

Urban Strategy

Smart principles, smart processes
smart tools, smart outcomes

Space Syntax

- 1. Urban Strategy guidelines**
- 2. The importance of design**
- 3. Where to begin? Focus on the desired outcomes**
- 4. Urban Strategy process (Part 1)**
- 5. Urban planning & design principles for a resilient future**
- 6. Key urban design elements**
- 7. Urban Strategy process (Part 2)**
- 8. Urban Data Strategy (Part 1)**
- 9. Urban Data Strategy (Part 2)**
- 10. Measurable outcomes & indicators**

The creation of a new urban settlement is a complex undertaking. Whether it is a small town or a large city, it requires the balancing of multiple inputs: social, economic, environmental, technological and political. Most importantly it requires clear vision, ongoing financial support and strong, capable leadership.

This document sets out a structure and process to create an Urban Strategy for existing and new urban places.

Space Syntax has created this **Urban Strategy** document to help city leaders shape the future of urban places. Based on over 25 years of practice worldwide, the guidelines here help direct the physical and spatial form of urban places to deliver effective social, economic and environmental outcomes for people. Covering a range of scales from regional planning to detailed architectural and urban design, the guidelines can ultimately create proposals that will appeal both to the people that fund them and the people that use them.

A “smart” approach

By adopting these guidelines, city leaders and managers can operate at the leading edge of best practice in *Smart City* planning, using world-leading science to put people first. The guidelines are built around techniques of data analysis that make sense of “Big Data” to predict the impacts of urban development plans across a range of issues including transport, property value, health, safety and social wellbeing. At the same time, the guidelines incorporate *Smart Working* processes of multi-disciplinary collaboration, design review and stakeholder consultation. In this way, the best of computational analysis is combined with the best of interpersonal working methods.

Space Syntax’s Urban Strategy guidelines carefully synthesise multiple inputs from wider socio-economic conditions, to local city goals, to detailed technical requirements. They do this in a way that not only allows development to take place, but which creates the most efficient and optimal systems for future operation and management. The guidelines provide a framework that can be adapted and revised as conditions change in the future, or in response to the local knowledge of stakeholders.

They do all of this, but most importantly, they work for people.

Introduction

The importance of design

Design has a key role to play in making new towns and cities more efficient and more effective places to support human life in all its various manifestations: living, working, visiting, creating, innovating and celebrating. Design matters not only in terms of the *visible city* – the buildings and urban spaces through which people move and interact but also the *invisible city* – the tunnels, pipes, cables and digital networks that support urban life.

Furthermore, while design can improve the visible and invisible products of towns and cities, it can also benefit the processes that shape the ways in which finance flows and decisions are taken.

The creation of a new town or city is therefore as much about the design of the invisible city as the visible; as much about the design of processes as it is about products. And the common thread that passes through all of these issues is the design of *networks*. When towns and cities work well, they do so not according to the strength of any individual building, space or person but according to the strength of their overall networks.

Producing an Urban Strategy is, in this way, an exercise in *network design* and there are three key types of network that must be considered simultaneously:

2.1 Place

The physical and spatial network of buildings, streets, squares and parks, as well as the design of the pipes, cables and digital connections that link everything together. “Place design” focuses on what goes where and how it is all connected together.

2.2 Finance

The financial instruments that make it possible to pay for the construction of the Place, then support the ongoing operations of the town or city through, for example, the generation of business revenues and collection of taxes. These mechanisms can not be taken for granted. They vary from place to place. They change and are open to innovation in the same way that the physical design of Towns and cities is. “Finance design” is therefore a critical element in the success of future places.

2.3 Governance

Third is the design of the decision-making systems that public, private and third sector organisations use to manage towns and cities as well as plan for the future. Governance includes consultation with other organisations and individuals in order to help shape decisions. As with “Place design” and “Finance design”, “Governance design” is open to innovation and subject to local variation to suit cultural expectations.

