TRACTEBEL

ENGIE

CITIES
2030

**What will cities
look like in 2030?**

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Introduction

"The future of the world's population is urban. With more than half of the world's people living in urban areas, urbanization determines the spatial distribution of the world's population and is one of the four demographic mega-trends, with the growth of the global population, population ageing, and international migration."

(United Nation DESA, 'World Urbanization Prospects')

The century of cities

The world is continuing to urbanize at a massive scale and intensity. Globally, over 50% of the population lives in urban areas today. By 2045, the world's urban population is expected to increase by 1.5 times reaching 6 billion people and the 68% mark. In comparison, in 1950, only 29% of people lived in cities.

Half of the world's urban population reside in relatively small settlements of less than 500,000 inhabitants, while around 12% live in 33 megacities with more than 10 million in- habitants. The distribution of the urban population is also changing fast: in the recent past, most of the world's largest urban settlements were located in the more developed regions, while today's large cities are concentrated in the global south.

Given this massive shift towards urban living, sustainable development depends increasingly on the successful management of urban growth, especially in countries with low income and lower-middle income where the most rapid urbanisation is expected to happen.

At the same time, solutions to the increasing demand for resources (water, food, materials,

"Cities are, simultaneously, the places where global issues become tangible and the place where solutions could be found"

Cities growth worldwide and the big shift towards East
Image: Tractebel visualization based on http://luminocity3d.org

energy,...) and the manifold challenges (climate change, demographic changes, social and technological transformations) that are affecting cities also need to be found in a new and sustainable relationship between urban and rural areas. In this context cities are, simultaneously, both the place where global issues become tangible and where solutions are / could be found.

On the other hand urbanisation, if badly managed, leads (and is leading) to greater problems of all dimensions: from environmental degradation to the declining of quality of life; from social inequalities to political stresses.

Cities consume two-thirds of the total energy used and emit more than 70% of energy-related carbon dioxide emissions worldwide. However, urbanisation also brings benefits: technological innovation, economic prosperity, wealth production, cultural, social and scientific development as most of the scientific resources and production are concentrated in cities.

Cities also concentrate entrepreneurship and attract a diverse and well-educated labour force and a high concentration of businesses.

They are hubs for development, where the proximity of people and activities connected through infrastructures enable the necessary platform for sharing knowledge and information.

The quality of future urban growth and its successful management and design will have a huge influence on global resource efficiency and sustainability, directly affecting the quality of life of billions of people. Taking this perspective and all the above mentioned facts into consideration, this research considers the 'city' as an appropriate 'concept/ tool' to understand the contemporary urban condition worldwide.

Cities' evolution and global trends

This research document aims to sketch a qualitative understanding of the worldwide urban landscape within the time frame of 2030 – keeping in mind that several forces steer the evolution of cities. On the one side, in a globalised and interconnected world all cities are influenced, with differing intensity, by global trends and tendencies.

For this reason this study tries, firstly, to understand which are the main trends, in their manifold dimensions - demographic, environmental, economic, geopolitical, social, technological, spatial - that describe our societies.

All trends influencing cities acting as external forces that steer their development.

On the other side, each city has inherent characteristics, weaknesses and strengths that con- tribute to determining its potential development: enabling certain changes and acting as obstacles for others.

Each real city will develop according to its social and cultural preferences, level of maturity, geographical conditions, financial resources, political and institutional capacities.

"Each city has inherent characteristics, weaknesses and strengths that enable certain changes and act as obstacles for others"
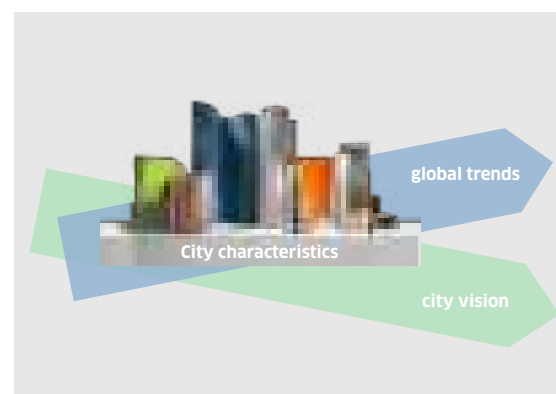
Cities' development forces
Image: Tractebel visualization

"What then is type? It can most simply be defined as a concept which describes a group of objects characterized by the same formal structure. It is neither a spatial diagram nor the average of a serial list. It is fundamentally based on the possibility of grouping objects by certain inherent structural similarities. It might be said that type means the act of thinking in groups. [...] Then, as one becomes increasingly precise, one introduces other levels of grouping, thus describing new ranks of types. One finishes with the name of a specific building. Thus, the idea of type, which ostensibly rules out individuality, in the end has to return to its origin in the single work"
(Rafael Moneo, 'On typology')

Nevertheless certain development pathways are similar within certain 'classes' or 'typologies' of cities.

A third element to consider while reflecting on the future of a city relates to the political vision, if existent, that guides its development. This vision could align, or not, with the trends and the characteristics of the city, being regressive, conservative, progressive or revolutionary as case by case examples. Being city-specific, so not suited for general consideration at a worldwide scale, this factor is not included in this study.

All the other mentioned elements, are equally important in determining the evolution of cities interpreted as a combination of global, local, internal and external forces.

Cities typologies...why?

This research document aims to sketch a qualitative understanding of the worldwide urban landscape within the time frame of 2030. The first part related to global trends showed the complexity of exogenous and endogenous forces, interest and dynamics that characterise our urbanised territories. Starting with this observation, we made the assumption that the 'typological' approach could adequately and simply describe the contemporary urban condition of the world.

This decision implies an acceptance of a certain degree of 'error' given by the 'reduction process' (classification) with which the cities typologies were defined.

The 'typological' approach assumes that cities worldwide can be seen as belonging to a class of 'repeated objects' characterised by some general attributes. Defining those common attributes is a first step in the process of understanding how cities are and how they possibly will evolve in the next future.

" Each city won't follow a single model of urbanisation. Nor is there a single ideal to which all cities will conform or aim towards. Each city will develop in a different way "

Each city's evolution pathway won't follow a single model of urbanisation. Nor is there a single ideal to which all cities will eventually conform to or aim towards. Each city will develop in different ways depending on its social and cultural preferences, level of maturity, geographical conditions, and financial resources, political and institutional capacities.
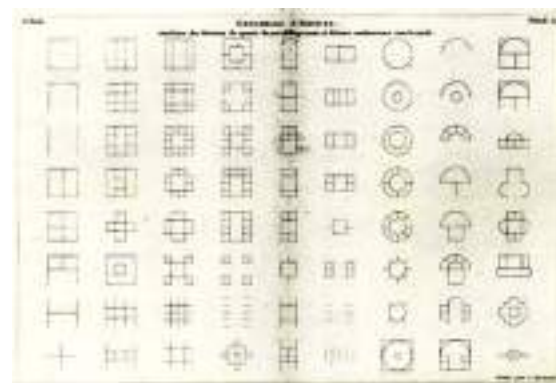
The typological approach: a long history
Image: Durand Recueil et parallèle des edifices de tous genres, anciens et modernes. J.N.L. Durand. 1799)

It's not so simple anymore...
Image: Ambrogio Lorenzetti, Allegoria ed effetti del Buono e del Cattivo Governo, Palazzo Pubblico in Siena (1338-1339)

This research considers the 'city' as an appropriate 'concept/tool' to understand the contemporary urban condition, nevertheless we are aware and recognize that it has certain limits in its capacity to describe the wide range of urban conditions worldwide.

Four concepts are key in order to understand the cities context worldwide and the perimeter and limits of this research exercise.

The ambiguity of the 'city' definition

The first concept relates to the ambiguity of the 'city' definition. Everyone knows what it means but no one will give the same definition. From Wikipedia: "A city is a large human settlement. A city is distinguished from other human settlements by its relatively great size, but also by its functions and its special symbolic status, which may be conferred by a central authority. The term [...] can be used in a general sense to mean urban rather than rural territory".

Since the last century the borders between urban and rural territory started to blur, making the previous definition insufficient. It becomes almost impossible to define the border between what we could define 'a city' and the 'rest' (village, countryside, urbanisation, nature, rural territory...).

The on-going massive urbanisation at global scale is definitely changing our physical world at a scale and with an intensity so that this division and difference no longer exist, and we could argue that it doesn't matter anymore. Within the urbanised territory there are many cases and areas that we hesitate to define or name, as their definition falls in-between the 'city' and the 'non-city'.

This semantic limit implies that what is comprised within this research describes a part of the urbanised world, but not all of it.

" The on-going massive urbanisation at global scale is definitely changing our physical world at a scale and with an intensity so that It becomes difficult to define what we call 'a city' "

"Mega-regions are a considerable economic force globally. The world's 40 largest mega-regions [...] are home to less than 18% of the world's population; yet, they are responsible for 66% of global economic activity and about 85% of technological and scientific innovation. The great paradox of our time: at the same moment that technology enables the geographic spread of economic activity, economic activity continues to cluster and concentrate around this megaregional unit"
(R.Florida, T.Gulden, C.Mellander,'The Rise of the Mega-Region')

Global distribution of population
Image: Tractebel visualization based on R.Florida, T.Gulden, C.Mellander,'The Rise of the Mega-Region'

The rise of the mega regions

The second concept refers to one of the main global trends related to urbanisation: the rise of the mega regions. We are used to thinking about economic growth and development in terms of nation-states. But over the past two or three decades, we have seen the rise of a new urban and economic unit– the mega-region. The emergence of globalisation in the 21st century made national boundaries less and less meaningful. Capital and labour (especially highly creative and productive labour) can now be globally reallocated freely around the world – seeking maximum returns wherever they may be. Nation-state has therefore started to lose its weight and mega-region can be interpreted as a parallel structure.

" The emergence of globalisation in the 21st century made national boundaries less and less meaningful "

Mega-regions are integrated sets of cities and their surrounding suburban hinterlands across which labour and capital can be reallocated at very low cost. Forty mega-regions have been detected worldwide. They account, similarly for the 40th largest nation in terms of GDP, an economy of about $100 billion. These regions host talent, productive capability, innovation and markets on a large scale and, thanks to advanced globalisation are exposed to world-wide competition. This means that city-systems have also become global.

Development dilemma

The contemporary global economy is also made up of "islands" (cities and mega regions) where high-tech and value-added productions are concentrated and where the most relevant innovations are realized.
These metropolitan areas concentrate a high population density where employment, income

and productivity growth are considerably higher than elsewhere.

Each job in sectors with high-added-value generates on average five jobs in traditional sectors, generally local services. This concentration dynamic is self-reinforcing, because productive workers attract other productive workers. And the relatively less qualified occupations also benefit from this flow.

" The areas of physical agglomeration of production are therefore the locomotives that drive the economy, in a structural process that inevitably tends to generate territorial divergences "

In this context the areas of physical agglomeration of production are therefore the locomotives that drive the economy, in a structural process that inevitably tends to generate territorial divergences. Cities could also be interpreted as back holes that produce inequalities and territorial disequilibrium.

This condition produces a "development dilemma": uniform growth in the territory compensating the disruption that cities produce or concentrated efforts on the good functioning of the economy-driving cities?

Are cities blackholes?
Image: Black hole Messier 87 from Wikipedia (2019)

Every city is a lot of cities
Image: 'The city in the city' O.M. Ungers and Rem Koolhaas (1977)

Cities within a city

The fourth concept relates to the multiple identities and characteristics that are hosted simultaneously in one city.

This concept looks at the city up close, at a different scale that allows us to recognise that contemporary cities are often characterised by the overlapping of many distinct, sometimes divergent principles. This is true for larger cities and settlements but sometimes also towns, smaller and medium-size cities or even at the scale of a city district.

This concepts is key to understanding the limits of the proposed methodology of classification by typologies and understanding how to interpret the results.

Each city typology is therefore not mutually exclusive. For this reason each real city could fit within one or more typologies depending on its degree of complexity.

PART I

Key Global Trends

Urbanization trends

Key question

How to tackle massive urbanisation and create a sustainable urban environment?

"Pervasive urbanization has modified the urban condition itself beyond recognition. **The 'city' no longer exists**"

Rem Koolhaas - Founder of OMA, Professor in Urban Design at MIT
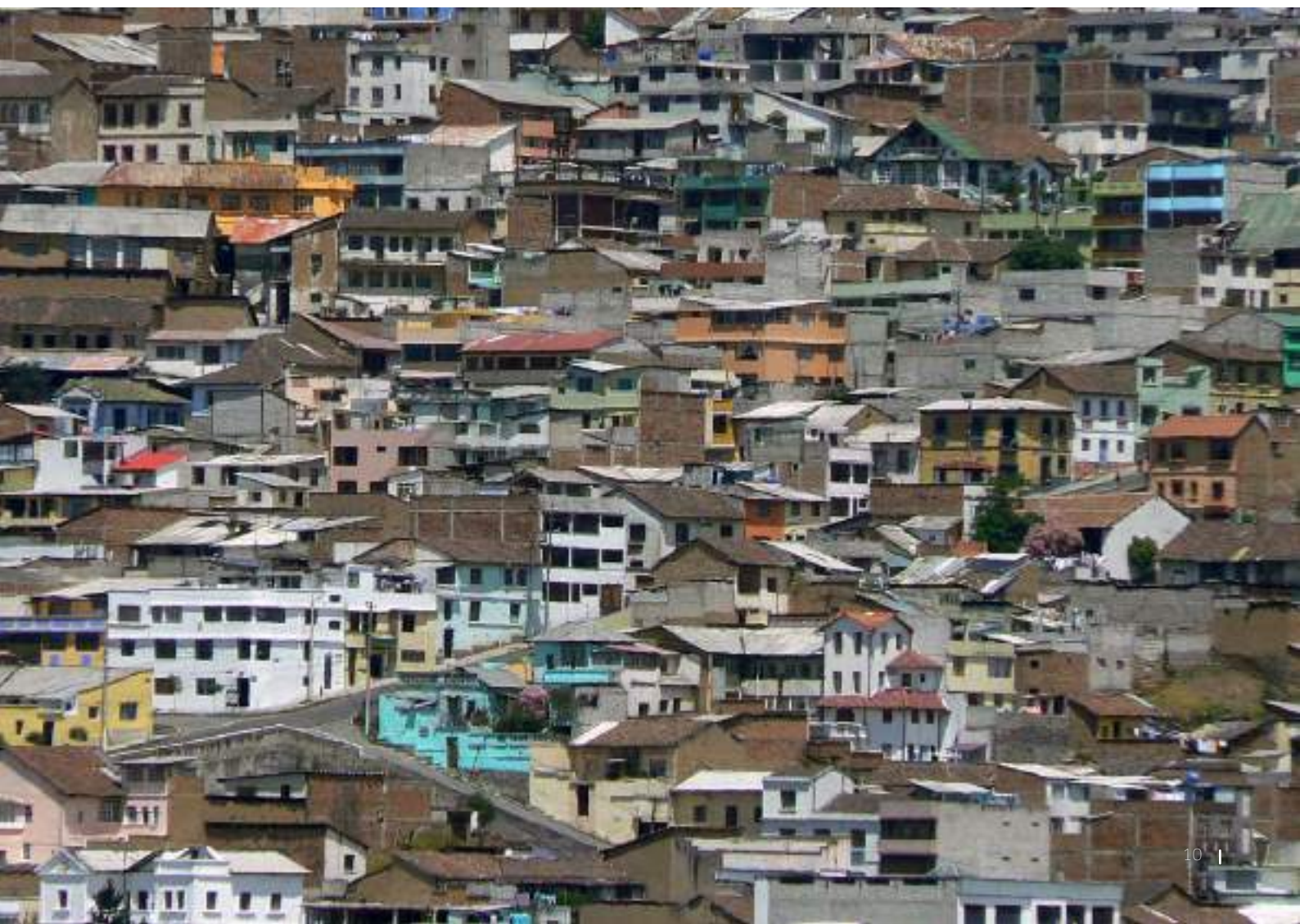
Urban and rural population trends and projections 1950-2050

The future of the world's population is urban. The global population is increasing and more than half of the world's people is now living in urban areas. The global rural population, on the opposite, is decreasing. In 1950, only 29% of people lived in cities while the world's urban population is expected to increase by 1.5 times to 6 billion reaching the 68% of urban population in 2040.

Population, millions   >>>

Share of urban population, %   >>>

Global population

Share of urban population

Global rural population

today
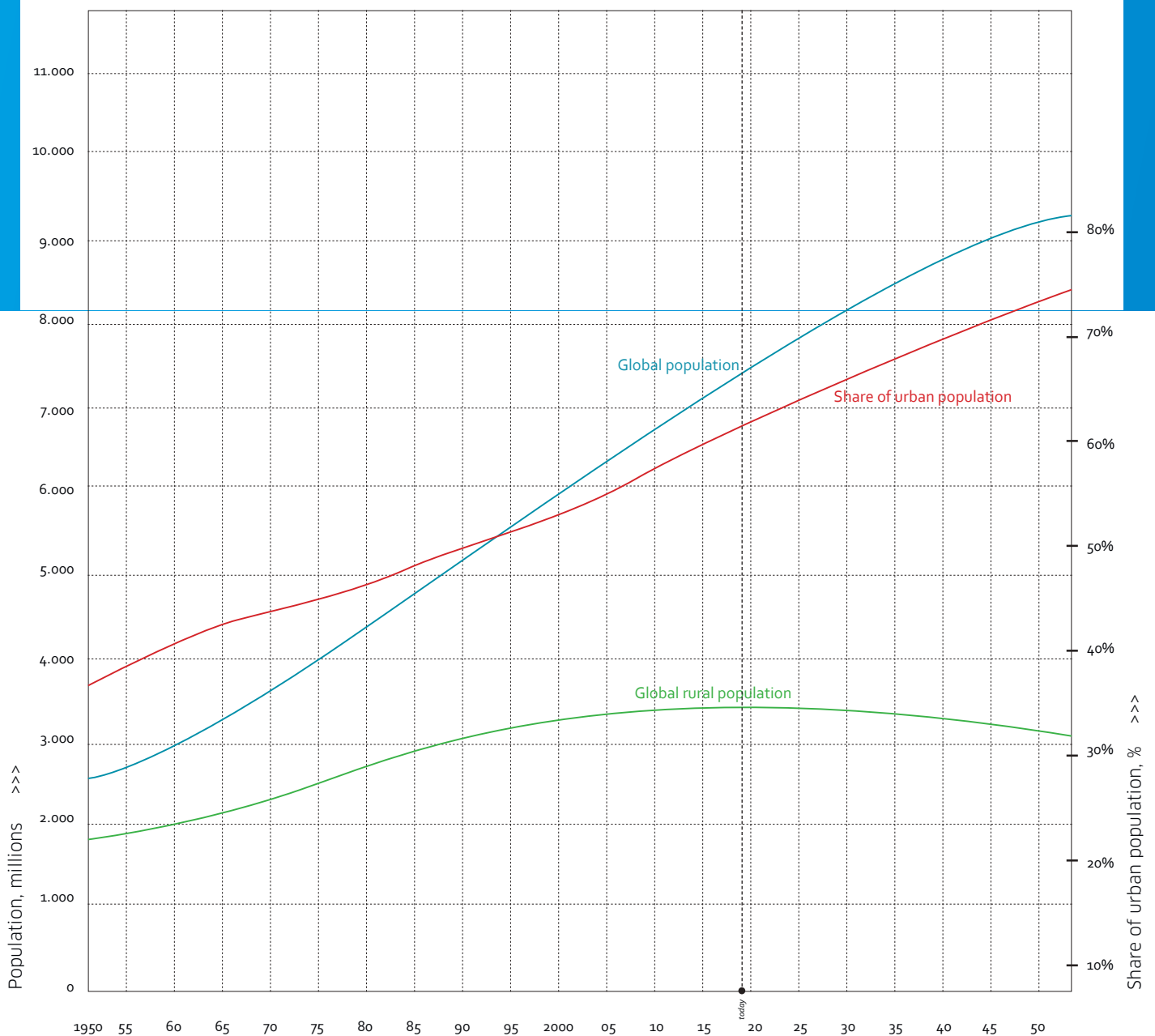
Demographic trends

Key question

How to deal with an increasing world population, massive migration and changes in demographic patterns and resources availability?

