parental care, poor people, alone and dependent elderly people, ethnic minorities, people with disabilities, people living in marginalized communities, and other categories (HIV/AIDS, addictions, deprivation of liberty, homeless, LGBTI, victims of domestic violence, trafficking, refugees and immigrants).

4 Principles for building urban resilience

4.1 Principle 1: Dynamic nature of urban resilience

Resilience is not a condition but a state that cannot be sustained unless the system evolves, transforms and adapts to current and future circumstances and changes. Therefore, building resilience requires the implementation of context-specific and flexible plans and actions that can be adjusted to the dynamic nature of risk and resilience.

4.2 Principle 2: Systemic approach

Recognizing that urban areas are comprised of systems interconnected through complex networks and that changes in one part have the potential to propagate through the whole network, building resilience

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