It is tempting to begin the design process with an idea in mind about a new building material, a new construction technique, a new form of transport or even a major new building - perhaps also a new financial instrument or new form of participatory planning. Such ideas occupy the mainstream of conference presentations and magazine articles. Nevertheless they are details: the means to the end and not the end itself. It is more helpful, and no less demanding, to first focus on the desired *outcomes*. What do we want the future urban place to do?

It helps to be straightforward and, in Space Syntax's experience, there are four outcomes that matter most:

3.1 Health

People want to feel well in their town or city – in mind as well as in body - yet the legacy of failed and failing cities worldwide can be evidenced in the patterns of obesity, loneliness and premature death that blight urban places. Future urban places need to stimulate physical activity and engender social life first and foremost. If they do not do this then, no matter how tall their buildings, how large their open spaces, how fast their digital networks or how rapid their transit systems, they will not be truly great.

3.2 Wealth

Successful urban places produce great wealth, whether this is in the form of industrial output and employment, educational achievement or cultural productivity. Towns and cities are crucibles of invention and, key to this, are effective patterns of human interaction that create opportunities for ideas exchange, innovation and industry.

3.3 Happiness

The importance of happiness to economic, political and social life should not be underestimated. Social satisfaction underpins economic productivity, stabilises communities and stimulates interpersonal exchange. An effective urban settlement is one that promotes a “sense of place” and – by virtue of both how it looks and how it works - is attractive to visitors & long-term “participants” - whether they are residents, employees or both.

3.4 Environmental responsibility

Towns and cities require large amounts of natural and manufactured resources but successful urban places are ones that consume energy more efficiently, produce energy of their own and treat their waste responsibly – they make *more with less*. Personal and community responsibility contribute to effective environmental outcomes, supported by organisational and political leadership that provides the means to achieving environmental effectiveness.

Urban strategy process

Part 1

An Urban Strategy is first, a set of written, drawn and modelled descriptions of the future and second, a description of the process that will be followed in getting there.

An Urban Strategy should clearly explain:

4.1 Stage One

- a. a vision for the future
- b. the purposes, objectives, priorities and expected outcomes of the Urban Strategy.

4.2 Stage Two

- a. the urban planning and design principles that should be followed to achieve the vision
- b. the key design elements that should be controlled by the Urban Strategy.

4.3 Stage Three

- a. the process of research, plan-making and implementation that should be needed to deliver a sustainable vision
- b. the baseline data requirements
- c. the measurable indicators to monitor the performance of the Urban Strategy.

4.4 At each stage

- a. the presentation materials for describing the Urban Strategy outputs
- b. the timeline for producing the Urban Strategy
- c. the costs for producing the Urban Strategy.

The creation of an Urban Strategy should be driven by fundamental urban planning and design principles. Following these principles should give investors greater confidence a) that their investments are more likely to comply with political expectations, b) that other investors' investments are more likely to be compatible and therefore complementary rather than competitive and c) that overall, the Urban Strategy is more likely to succeed in its core purposes.

An Urban Strategy should adopt the following urban planning and design principles. It should be:

5.1 Socially economically and environmentally resilient

ie sustainable and durable, incorporating eco-city design principles of compactness, connectedness and mixed use. By targeting positive social, economic and environmental impacts, the aim of an Urban Strategy should be to create a city that is substantially different to the cities which emerged during the 20th century. These were car-dominated, often segregated, sprawling cities. By contrast, the vision for new urban places should be for a human-focused and connected city, which puts people first, buildings later and, before them, great streets, parks and public spaces.

Future urban places should harness the energy of people, through their movement patterns and socio-economic interactions, to drive the social, economic and environmental sustainability of a town or city. Most importantly therefore, an Urban Strategy should focus on how to make the city inclusive and comfortable for the everyday lives of its diverse and changing populations of inhabitants and visitors. It should focus on creating new, and improving existing, public spaces and infrastructures, in order to make them not only innovative and economically viable but also accessible and inclusive.