"The world population will never reach nine billion people. It will peak at 9 billion in 2040, and then decline"

Jørgen Randers - Professor of climate strategy at BI Oslo business school

World population projected to 2100

(Source: ourworldindata.org)

Is population growth a never-ending trend? How does it relate to the availability and production of resources? How is the population distributed across regions? This visualisation shows the historical population estimates by region from 1960 through to today. The striking change between now and 2100 is the expected growth in the African population. Today, it is around 1.3 billion; by 2100 it's projected to more than triple to 4.3 billion. Over the past 50 years Asia experienced similar rapid population growth. Today its population stands at around 4.6 billion. By 2050 it's expected to rise to 5.3 billion, but then fall in the latter half of the century.
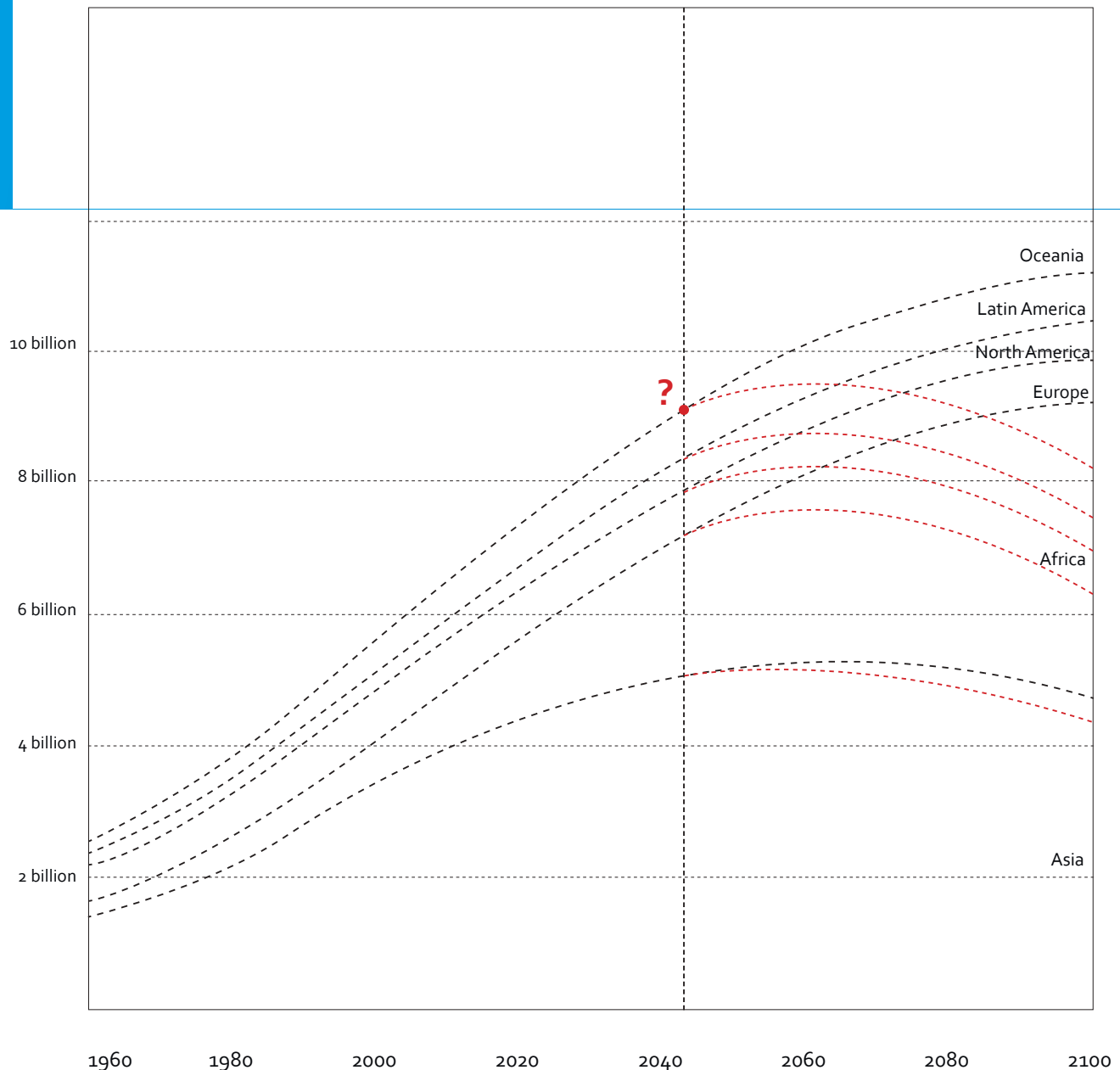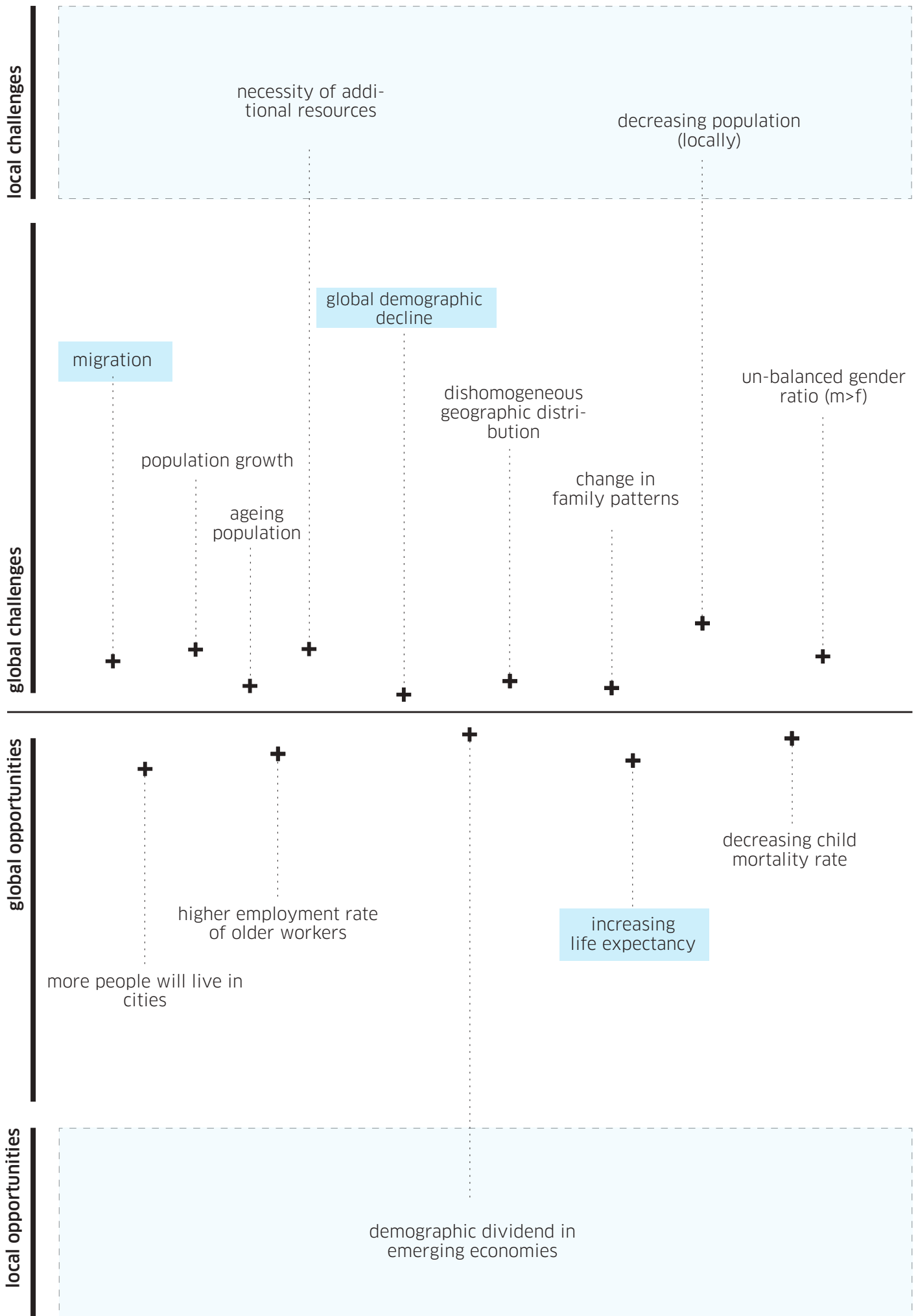
Worldwide major variations in the population structure are occurring (gender, age, ethnicity, education, mobility, employment…). Three major trends are the cause of these changes: declining birth rates, longer life expectancy and increasing immigration.

Migration

Movement of people from one place to another with the intentions of settling, permanently or temporarily in a new location. 3.4% of the world's inhabitants today are international migrants. Economic factor plays a dominant role in migration movements, in addition to other key factors such as political reasons (instability, dictatorships, wars, ethnic and religious conflicts…) and the climate change effect.

Global demographic growth rate decline

The "population growth rate" is the rate at which the number of individuals in a population increases in a given time period. Long-term population estimates, however, reveal that growth in the global population is expected to see a dramatic decline.

Resource availability & distribution

Many people are highly vulnerable to hunger and malnutrition. In particular, people most affected by lack of access to resources are those who live in an area recently affected by drought or overpopulation.

Ageing population

As health is rapidly improving around the world, life expectancy is also increasing rapidly. Moreover the fertility rate is decreasing, being driven by the socio-economic development of the population, especially the status and wellbeing of women.

Increasing life expectancy

Life expectancy at birth reflects the overall mortality level of a population. Global average life expectancy increased by 5.5 years between 2000 and 2016, the fastest increase since the 1960s. Those gains reverse declines noted during the 1990s, when life expectancy fell in Africa due to the AIDS epidemic, and in Eastern Europe following the collapse of the Soviet Union.

Environmental trends

Key question

How should we deal with emerging environmental issues and make cities adaptable to climate change?

" I want you to act as if the house was on fire...because it is"

Greta Thunberg - Initiator of School strike for climate

Environmental risks
related to potential impact and possibility of occurrence

(Source: World Economic Forum Global Risk Landscape 2018)

Environmental risks dominate the results of the annual Global Risks Perception Survey (GRPS 2018). They accounted for three of the top five risks by likelihood and four by impact. Extreme weather is the risk of greatest concern, with environmental policy failure and threats of natural disasters as secondary key worries. The results of climate inaction are becoming increasingly clear.

The accelerating pace of biodiversity loss is a particular concern. Species abundance is down by 60% since 1970. In the human food chain, biodiversity loss is affecting health and socio-economic development, with implications for well-being, productivity, and even regional security.

Extreme weather events

Natural disasters

Failure of climate change
mitigation and adaptation

Biodiversity loss
and ecosystem collapse

Man-made
environmental disasters

*other risk related to
economy, technology, geo-
politics and society are
not showed*

average

Impact >>>

Likelihood >>>

average

local challenges

increasing emissions

access to water

lack of resilience

global challenges

sea level rising

heat island effect

natural disasters

climate change

increasing waste production

energy consumption

resource scarcity

air-water-soil pollution

global warming

biodiversity loss

global opportunities

cradle to cradle

ethical consumption

awareness becomes higher

self-sufficiency

local opportunities

biodiversity in the city

progress of ecodistricts

urban farming

zero-carbon initiatives

Worldwide, cities are the main consumers of resources and accountable for a considerable part of global pollution and climate change. However cities are also the places where the main environmental gains can be made and the ecological footprint per capita can be reduced.

Climate change

Is caused directly and indirectly by human activity, altering global or regional climate patterns. Greenhouse gases become trapped in the atmosphere and heat the planet, resulting in extreme weather conditions (drought, flooding, tropical storms...).

Air-water-soil pollution

Environmental pollution has grown into a global transboundary problem that affects air, water, soil and ecosystems, and is linked directly to human health and well-being. Pollution is linked to three main human activities: fossil-fuel combustion (industry and transport); the use of fertilizers and pesticides in agriculture; the growing use and complexity of chemicals.

Resource scarcity

Addresses the conflict between a rising demand for resources of all kind (water, food, land, carbon, oil, soil...) due to a growing population and rising affluence in emerging economies and the Earth's finite amount of resources.

Increasing emissions

Greenhouse gases make the planet warmer. Human activities are responsible for almost all of the increase in greenhouse gases in the atmosphere. The primary sources of greenhouse gas emissions are transportation (14%), electricity production (25%), industry (21%), commercial and residential (6%) agriculture, forestry and land use (24%), other energy production (10%).

Zero-carbon initiatives

Carbon neutrality, or climate neutrality or having a net zero-carbon footprint, refers to achieving net zero-carbon dioxide emissions by balancing carbon emissions with carbon removal.

Social trends

Key question

How to solve the increasing inequalities and polarisation in cities? How can cities offer equal and well distributed opportunities to their citizens?

"Forms of modern life may differ in quite a few respects – but what unites them all is precisely their **fragility, temporariness, vulnerability and inclination to constant change***"*

Zygmunt Bauman - Sociologist and philosopher, Professor at University of Leeds

Emerging middle class
(People living on 2-20$ per day with purchasing-power parity)

(Source: economist.com)

A sharp contrast between recession-hit rich countries and emerging "giants" has been seen in recent years. Estimates from the Asian and African Development Banks, using a broad definition of middle class as living on $2-20 a day, confirm this. Based on this assumption Asia and Africa have seen the biggest middle class rise from 1990 to 2008. However, evidence that this progress will bring political demands that will reshape the developing world is also mounting.

local challenges

changing models
of consumption

global challenges

individualism

emerging issues
(privacy, data, ...)

poverty

fast changing
patterns

polarisation

increasing
inequalities

unemployment

global opportunities

changing models
of consumption

multiculturalism

emerging
middle class

increasing demand of
participation

social
entrepreneurship

rising quality
of life

safer cities

local opportunities

better inclusion of
disabled people

collectivity

citizen centered
cities

knowledge society

Many shifts in the mechanisms within the social structure are transforming cities and regions. Among them changes in cultural symbols, modes of production, rules of behaviour, social organisations, institutional structure or value systems.

Poverty

A person is considered to be living in extreme poverty if they live on less than 1.90 international dollars (int.-$) per day. Important progress has been made in reducing global poverty – resulting in a decline of the share of the world population below this poverty line. However, the amount of people living in poverty remains extremely high and half a billion people are projected to still be living in extreme poverty in 2030.

Increasing inequalities

Growing inequalities affect many different aspects of society representing an obstacle for growth. These generally include; gender equality, education, income, health, innovation and well-being.

Polarisation

Is associated with segregation within a society that may emerge from income inequality, economic displacements and/or ethnic-religious-culture differences etc.

Multiculturalism

Is the co-existence of diverse cultures, where culture includes racial, religious, or cultural groups and is manifested in customary behaviour, cultural assumptions and values, patterns of thinking, and communicative styles.

Increasing demand of participation

There is a fast increasing demand for participation and co-creation in cities worldwide. This is a process of sharing information and ideas (among different actors: governments, academia, non profit and/or profit organisations and citizens) that allows engagement and empowerment in developing policy, creating programmes, improving services, and tackling systemic changes in cities.

Technological trends

Key question

How can technology enable and foster sustainable urban cultures, smart citizens and cities?

*"Technology is the answer, **but what was the question?"***

Cedric Price
Architect and professor at AA School of London

Diagram of perceived benefits and negative consequences of emerging technologies

(Source: World Economic Forum Global Risk Percepetion 2016)

Emerging technologies raise discussions between two extremes: the focus on the potential gains and that of the potential dangers. The real challenge lies in thinking between these two poles. This middle way approach is becoming more pressing as technological change deepens and accelerates, and as we become more aware of the lagged societal, political and even geopolitical impact of earlier waves of innovations. Nevertheless worries about technologies and new conflicts should be taken into account.

decentralized and
local solution

impact on
health of new
technologies

inadequate
infrastructure

everyday-life
technologization

increasing
obscolescence rate

cyber dependency

technological
unemployment

cyber-risks

privacy

global challenges

+

+

+

+

+

+

+

+

+

global opportunities

+

+

+

+

+

+

+

+

big data

biotechnologies

digital reality
(IoT)

smart citizenship

better measurement
of impact

local opportunities

automation,
artificial intelligence
and robotics

connected people and
activities

local energy
communities

everyday-life
technologization

The convergence of digital, biological and industrial technologies and the proliferation of digital tools in our daily life have definitely fused technology and culture.

Technological unemployment

Technological unemployment is the loss of jobs caused by technological change. It is a key type of structural unemployment. There is a consensus on the fact that temporary job losses can result from technological innovation. Similarly, there is no dispute that innovation sometimes has positive effects on workers. Disagreement focuses on whether it is possible for innovation to have a lasting negative impact on overall employment.

Cyber dependency

Any risk of financial loss, disruption or damage to the reputation of an organization from some sort of failure of its information technology systems. There is globally an increase of cyber-attacks (trade war, conflict among nations or organisations…) that could threaten the stability of societies at the level of all key components (social, political, economic…).

Privacy

Traditional concepts of privacy and the basic principle that the content of our communications should remain confidential are challenged and eroded with advancements in digital technology. The fundamental principle that individuals should be able to control when their personal data is collected by third parties and how it is used is hard to implement in a world where personal data is collected, created, used, processed, analyzed, shared, transferred, copied, and stored in unprecedented ways and at an extraordinary speed and volume.

Big data

Is a field dealing with ways to analyze, systematically extract information from, or otherwise manage data sets that are too large or complex to be dealt with by traditional data-processing application software.

Everyday-life technologization

The convergence of digital, biological and industrial technologies and the proliferation of digital tools in our daily life have definitely fused technology and culture. People, objects and datas are connected more then ever, it is estimated that the number of internet users worldwide grew from 44 million in 1995 to 3.4 billion in 2016

Geo-political trends

Key question

How can cities be equipped to manage and interact in a global world with shifting centers of power and periods of instability?

" Our geopolitical space is getting crowded. […]
We see emerge a network of complex actors with multiple capabilities."

Saskia Sassen - Sociologist and Professor at London school of Economics

Attitudes towards globalisations against change in GDP per capita

(Source: economist.com)

A survey of 19 countries measuring people's attitudes towards immigration, trade and globalisation. The data reveals a split between emerging markets and the West, which is increasingly turning its back on globalisation. Beset by stagnant wage growth, westerners say the world is getting worse. This feeling decreases in countries (Asia) with high GDP growth.

"Globalization is a force of good", '%agreeing, Oct-Nov 2016

GDP per person at purchasing power parity , % change, 2011-2015

Philippines
India
Thailand
Malaysia
Singapore
Indonesia
Denmark
Hong Kong
UAE
Sweden
Germany
Finland
Britain
Norway
Australia
Saudi Arabia
France
United States

% foreign-born population
0 10 20 40 80 80+

GDP, $ trn

local challenges

lack of long term visions

war and
conflicts

political instability

hierarchical state system

global challenges

decentralisation

global power
shifting east

terrorism

protectionism

de-nationalization

new private
global actors

globalization

global opportunities

globalization

increasing
cities autonomy

global visibility
of new/old actors

new private
global actors

local opportunities

decentralisation

bottom-up
participation

more horizontal
governance

The heart of geopolitics is understanding how people relate to power. A diverse range of geopolitical actors are interacting and conflicting: international institutions, civil society organisations, nations and also networks of cities. The latter find themselves at the forefront of many of our major challenges, because it is in cities where geopolitics become evident, urgent, and empirical.

Political instability

Political instability is the propensity for a regime or government to change. At a global scale the instability at geo-political level is expected to grow with the shift of power toward east (China, India), decrease of power of USA, Russia and Europe and the fast changing relations among the three powers.

Global power shifting east

The rise of Asia is not a new phenomenon. Global economic power has been shifting to Asia for some time and this process is set to continue over the next few decades. By 2030 the top three economies of the world will be the US, China and India.

War and conflict

A bilateral or multilateral dispute between states that escalates into economic (e.g. trade/currency wars, resource nationalisation), military, cyber, societal or other conflict.

Decentralisation

Is the process by which the activities are distributed or delegated away from a central, authoritative location or group. The concepts of decentralisation have been applied to group dynamics and management science in private businesses and organisations, political science, law and public administration, economics, finance and technology.

Bottom-up participation

Cities do not grow organically. Rather, they are physical manifestations of creativity, conflict, community collaboration, and people's competing ideologies, user-values, expressions, and desires. The bottom-up participation refers to democratic processes of citizens and stakeholders engagement in cities' decisions.

Economic trends

Key question

How can cities ensure an equitable distribution of wellbeing among their citizens?

"The worst form of inequality is to try to make unequal things equal"

Aristotle - Philosopher

Global inequality, two ways of looking to it

Global inequality is often studied. Possible contrasting results depend on the scale of observations and on the parameters taken into account. The GINI coefficient representing a broader measure of inequality shows that globally inequalities have reduced since 1992. But if we consider just the gap between the 1% and the 99% in many countries itis actually getting bigger resulting in national increase of inequalities (as showed in second graph in the exemplary case of USA and Britain).

Gini coefficien >>>

o > perfect equality
1 > perfect inequality

1820   50   70   9 0   1910   29   50   70   92   2008

Top 1% income share, %   >>>

Sweden   USA   Britain   Germany   France

1913   20   30   40   50   60   70   80   90   2000   10

local challenges

infrastructures
life time

informal economy

declining public
expenditure in economic
and social infrastructures

deregulation

privatisation

specialisation

global challenges

global economic
power shifting east

trade war
and instability

inequalities
and social
polarisation

centralisation

growth rate
decline

new private
global actors

global opportunities

global economic
power shifting east

new private
global actors

increasing
local production

circular economy &
sharing economy

e-commerce

local opportunities

crowdfunding &
crowdsourcing

Cities are the main creators of economic wealth, generating over 70% of the world's GDP. However in this age of globalisation the relationship between economic growth and urban prosperity is still up for debate.

