

Cover Letter

Please read the cover letter and choose if you would like to participate in the study.

You are invited to participate in a study entitled “Validating an Abstraction Hierarchy for City Scale Resilience”. The study is being conducted by Kerri McClymont (PhD Researcher) from Heriot Watt University as part of the EPSRC EP.NE30419/1 project ‘Water Resilient Cities: Climate Uncertainty & Urban Vulnerability to Hydro-hazards’.

The purpose of this study is to seek subject matter expert knowledge and insights to inform the development of an abstraction hierarchy applied to a city. The abstraction hierarchy aims to explore the complex web of social and technical interactions and how they combine to affect critical system functionalities. Abstraction in this context means that qualities of objects which are considered separate from the objects themselves.

[Placement for figure to explain abstraction hierarchy]

Participants will be asked to review the draft list of abstraction hierarchy nodes and give their feedback. Please note there is a short follow up questionnaire which provides participants with the opportunity to review the feedback in order to reach consensus on the inclusion of these nodes. The average time required to complete this study in the pilot round was around an hour.

This survey does not ask you to reveal any personally identifying information. A limited number of research team members will have access to the data during data collection. Identification numbers will be kept during the data collection phase for tracking purposes only. This information will be stripped from the final dataset.

Your participating in this study is voluntary and you may withdraw your consent at any time. This study has been approved by the Ethics Committee at Heriot Watt University. If you have any questions please contact Kerri McClymont at km39@hw.ac.uk.

Instructions

The abstraction hierarchy will be used to assess the impact of a hydro-hazard on critical system functionalities with the aim of improving city resilience. The abstraction hierarchy focuses on the city limits, and therefore processes in the hinterland which contribute to city functioning are out with the scope of this study. The aim of this survey is to determine consensus on the nodes which should be included in each layer of the abstraction hierarchy in order to model a city. In other words: **what does a city include?** And is anything missing from this list?

This survey includes five sections. Please note the format of this questionnaire goes from **Tier 5-4-1-2-3** for ease of completion. Tier 5 and 4 are concerned with physical resources in a city. Tier 5 and 4 are concerned with the purposes of a city and how their success can be measured. Tier 3 connects the bottom and top sections of the hierarchy by identifying the tasks which can be accomplished by the Object-related Processes in order to contribute to the Values and Priority Measures.

Please tick whether you agree or disagree with the inclusion of each node across the five sections. Space has been given at the end of each section to add in anything you feel has been missed. Also, please add any comments regarding the placement of the nodes if you feel they would be better suited elsewhere in the hierarchy. Responses from this questionnaire will be collated to create a new list of nodes for each layer.

Thank you for taking the time to participate in this study.

TIER OF HIERARCHY	EXPLANATION	EXAMPLE
FUNCTIONAL PURPOSE (TIER 1)	Why the city system exists	Shared community resources
VALUES AND PRIORITY MEASURES (TIER 2)	Criteria to measure whether a city is meeting its Functional Purpose	Effective safeguards to human health and life
GENERALISED FUNCTIONS (TIER 3)	What can be accomplished by using the Object-related Processes in order to contribute to the Values and Priority Measures	Provide emergency services
OBJECT-RELATED PROCESSES (TIER 4)	Explains what each component can afford	Enable transport
PHYSICAL OBJECTS (TIER 5)	Physical description of the city system	Roads

Please state your profession and sector:

Section One: Physical Objects (Tier 5)

Tier 5 includes a physical description of a general city system. A 'physical object' can be a type of infrastructure, people, buildings, facilities etc. Items have been grouped into categories depending on their affordance (similar Object-Related Processes). **Please tick whether you agree that the items listed below are appropriate to be included for a city system. If you think any of the items are not appropriate, please tick accordingly along with reasons why in the space provided. If you feel any items have been missed, please comment in the space provided.**

