



# ISO 22371: Principles, framework and guidelines on urban resilience

Prof. Caroline Field MSc CEng FICE RSES

Partner, PA Consulting | Co-Founder Centre for Whole of Society  
Resilience | Visiting Professor, Loughborough University

Dr. Guy Felio, PEng FCSCE FIAM IRP

Independent Consultant



---

# We are living in an increasingly VUCA environment



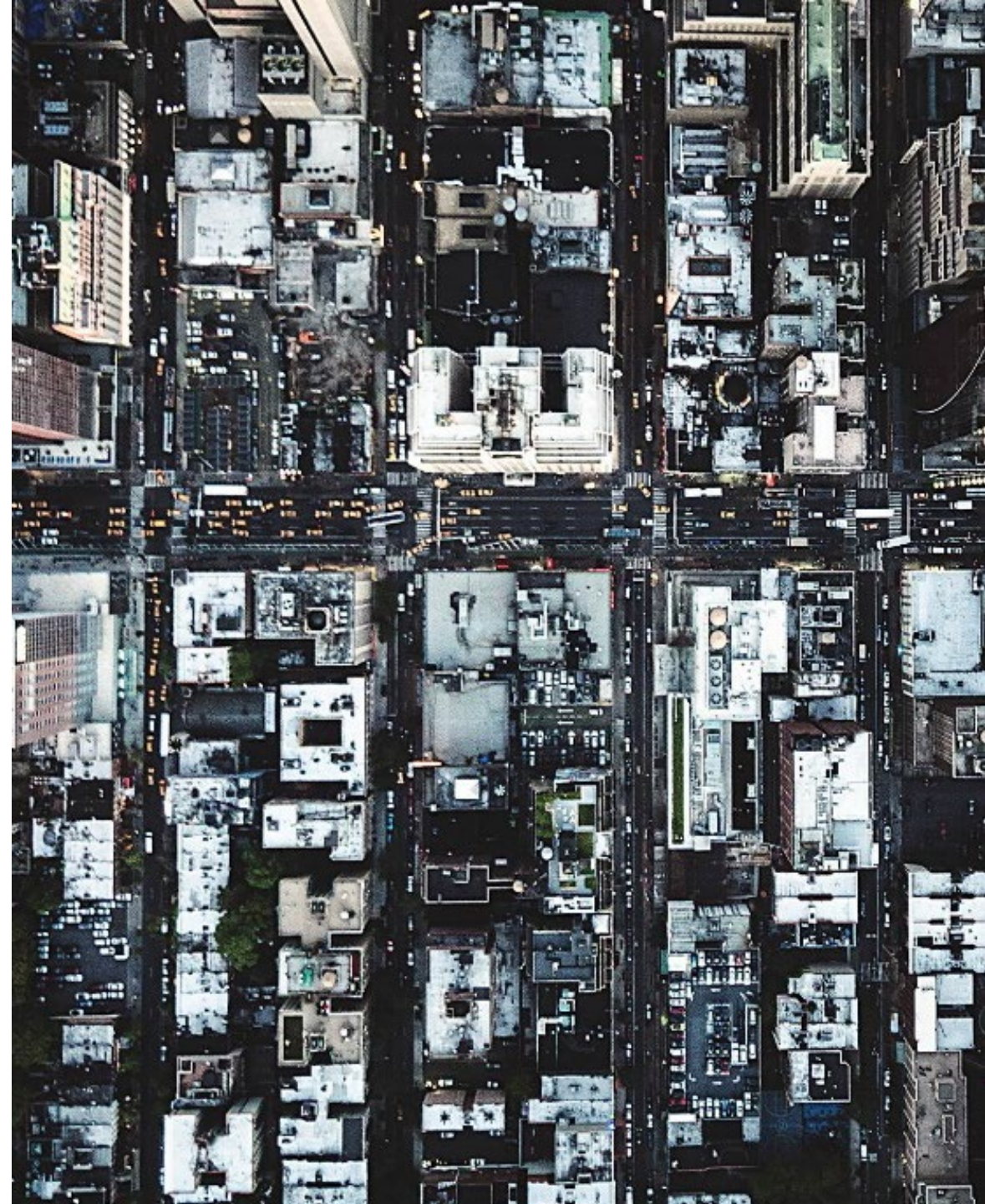
# Why Cities?

---

**70% of World's population will live in cities by 2050**

**75% of World's energy consumed in cities**

**80% of World's greenhouse gases produced by cities**



# Urban Resilience

---

The ability of any urban system, with its inhabitants, in a changing environment, to **anticipate, prepare, respond to and absorb shocks, positively adapt and transform** in the face of **stress and uncertainty**, while facilitating **inclusive and sustainable development**.