Inequalities and social polarisation

During the 19th and for much of the 20th century, inequality between countries rose dramatically as the world's most advanced economies pulled ahead from poorer nations. This balance has been redressed more recently, reflecting strong growth in many developing nations, particularly China and India. While inequalities seems to decrease the share of income going to the top 1% of richest households has nearly tripled in the past four decades.

New private global actors

New global actors are gaining economic power and visibility, among them transnational actors, private institutions and global firms. This result in a shift from mostly small private to large corporate modes of ownership, and from public to private. This trend, coupled with the decreasing loyalty of these global corporates to national states, represent a major challenge and uncertainty.

Trade war and instability

Trade wars are a side effect of protectionism, which are government actions and policies that restrict international trade. In a global economy, a trade war can damage consumers and businesses of both nations, with contagion spread.

Circular & sharing economy

Looking beyond the current take-make-waste industrial model, a circular economy aims to redefine growth, focusing on positive society-wide benefits. It entails gradually decoupling economic activity from the consumption of finite resources. A sharing economy, also known as collaborative consumption or peer-to-peer-based sharing, is a concept that highlights the ability - and perhaps the preference - of individuals to rent or borrow goods rather than buy and own them.

Crowdfunding & crowdsourcing

They are funding & sourcing models in which individuals or organizations organize and obtain services and finances from a large, relatively open and often rapidly-evolving group of users. It could unlock participatory design and innovation in cities, representing an alternative to usual models of debating, governing, investing and delivering built assets.

Spatial trends

Key question

How can cities equally distribute, in a given space, their valuable resources and create sustainable place to live, work and recreate?

"spatial (in)justice [...]involves **the fair and equitable distribution in space of socially valued resources** *and the opportunities to use them"*

Edward Soja - Professor in Urban planning at UCLA and at LSE

Transport energy per capita vs Urban density

(Source: ourworldindata.org)

Newman and Kenworthy's famous hyperbola "Urban density and transport-related energy consumption" shows a high correlation between average urban density and intra-urban transport-related energy consumption per capita. These results are due to density being highly correlated with modal distribution and the intensity of automobile use.

gentrification

increasing mobility

informal urbanization

mpact of sanitationin-fra on urban develop-ment

lack of integrated spatial solutions

global challenges

increasing inequalities

specialization

gated communities

sprawl

land consumption

last mile

privatization

increasing mobility

de-urbanization

global opportunities

nature in the cities

heritage preservation

slow & zero carbon mobility

local opportunities

more soft and shared mobility

innovative integrated design

Diverse trends that relate to the creation, accumulation or redistribution of social, cultural and spatial capital/assets are actively shaping cities worldwide. Even if cities have always been the places where difference is spatial and therefore dramatically visible, today the phenomenon is more and more evident.

Informal urbanisation

Is defined as the production of urbanisation independent of formal frameworks and assistance (if existent) that do not comply with official rules and regulations. Informal urbanism emerged as an alternative path of city construction in the wake of massive migration from rural to urban environments and the lack of affordable housing and serviced land for some social groups.

Increasing spatial inequalities

Growing spatial inequalities refer to the unequal distribution of quality of space or resources and services in a territory or in cities. This concept goes hand in hand with the understanding that justice has a geography and that the equitable distribution of resources, services and access is a basic human right. It builds upon current concerns in critical geography and a new spatial consciousness in urban development.

Increasing mobility

A growing global population, increasing affluence and urban sprawl, and declining transport costs and advanced globalization are pushing the demand for mobility upwards. Mobility is seen increasingly as a 'right' to move, as part of the right to the city/right to citizenship.

Slow & zero carbon mobility

This addresses a range of diverse technologies and actions towards establishing sustainable mobility. It includes investments in public transportation, pedestrian and cycling infrastructures, as well as renewable fuel technologies for new vehicles and mobility transport.

Nature in the cities

Future cities will need a massive introduction of nature within their structure and functions. Urban nature helps to conserve habitats, manage water, reduce pollution, promote sustainable urban cultures and address climate change.

PART II

Cities typologies

The city typologies descriptive fiche

The 9 cities typologies

This study has developed a description of a set cities typologies that summarize a wide spectrum of cities worldwide. The 9 typologies are: Global city, Knowledge city, Historical city, Industrial city, Resort city, Cultural city, Administrative city, Mega city and Local city.

Criteria of definition

A diverse range of criteria were defined in order to express and clarify the differences between each cities' typology and their common features. Four main criteria emerged as relevant to have a first high-level characterisation of the typologies.

Privileged function

The first criteria relates to the fact that certain typologies are mainly defined by one key function that they host. In most of the cases this primary function does not exclude others, but it represents the 'raison d'etre' of the city itself. This criteria applies mainly to cities with a high degree of mono-functionality, cities characterised by one dominant economic sector. This criteria is key for the Knowledge city, Industrial city, Resort city, Cultural city and Administrative city.

Complex urban (eco)systems

The second criteria relates to cities that are characterised by a high level of complexity, they normally host diverse activities within all economic sectors and a huge diversity in terms of population and social dynamics. This criteria is key for the Global city, Administrative city and Mega city.

Dynamic of dependency

The third criteria relates to cities that are mainly characterised by their relationship of dependency on others cities. This applies normally to small-medium cities and towns and to certain mono-functional cities whose relationship with bigger centers could be defined as 'supplier-consumer'. This criteria is key for the Industrial city, Resort city and Local city.

Way of developing

The fourth criteria relates to cities whose development is clearly defined by specific processes and methods or by a high degree of complexity (past, present or future).
This applies to historical cities with a complex palimpsest of elements that define their identity or to mega-cities that grow 'spontaneously' through uncontrolled urbanisation. This criteria is key for the Industrial city too.

A diverse range of complexity

A diverse range of complexity characterises the defined cities typologies. This diverse range of complexity can be explained through a 'radar' diagram. Each real city will exhibit the characteristics of multiple typologies, thus it could be understood as a combination of multiple cities typologies. Each one presenting with a different intensity.
Complex cities host multiple functions and diverse levels of complexity. For this reason
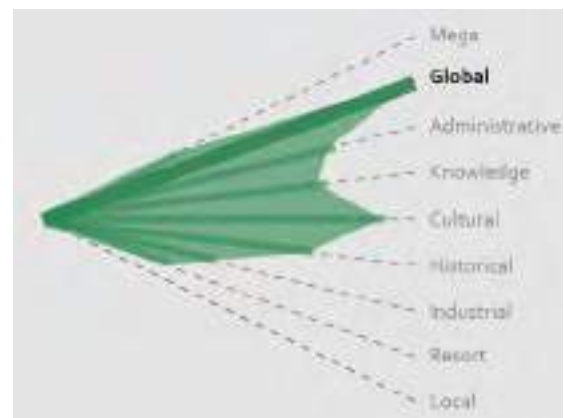
Global city: example of high level of complexity
Image: Tractebel visualization diagram

they are the result of the combination of the characteristics of many city typologies. Nevertheless they have a main characteristic that defines their identity. One dimension is always dominant. Other city typologies host few key functions and a lower level of complexity, they could be easily considered as belonging to one city typology and not to others.

Industrial city: example of low level of complexity
Image: Tractebel visualization diagram

The structure of the descriptive fiche

Each city typology is described through a fiche containing a set of quantitative and qualitative elements that, together, give a comprehensive view of their characteristics. Seven elements form the structure of the descriptive fiche:

9 examples of real cities
A set of examples helps understand which kind of cities fit within the mentioned typologies. Considering that, as already mentioned, belonging to one category does not mean that the city cannot exhibit characteristics of another typology.

Economic category
Taking the UN Nation classification as a reference, for each city, the results of the corresponding nation state were considered.

Fragile state index
The 'fragile state index' from the think tank Fund for Peace and the American magazine Foreign Policy.

City population size
The city population size considering; extra small a city with less than 500.000 people, small between 500.000 and 1 million, medium between 1 million and 5 million, large between 5 million and 10 million and extra-large with more than 10 million.

SWOT analysis and ratio diagrams
For the above mentioned elements, the study considered the average position calculated taking into account the 9 examples of real cities. A SWOT analysis with a description of the city typologies' strengths, weaknesses, opportunities and threats clustered by the seven dimensions used to describe the global trends (ref. Part I). Each SWOT analysis is concluded with one radar diagram showing the intensity of strengths and weaknesses in each dimension and one radar diagram showing the intensity of opportunities and threats in each dimension.

Thematic and sectoral description
This gives a qualitative understanding of which themes are more sensible for each city.
A thematic description considering the mobility sector, the energy sector and the buildings & infrastructures sector. This gives a sectoral overview of the main characteristics and opportunities within each sector.

Solutions & Opportunities overview
A project-and-solution-oriented description with a synthetic visualisation of the city typology with its distinctive key characteristics (selected from the SWOT analysis) and the related key project, solutions and business opportunities.

Global City

Global cities are major nodes in the interconnected systems of information and capital. Their growth and wealth is intimately related to the specialised businesses that facilitate those flows - financial institutions, consulting firms, accounting firms, law firms and media organisations.

Examples

The following 9 global cities are presented as representative examples of the category, without being exhaustive and without covering all the possible range and types of global cities worldwide.

London [UK]

New York [US]

Tokyo [JP]

Singapore [SG]

Paris [FR]

Hong Kong [HK]

Beijing [CHN]

Shangai [CHN]

Sydney [AUS]

Other cities within this category are: Los Angeles, Amsterdam, Chicago, San Francisco, Toronto, Seoul, Dubai, Milan, Moscow, Sao Paulo, Frankfurt and Madrid.

Economic category

Global cities are mainly located in countries defined as 'developed economies'. Countries with relatively high levels of economic growth and security are part of this category. Other common criteria for the evaluation are defined through income per capita or per capita gross domestic product.

Developing economies	Economies in transition	Developed economies
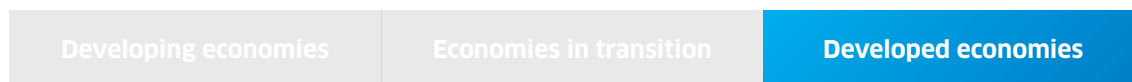
Fragile states index

Global cities are normally situated in the range of 'sustainable' fragile state index. The index's ranks are based on twelve indicators of state vulnerability, grouped by category: Cohesion, Economic, Political and Social. Considered together in the index, the indicators are a way of assessing a state's vulnerability to collapse or conflict.

Alert	Warning	Stable	Sustainable
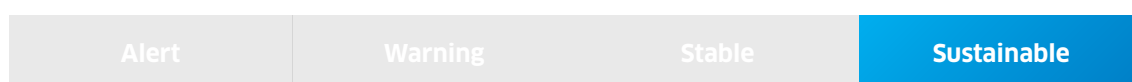
City size   Legenda   XS | < 0.5m   S | 0.5-1m   M | 1-5m   L | 5-10m   XL | >10million people

Global cities vary in population size, ranging from less than 1.5 million citizens up to 5 million people. Most Global cities stay in the middle of these extremes.

XS	S	M	L	XL

Morphology

Considering the morphology, Global cities are mainly very polycentric and are usually subject to sprawl due to a large group of middle class living in the outskirts of the cities

Compact	Sprawl	Diffuse	Polycentric	Mega

Strengths & weaknesses

This table gives an overview of the main intrinsic characteristics of the city typology. These are here referred to as weaknesses or strengths and divided by the themes defined in the Part I of this research document.

	STRENGTHS	WEAKNESSES
Demographic	High social and economical capita	
Environmental	Citizen environmental awareness Ethical consumption	High level of resource consumption Air-water-soil pollution
Social		Low-wage labour force working in the informal economy
Technologic	High level of acceptance of technologies Data center	
Geo-political	Power and decision making centers High level of political autonomy	Favoritism
Economic	Human capital Financial expertise Branding	Volatility Over-concentration in key sectors
Spatial	High qualitative public spaces Symbolic character Well-developed transit system	Mobility issues Long distances

The main challenges for Global cities are focused on the demographic and spatial domains. Concerning the demographic aspect they have a strong attraction for migrants because of their perceived status as power centers and derived economies. As a result they host citizens with large demographic diversity (ethnic, religion, age structure, education, culture...). Global cities are usually highly-mature and well equipped (through social and economic capital) to face environmental challenges. Resource scarcity remains however an element that must still be taken into account, mainly through an increase in waste production. Global cities also have increasing self- governing powers and are well able to manage the externalities of growth.

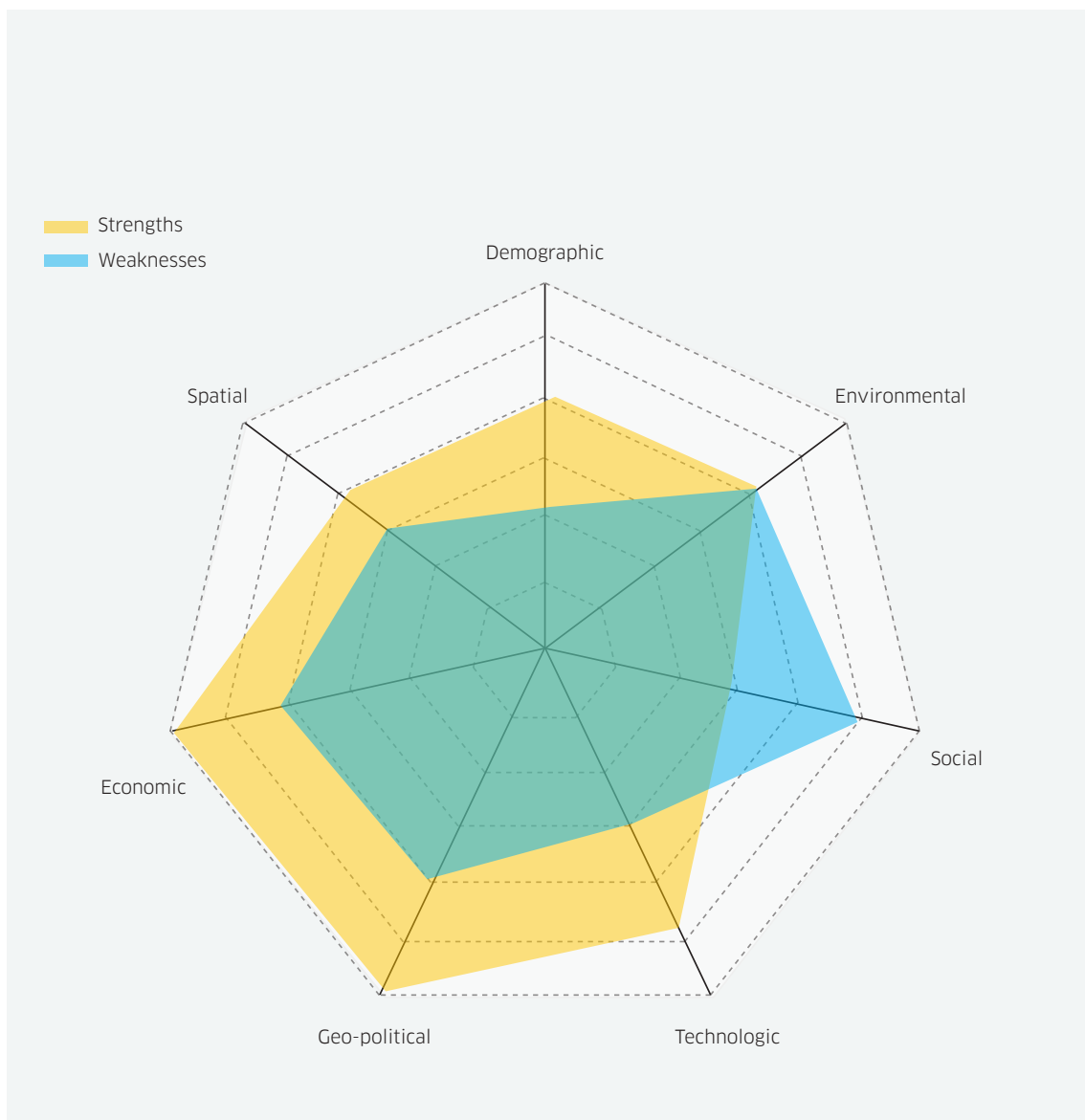# Opportunities & threats

This table gives an overview of the main extrinsic characteristics of the city typology. These are here referred as opportunities and threats and divided by the themes defined in the Part I of this research document.

OPPORTUNITIES

	OPPORTUNITIES	THREATS
Demographic	Migration	
Environmental	Higher citizen environmental awareness Highly equipped	Climate change
Social		Low-wage labour force High living costs
Technologic	High level of maturity and acceptance of technologies Information city	
Geo-political	Power and decision makings centers High level of political autonomy	Favouritism
Economic	Human capital Productivity Expertise Branding	Volatility Over-concentration
Spatial	High qualitative public spaces Symbolic character	Mobility issues

THREATS

There is often a high level of resource consumption per capita because of behavioural patterns. To cover these threats, the Global city often invests in circular economy, implementation is often possible given the high technological capital and highly-skilled workers usually available.

From a spatial point of view, they often have increasing inequalities due to distribution of spatial values among citizens and urban areas. There is often also a risk of generic city development that creates a lack of authentic and unique urban development often not aligned to their historical and cultural identity. A strong opportunity in this case is the way in which innovative integrated design is often tested in these type of cities.
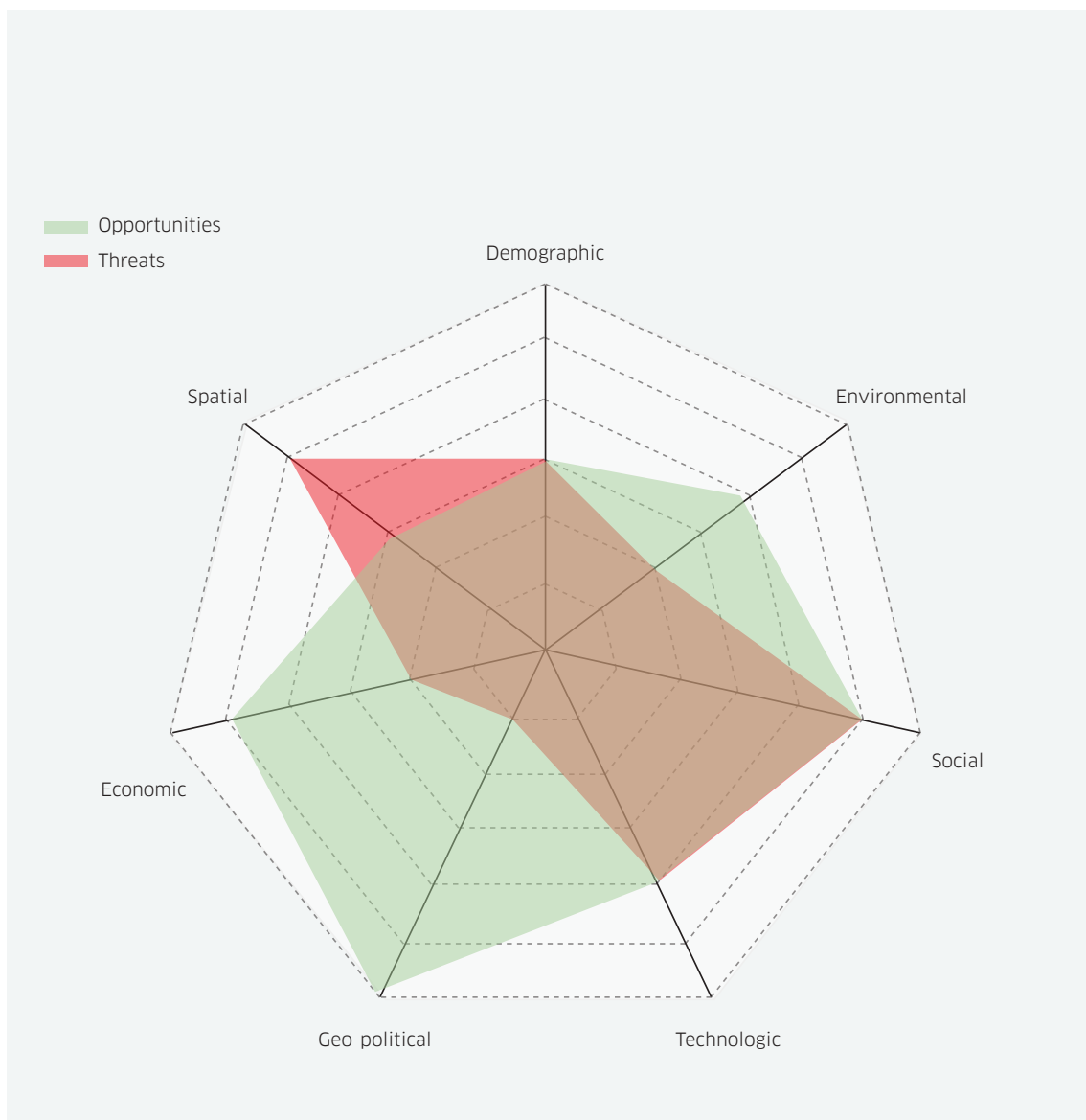
Description per theme

Presented here is a synthesis of the main characteristics of the city typology derived from the previously presented SWOT analysis.