Category	Physical Object	Agree	Disagree	Unsure
Public	People	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accommodation	Assisted Living	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Estate Agents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Hotels (with Restaurant/Meals)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Hotels (Self-Catering)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Private Accommodation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Education & Professional Services	Creches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Job Centres	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Driving Schools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Music Services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Schools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Training Providers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Further Education (University, Colleges)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Finance	Accountancy Firms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	ATMs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Banks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Credit Unions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Currency Exchanges	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Debt Collection Companies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Insurance Providers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Investment/Financial Advisors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Money Transfer Services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Pawn Shops	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Food & Drink	Bars/Nightclubs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Eateries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Food Markets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<i>Government</i>	Armed Forces	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Council Offices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Courthouses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Fire Departments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Libraries/Archives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Parliamentary Buildings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Police Departments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Politician Offices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Procurator Fiscal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Registrar Service Offices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Social Work Offices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Healthcare</i>	Doctors' Offices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Hospitals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Healthcare (Other)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Pharmacies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Industry</i>	Construction & Heavy Industry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Farms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Tradesmen Businesses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Lawyers/Solicitors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Media Outlets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Security Services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Industry (Other)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Telephone Exchanges	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Network Access Points	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Derelict Land	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Infrastructure</i>	Broadband Providers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Electricity Providers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Gas Providers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Waste Collection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Wastewater Treatment Works	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Water Pumping Stations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Reservoirs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Dykes (or other structural defence)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Water Tanks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Water Distribution Network	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Cultural, Leisure, Recreation and Tourism</i>	Community Centres	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Gyms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Attractions (Includes museums, concert halls, cinemas)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Pet Goods & Services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Shops (Clothing)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Shops (Home & Garden)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Shops (Non-Essential)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Sports Grounds & Facilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Religion & Major Life Events</i>	Cemeteries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Funeral Directors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Religious Buildings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Social Support</i>	Business Advice/Support Organisations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Charity Organisations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Citizens Advice Bureau	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Day Centres	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Employment Services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Food Banks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Homeless Shelters	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Transport & Logistics</i>	Airports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Bus Stations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Couriers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Bicycle Parking Points	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Distribution Centres	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Petrol Stations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Rail Stations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Railway Lines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Post Offices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Roads	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Vehicle Dealerships	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Vehicle Repair Services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Cycle/pedestrian paths	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Ecosystems</i>	Parks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Urban Forests	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Rivers/Canals/Streams	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Storm Water Retention Ponds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please provide any additional comments/reason for disagreement:

Section Two: Object-Related Processes (Tier 4)

The Object-Related Processes capture the affordance of the Physical Objects within a city system. These processes should be independent of the purpose of the system. Think about the Physical Objects listed previously, what functions do they do or afford? **Please tick whether you agree that the processes listed below are appropriate based on the physical objects listed previously. If you disagree, please give reasons why in the space provided. If you think any Object-Related Processes have been missed, please list them in the space provided.**

**Note the Object-Related Processes have been grouped into the same categories as above for ease of completion, but some may have more than one function that is listed under another category.*

Category	Object-Related Process	Agree	Disagree	Unsure
Accommodation	Act as main base of living	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide temporary or permanent shelter/protection from weather/events	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide assisted living (for elderly, disabled)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Education & Professional Services	Provide education services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide professional/other qualification services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide employment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide youth/older childcare	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Undertake research	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Finance	Provide access to cash	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Make loans	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide other financial services/advice (e.g. mortgages, business)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Make payments/wire money	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide access to consumer advice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Food & Drink	Provide food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide drink	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Government	Investigate crimes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Undertake legal action and proceedings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide information on crime prevention	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Facilitate and increase employment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide general legal advice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Facilitate and process subsistence grants and/or benefits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Facilitate & process taxes (Council/income/business)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Manage council-let housing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Facilitate traveller sites	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Facilitate and process early childcare	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Facilitate & process community project grants	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Improve road conditions and safety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide information on local resources (library services, archives, family history resources)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Provide information on local conservation areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Facilitate waste collection and recycling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide access to planning resources (guidance on process, existing local development plans, past building warrants/completion certificates/plans/specifications, current regulations)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide street care (lighting, cleaning, dog fouling, stray dogs)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide information on local road issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide information on listed building and applications for consent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Enforce building standards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Enforce food standards (cleanliness, food labelling, food hygiene etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Healthcare</i>	Respond to medical emergencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide healthcare services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide rehabilitation centres	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide medicines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Industry</i>	Maintain/repair homes/shelter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Keep roads in adequate condition (roadworks/gritting/etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Produce goods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Environmental protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Environmental monitoring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Infrastructure</i>	Transmit & receive communications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Store & distribute fuel & energy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide clean water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Manage & dispose of sewage/wastewater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide drainage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Cultural, Leisure, Recreation & Tourism</i>	Act as facility for leisure/recreation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide luxury/recreational/non-essential goods/services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Act as community/meeting space	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Support health/fitness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide/maintain clothing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Act as place of historical/cultural importance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Religion & Major Life Events</i>	Provide place of worship	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Facilitate use of/provide information on cemeteries, crematoriums, & memorial options	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide death-related services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Facilitate registrar services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Social Support</i>	Provide help/support for vulnerable people/groups	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Assess risk level/needs of vulnerable people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Advise & support carers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Advise on relevant community activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide domestic violence advice/support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Transport & Logistics</i>	Enable transport	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Maintain/repair vehicles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Ecosystems</i>	Provide microclimate regulation (reduce urban heat effect)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide air filtration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide natural hazard regulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide water purification	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Manage pest control	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide nutrient cycles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide sources of energy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Fertilise soil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provide aesthetic value	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provides species habitat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please provide any additional comments/reason for disagreement:

Section Three: Functional Purpose (Tier 1)

Functional Purposes capture the overall purpose of the system and should be independent of any particular activity. What reasons do cities exist? What is their ultimate purpose?