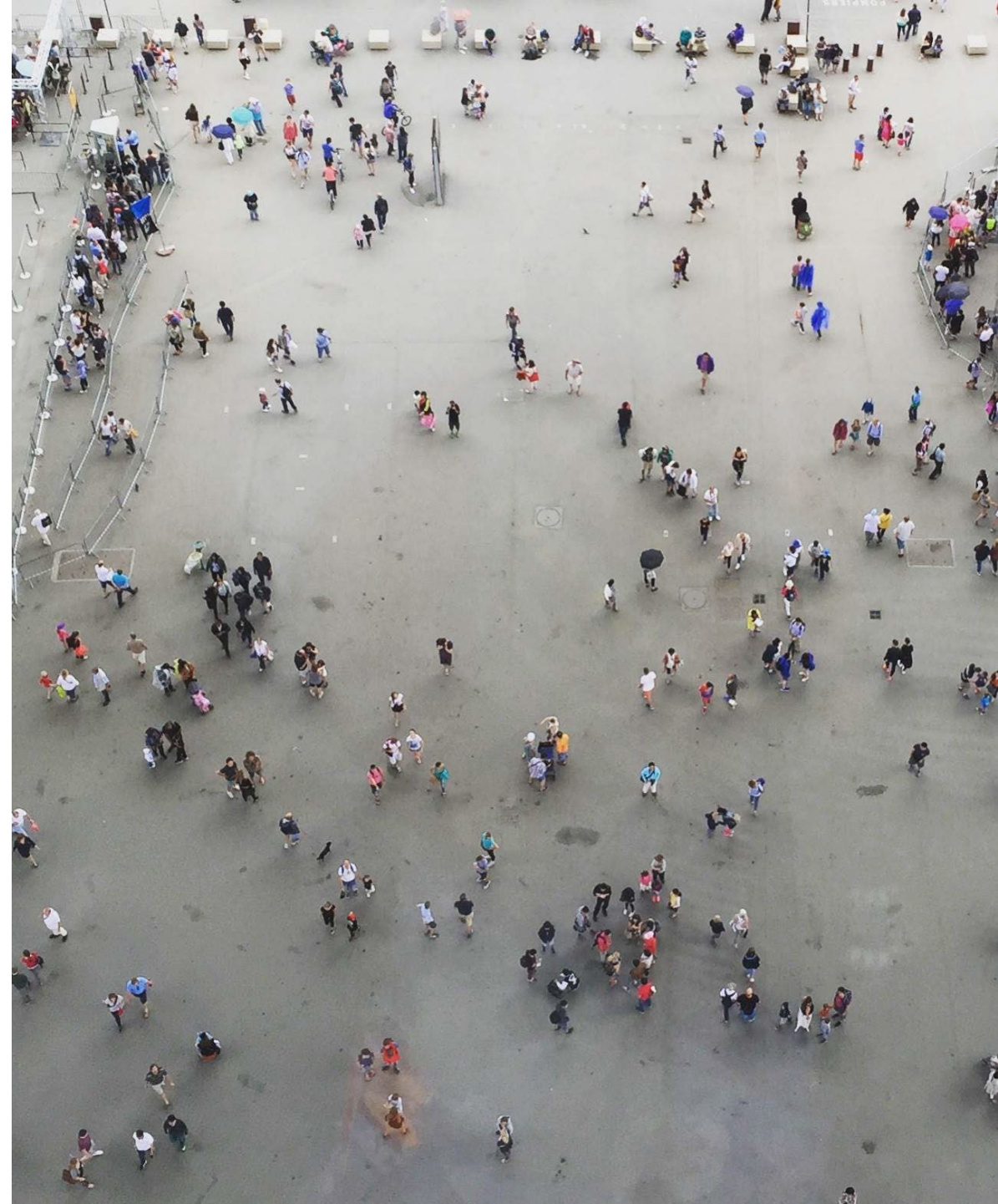
“the ability to absorb and adapt in a changing environment”

# Scope

---

ISO 22371 provides principles, framework and guidelines on how to enhance urban resilience to protect communities, people and organizations and improve residents' quality of life. It describes:

- how to build capacity to better manage change and disruptive events, minimizing the impacts on the residents, including the most disadvantaged and vulnerable persons;
- the benefits of urban resilience;
- how to organize, assess, plan, implement and continually improve urban resilience.