Demographic
Environmental
Social
Technologic
Geo-political
Economic
Spatial

Demographic characteristics

Global cities have relatively stable demographic patterns of development. Nevertheless, they constitute an attraction pole for fairly young immigrants due to the fact that they are centers of power and derived economies. This often leads to an increasing gap between the haves and have-nots.

Environmental characteristics

Global cities are mature and highly equipped (high social and economic capital) to face environmental challenges. However, resource scarcity due to a high level of consumption and increasing waste production are areas for concern. At the same time, in higher income categories, there is proof of higher citizen's environmental awareness.

Geo-political characteristics

Global cities are economic power houses and decision making centers characterized by a high level of political autonomy. This leads to big private global actors, which are growing in importance, vying for power with public authorities. At the same time, Global cities gain greater importance than nation states as they seem to be better placed to tackle global issues as well.

Social characteristics

Increasing inequalities pave the way for unfair distribution of wealth and wellbeing for citizens. Affordable housing becomes more of a problem. Inequalities are largely due to the fact that the low-wage labour force is employed in the informal economy which is dependent on the main economic activities present in the cities.

Technologic characteristics

High level of maturity and acceptance of technologies both in public (government) and private sector. However, as cyber dependency increases, privacy and risk issues continue to grow quickly. Nevertheless, connected people and activities lead to more efficient interaction between Global cities through digitalisation and Big Data.

Economical characteristics

Global trend towards in-sourcing knowledge-intensive and non-production activities and the corresponding demand for highly specialised corporate services is seen in practice to a large extent in Global cities. Services that encompass new developing knowledge-intensive and highly specialised corporate needs to open up new markets with further growth potential.

Spatial characteristics

Unfair distribution of spatial values among citizens and urban areas. Generic city development risks a lack of authentic and unique urban development aligned with their economies and with their historical and cultural identity. Despite well-developed mass transit systems, issues arise with management of increasing mobility demands and insufficient coordination for long distance travel.

Description per sector

Presented here is a synthesis of the main characteristics of the city typology related to three key sectors: the energy sector, the mobility and the buildings & infrastructure sectors.

Energy

Even if their size is usually inferior to that of the Mega cities, Global cities also use a large amount of energy because of sophisticated technical infrastructure. The energy consumption of these wealthier cities is mostly used to heat and light residential and commercial buildings and to a second extent, for transportation. In comparison with Mega cities that are located in middle-income countries, the overall energy consumption of the Global cities greatly contributes to the world over-consumption of resources and has a greater ecological footprint than their capability to regenerate the resources used. For instance, New York consumes the energy equivalent of one supertanker approximately every 1.5 days. Still, being at the core of capital funds, Global cities have a key role to enable the energy transition. Most of them have committed to fight climate change and have established energy masterplans to achieve 100% renewable energy supply by 2050 at the latest. For instance, the city of Frankfurt will meet its energy needs with 50% reduction through energy savings and energy efficiency, and the rest of energy demand will be covered 25% by the city itself and 25% by the metropolitan area.

Mobility

Global cities are very densely populated and attract commuters daily, so face the challenge of offering their residents, commuters and visitors reliable and efficient transport. These cities are usually up to this challenge and usually provide first-class public and private transport and qualitative mass transit. Global cities are working on expanding their transport network, easing congestion and managing sustainability issues. Even though they have a well-developed transit system, the inhabitants of some Global cities (especially in America) usually rely on private vehicles even though car trips are not efficient due to constant congestion and the lack of parking spaces. The challenge is to make residents and employees increasingly multimodal and to let them switch from a private car model (ownership) to a use model. The efficiency of walking and cycling is increasing for short distances and no longer needs to be proven in Global cities. Global cities are often the ideal setting for testing and implementing advanced mobility services. The surroundings of historic or cultural neighbourhoods in Global cities must be walkable and cyclable in order to increase the availability of public space and the quality of life.

Mobility & Building infrastructure

Global cities have the most developed transportation systems and are very suitable for public transportation. One of the challenges, though, is to improve the accessibility of (public) transportation for the elderly and people with disabilities. Committed to a focus on pedestrian and bicycle-oriented programmes, Global cities have already provided sufficient infrastructure for non-motorised transport and are usually planning to further develop this by creating more car-free zones and promoting public transport. There is a clear paradigm shift from vehicle ownership to vehicle use: in addition to conventional public transport, more cars and bicycles are shared, both through peer- to-peer and business-to-consumer models. Technologies, information and communication should also be used to improve the quality and performance of urban mobility services and to reduce the costs and consumption of resources. The economic heart of the Global city is characterized by high office buildings, often with a curtain wall. The buildings in a Global city are often used by international companies for their marketing strategies - the architecture and sustainability level of the building convey the vision of the company. This results in large investments, making the buildings efficient and technically well equipped.

City decarbonization measures will be easily adopted if these measures provide financial benefits. However, the practical implementation of these measures in Global cities is more difficult due to the limited space: small roof areas, limited ground areas, dense buildings... However, mixed use of the buildings will help to increase the degree of use and to balance energy demand.

The city in a picture...
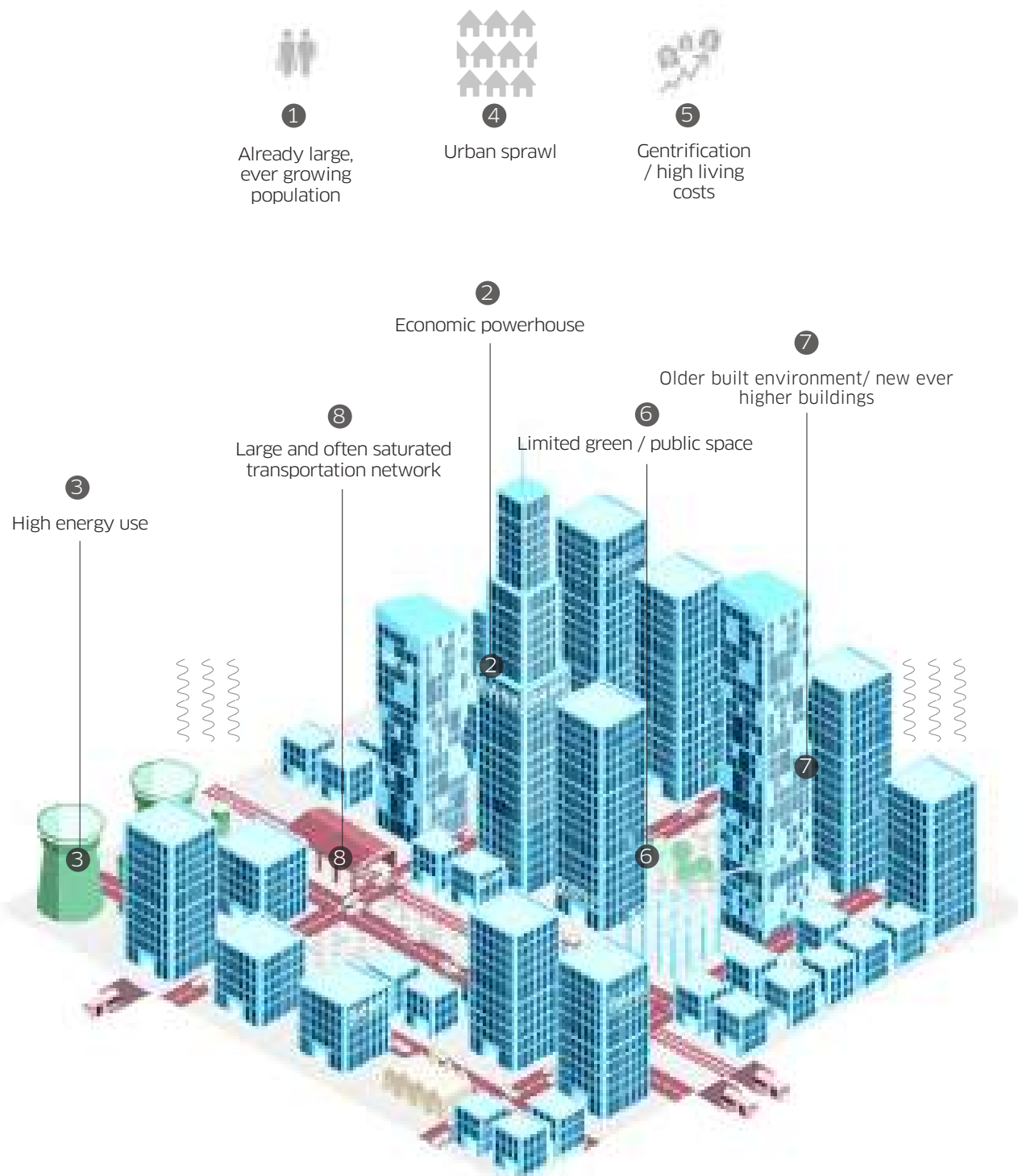
① Already large, ever growing population

④ Urban sprawl

⑤ Gentrification / high living costs

② Economic powerhouse

⑦ Older built environment/ new ever higher buildings

⑧ Large and often saturated transportation network

⑥ Limited green / public space

③ High energy use

KEY CHARACTERISTICS

Derived from the SWOT analysis, and showing the main weaknesses and threats of the city typology

SOLUTIONS & OPPORTUNITIES

- Urban
- Energy
- Mobility
- Building & Infrastructures

360 CITY SCAN

Key perspectives that are linked with the key characteristics and the related solutions and opportunities

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1 Already large, ever growing population

- Regional urban planning
- Housing development
- AI and city data
- Specialised buildings design (hospitals, schools, etc.)

CIRCULAR CITY
- Land

---

2 Economic powerhouse

- Facility management
- IT networks
- Smart buildings
- Zero-carbon strategy roadmaps

PRODUCTIVE CITY
- New economies
- Dynamic economies
- Diverse economies

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3 High energy use

- Green energy production
- District-level energy and service contracts
- Local / distributed renewable production
- Energy storage

CIRCULAR CITY
- Energy

ATTRACTIVE CITY
- Healthy environment

RESILIENT CITY
- Protective ecosystems

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4 Urban sprawl

- Green & smart mobility
- Regional urban planning
- New urbanism and regulations
- Infrastructure
- Community action

INCLUSIVE CITY
- Housing

CIRCULAR CITY
- Land

---

5 Gentrification / high living costs

- Regulating the construction of new buildings in the neighbourhood
- Protecting and preserving existing housing
- Protecting small, ethnic businesses of the neighbourhood

RESILIENT CITY
- Governance

INCLUSIVE CITY
- Housing

---

6 Limited green / public space

- Urban planning
- Quota and investments in green

ATTRACTIVE CITY
- Green
- Vibrant public space

---

7 Older built environment/ new ever higher buildings

- Infrastructure works
- Specialised buildings design
- Heritage conservation
- Smart zoning

CIRCULAR CITY
- Land

---

8 Large and often saturated transportation network

- Mobility plans to optimise modal share
- Investments in sustainable transport and services
- IoT and data management
- Collaboration between stakeholders

CONNECTED CITY
- Transportation
- Logistics

Knoweldge City

Knowledge Cities are usually driven by an economy based on research and technology. They possess a large amount of intellectual capital through highly evaluated educational systems which create constant innovations. These types of cities are enriched by the commitment of very diverse actors, public and private, an open information approach and a pro-active public participation.

Examples

The following 9 Knowledge cities are representative examples of the category, without being exhaustive and without covering all the possible range and types of Knowledge cities worldwide.

Leuven [BE]
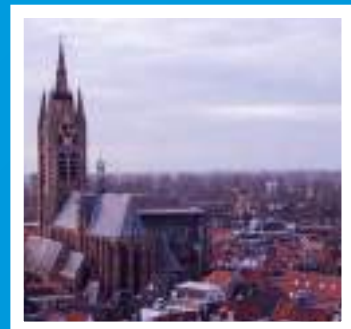

Zurich [CH]

Boston [US]

Berkeley [US]

Coimbra [PT]

Delft [NL]

Portsmouth [UK]
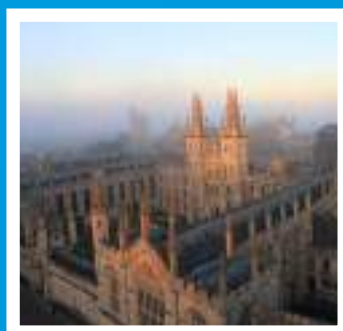
Oxford [UK]

San Jose [US]

Other cities within this category are: Groningen, Cambridge, Stanford, Mountain View, Bristol, Enscheda and Eindhoven.

Economic category

Knowledge cities are mainly defined as 'developed economies'. Countries with relatively high levels of economic growth and security are part of this category.

Developing economies	Economies in transition	Developed economies

Fragile states index

Knowledge cities are normally situated in the range of 'sustainable' fragile state index. The index's ranks are based on twelve indicators of state vulnerability, grouped by category: Cohesion, Economic, Political and Social. Considered together in the index, the indicators are a way of assessing a state's vulnerability to collapse or conflict.

Alert	Warning	Stable	Sustainable

City size   Legenda   XS | < 0.5m   S | 0.5-1m   M | 1-5m   L | 5-10m   XL | >10million people

Knowledge cities are usually small in population size, with less than 500.000 citizens.

XS	S	M	L	XL

Morphology

Knowledge cities are normally compact urban systems, sometimes with sprawl development depending on their main economic structure. They are mostly polycentric due to scattered large knowledge institutions.

Compact	Sprawl	Diffuse	Polycentric	Mega

Strengths & weaknesses

This table gives an overview of the main intrinsic characteristics of the city typology. These are here referred to as weaknesses or strengths and divided by the themes defined in the Part I of this research document.

STRENGTHS

	STRENGTHS	WEAKNESSES
Demographic	Incoming knowledge	Outgoing knowledge Population fluctuation between day and night
Environmental	Self-sufficiency Zero-carbon initiatives Ethical consumption Higher environmental awareness	
Social		
Technologic	Testing ground for technologies and innovation	
Geo-political		
Economic	Knowledge industries Circular economy	
Spatial	Integrated adaptation	Monofunctionality

WEAKNESSES

Knowledge cities have a great power in technology that can be deployed in an integrated way for different domains. From a demographic point of view, Knowledge cities have to deal with a large amount of outgoing knowledge from people who are trained in the city but tend to move out after graduation. Nevertheless, this also creates a great deal of incoming knowledge from all over the world. Population also often fluctuates between day and night, A lot of people commute to the city for education and work. This creates a rather one sided environment. This weakness also occurs in the often one-sided specialisations, which reduces resilience of these cities. There is often also a higher investment capacity necessary from local authorities and the private sectors.
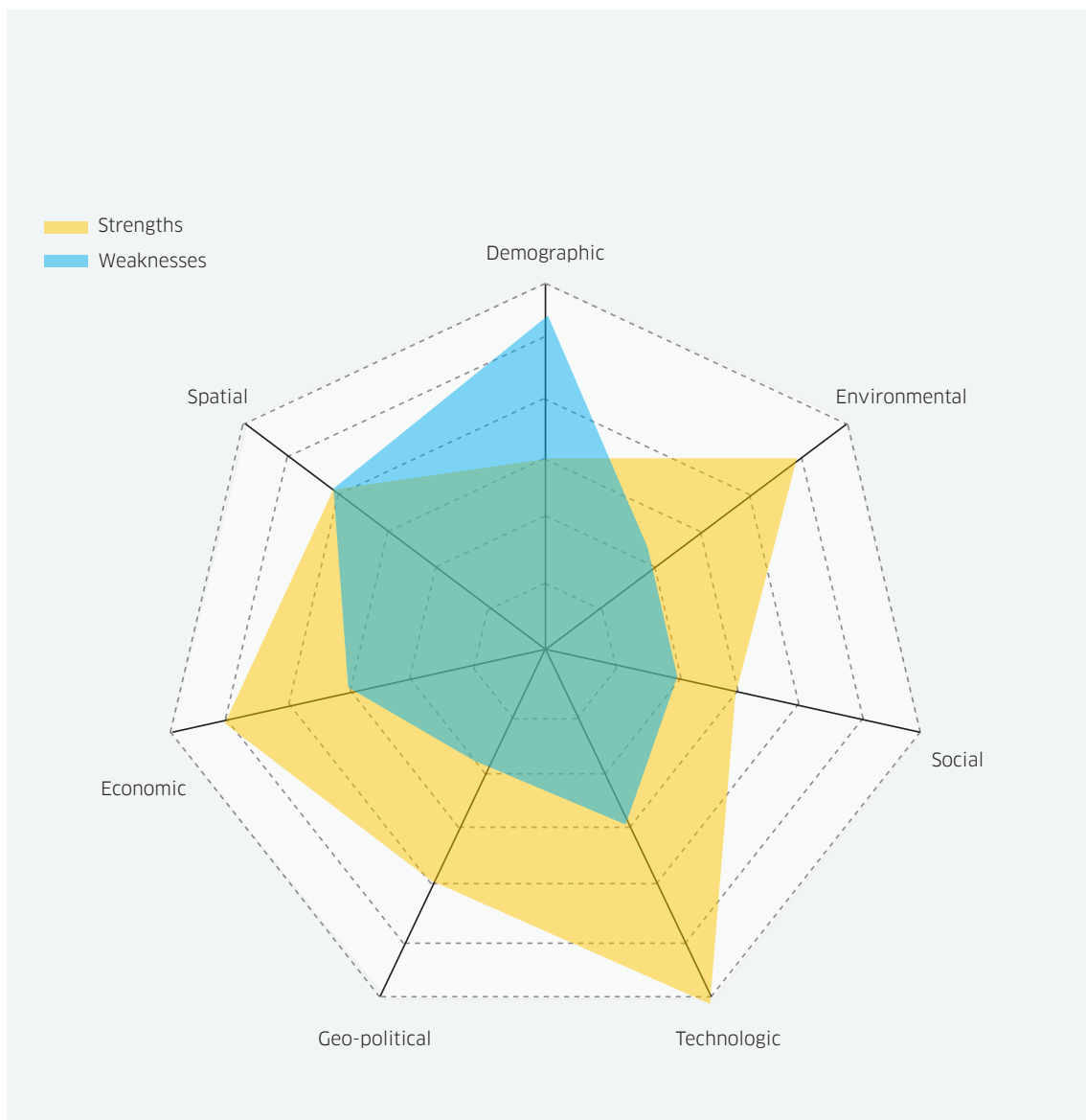
Opportunities & threats

This table gives an overview of the main extrinsic characteristics of the city typology. These are here referred as opportunities and threats and divided by the themes defined in the Part I of this research document.

	OPPORTUNITIES	THREATS
Demographic		
Environmental	Circular economy Environmental innovation	Climate change
Social	Knowledge society Emerging middle class	Polarisation Individualism
Technologic	High level of maturity and acceptance of technologies	
Geo-political	Cooperations	Global competition
Economic		
Spatial	Smart work Innovative integrated design	Gentrification Privatization Spatial specialization

There are many strong opportunities in Knowledge cities. Circular economies and the pursuit of a sustainable form of cooperation and integration is an important challenge which could possibly be tackled through knowledge. Often environmental innovation is a strong asset in Knowledge cities, as they are often the best-placed to steer innovation (technological). Integrated adaptation, good facilities and equipment are key in this matter.