5.2 Open and understandable

to investors and city stakeholders, including businesses, institutions and citizens.

5.3 Evidence-informed

At the heart of the Urban Strategy should be "Smart City" technologies that employ Integrated Urban Modelling techniques to rigorously review evidence and evaluate alternative future scenarios. The Urban Strategy should be built with data capture, analysis and predictive modelling methodologies that accelerate the production of higher quality plans.

5.4 Outcomes-focused

i.e. with a focus on building performance, infrastructure performance and, especially, human behaviour performance.

5.5 Spatial

with as much emphasis on the space between buildings as on the buildings themselves ie prioritising the essential urban issues of a) Location, b) Linkage, c) Layout, d) Land use and e) Landscape. At the same time, an Urban Strategy should consider multiple spatial scales ie a) *Macro*, city-scale issues – the big picture, b) *Meso*, subcentre issues – the local story and c) *Micro*, the individual street, space or building – the necessary detail.

5.6 Three-dimensional

including the exploitation of underground space.

5.7 Digital as well as physical

describing opportunities for towns and cities to exploit digital connectivity and online communications as well as to enhance physical flows and interactions between people.

5.8 Scenarios-based

not determined and fixed, emphasising principles and processes rather than rigid plans.

5.9 Integrated

combining multiple professional disciplines and issues, including planning, design, engineering and economics inputs, into the following issues: buildings, transport, services infrastructure, landscape and security.

5.10 Cultural

respecting and enhancing the deep, historical identity of places.

5.11 Evolutionary

understanding the historic patterns of planned and unplanned growth.

5.12 Connected

establishing the network of primary movement connections as well as the principles for creating the secondary and tertiary movement networks.

5.13 Transaction-based

emphasising the essential purpose of the city to facilitate social harmony and economic trade.

5.14 Flexible

to accommodate changing circumstances and avoid lock-in, an Urban Strategy should focus on the essential features of sustainable urbanism without being unnecessarily prescriptive.

5.15 Co-created & inclusive

by multiple professionals, city officials, city stakeholders and citizens through Creative Workshop events. An Urban Strategy should benefit from a new approach to urban planning and design, which moves beyond the fragmentation of skills and expertise which typified the development of many cities in the 20th century. Instead, teamworking based on co-creation, co-production and co-invention should be key to the success of an Urban Strategy, ensuring that the Urban Strategy guidelines are accessible and integrated into city processes.

5.16 Incorporating a Design Review process

to assist the market in producing Urban Strategy-compliant proposals.

5.17 Regularly reviewed

by an Urban Strategy Review panel and updated using evidence. Unlike some policy documents, which quickly become outdated as circumstances change, an Urban Strategy should incorporate processes of review and renewal to make sure that it can be kept up to date.

5.18 Exploiting the beauty of the natural landscape

including blue (water) and green (landscape) ecologies. An Urban Strategy should recognise the unique beauty and individuality of a place and seek further development of this potential.

5.19 Protecting the city against the hazards of the natural landscape

including flooding, harsh temperature extremes, earthquake and other hazards.

5.20 Defending the city against human attack

and other forms of criminal behaviour.