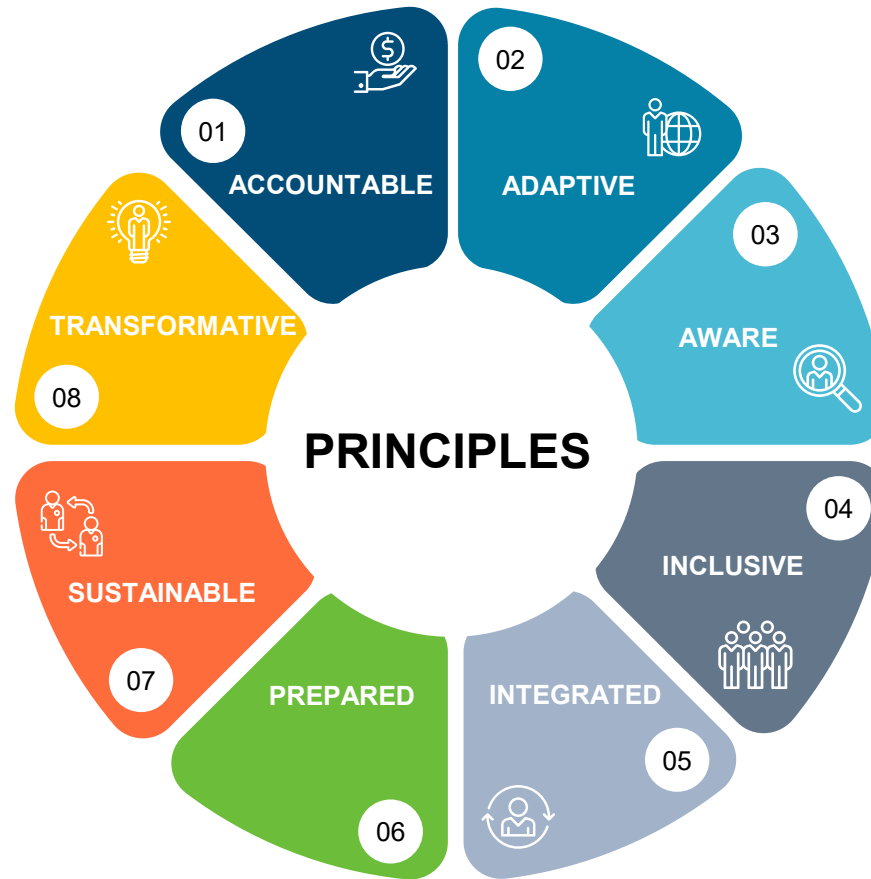
# Principles

Upholding methods for effective governance that promote clear responsibilities, accountability, unity of vision and transparency; delivering long-lasting urban resilience benefits that go beyond short-term decision-making cycles (for example, electoral cycles, annual budgets, short-term investment plans and programs) and avoid fragmentation, ensuring that there are long-term, sustained financing mechanisms in place to provide ongoing support to urban resilience-building projects.

Bouncing forward following disasters so that systems can thrive, not just survive. Rapidly finding different ways to achieve their goals or meet their needs under changing circumstances. Transcending traditional ideas, roles, and patterns to create something new by using originality of thought and demonstrating imagination.

Pursuing and committing to sustainable, resource efficient solutions for long-term, whole system urban resilience that do not compromise the well-being and quality of life for future generations and ecosystems – building on the recommendations of the United Nations Sustainable Development Goals.

Addressing identified system vulnerabilities through robust design, redundancy, spare capacity and fail-safe measures, balancing risk, performance and cost. Responding quickly to mitigate adverse impacts of events and to accelerate recovery.



Building flexibility and resourcefulness; creating urban systems that can evolve and manoeuvre quickly in a changing landscape – addressing risks and capitalising on opportunities. Accepting of ever-increasing uncertainty and change and having the ability to apply existing resources to new purposes. Rapidly finding different ways to achieve desired outcomes or meet needs during a shock or when under stress, mobilising human, financial, technical and material resources inside or outside of traditional response structures to deliver innovative solutions in the face of adversity.

Gathering information, harnessing real-time data and conducting horizon scanning to improve awareness, anticipate change and inform evidence-based decision making. Assessing, building knowledge capital, learning and continually improving for better future outcomes.

Conducting broad consultation and co-creating with communities, including those which are identified as vulnerable – creating community cohesion, strengthening social contracts and empowering people to participate and create a whole society approach to resilience. All parts of the community agree on a vision for its future, and are aware of the shocks and stresses it faces and their respective and complementary roles in protecting and strengthening urban resilience. Benefits and impacts are distributed justly and equitably across urban networks; reducing social stresses and disproportionately poor outcomes for vulnerable groups.

Integrating and aligning urban systems to reduce silos and bring together decision makers, sectors, departments, budgets, activities, and agendas. Maintaining a systems-thinking approach, looking at the whole system rather than focusing on its individual parts to better understand the complexity and interdependencies between multiple stakeholders with divergent perspectives, allowing for solutions that provide multiple benefits and prevent cascading and disproportionate failures across the system.