The emerging middle class that is strongly present causes a few possible weaknesses. Prosperity is increasing rapidly in Knowledge cities which creates chances for increasing polarisation due to differences. Gentrification also creates a specific threat since original residents are pushed away by new temporary knowledge workers. Technological job loss and automation are points that must be analysed further in future.
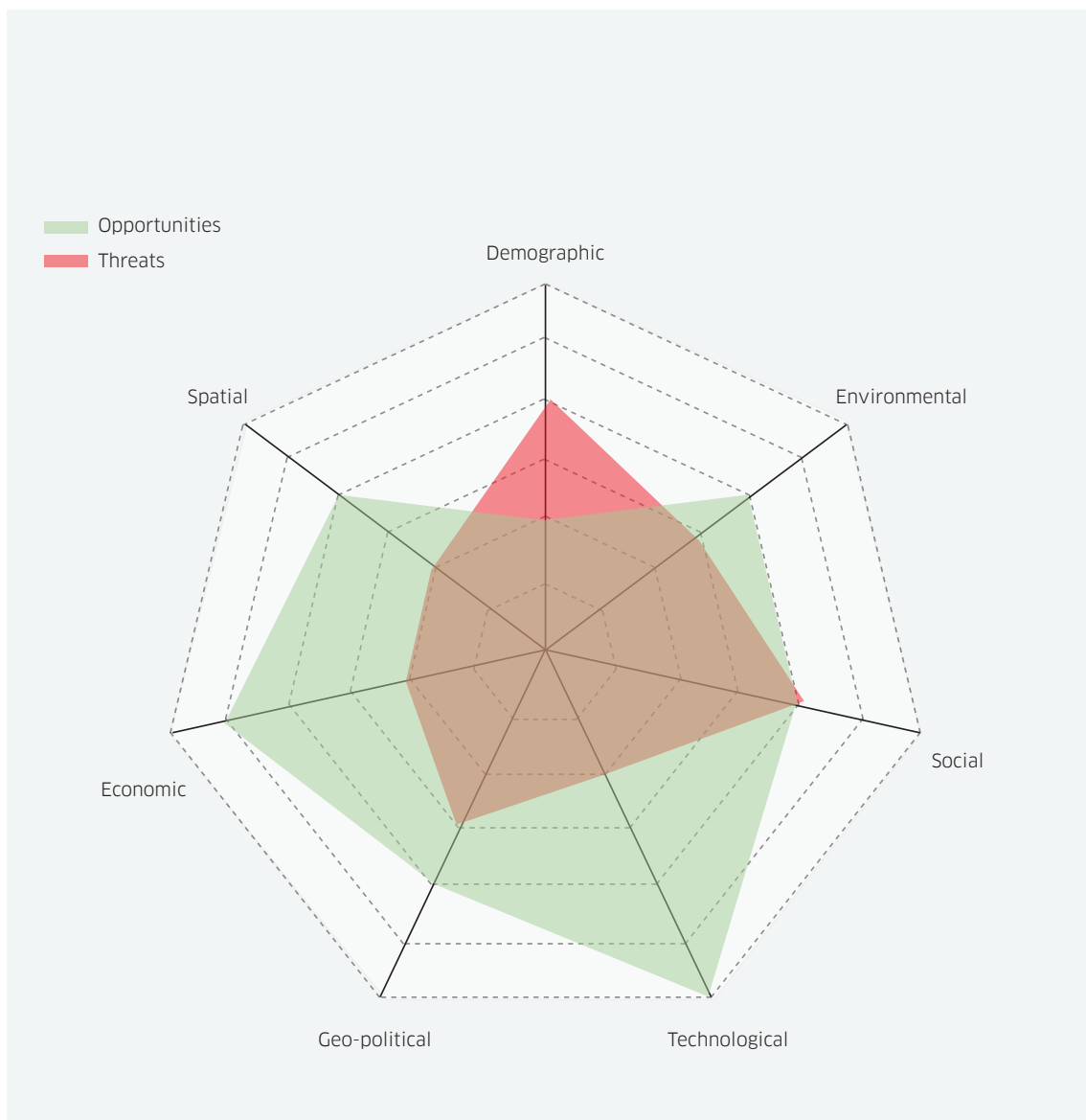
Description per theme

Presented here is a synthesis of the main characteristics of the city typology derived from the previously presented SWOT analysis.

Demographic
Environmental
Social
Technologic
Geo-political
Economic
Spatial

Demographic characteristics
Knowledge cities have stable (although slightly rising) demographic patterns of development.

Environmental characteristics
Knowledge cities are the best-placed to steer innovation (technological and cultural) in the environmental sector. They are normally well-equipped to face environmental challenges given the high environmental awareness of their citizens and their high economic-technologic capital associated with highly-skilled workers.

Geo-political characteristics
Knowledge cities create stability through cooperations although openness remains a challenge.

Social characteristics
Knowledge cities are characterised by increasing polarisation and individualisation.

Technologic characteristics
Knowledge cities have a high maturity and integration of technologies both in private and public sectors.

Economical characteristics
Knowledge cities have a main economic issue based on specialisation and over-sectoralisation.

Spatial characteristics
Knowledge cities are generally characterised by good and integrated spatial urban conditions.

Description per sector

Presented here is a synthesis of the main characteristics of the city typology related to three key sectors: the energy sector, the mobility and the buildings & infrastructure sectors.

Energy

Knowledge cities today are put under the spotlight by the energy transition. The combination of availability of capital, educated high-income citizens and a hub of research and technology makes these cities the ideal place to accelerate the shift to cleaner, more efficient, and decarbonised energy supply and use. Supported by advanced energy policy strategies, they usually invest massively in decentralised renewable energy sources and start-of-the-art smart meters and appliances. A major concern, however for Knowledge cities might be the 'rebound effect' of the implementation of energy efficiency measures - where savings from energy efficiency would be cancelled out by increases in other carbon-intensive behaviour (i.e. turning up the heating in a newly insulated house). To tackle this issue, a holistic energy approach will avoid intelligent systems being implemented in silos without mutual energy savings. With the worldwide energy transition that is happening, but not quickly enough, Knowledge cities can lead by example to implement sustainable energy supply and use, smart city innovation, establishment of sustainability governance and innovative ways of securing the necessary funding for this energy transition.

Mobility

Knowledge cities are showcases for innovations in urban transport and mobility. Integrated multimodal travel, mobility as a service and intelligent traffic routing make it possible to reduce CO_2 emissions through fewer vehicle movements and better monitoring without investing in new infrastructure. Key technologies are geo-sensors, data mining, smart cards, peer-to-peer or crowd-funded mobility solutions … Open data is also available to generate inventive solutions from an innovative, pragmatic and talented pool. Smart, empowered citizens organise bottom-up initiatives focused on sustainability and quality of life through pragmatic, collaborative, solutions that can be implemented immediately and without major investments. Knowledge cities are often the residence of students. Smart bicycle plans, technology-based mobility solutions, shared mobility and efficient public transport are therefore a must. By using the city as an urban laboratory, mobility innovation can be promoted and becomes a benchmark for the rest of the city and other cities - to learn and create new mobility products or services that offer improvements for citizens. A smart city platform must be implemented to improve the exchange between stakeholders such as universities, industries, companies, citizens, administration, start-ups and governments.

Mobility & Building infrastructure

A Knowledge city uses technologies, information and communication to improve the quality and performance of urban mobility services. The overall goal is to reduce the costs and consumption of resources and to engage more effectively and actively with citizens. Universities, industries, companies and the government must share a common ambition of CO_2 reduction and enable public-private initiatives. The city must function as an 'urban laboratory': stakeholders carry out tests and pilots on products and services that have an urban impact. The infrastructure is optimised by intelligent traffic systems and cooperative systems. Some Knowledge cities are already equipped with pilot projects with autonomous vehicles. Research and development in the field of transport and mobility behaviour can use Knowledge cities as living laboratories.

Because of the presence of universities, there is an atmosphere of change in Knowledge cities. These cities want to be an example for other cities and their inhabitants are well-informed, open-minded and open to new building techniques. Politics and policies in Knowledge Cities are more progressive, which means that regulation is less strict and open to measures aimed at reversing climate change. Due to the presence of students, Knowledge cities also have a high percentage of rental properties, which are generally less maintained than houses occupied by owners. House owners see the property as a financial investment, and only regulations will be able to force building owners to renovate their buildings or to innovate in building techniques.

The city in a picture...

1 Urban laboratories

3 Smart empowered citizen

6 Green economy

8 Gentrification / high living costs

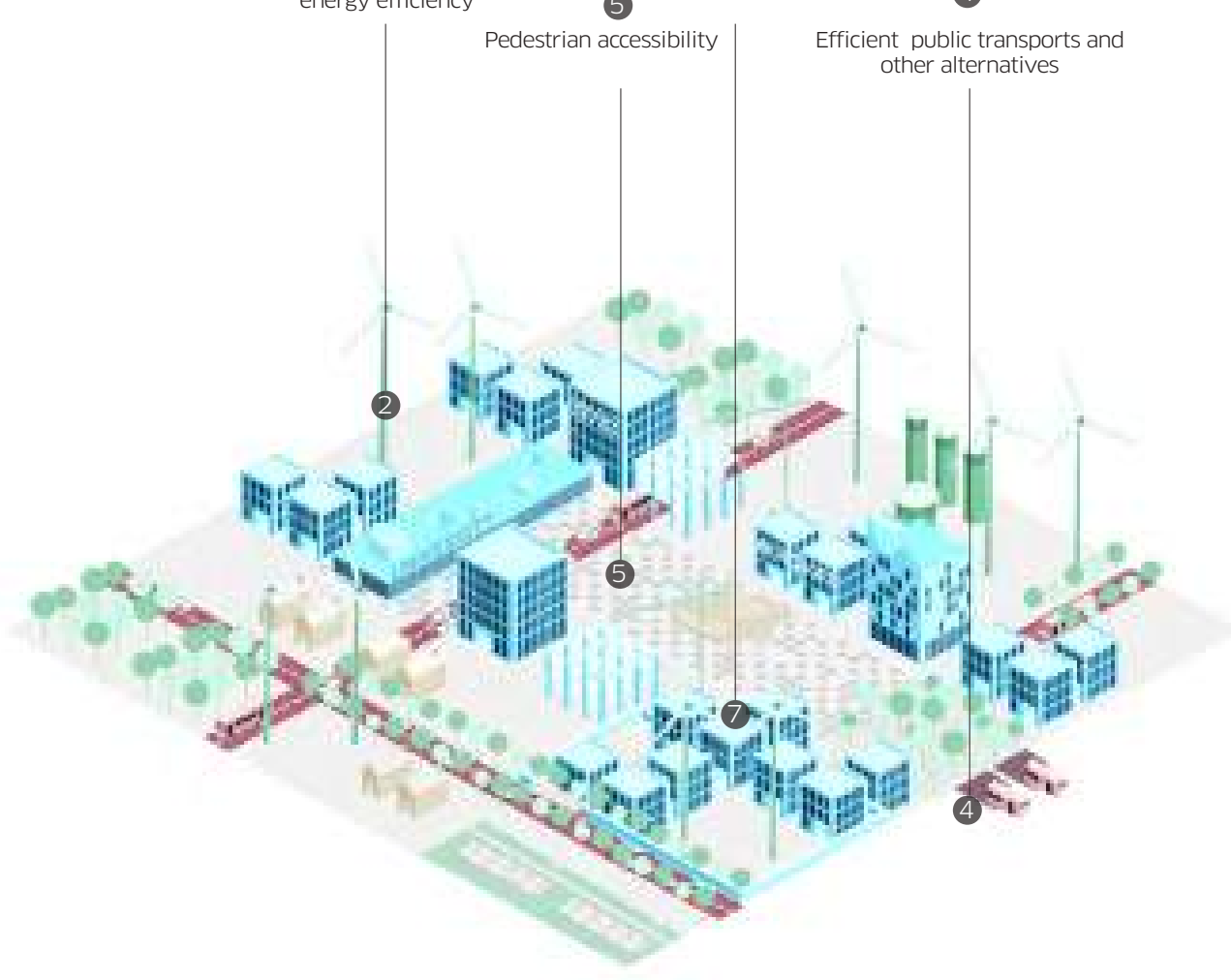**2** Local production and energy efficiency

7 Monofunctional programming

5 Pedestrian accessibility

4 Efficient public transports and other alternatives

KEY CHARACTERISTICS

Derived from the SWOT analysis, and showing the main weaknesses and threats of the city typology

SOLUTIONS & OPPORTUNITIES

- ● Urban
- ● Energy
- ● Mobility
- ● Building & Infrastructures

360 CITY SCAN

Key perspectives that are linked with the key characteristics and the related solutions and opportunities

1 Urban laboratories

- Autonomous vehicles
- Intelligent transport system
- Optimised and sustainable public lighting
- Vegetalisation (biomimicry, green facades, …)

RESILIENT CITY
- Local economy

PRODUCTIVE CITY
- Local employment

2 Local production and energy efficiency

- District-level energy and service contracts
- Local / distributed renewable production
- Energy storage
- Smart Buildings / BIM
- Zero carbon initiatives
- Higher efficiency in buildings
- Apply technological innovations

RESILIENT CITY
- Protective ecosystems

PRODUCTIVE CITY
- Dynamic economies
- Diverse economies

CIRCULAR CITY
- Energy
- Water

3 Smart empowered citizen

- Smart cycling plans, technological based mobility solutions, shared mobility and efficient public transport
- Integrated urban parking solutions
- Passenger Information Systems

CONNECTED CITY
- Partnerships
- Communication

4 Efficient public transports and other alternatives

- Buildings & Infrastructures retrofit
- Collaboration between stakeholders
- Broaden the market

CONNECTED CITY
- Transportation
- Logistics

5 Pedestrian accessibility

- Pedestrian infrastructure and information systems
- Mobility planning & prospective

CONNECTED CITY
- Transportation

6 Green economy

- Zero-carbon Strategy roadmaps
- CO2 calculation tool
- CO2 / Energy saving Apps
- Circular economy
- Urban farming
- Climate resilience strategy

ATTRACTIVE CITY
- Healthy environment
- Green
- Vibrant public space

7 Monofunctional programming

- Mixing of programmes
- Knowledge industry
- Broad application areas
- Spinoff companies

INCLUSIVE CITY
- Citizen engagement

8 Gentrification / high housing prices

- Regulating the construction of new buildings in the neighbourhood
- Protecting and preserving existing housing
- Protecting small, ethnic businesses of the neighbourhood

ATTRACTIVE CITY
- Green
- Healthy environment

CIRCULAR CITY
- Energy

Historical City

**Historical cities are strongly characterised by a physical structure originating in the past and recognizable as representing the evolution of different cultures over time.
They are often strongly layered and have a distinctive identity that guides their authentic development. However they are normally developing slowly through selective additions and renovations. Their population is also often stagnating or falling back. These cities usually rely heavily on tourism and temporariness.**

Examples

The following 9 Historical cities are presented as representative examples of the category, without being exhaustive and without covering all the possible range and types of Historical cities worldwide.

Bruges [BE]

Florence [IT]

Canterbury [UK]

Weimar [DE]

Granada [ES]

Rome [IT]

Kyoto [JP]

Cork [IE]

Venice [IT]

Other cities within this category are: Varanasi, Isfahan, Istanbul, Jerusalem, Vienna, Alexandria and Samarkand.

Economic category

Historical cities are present in all countries worldwide, from economies in transition to developed economies. However, the maturity of their economy varies greatly.

Developing economies	Economies in transition	Developed economies

Fragile states index

Historical cities are situated in the range of 'sustainable' and 'stable'. The index's ranks are based on twelve indicators of state vulnerability, grouped by category: Cohesion, Economic, Political and Social. Considered together in the index, the indicators are a way of assessing a state's vulnerability to collapse or conflict.

Alert	Warning	Stable	Sustainable

City size   Legenda   XS | < 0.5m   S | 0.5-1m   M | 1-5m   L | 5-10m   XL | >10million people

Historical cities vary in population size, ranging from less than 500.000 citizens up to 5 million people. The most of cultural cities stay in the middle of this extreme.

XS	S	M	L	XL

Morphology

Historical cities vary in terms of morphologies, being mostly compact cities with a development pathway towards polycentric cities or/and with a diffuse morphology characterising the more recent urban growth outside the historical core.

Compact	Sprawl	Diffuse	Polycentric	Mega

Strengths & weaknesses

This table gives an overview of the main intrinsic characteristics of the city typology. These are here referred to as weaknesses or strengths and divided by the themes defined in the Part I of this research document.

STRENGTHS

	STRENGTHS	WEAKNESSES
Demographic		Lack of housing Diversity within urban population
Environmental	Ethical consumption Resilience	Out-dated assets of buildings Built heritage as major barrier
Social	Strong identity Social cohesion	
Technologic	Testing ground for technologies	Acceptability to test new technologies to preserve environment
Geo-political	Soft power of culture Symbolic character	
Economic	Authentic development	Economic specialization and dependence Rent-seeking economy
Spatial	Workability	Low-energy performances of built asset Narrow streets

WEAKNESSES

In general, one of the most pronounced weaknesses for Historical cities is their built heritage which presents a major barrier for refurbishment. Out-dated assets (buildings) are often in need of expensive retrofitting interventions to match today standards. Older buildings have however a stronger resilience towards heat waves and they also create a strong identity. This identity is also translated in their social cohesion.
Historical cities have unique authentic cultural assets that represent their most important asset and competitive advantage. They also have the opportunity to align their economies with their historical and cultural identities. In this aspect, there also is a risk of an increasing economic specialisation and dependence on tourism.

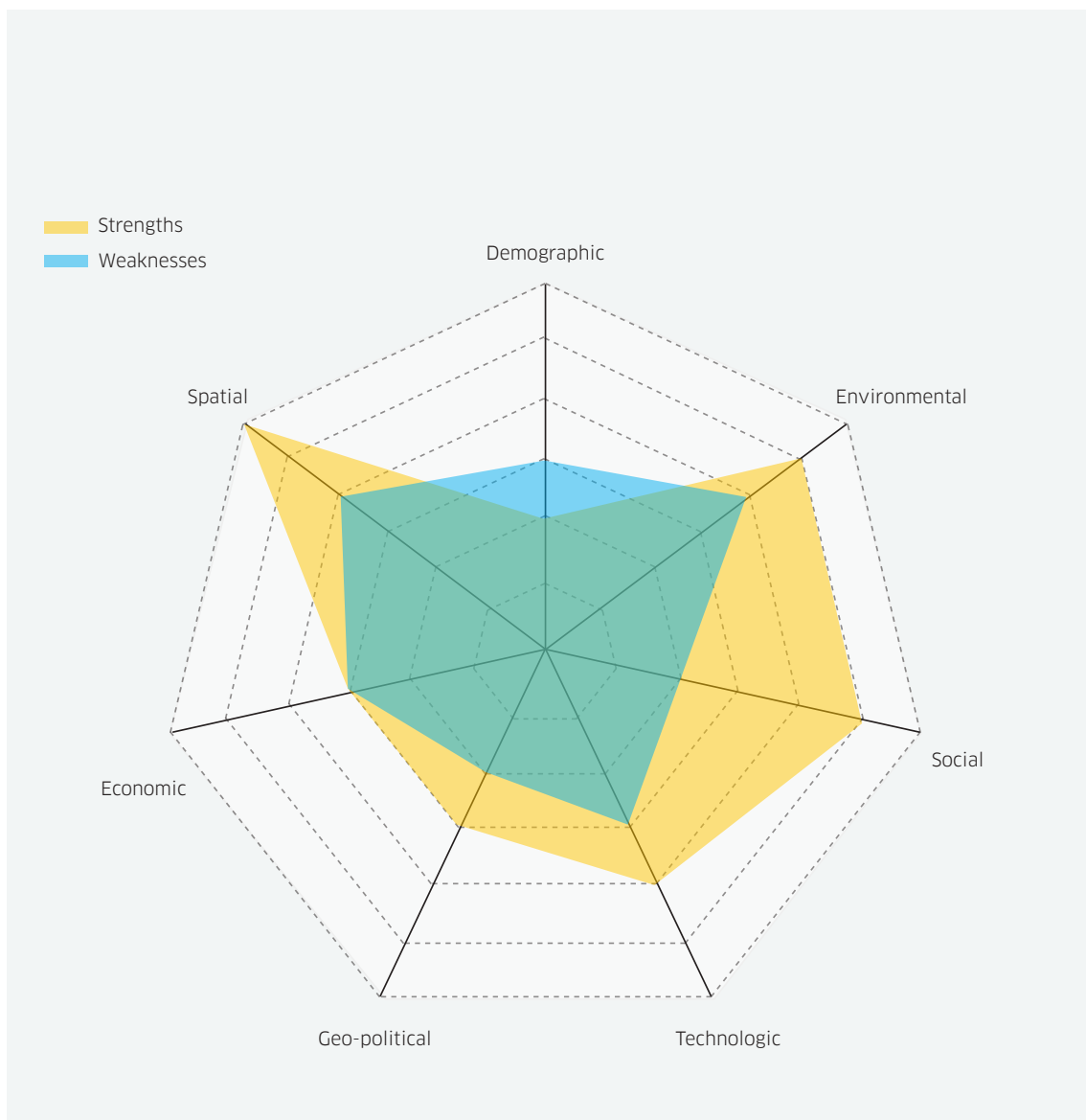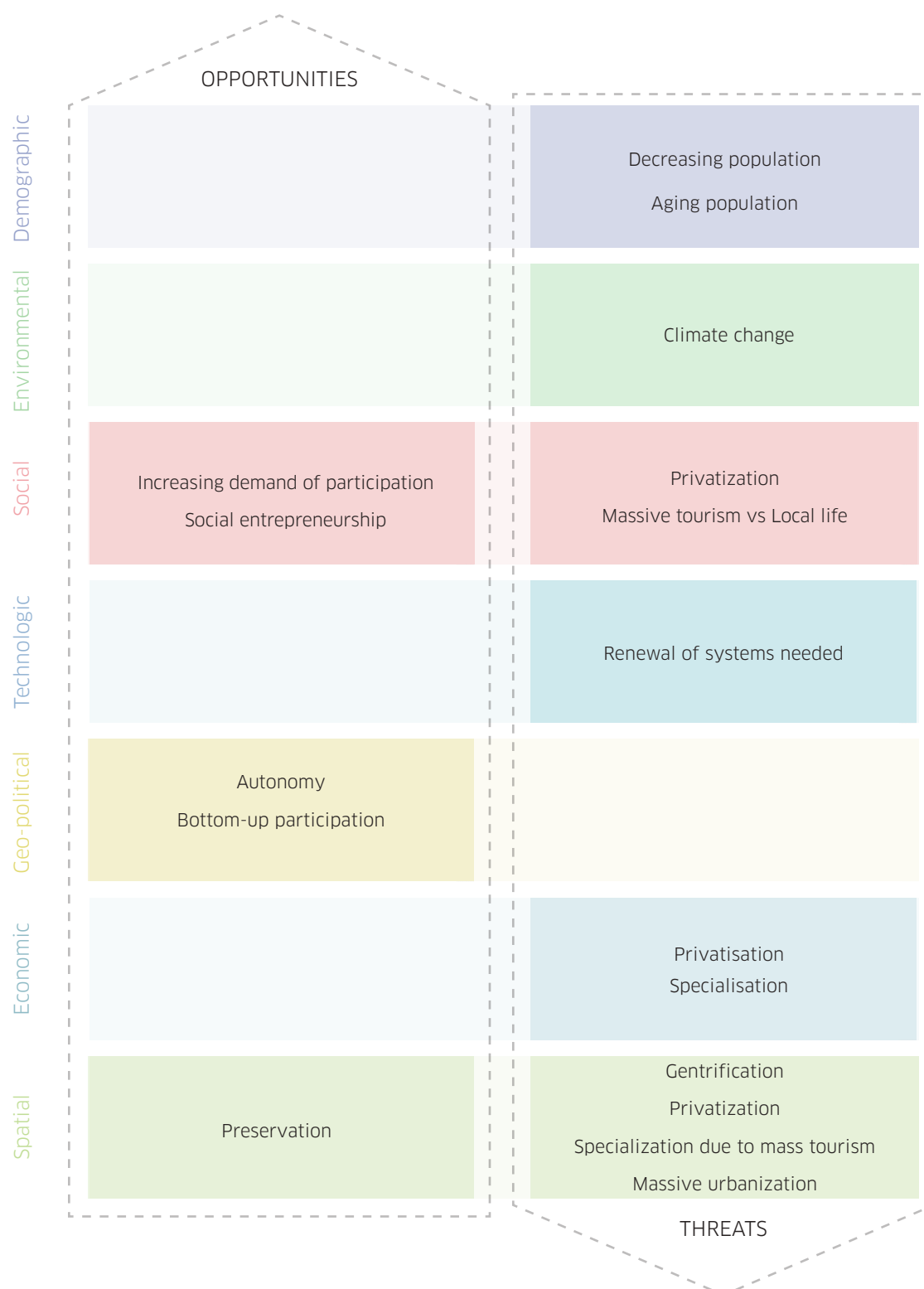## Opportunities & threats

This table gives an overview of the main extrinsic characteristics of the city typology. These are here referred as opportunities and threats and divided by the themes defined in the Part I of this research document.