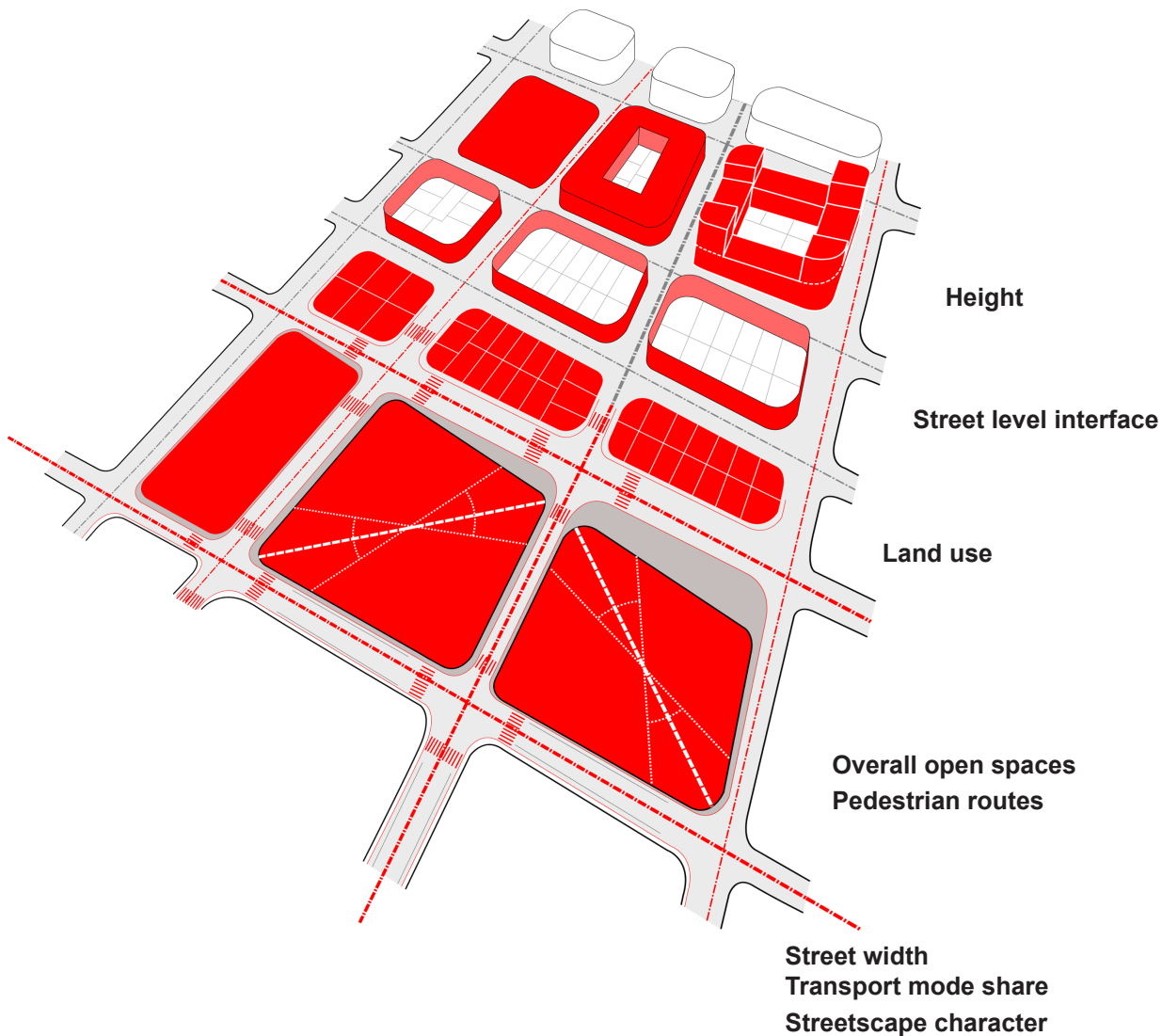
5.21 Investable

ie satisfying the needs of investors for a strong vision supported by a robust process. An Urban Strategy should be built on solid, commercial foundations. It should benefit from robust, evidence-based research into the commercial success of global cities. It should be produced and presented in ways that are relevant to and transparent to the investment community.

In summary, an Urban Strategy should not be a simple combination of texts, images and schemes. It should be an interdisciplinary, living set of plans that are co-created by city officials, local residents, urban planners and designers. The process of co-creation should ensure mutual skills and knowledge transfer between professionals, policymakers and members of the public. A process of science-based and human-focused co-creation should secure the long-term sustainability and relevance of an Urban Strategy.