Please tick whether you agree that the purposes listed below are appropriate for a city. If you disagree, please state why in the space provided. If you think any purposes are missing, please comment in the space provided.

Functional Purpose	Definition	Agree	Disagree	Unsure
Economic Opportunity	This includes economic security and diversity of jobs as well as trade, investment, job creation and economic growth.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cultural Heritage & Sense of Place	Cities should provide a 'sense of place' which is defined as the degree of meaning people ascribe to a particular location. Cities strive to have a strong identity which is deeply felt by its inhabitants and visitors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Urban Ecosystem Services	Direct and indirect contributions of ecosystems to human well-being. It includes all green and blue spaces within an urban area which generate a habitat that deliver services to city inhabitants. These services include climate change mitigation and adaptation, improved air quality, aesthetic values, reduced stress and improved social cohesion.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shared Community Resources	These are collectively built at a lower cost to the individual (economies of scale). Includes payment of public services, emergency response, rule of law etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Freedom of Movement & Expression	This includes ideas, communications, people and goods, as well as the degree of anonymity which enables people to freely choose who to associate with and express themselves.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Social Opportunity	Cities provide higher quantities and diversity of people, which drives knowledge, innovation and social relations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Globalised Connectivity	This includes global connectivity with travel and trade. It includes a city becoming an international player, but also building social relations on a larger scale and give a voice to local interest.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Physical Settlement	Cities should provide adequate housing and accommodation which provides homes for people as well as driving tourism.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Do you have any additional comments? Please state below.

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Section Four: Values & Priority Measures (Tier 2)

Values and Priority Measures consist of criteria that can measure the extent to which a city is meeting its Functional Purpose. The criteria should be defined in terms that can be measured. *What are the measures of a successful city?* These are based on the 12 goals of the 100 resilient cities framework. **Please state whether you think the goals listed below are appropriate for a city. If you disagree, please give your reasons in the space provided.**

Value and Priority Measure	Definition¹	Agree	Disagree	Unsure
Minimal human vulnerability	The extent to which everyone's basic needs are met	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Diverse livelihoods and employment	This is facilitated by access to finance, ability to accrue savings, skills training, business support, and social welfare	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Effective safeguards to human health and life	This relies on integrated health facilities and services, and responsive emergency services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collective identity and community support	This is observed as active community engagement, strong social networks and social integration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comprehensive security & rule of law	This includes law enforcement, crime prevention, justice, and emergency management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sustainable economy	This is observed in sound management of city finances, diverse revenue streams, and the ability to attract business investment, allocate capital, and build emergency funds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reduced exposure and fragility	This relies on environmental stewardship, appropriate infrastructure, effective use planning and enforcement of planning regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Effective provision of critical services	This results from diversity of provision, redundancy, active management and maintenance of ecosystem services and infrastructure, and contingency planning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reliable communications and mobility	This is enabled by diverse and affordable multi-modal transport systems and information and communications technology networks, and contingency planning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Effective leadership and management	This relates to government, business and civil society and is recognisable in trusted individuals, multi-stakeholder consultation, and evidence-based decision-making.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Empowered stakeholders	This is underpinned by education for all, and relies on access to up-to-date information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

¹ Arup (2015) 'City Resilience Framework'. Available at: <https://www.rockefellerfoundation.org/report/city-resilience-framework/>.

	and knowledge to enable people and organisations to take appropriate action			
Integrated development & management	This is indicated by the presence of a vision, an integrated development strategy, and plans that are regularly reviewed and updated by cross-departmental groups.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Do you have any additional comments? Please state below.

Section 5: Generalised Functions (Tier 3)

This layer links the physical description of system components at the bottom of the hierarchy to the more abstract functional description of what the system should do at the top of the hierarchy. Desirable outcomes of dynamic interactions should be listed here, not material objects. Think about how the object-related processes can be used to have an effect on the identified Values and Priority Measures. What should be the key functions of a city? What functions coordinate the use of physical resources? What tasks are required or expected? **Please tick whether you agree that the listed functions below are appropriate for a city. If you disagree, please state why in the space provided. If you feel any functions have been missed, please comment in the space provided.**

Generalised Function	Agree	Disagree	Unsure
Maintain public health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maintain law & order	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Support community activities & engagement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ensure provision of food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ensure provision of housing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ensure provision of clothing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provide financial services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Generate tourism	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Perform planning activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Support travel (people, not goods)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enable people to work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provide emergency services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Regulate government activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provide communications systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Support observance of religion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Support distribution of goods (logistics)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Manage & dispose of waste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supply energy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supply of/access to clean water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provision of sanitation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Generate economic output	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Preserve & protect historical/cultural features	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Preserve & protect natural features	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Promote learning & education	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Perform/support ceremonies, services, etc. for major life events	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conservation of environmental assets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access to clean air	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provide physical security (personnel and property)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enable social interaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Do you have any additional comments? Please state below:

Thank you for taking the time to complete this study