OPPORTUNITIES

Theme	Opportunities	Threats
Demographic		Decreasing population Aging population
Environmental		Climate change
Social	Increasing demand of participation Social entrepreneurship	Privatization Massive tourism vs Local life
Technologic		Renewal of systems needed
Geo-political	Autonomy Bottom-up participation	
Economic		Privatisation Specialisation
Spatial	Preservation	Gentrification Privatization Specialization due to mass tourism Massive urbanization

THREATS

The decreasing population (locally) presents a major threat in Historical cities. There are more and more temporary residents and tourists and fewer permanent residents. This reduces the critical mass of this typology. Also from an economical point of view this specialization holds a risk when tourism becomes the key activity. This represents a factor of lower-resilience for the whole city economy.
Massive urbanization of historical cities are especially vulnerable to massive urbanization that could threaten their uniqueness, identity and urban coherence. Preservation of historical heritage also have a lot of opportunities such as the urbanistic rules to respect in infrastructural projects.
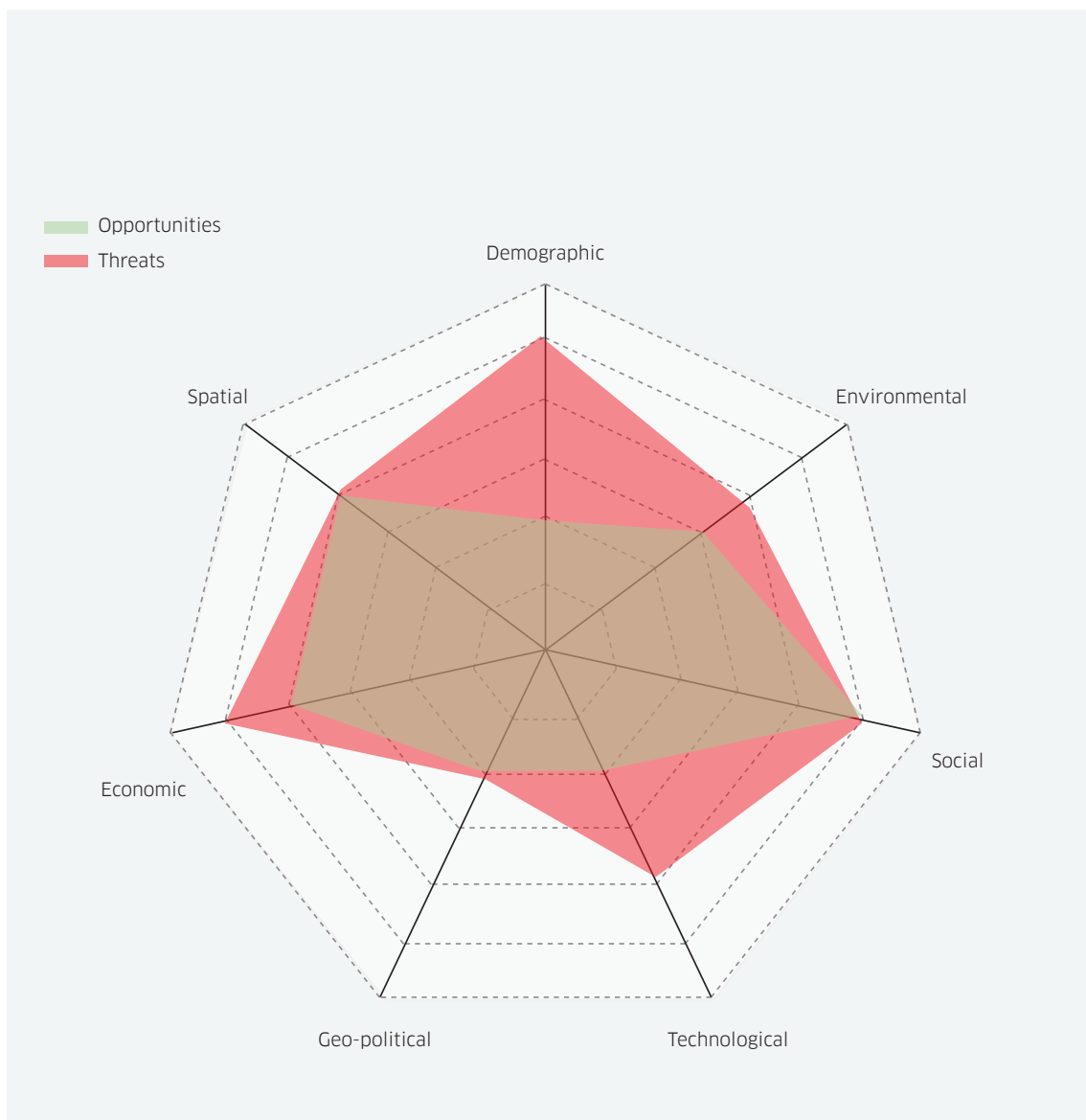
Description per theme

Presented here is a synthesis of the main characteristics of the city typology derived from the previously presented SWOT analysis.

Demographic
Environmental
Social
Technologic
Geo-political
Economic
Spatial

Demographic characteristics
More and more temporary residents and tourists and fewer permanent residents. Lack of suitable housing keeps citizens from living in the city. These trends lead to lower birth rates and a decreasing and aging population as a consequence. Furthermore, we see a low level of diversity within the concerned urban populations (majority natives).

Environmental characteristics
Historical cities are facing major environmental challenges related to climate change adaptability of their heritage (natural or cultural) and the efficiency on the use of resources (energy, materials, etc.). Out-dated buildings needing extensive and expensive retrofitting interventions. Built heritage is a major barrier for refurbishments.

Geo-political characteristics
With often a highly symbolic character representing a collective identity, the Historical cities facilitates a special focus from policy or political level.

Social characteristics

Mass tourism generates tensions with native inhabitants. Native population is characterised by a strong local identity. Old neighbourhoods exemplify a tradition of extensive social cohesion. Privatisation of cultural and local activities is pushed towards its limits.

Technologic characteristics

Due to their vast heritage capital, Historical cities are a challenging testing ground for technologies and innovation related to preservation, valorisation of cultural artefacts. However, acceptability to test new technologies to preserve environment needs to increase. Great opportunities to renovate existing infrastructure such as public lighting lay clear ahead.

Economical characteristics

Historical cities have unique authentic cultural assets that represent their most important competitive advantage. However, they face the risk of an increasing economic specialisation and dependence on tourism. When tourism becomes the key activity, a lower resilience for the whole city economy could be a consequence.

Spatial characteristics

The low flexibility of historical built assets has a lower capacity to be refurbished with new functions or purposes. The challenge is to modernise without losing uniqueness. Lack of opportunities for mass public transport is partially compensated by their walkable character.

Description per sector

Presented here is a synthesis of the main characteristics of the city typology related to three key sectors: the energy sector, the mobility and the buildings & infrastructure sectors.

Energy

Using renewable energy sources for centuries, Historical cities have resisted any excess of modern energy consumption. Their often relative small size averts high energy use in heavy industries, road freight or high level of consumer goods. Besides, with relatively stable change in GDP growth, these cities have still some diversity in terms of total primary energy supply, where their relatively low import energy dependence makes them more resilient to geopolitical energy issues. Moreover, local governments and communities are not pioneers in the future energy trends. Investments in decentralised renewable energy sources are generally moderate and a vision of becoming a 'smart city' is not often a priority. Hence, energy policies are likely to follow trends from other advanced cities. Nevertheless, Historical cities - mostly located in developed countries, are aware of climate change issues and develop strategic roadmaps to plan different programmes. While retrofitting buildings will be more challenging, promoting sustainable modal shift and expanding green and resilient spaces are adaptive measures that will enhance the Historical city's quality of life.

Mobility

City centers of Historical cities are often characterised by narrow streets and are therefore ideally walkable, generating vibrant areas with art galleries, events, restaurants and creative industries that help regenerate the city economy and the touristic appeal. Walkability can be encouraged and enhanced by creating car-free zones and by installing low emission zones or intelligent tolls. Public squares, gardens and streets in Historical cities should be accessible and equipped with levelled pavements, resting places, ramps and tactile guide strips. There is an opportunity in Historical cities to use vacated public space to enhance symbolic architecture. To prevent tourists entering Historical cities with their cars, Park & Ride facilities with advantageous rates can be provided in the peri-urban area. Where possible, water buses must be integrated as a public transport. Supply rules must be carefully considered and encourage the use of cargo-bikes and electric vehicles. The (use of the) public transport system must be easily accessible and understandable, and public transport rates must be unified even if several operators run it. Historical cities lend themselves perfectly to offering mobility solutions for visitors combined with e.g.museum cards. In case (shared) bicycles are offered to citizens and tourists, this service should be safe and comfortable.

Mobility & Building infrastructure

Historical districts must be easily accessible and be able to cope with large streams of visitors from international transport hubs (airports, international bus and train stations). Parking places for touristic coaches must be spread throughout the city. A well-considered parking policy with Park & Ride (P&R) possibilities is essential. In old and densely built Historical cities, construction of additional separated tram lines is not always possible; therefore high standards for public transport - which includes dense networks of tram and bus lines, tight schedules, convenient and simple accessibility, and preference given to public transport at traffic lights - is key. Secure and comfortable bike parking and bike lanes must be created all around the city.

Historical cities are characterized by a building envelope with low energy performance (low insulation, low airtightness) and simple techniques (limited or no ventilation, conventional heating and cooling). Cultural heritage has priority over measures to reduce energy demand. Extra insulation or higher airtightness performance is practically unrealizable, and the implementation of renewable energy (photovoltaic panels, wind turbines, geothermal energy, …) is also not an option. Local, regional, international … regulations are a limiting factor. Decarbonization is only possible through smart and efficient production of energy. The need to preserve the historic character limits the possibilities to adapt the buildings for other functions.

The city in a picture...

② Low accessibility

④ Touristic appeal

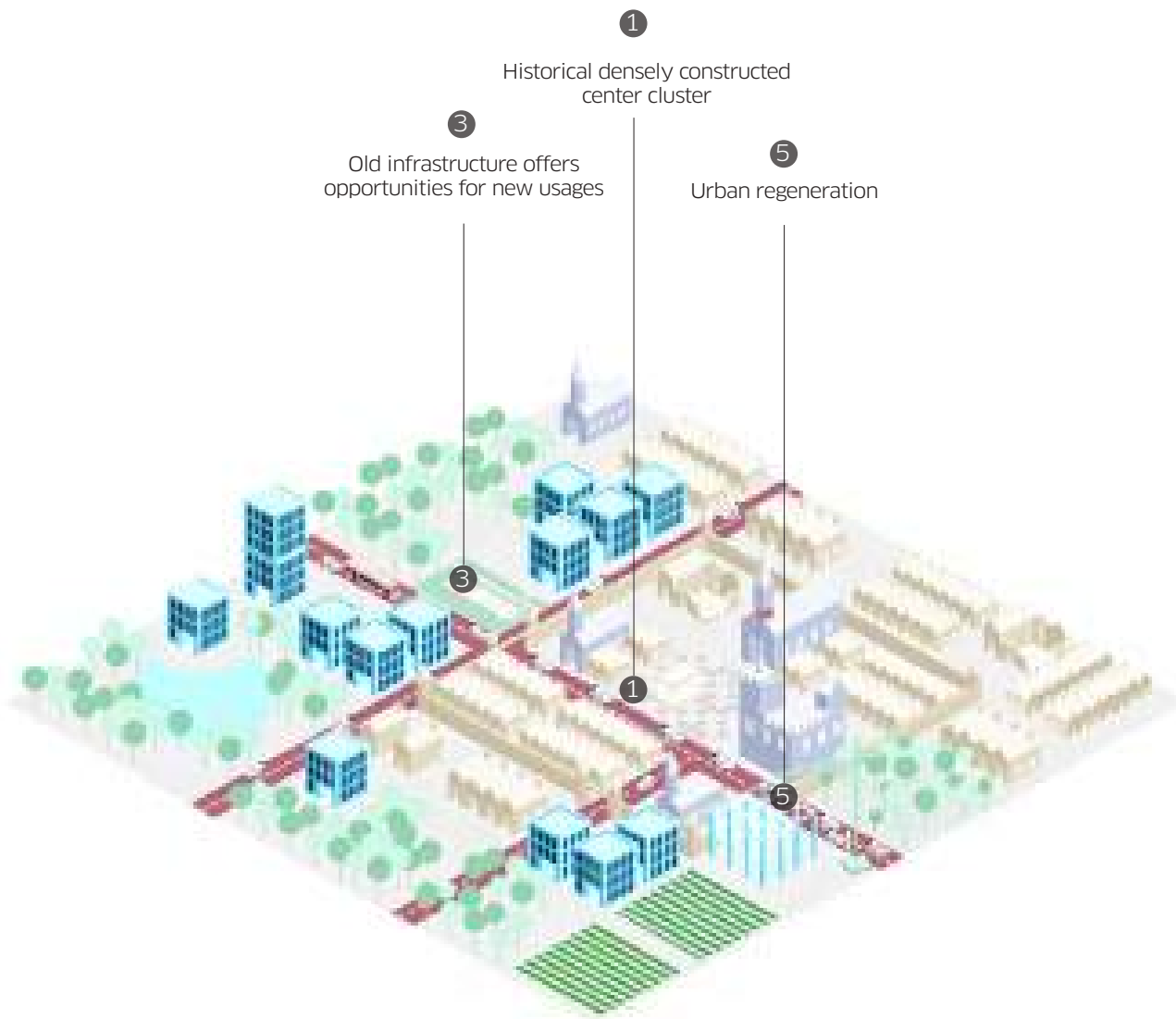**⑥** Declining population and economy

⑦ Aging population

⑧ Green economy

❶ Historical densely constructed center cluster

❸ Old infrastructure offers opportunities for new usages

❺ Urban regeneration

KEY CHARACTERISTICS

Derived from the SWOT analysis, and showing the main strengths, weaknesses, opportunities and threats of the city typology

SOLUTIONS & OPPORTUNITIES

- Urban
- Energy
- Mobility
- Building & Infrastructures

360 CITY SCAN

Key perspectives that are linked with the key characteristics and the related solutions and opportunities

---

1 Historical densely constructed center cluster

- Retrofits
- Regeneration projects (housing)
- Heritage preservation

CIRCULAR CITY
- Land

ATTRACTIVE CITY
- Culture and heritage

---

2 Low accessibility

- Micro mobility
- MaaS
- Mobility plans to optimize modal share
- Investments in sustainable transport and services
- Collaboration between stakeholders

CONNECTED CITY
- Transportation
- Partnerships

---

3 Old infrastructure offers opportunities for new usages

- Retrofits for housing
- Development for parks
- Flexible buildings/ temporary use
- Guidelines for Rehabilitation

CIRCULAR CITY
- Materials
- Land

ATTRACTIVE CITY
- Culture and heritage

INCLUSIVE CITY
- Housing

---

4 Touristic appeal

- Investment in divers economies
- Collaborations between stakeholders
- Stimulations in specific education

PRODUCTIVE CITY
- Inclusive housing

INCLUSIVE CITY
- Education

---

5 Urban regeneration

- Collaboration between stakeholders
- Regulating the construction of new buildings
- Opening up vacant sites
- Temporary use

CONNECTED CITY
- Partnerships

CIRCULAR CITY
- Land

---

6 Declining population and economy

- Retrofits
- Regeneration projects (housing)
- Heritage preservation
- Subsidies

CIRCULAR CITY
- Land
- Materials

ATTRACTIVE CITY
- Culture and heritage

---

7 Aging population

- High accessibility in public spaces
- Investments in healthcare
- Proximity of residential care centers

ATTRACTIVE CITY
- Green
- Healthy environment

CIRCULAR CITY
- Energy

---

8 Green economy

- Zero-carbon Strategy roadmaps
- CO_2 calculation tool
- CO_2 / Energy saving Apps
- Circular economy
- Urban farming
- Climate resilience strategy

ATTRACTIVE CITY
- Healthy environment
- Green
- Vibrant public space

Industrial City

Industrial cities are defined by their economy which is built and developed on commercial production (producing and selling of goods). Because of their often - mobility driven - strategic locations they are specifically planned for factories.
Industrial cities are often highly vulnerable and not resilient because of their specialised economy and urban structure. Their development is strictly dependent on the success and stability of national and global markets of goods and products. Their dependence on external factors often leads to their decay and to a radical urban renovation based on the construction of a new identity.
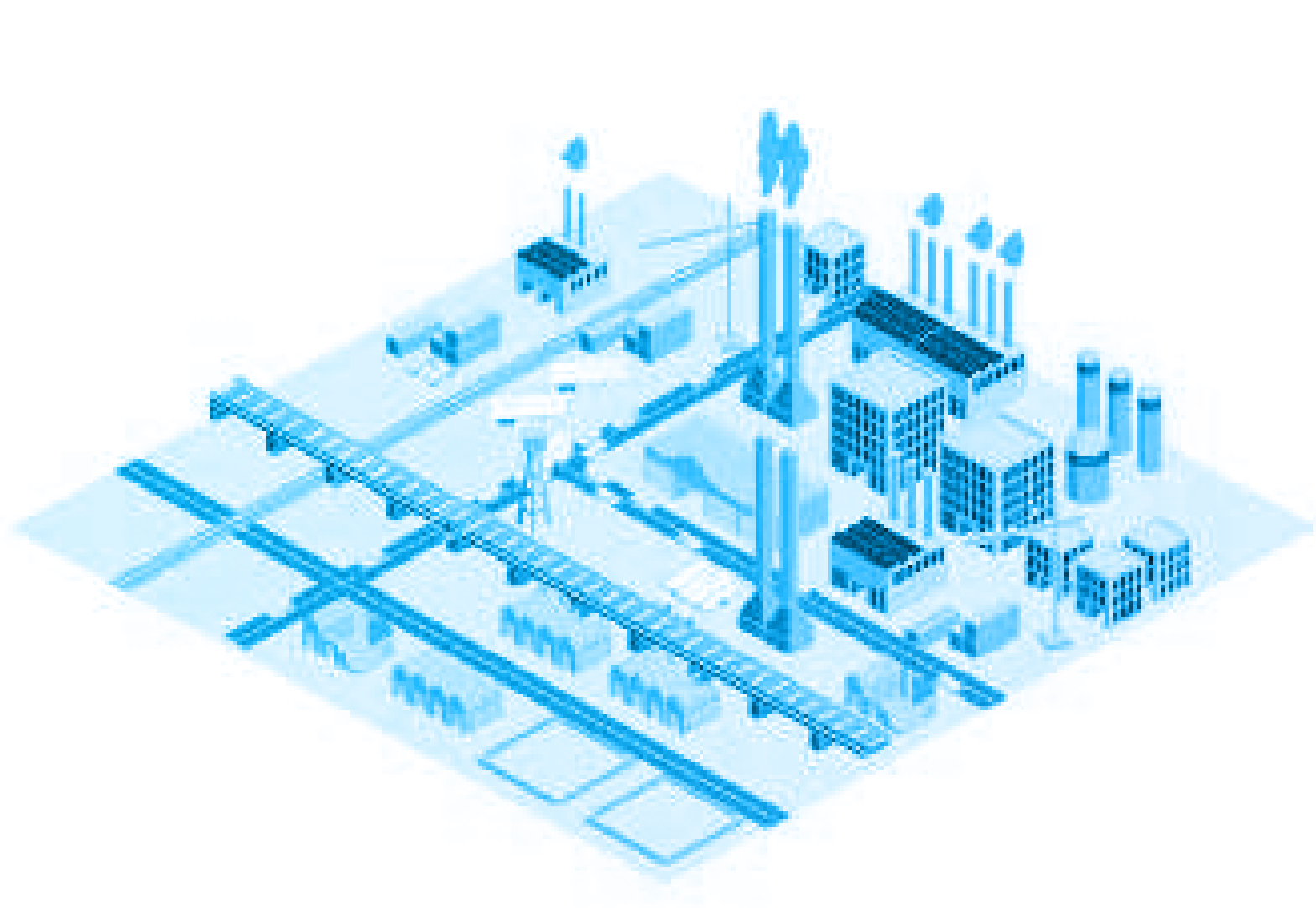
Examples

The following 9 Industrial cities are presented as representative examples of the category, without being exhaustive and without covering all the possible range and types of Industrial cities worldwide.