An Urban Strategy should strike a balance between two competing issues: control and flexibility. It should do this by establishing certain *fundamental* proposals for the most important streets and buildings, while creating *template guidelines* to shape the design of the secondary and tertiary locations.

The purpose of this approach is to control certain critical features of the city while providing *flexibility* to developers and investors in other locations. This flexibility should be carefully guided by the creation of “templates” that set parameters within which individual development projects can be designed.



The Key Urban Elements are the Streets, Urban blocks and Building plots of the city:

6.1. Streets

Streets channel the movement flows, infrastructure corridors and linear green spaces of the city, driving social, economic and environmental sustainability. An Urban Strategy should establish a series of Fundamental Proposals for the “foreground” network of primary connections in terms of:

- a. street width
- b. transport mode share
- c. landscape character

and should create Template Guidelines to shape the “background” network of secondary and tertiary routes in terms of their street width, transport share and landscape character.

6.2. Urban blocks

Gridblocks are the parcels of land that sit within the street network, either built, unbuilt or partly built on. An Urban Strategy should establish a series of Fundamental Proposals for the:

- a. land use mix
- b. overall building height
- c. overall floor-area-ratio densities
- d. overall open space areas

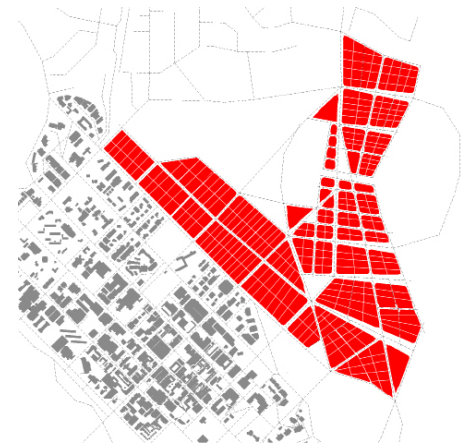
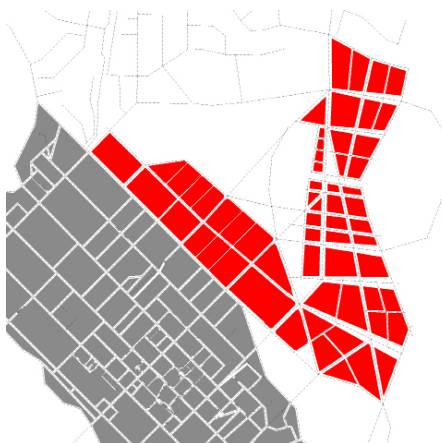
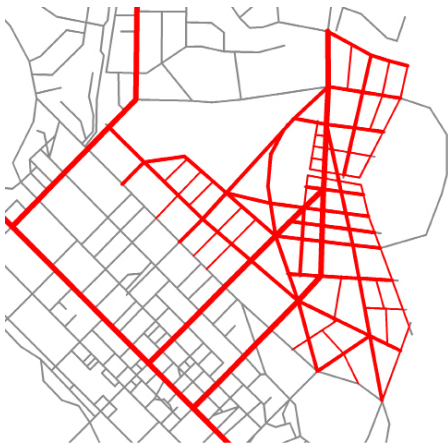
of the “super blocks” that sit within the foreground network of primary connections. An Urban Strategy should also create Template Guidelines to shape the land use, height, density and open space areas of the super blocks that sit within the background network of secondary and tertiary connections.

6.3. Building plots

Building plots are created when super blocks are subdivided into individual parcels of developable land. The Masterplan will establish a series of Fundamental Proposals for the:

- land use
- height
- general street-level interface

of those key building plots that sit at key locations in the foreground network of primary street connections. An Urban Strategy should also create template-based guidelines to shape the finer-scale masterplanning and architectural design of individual building plots elsewhere.