# Framework

Stakeholder collaboration, sharing and learning

## Organize and define

- Appoint urban resilience lead
- Communicate leadership commitment,
- Develop an urban resilience policy
- Establish governance structure
- Map and engage stakeholders
- Empower communities and organizations
- Agree on urban societal objective and benefits
- Allocate resources
- Collect data

## Assess and prioritize

- Map urban systems
- Analyze interdependencies
- Identify and assess risk
- Assess system baseline resilience
- Plan and test scenarios
- Prioritize urban resilience needs

## Strategy Development

- Determine risk appetite and propose appropriate treatment
- Develop a list of urban resilience initiatives
- Prioritize initiatives based on agreed criteria
- Consider risk transfer and insurance

## Implementation

- Implement a portfolio management office or similar
- Develop tactical delivery plans for each project
- Identify project partners, funding and procurement
- Review urban financial planning, insurance and risk
- Develop a business case for investment

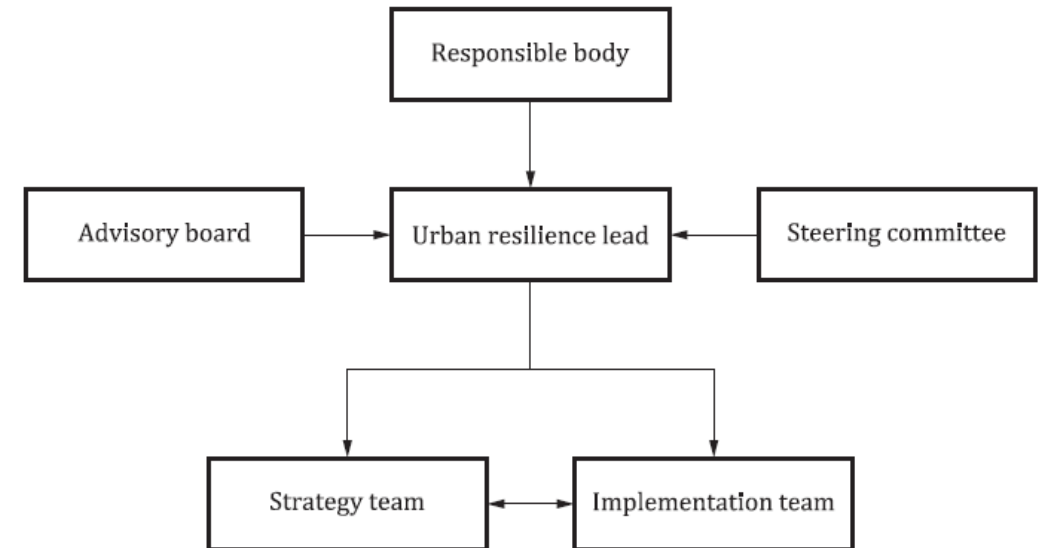
## Continual Improvement

- Collect real time data
- Monitor progress
- Conduct horizon scanning
- Report and audit
- Reflect, learn, innovate and improve
- Remeasure and incentivize

Monitor, evaluate, learn and improve

# Organise and Define

	Activities
<b>6.1 Governance, leadership and commitment</b>	Appoint an “Urban Resilience Lead” with supporting team
	Provide a written commitment to urban resilience
	Establish an agreed governance structure for urban resilience
	Write and define an urban resilience policy with rules of engagement, expectations and governance structure for the resilience process
	Conduct benefits mapping exercise to assess the extent to which urban resilience benefits are felt proportionately, or disproportionately, across communities. Use this to guide amendments to the strategy
<b>6.2 Vision, objectives and benefits of the urban resilience strategy</b>	Define shared vision, objectives and needs to be delivered through the urban resilience process
<b>6.3 Communication and engagement</b>	Identify key stakeholders, form stakeholder steering committee and develop an engagement plan <ul style="list-style-type: none"> <li>a) Develop an engagement plan to help with the community assessment and design of the strategy</li> <li>b) Conduct identification, mapping and analysis of stakeholders</li> <li>c) Form steering committee and advisory board</li> <li>d) Raise public awareness through communication and outreach – focusing on articulating the benefits of urban resilience</li> </ul>
<b>6.4 Allocation of resources</b>	Allocate resources to urban resilience
<b>6.5 Data collection, assessment and sharing</b>	Data collection, assessment and sharing <ul style="list-style-type: none"> <li>a) Develop tools and methods for qualitative and quantitative data collection and sharing</li> <li>b) Adopt instruments for ensuring data quality and reliability</li> <li>c) Set data criteria, metrics and indicators</li> <li>d) Collect data</li> </ul>