Genk [BE]

Charleroi [BE]

Manchester [UK]

Detroit [US]

St. Louis [US]

Pittsburgh [US]

Marseilles [FR]

Belfast [IE]

Essen [DE]

Economic category

Industrial cities are present in all countries worldwide, from developing economies to economies in transition and developed economies.

Developing economies	Economies in transition	Developed economies

Fragile states index

Industrial cities cover most of the spectrum of the UN fragile state index. The index is based on twelve indicators of vulnerability, grouped by category: Cohesion, Economic, Political and Social. Considered together, the indicators are a way of assessing a state's vulnerability to collapse or conflict.

Alert	Warning	Stable	Sustainable

City size   Legenda   XS | < 0.5m   S | 0.5-1m   M | 1-5m   L | 5-10m   XL | >10million people

Industrial cities vary in population size, ranging from 500.000 citizens up to 5 million people. Most Industrial cities stay in the middle of this extreme.

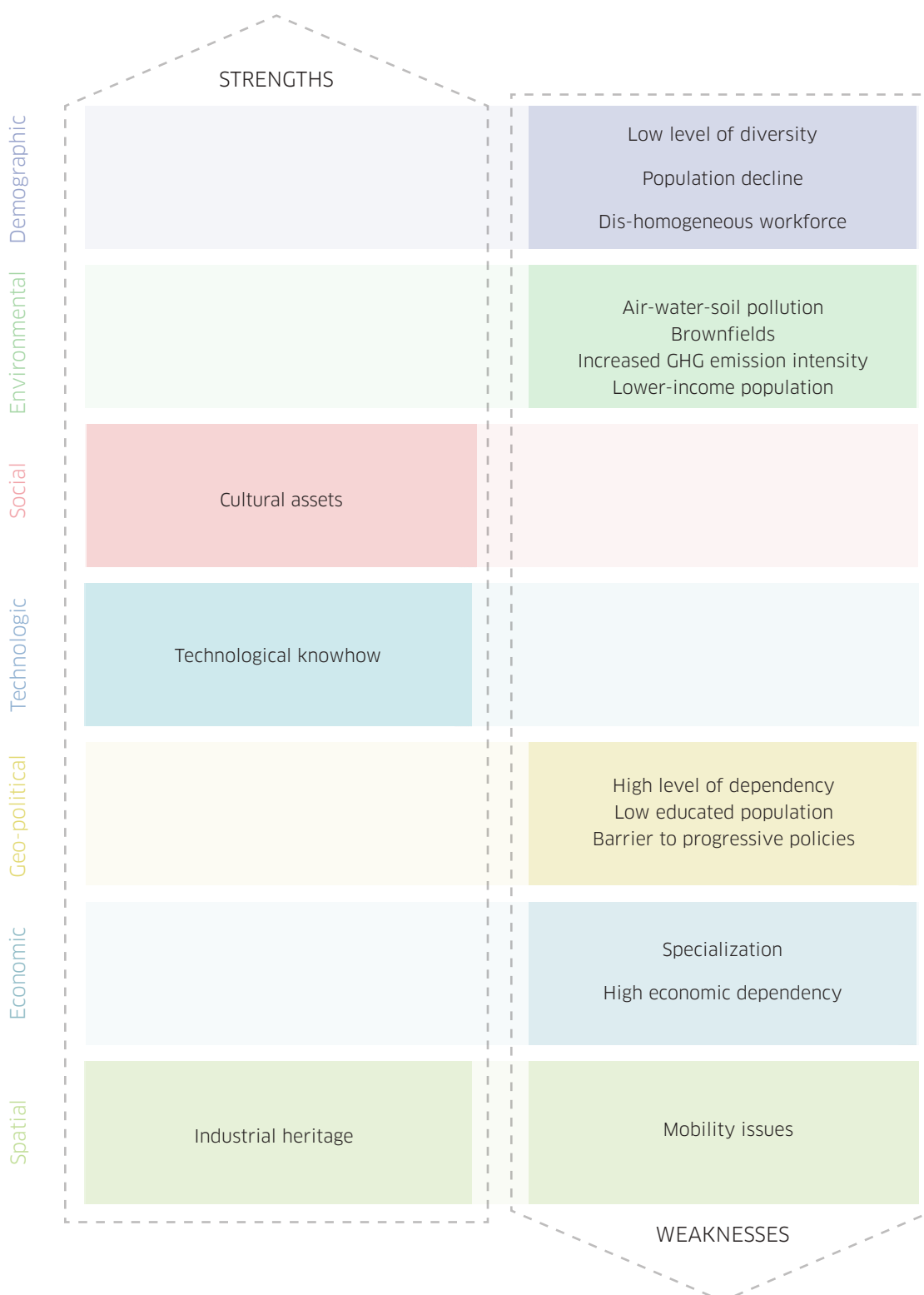| XS	S	M	L	XL

Morphology

Industrial cities are often subject to sprawl and have a polycentric character due to the necessary proximity of infrastructure and raw materials. Consequently, they are also rather diffuse.

Compact	Sprawl	Diffuse	Polycentric	Mega

Strengths & weaknesses

This table gives an overview of the main intrinsic characteristics of the city typology. These are here referred to as weaknesses or strengths and divided by the themes defined in the Part I of this research document.

STRENGTHS

Demographic		Low level of diversity Population decline Dis-homogeneous workforce
Environmental		Air-water-soil pollution Brownfields Increased GHG emission intensity Lower-income population
Social	Cultural assets	
Technologic	Technological knowhow	
Geo-political		High level of dependency Low educated population Barrier to progressive policies
Economic		Specialization High economic dependency
Spatial	Industrial heritage	Mobility issues

WEAKNESSES

The Industrial city has various weaknesses. The most prominent are concentrated around the geopolitical, economic and environmental aspect. We also notice urgency in demographic terms. Young, educated people move away from the city for better options, as a result, we see urban decay and many abandoned buildings. Another result of this deflation is the low level of diversity within the urban population. Lower-income populations often also have a lower environmental awareness. The weaknesses in regard to the environment is quite evident; air-water and-soil pollution are widely spread. Increased local pollution of soil, air, waste, water and resources consumptions have large effects on the biodiversity. On the spatial level we notice that long lasting pollution results in brownfields that require expensive remediation interventions. Industrial cities are also often dependent on political stability. Big economic actors have major influence on political decision makers which works as a barrier to progressive policies.

Strengths
Weaknesses

Demographic
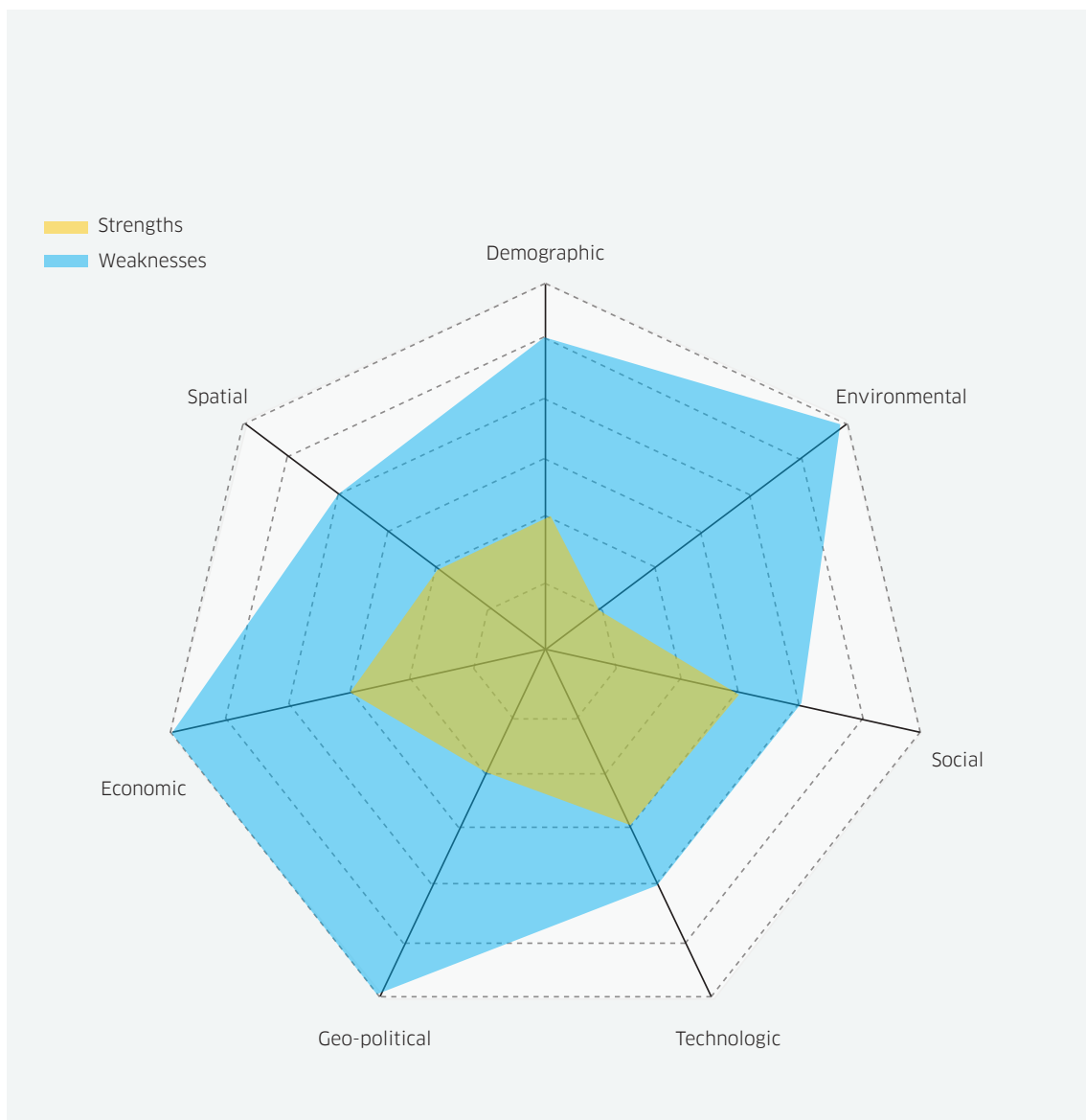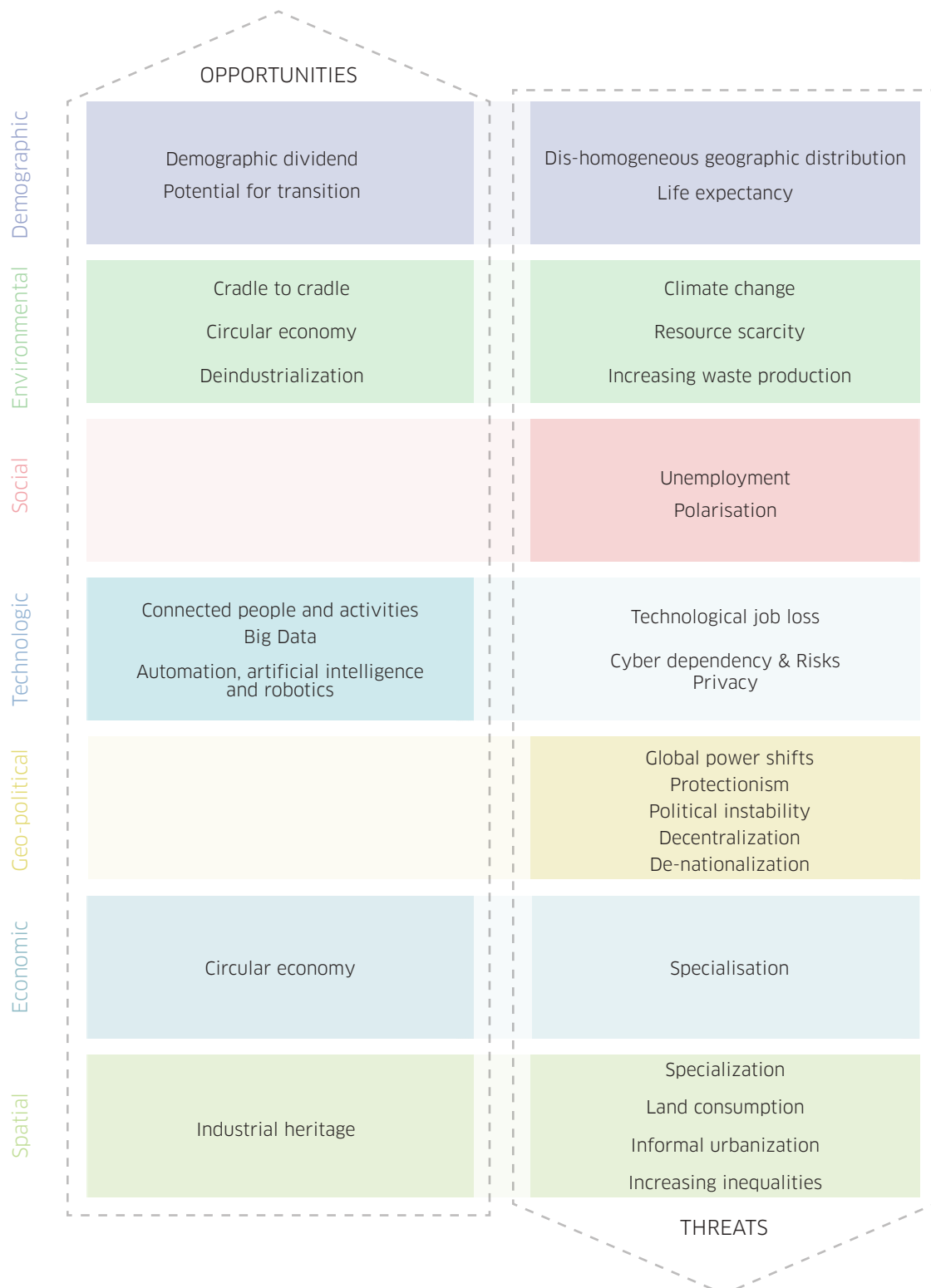Environmental
Spatial
Social
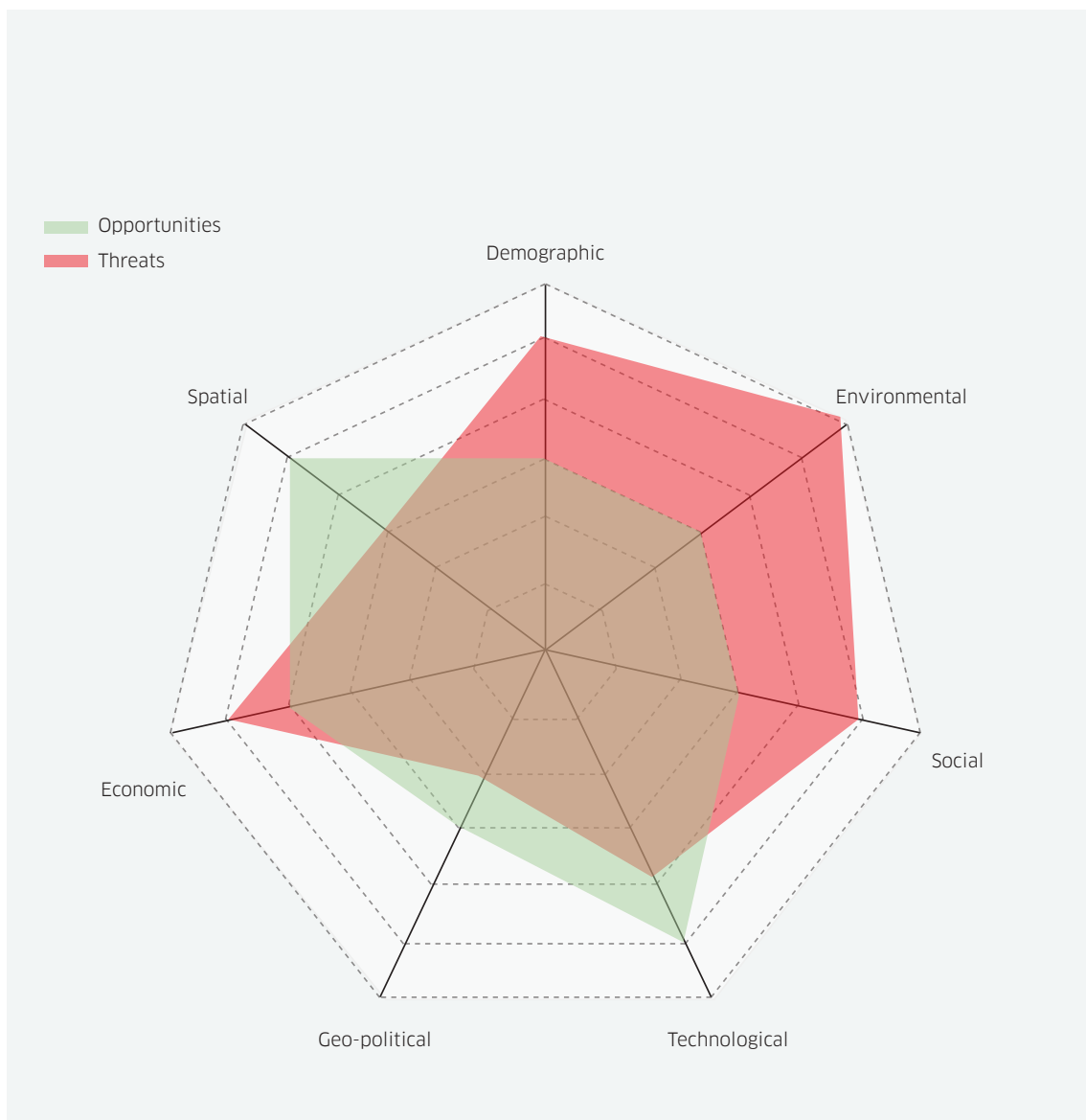Economic
Geo-political
Technologic

OPPORTUNITIES & THREATS

This table gives an overview of the main extrinsic characteristics of the city typology. These are here referred as opportunities and threats and divided by the themes defined in the Part I of this research document.

OPPORTUNITIES

	OPPORTUNITIES	THREATS
Demographic	Demographic dividend Potential for transition	Dis-homogeneous geographic distribution Life expectancy
Environmental	Cradle to cradle Circular economy Deindustrialization	Climate change Resource scarcity Increasing waste production
Social		Unemployment Polarisation
Technologic	Connected people and activities Big Data Automation, artificial intelligence and robotics	Technological job loss Cyber dependency & Risks Privacy
Geo-political		Global power shifts Protectionism Political instability Decentralization De-nationalization
Economic	Circular economy	Specialisation
Spatial	Industrial heritage	Specialization Land consumption Informal urbanization Increasing inequalities

THREATS

In the Industrial city, the threats run parallel to the weaknesses. There is a substantially increased risk for the environmental, demographic and economic topics. We also notice from a demographic point of view an inhomogeneous geographic distribution. Homes are often located close to industrial zones and outside demographic or r historical centers. Compared to other city typologies life expectancy stays relatively low. There are also many challenges in relation to the shift from the existing economic trends towards more sustainable and climate adaptive activities. This change is becoming more urgent because of resource scarcity. Industrial cities run empty on almost every aspect when resources are up used. On the plus side we note that better coordination between companies is becoming more regular. This opens possibility for cradle-to-cradle and circular economies. Often leading to de-industrialisation this offers opportunities in terms of environment protection, fields recovery/rehabilitation. Additionally; from a spatial point of view preservation awareness increases with potential for industrial heritage.

Description per theme

Presented here is a synthesis of the main characteristics of the city typology derived from the previously presented SWOT analysis.