An Urban Strategy should be achieved by following a three-phase process. Each part of the process should be run by a dedicated team.

7.1 Phase One

First, and most importantly, the Urban Strategy should be created by an **Urban Strategy Production Team**. This is the key phase in the Urban Strategy process. It should have four Work Stages:

a. Urban Data Collective

The Urban Strategy process begins with the assembly of key data on the existing city or new city site (Urban Data Review), the bringing together of this data within a single, geospatial storage environment (Urban Data Store) as well as the identification of data gaps that can be filled through surveys (Urban Data Sensing).

Process

Urban Data Review
Creation of an Urban DataStore
Creation of an Urban Data Sensing Strategy.

Outcomes

A description of the functional performance of the existing city or new city site in terms of its social, economic and environmental characteristics.

b. Urban Performance Model

The various datasets of the Urban Data Collective should be analysed using multiple regression analysis to establish correlational associations. An Urban Performance Model should be created that explains the functional performance of the existing city or new city site.

Process

Multiple regression analysis
Urban Performance Model.

Outcomes

An Urban Diagnosis should be created, establishing a science-based foundation for the later strategy work. Using maps and statistical charts in combination with experience and expertise in urban analysis, the Urban Strategy Production team should construct an Urban Performance Model: an evidence-based description of the relationships found between data on people, urban form, resource flows and environmental factors in the existing city or new city site.

c. Urban Strategy

On the basis of the Urban Diagnosis, the Urban Strategy Production Team should use a process of Creative Workshops to generate a set of social, economic and environmental Issues that the Urban Strategy process should address. Where possible, these should be stated as measurable Objectives such as increases in air quality and accessibility to key social infrastructure such as schools and shops. The means by which these Issues and Objectives can be achieved through physical and spatial change should then be described in terms of *Design Principles* that should be followed during the strategy process.

Consideration of the Issues, Objectives and Design Principles against the conditions found in the existing city, or new city site, should identify a series of *Opportunities* and *Constraints* that a) identify places where physical and spatial change is highly desirable and b) highlight aspects of the urban form that may constrain change. The Opportunities & Constraints report provides an essential, highly valuable bridge between analysis and action. The Urban Strategy Production team should use the results of the Urban Diagnosis in combination with the results of the Issues, Objectives & Design Principles work to target locations that should be addressed by the strategy process.

The most significant task in this part of the work should be to create a series of *Fundamental Proposals* and a series of *Template Guidelines* for each of the three key elements: streets, super blocks and building plots (as described in Section 6).

Process

Creative Workshops
Issues, Objectives & Design Principles
Opportunities & Constraints Analysis
Fundamental Proposals for streets, urban blocks and building plots
Template Guidelines for streets, urban blocks and building plots.

Outcomes

An evidence-informed Urban Strategy in the form of Fundamental Proposals and Template Guidelines.

d. Urban Impact Review

The Urban Performance Model should be transformed into an Urban Impact Model, using the findings of the multiple regression analysis to model the effect of planning and design changes, including changes in spatial accessibility, infrastructure provision and land use attraction. Regular testing during the production of the Urban Strategy should serve to optimise the end product.

Process

Urban Impact Modelling
Urban Strategy Optimisation.

Outcomes

A rigorously tested set of Urban Strategy proposals.

7.2 Phase Two

An Urban Strategy should be a living document and, to ensure its ongoing success, it should be administered by an **Urban Strategy Delivery Team**. The role of the Urban Strategy Delivery Team should be to assess investor inquiries and development proposals in terms of their compliance with the ethos and principles of the Strategy. Assistance should be provided through a process of expert **Design Review** in order to assist developers in producing proposals that comply with the Urban Strategy.

7.3 Phase Three

The **Urban Strategy Review Team** should conduct an annual update of the Urban Strategy, making sure that the plan and its analytic processes incorporate the latest information on urban data and investment projects (which should be broadly classified as “constructed”, “approved” or “proposed”).