**Figure 2 — Model governance structure**



# Assess and prioritize

Clause	Activities
<b>7.2 System value and benefits</b>	Ensure that the urban resilience assessment links to the vision and urban societal objectives agreed in 6.2.1 so that value at risk can be understood and inform the decision making
<b>Conduct community engagement activities with key stakeholders</b>	<ul style="list-style-type: none"> <li>a) Hold discussions around the outcomes of the evidence-based analysis and assessment</li> <li>b) To provide input on and review of the identified shocks, stresses and trends</li> <li>c) Understand system interdependencies and criticalities</li> <li>d) Build consensus on priority areas of action to be addressed through the urban resilience strategy</li> </ul>
<b>7.3 System definition and understanding</b> 7.3.1 System mapping 7.3.2 Interdependencies and critical components	<ul style="list-style-type: none"> <li>a) Determine the urban area and extent of the system</li> <li>b) Develop a map of the urban area and its systems (people, place, governance etc)</li> <li>c) Map how urban societal value is delivered through these systems</li> <li>d) Conduct interdependency analysis of system components</li> <li>e) Identify critical components through a combination of those most relied upon (dependency analysis and those that contribute most to value delivery)</li> </ul>
<b>7.4 Risk identification and assessment</b>	To include shocks, stresses, trends and opportunities
<b>7.5 System baseline urban resilience assessment</b> 7.5.1 System risk 7.5.2 System capacity 7.5.3 Gap analysis	<ul style="list-style-type: none"> <li>a) System risk – evaluate the exposure and risk of critical system components to the identified shocks, stresses and trends</li> <li>b) System capacity – consider the vulnerability of the critical system components. Assess the ability of the components to mitigate and adapt to the impacts of shocks and stresses</li> <li>c) Gap analysis – identify the ‘resilience gap’ or residual risk between system risk and system capacity</li> </ul>
<b>7.6 Scenario planning and urban resilience testing</b>	<ul style="list-style-type: none"> <li>a) Develop plausible scenarios</li> <li>b) Perform virtual stress testing of the system model – i.e. “what if” analysis</li> <li>c) Perform urban resilience exercising to test response to emergency scenarios</li> </ul>
<b>7.7 Identify and prioritize urban resilience needs</b>	Identify and prioritise urban resilience needs



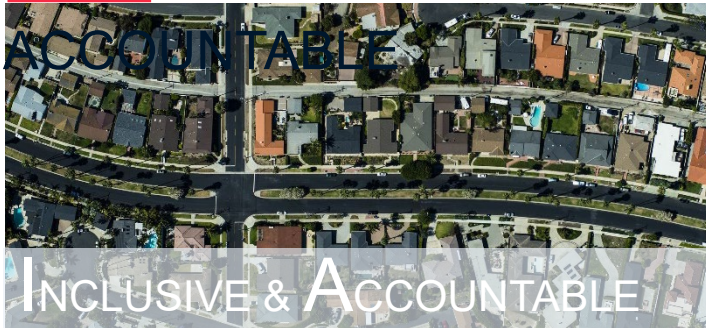
from BS67000

# Strategy Development

Clause	Activities
<b>8.2 Risk appetite and Treatment</b>	Determine acceptable levels of urban area risk to deliver the urban societal objectives and determine appropriate treatment: <ol style="list-style-type: none"> <li>avoiding the risk through threat or hazard mitigation;</li> <li>accepting the risk;</li> <li>reducing the risk through appropriate resilience capacity building initiatives;</li> <li>sharing or transferring the risk to another party, for example, an insurer.</li> </ol>
<b>8.3 Development of urban resilience initiatives</b>	Develop comprehensive urban resilience initiatives that provide a balanced approach to resilience and incorporate the principles and the risk appetite of the urban.
8.3.1 General	Apply the adaptation pathways approach for addressing the uncertainties in long-term risk management decision making.
8.3.2 Adaptation pathways	
<b>8.4 Prioritization of urban resilience initiatives</b>	Prioritize initiatives against urban resilience needs and explain the extent to which the initiative contributes to the agreed urban societal objectives and aligns with the principles.
8.4.1 Benefits Analysis	Engage with key stakeholders across the urban system to provide feedback on the proposed initiatives.
8.4.2 Stakeholder Engagement	
<b>8.5 Insurance and risk transfer</b>	Collaborate with insurance companies to promote investment in improving levels of urban resilience.



# Strategies for Resilience:



- Identify and fund an urban resilience lead or equivalent
- Establish a cross-sectoral committee/platform (e.g. a resilience forum)
- Build community trust and cohesion
- Set up community education and training programmes
- Develop community-based initiatives that build agency and ownership in the community (including vulnerable populations)
- Include public community spaces within projects
- Seek to target vulnerable groups with resilience measures as they tend to be disproportionately affected



- Provide monitoring systems to identify changes and opportunities
- Conduct trend analysis and scenario planning (e.g. monitoring and identifying cross-sector implications of change and innovation)
- Install sensors on infrastructure to understand conditions and create alerts in cases of damage or disruption
- Set up an urban area dashboard so that citizens can track changes in the urban area and check data sets
- Provide a public notification system to warn, inform and empower citizens



- Develop contingency plans and recovery strategies to ensure continued operations of critical functions and rapid recovery following an interruption
- Procedures for multi-agency debrief and learning
- Develop policies to capture evidence, learning and innovation
- Keep spare components to aid in rapid repair and recovery of critical systems
- Develop policy measures to attract new employment as old industries decline, which can include changes to education policies or investment infrastructure to attract new investment

# Strategies for Resilience



- **Planning policies that promote nature-based solutions as protections to high risks**
- **Land use planning to avoid building in flood prone areas or to permit construction only of resilient buildings**
- **Local policy to address risks outside of jurisdictional authorities such as land development restrictions near heavy rail corridors or restrictions for dangerous goods storage near developed or sensitive areas**



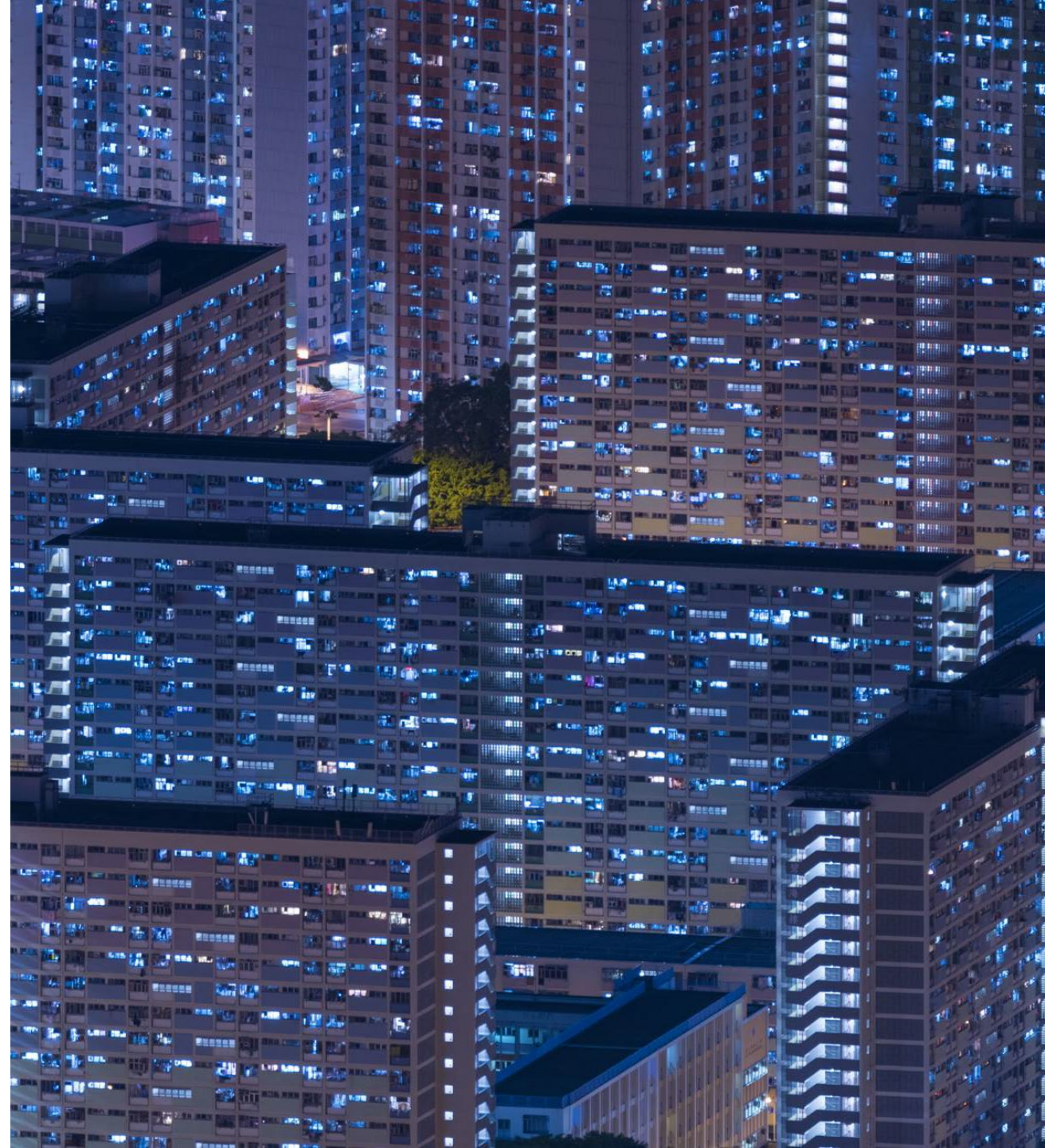
- **Flood storage schemes inside and outside the city urban area to ensure that flooding does not affect the city urban area**
- **Fire engineering to prevent and reduce the spread of fire, protecting people and structures from fire**
- **Harden systems to specific threats, such as a structure that has been enhanced to withstand specific extreme shock factors (e.g. wind, flooding, blast, wildfire or dust)**