8 Urban data strategy

Part 1

An Urban Strategy requires an Urban Data Strategy to ensure the quality, completeness and up-to-dateness of the data that should drive the Urban Performance Model and Urban Impact Model.

Urban data will be generally categorised as follows:

8.1 People

Data on social and economic profiles as well as behaviour patterns (movement and space use).

8.2 Urban form

Data on the built assets of the city, including buildings, streets, spaces, bridges, highways, rail lines, air and sea corridors.

8.3 Resources

Data on natural, “extracted” resources such as water, gas and minerals as well as artificial, “created” resources such as data, finance, power and machines including cars and computers.

8.4 Environment

Data on meteorology, topography, geology and hydrology.

Some data will already exist in the city’s records, whereas others will need to be gathered through surveys. All data will need to be updated on a regular basis to ensure the Integrated Urban Model remains viable. Key outcomes of the Urban Data Strategy will be:

a. Urban Data Store

A database in which all data is tagged according to its spatial and temporal characteristics.

b. Urban Data Sensing Strategy

An ongoing programme of data collection.



The four general urban data categories **People, Urban Form, Resources, and Environment** will be subdivided into further categories. The conclusions that can be drawn from data analysis will support effective delivery of further recommendations.

9.1 People

a. Demography

What are the patterns of social and economic diversity across the city and how are these changing with migration to, from and within the city?

What are the factors that influence these patterns?

b. Consultation

What are the current methods of consultation with community leaders and other organisations/individuals?

What are the factors that influence these methods?

c. Building development and occupancy

Which parts of the city are more or less popular for development and occupancy?

What are the factors that influence patterns of development and occupancy?

d. Human behaviour - movement

How do people move across the city in public and private vehicles, on foot and on bicycles?

Which routes are more or less popular for which kinds of journey?

What are the factors that influence patterns of use?

e. Human behaviour - public space use

How are parks and public spaces used by people?

Which are more or less popular?

What are the factors that influence patterns of use?

9.2 Urban form

a. Transport

What are the alignments, capacities and conditions of public/private vehicle (car, bus, train, plane), walking and cycling networks across the city?

What are the factors that influence these networks?

b. Land use

What are the patterns of building-by-building and floor-by-floor land use across the city including residential, workplace, educational, healthcare and religious buildings?

What are the factors that influence these patterns?

c. Services infrastructure

What are the locations, connectivity, capacity and condition of energy/water/data supply and water/waste removal infrastructure across the city? What are the factors that influence patterns of infrastructure?

d. Culture - built environment

What are the culturally significant built assets across the city?

What are the factors that influence these patterns?

e. Heritage

What are the historically significant built assets across the city?

What are the factors that influence these patterns?

9.3 Resources

Data on natural, “extracted” resources such as water, gas/oil and minerals as well as artificial, “created” resources such as data, finance, power, food and machines including cars and computers.

a. Energy

What are the locations of energy generation and patterns of energy supply across the city?

What are the factors that influence these patterns?

b. Data

What are the patterns of land value/property sale value/rental value across the city?

What are the factors that influence these patterns?

c. Finance - real estate economics

What are the patterns of land value, property sale value and rental value across the city?

What are the factors that influence these patterns?

d. Food

What are the patterns of local food production and distribution across the city?

What are the factors that influence these patterns?

e. Extractions – water, gas/oil and minerals

What, if any, are the local patterns of extraction in or near the city?

What are the factors that influence these patterns?

9.4. Environment

a. Air quality

How does air quality vary across the city in space and time?

What are the factors that influence patterns of air quality?

What conclusions can be drawn?

What recommendations can be made?

b. Environment - climate

What are the patterns of rainfall, sun and wind across the city?

What are the factors that influence these patterns?

c. Environment - landscape

What are the patterns of plant, animal, bird and insect species across the city?