- **Develop coordinated evacuation plans at appropriate scales, including floor, building and zone plans. Depending on the scale, specific assembly, marshalling, transport and emergency shelter arrangements can be necessary.**
- **Build the ability to provide a coordinated response and keep the public informed with pertinent information to reduce the impact of the event and to prevent cascading events**
- **Provide response capacity, such as emergency services or other responders, to manage the direct impacts of an adverse event and accelerate recovery**

# Implementation

Clause	Activities
<b>9.2 Portfolio and project management Structure</b>	Set up a portfolio management office (PMO), as required, to oversee the pipeline of urban resilience projects. Develop a strategic framework for managing the projects.
<b>9.3 Programme and project delivery</b> 9.3.1 Ownership 9.3.2 Development 9.3.3 Schedule 9.3.4 Budget 9.3.5 Partners 9.3.6 Procurement	Develop delivery plan for each urban resilience project to include: a) Ownership b) Project financing c) Key partners that can assist with delivery, facilitation and support d) Procurement strategy e) Schedule and milestones
<b>9.4 Financing urban resilience</b> 9.4.1 General 9.4.2 Business case for investment	Review the financial strategy for the urban area and ensure that it considers how funds are accessed before, during and after a disaster.  Develop agreements with insurance companies to promote investment in urban resilience capacity building projects.  Develop a business case for investment in the urban resilience projects.



# Continual Improvement

Clause	Activities
<b>10.1 Overview</b>	Ensure there is an effective process for continual improvement and active learning development to support long-term urban resilience building.
<b>10.2 Monitoring</b> 10.2.1 General 10.2.2 Enhance situational awareness through real-time data collection 10.2.3 Monitor progress of the urban resilience strategy 10.2.4 Horizon scanning 10.2.5 Reporting and auditing	a) Enhance situational awareness through real-time data collection b) Monitor progress based on defined set of criteria related to the impact goals of the urban resilience strategy c) Conduct horizon scanning to monitor the potential future changes to both the risk landscape and identified systems  Reporting and auditing – collect data for audit, public scrutiny and external validation.
<b>10.3 Identifying further actions and implementing improvements</b>	Identify further actions and review urban resilience strategy for improvements. Capture lessons learned and implement new innovations and transformations
<b>10.4 Learn, innovate and transform</b>	a) develop a culture of learning and innovation within the urban area, facilitating the transfer of knowledge and capability to businesses and across communities; b) enable people to identify potential issues and opportunities early, to be more nimble and agile, and to respond more competently; c) consider establishing partnerships and collaboration activities with other urban areas and regions; d) facilitate an open and honest debrief after every incident, to ensure lessons can be learned;; e) look for opportunities to bounce forward – building additional resilience into urban systems; e) assess all initiatives delivered as part of the urban resilience strategy, with recommendations feeding back to leadership.
<b>10.5 Re-measuring</b>	Remeasure – repeat the urban resilience assessment periodically to determine how resilience capacity within the urban area has transformed.
<b>10.6 Incentivizing continual urban resilience improvement</b>	a) Foster a resilience culture and mindset b) Develop regulation, standards and incentives



# Articulating Benefits

stronger evidence backing investment

increased public participation

improved urban economic performance

improved well-being and quality of life

improved transparency and accountability of responsible

increased social trust and confidence amongst urban area stakeholders;

improved living standards of urban area residents

increased connection to place, sense of belonging and community pride

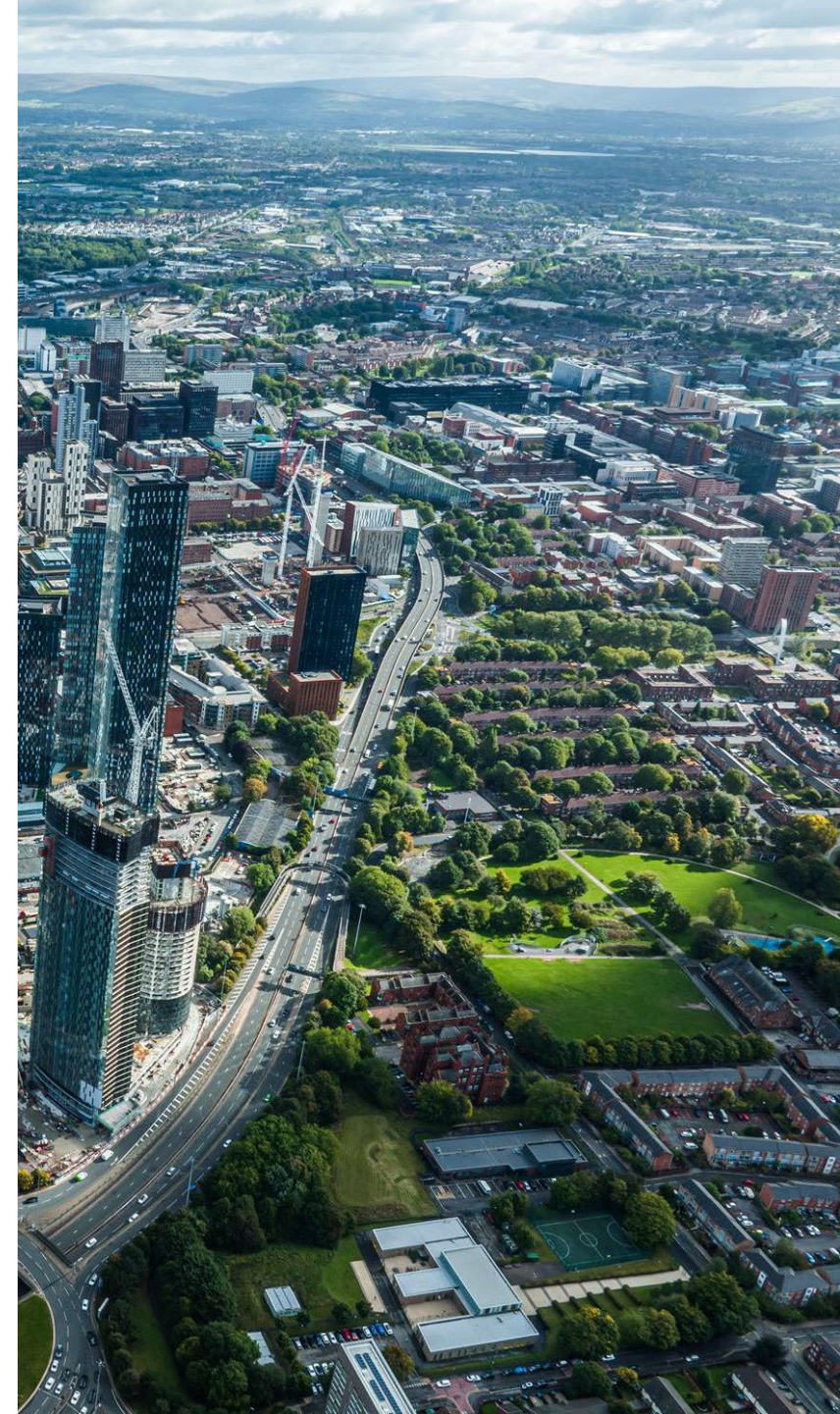
a culture of resilience at all levels of the urban system

improved community cohesion and urban support networks

shared commitments and performance metrics

increased social trust and confidence amongst urban area stakeholders;

improved awareness and understanding of the urban area's strengths, weaknesses opportunities and threats;



# ISO TC292 Suite of Standards

---



## Also under development:

ISO/CD 22354

Local resilience capability to enhance societal resilience to disruption



# Related ISO TC207 Climate Change Mitigation and Adaption Standards

---

## Mitigation

- Quantification  
14064-1, 14064-2,  
14064-4, 14067,  
14068, 14069,  
14082, 14083, IWA  
42
- Verification  
14064-3, 14065,  
14066, 17029

## Adaptation & Mitigation

- 14080 Climate  
action  
methodologies
- 14097 Assessing  
and reporting  
investments and  
financing activities

## Adaptation

- 14090  
Management  
Framework
- 14091 Assessment
- 14092 Planning
- 14093 Funding



# ISO 22371: Principles, framework and guidelines on urban resilience

Prof. Caroline Field MSc CEng FICE

Partner, PA Consulting | Co-Founder Centre for Whole of Society  
Resilience | Visiting Professor, Loughborough University

Dr. Guy Felio, P.Eng FCSCE FIAM IRP

Independent Consultant