What are the factors that influence these patterns?

d. Environment - soil condition and quality

How do ground conditions vary across the city?

10.1 People**a. Demography**

What are the patterns of social and economic diversity across the city and how are these changing with migration to, from and within the city?

Measures

Population numbers
Age, gender, ethnicity profiles
Economically active population
Employed population
Unemployed population/rate
Educational achievement
Salary profile

b. Consultation

What are the current methods of consultation with community leaders and other organisations/individuals?

Measures

Numbers of consultation events held
Community participation numbers, including repeat engagements
Scope and intensity of issues raised through consultation events

c. Building development and occupancy

Which parts of the city are more or less popular for development and occupancy?

Measures

Planning Applications/Permissions
Construction starts (sq m per month)
Building completion rates (sq m per month)
Building fit-out rates (sq.m per month)
Building occupancy rates (sq.m per month).

d. Human behaviour - movement

How do people move across the city in public and private vehicles, on foot and on bicycles?

Which routes are more or less popular for which kinds of journey?

Measures

Passenger turnover, all modes of movement
Mode split
Journey distance

e. Human behaviour - public space use

How are parks and public spaces used by people?

Measures

Space use density (people per sq.m)
User type (age, gender, occupation)
Activity type

10.2 Urban form**a. Transport**

What are the alignments, capacities and conditions of public/private vehicle (car, bus, train, plane), walking and cycling networks across the city?

Measures

Street network length
Street network hierarchy (from spatial network analysis)
Street network geometry (from spatial network analysis)
Street network density (spatial footprint of the city)
Street network capacity
Street network typology (highway, boulevard, avenue, local shopping street, mall, local street, lane, path, bridge)
Street network condition

b. Land use

What are the patterns of building-by-building and floor-by-floor land use across the city including residential, workplace, educational, healthcare and religious buildings?

Measures

Land use types and areas at the individual building level for buildings.
Land use types and areas at the individual floor of the individual building.
Land use condition
Open space areas
Open space typology (small/medium/large; public space/park/green corridor; degree of vegetation)
Open space condition
c. Services infrastructure
What are the locations, connectivity, capacity and condition of energy/water/data supply and water/waste removal infrastructure across the city?

Measures

Service infrastructure network length
Service infrastructure network capacity/hierarchy
Service infrastructure network condition

d. Culture - built environment

What are the culturally significant built assets across the city?

Measures

Building/place/facility numbers
Building locations
Building use levels

e. Heritage

What are the historically significant built assets across the city?

10.3 Resources

a. Energy

What are the locations of energy generation and patterns of energy supply across the city?

Measures

Facility location
Facility capacity
Operational activity

b. Data

What are the available urban datasets for different parts of the city?

Measures

See Section v.

c. Finance - real estate economics

What are the patterns of land value, property sale value and rental value across the city?

Measures

Gross Regional Product
Gross Regional Product per capita
Industrial production
Investment in fixed assets
Value (volume) of construction works

d. Food

What are the patterns of local food production and distribution across the city?

Measures

Food type
Food yield
Processing location
Processing capacity
Food quality

e. Extractions – water, gas/oil and minerals

What are the local patterns of extraction in or near the city?

Measures

Extraction type
Extraction volume/rate

10.4 Environment

a. Air quality

How does air quality vary across the city in space and time?

Measures

Carbon Monoxide (CO)
Nitrogen Dioxide (NO₂)
Ozone (O₃)
Particulate matter (PM_{2.5} and PM₁₀)
Sulphur Dioxide (SO₂)
Hydrogen Sulphide (H₂S)

b. Environment - climate

What are the patterns of rainfall, sun and wind across the city?

Measures

Rainfall profile
Sunlight profile
Wind profile

c. Environment - landscape

What are the patterns of plant, animal, bird and insect species across the city?

Measures

Ecosystem profile.

d. Environment - soil condition and quality

Measures

Soil condition and quality profile

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