Demographic
Environmental
Social
Technologic
Geo-political
Economic
Spatial

Demographic characteristics
There is often a low level of diversity in terms of social profiles in Industrial cities, Additionally it is very common to have more men than women in the workforce. This dis-homogeneous demographic distribution creates a possible potential for transitions in the future.

Environmental characteristics
Industrial cities are facing challenges in relation to the shift of economic activities towards more sustainable and climate adaptive activities. They are normally associated with a non- sustainable use of resources and production of waste. The key challenge relates to the recycling.

Geo-political characteristics
From a geo-political point of view, the increasing impact of decentralisation and global power shifts in this typology.

Social characteristics

From a social point of view, the greatest weaknesses in the Industrial city is the high level of unemployment due to instabilities in the (specialised) markets and the ever increasing degree of polarisation

Technologic characteristics

Industrial cities are vulnerable due to increasing technology. On the other hand, there are also many opportunities that definitely need to be taken into account in this matter.

Economical characteristics

Economically, there are many opportunities to be created by continuing to focus on strong internal cooperation and a circular economy. However, various spin-off companies can reinforce the danger of specialisation economics.

Spatial characteristics

Industrial cities usually have a large transportation network that includes a variety of road, rail, air, water transportation. The development of new eco-districts - that are in the vicinity of work areas or near the public transport stations can lead to more sustainable commuter behaviour.

Description per sector

Presented here is a synthesis of the main characteristics of the city typology related to three key sectors: the energy sector, the mobility and the buildings & infrastructure sectors.

Energy

Due to their inherent typology, Industrial cities have been used to high dependence energy usage. With the global shift of industrial production towards developing countries, these cities, most often still located in developed countries, have therefore seen major changes in their energy consumption. From their industrial processes to the related supply chain of their manufactured goods, their energy use has decreased in several sectors. Still, Industrial cities, with relatively old but existing technical infrastructure, have great energy transition potential. From energy efficiency measures to a better urban-rural linkage to exploit the local renewable energy sources, many opportunities exist to cover their energy needs. For instance, the municipality of Malmo in Sweden regenerated several of its districts with food waste collection to produce biogas for public buses and has the largest solar farm in the country. The city also plans in the long-term to convert a biogas to a hydrogen unit that will supply electricity and heat to municipal buildings.

Mobility

Industrial cities usually have a large transportation network that includes a variety of road, rail, air, water transportation. Specially dimensioned for freight, Industrial cities are also an important freight hub for freight in and out of the region or even the country. Decarbonisation of the freight transportation is obviously a hot topic. Industrial stakeholders are looking for cost effective solutions for freight transport and develop mobility plans to optimise modal share, vehicles and fuels. Investments in sustainable transport infrastructure and services will bring substantial, long-term, economy-wide benefits. More and more innovative solutions like IoT, data management and collaboration between several stakeholders should help the optimisation of the "last mile" freight transportation. Regarding the mobility of people, the concentric development of Industrial cities often leads to a personal vehicle-oriented urban design and to a road network that is often overloaded by increasing demand. Public transport, cycling and pedestrian infrastructure must be improved so that Industrial cities can offer a more sustainable living-work (commuting) culture, as well as a higher quality of life by offering support services, entertainment and educational facilities. Also, the development of new ecodistricts, in the vicinity of work areas or near the public transport stations, can lead to more sustainable commuter behaviour.

Mobility & Building infrastructure

The rather poor quality of life in Industrial cities often pushes workers to become daily commuters. Public transport infrastructure must therefore be properly sized to be more competitive than the use of individual cars. In order to decarbonise the freight transport, investments are required for ships, vessels, trucks, trains… as well as for railway, ports and charging infrastructures. Currently, most of the global shipping fleet – around 60,000 vessels - rely on diesel, while only 600 ships use alternative fuels. The sector clearly needs to accelerate the adoption of low-carbon fuels and low-carbon fuel stations must be developed and available. Industrial cities have buildings with a low-performance building envelope. Reducing the energy consumption of Industrial buildings is not a high priority, and financial investments are only made if they have a high return. Due to the low energy costs, the high investment costs for construction-related measures, and the low percentage of energy consumption for the buildings related to the total energy consumption, investments that reduce the energy consumption of industrial buildings are not often made. There are many options to improve building envelopes. The building regulations in Industrial cities are limited. Buildings in those cities often have low restrictions because the land is reserved for industry.

Industrial cities do have the space to implement sustainable energy measures (large roofs, ground surface, presence of waterways…) but they also need high temperature sources - so that they have a surplus of heat (waste heat). Energy production and consumption must be provided on a city scale, so that different industries can exchange their waste energy. However, Industrial cities only work together if they are certain of their supply.

The city in a picture...

① Heat loss and high energy consumption

③ Low social and economic diversity

④ Out-dated building & Infrastructure assets

⑤ Un-balanced use of space

⑥ Declining population and economy
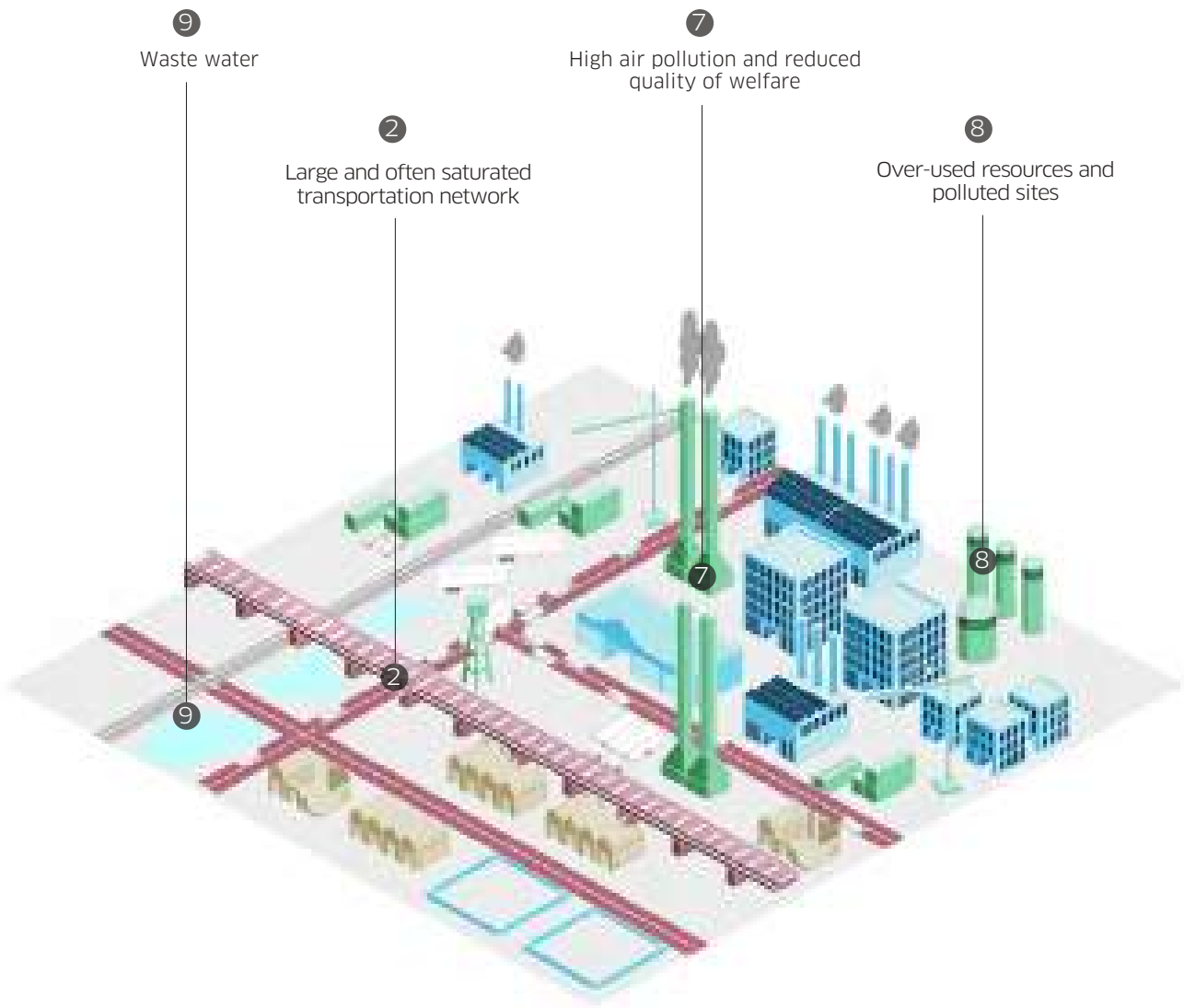
⑨ Waste water

② Large and often saturated transportation network

⑦ High air pollution and reduced quality of welfare

⑧ Over-used resources and polluted sites

KEY CHARACTERISTICS

Derived from the SWOT analysis, and showing the main weaknesses and threats of the city typology

SOLUTIONS & OPPORTUNITIES

- Urban
- Energy
- Mobility
- Building & Infrastructures

360 CITY SCAN

Key perspectives that are linked with the key characteristics and the related solutions and opportunities

1 Heat loss and high energy consumption

- Re-cycling heritage projects
- District-level energy and service contracts
- Local / distributed renewable production
- Energy storage
- Smart Buildings / BIM

CIRCULAR CITY
- Energy
- Materials

2 Large and often saturated transportation network

- Mobility plans to optimise modal share
- Investments in sustainable transport and services
- IoT and data management
- Collaboration between stakeholders
- Internal cargo train

CONNECTED CITY
- Transportation
- Logistics

PRODUCTIVE CITY
- Local employment

3 Low social and economic diversity

- Mixed-used districts
- Mixing of programmes
- Knowledge industry
- Investments in public spaces
- Regulating the construction of new buildings

INCLUSIVE CITY
- Citizen engagement

ATTRACTIVE CITY
- Vibrant public space

4 Out-dated building & Infrastructure assets

- Buildings & Infrastructures retrofit
- Collaboration between stakeholders
- Broaden the market

INCLUSIVE CITY
- Housing

CIRCULAR CITY
- Materials

5 Un-balanced use of space

- Collaboration between stakeholders
- Regulating the construction of new buildings
- Opening up vacant sites
- Temporary use

CONNECTED CITY
- Partnerships

CIRCULAR CITY
- Land

6 Declining population and economy

- Investments in public spaces
- Broaden the market
- Spin off companies

INCLUSIVE CITY
- Citizen engagement

PRODUCTIVE CITY
- Divers economies
- New economies
- Dynamic economies

7 High air pollution and reduced quality of welfare

- Developing regulations
- Circular economy
- Green energy

ATTRACTIVE CITY
- Green
- Healthy environment

CIRCULAR CITY
- Energy

8 Over-used resources and polluted sites

- Brownfield redevelopments
- Developing regulations
- Waste management businesses
- Site deconstruction & soil decontamination

ATTRACTIVE CITY
- Green
- Healthy environment

CIRCULAR CITY
- Land
- Materials

9 Waste water

- Rinse water projects
- Managing vast water resources
- Reducing pollution at the source
- Monitoring water quality
- Investing in infrastructure
- Developing regulations

RESILIENT CITY
- Protective ecosystems

CIRCULAR CITY
- Land
- Water

Resort
City

A resort city is characterised by tourism or vacationing as the primary component of the local economy. They are normally defined by a discontinuous pattern of use: highly seasonal and dependent on climate conditions, recreational opportunities, socio-cultural factors and events. These highly variable dynamics in population and economic activities typically define specific challenges as high pressure on natural and cultural resources, social cohesion and economic resiliency.

Examples

The following 9 Resort cities are presented as representative examples of the category, without being exhaustive and without covering all the possible range and types of Resort cities worldwide.

Goldcoast [AU]

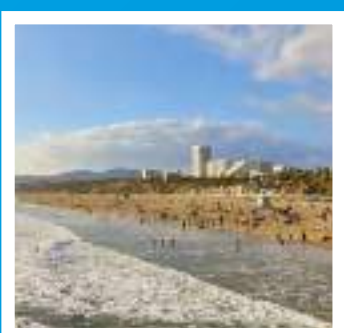St. Anton [AT]

Benidorm [ES]

Cancun [MX]

Blackpool [IT]

Sunny Beach [BG]

Santa Monica [US]

Queenstown [NZ]

Sharm el-Sheikh [EG]

Other cities within this category are: Cannes, Ponce, Benidorm, Riccione.

Economic category

Resort cities are mainly defined as 'developed economies'. The countries in which they are located are not always economically stable.

Developing economies	Economies in transition	Developed economies

Fragile states index

Resort cities are normally situated in the range of 'stable' or 'sustainable' in the fragile state index. The index's ranks are based on twelve indicators of state vulnerability, grouped by category: Cohesion, Economic, Political and Social. Considered together in the index, the indicators are a way of assessing a state's vulnerability to collapse or conflict.

Alert	Warning	Stable	Sustainable

City size   Legenda   XS | < 0.5m   S | 0.5-1m   M | 1-5m   L | 5-10m   XL | >10million people

Resort cities are usually small in population size, with less than 500.000 citizens.

XS	S	M	L	XL

Morphology

Resort cities usually have a rather diffuse character with no clear city center. In most cases, however, they have a fairly large built-up density with limited sprawl problems.

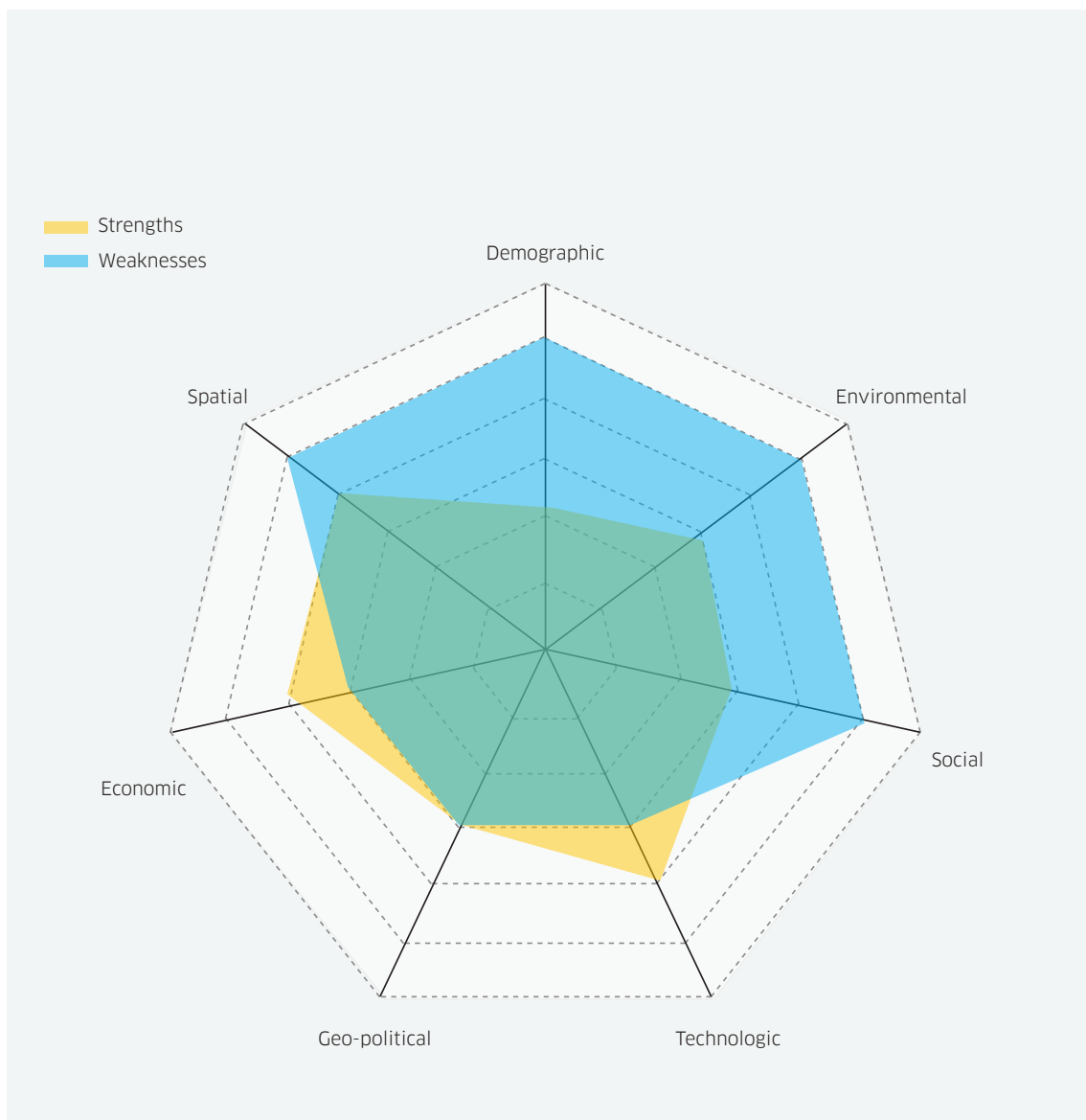| Compact	Sprawl	Diffuse	Polycentric	Mega

Strengths & weaknesses

This table gives an overview of the main intrinsic characteristics of the city typology. These are here referred to as weaknesses or strengths and divided by the themes defined in the Part I of this research document.

STRENGTHS

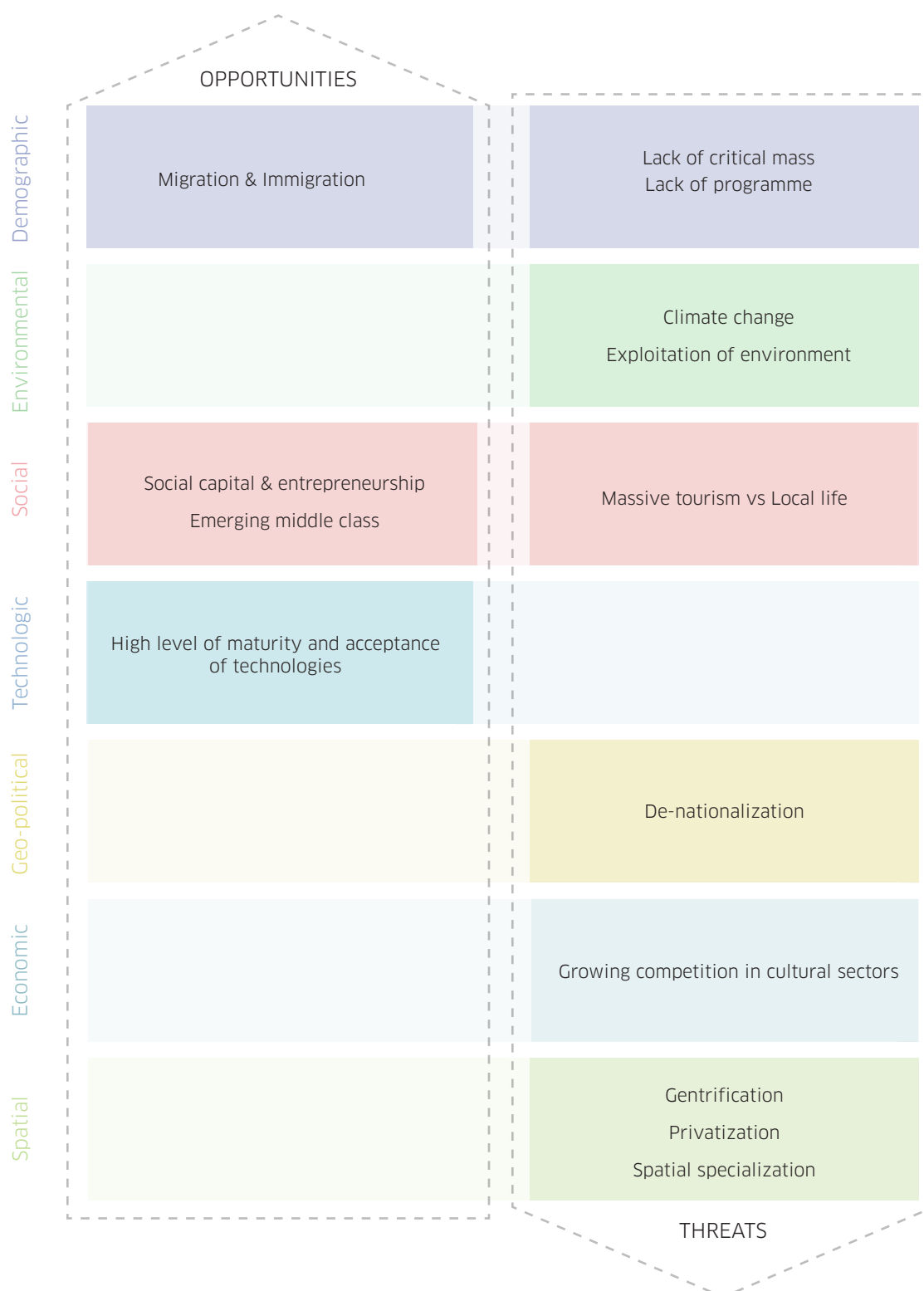|	STRENGTHS	WEAKNESSES
Demographic		Low level of diversity Populations stress by season use and unbalanced population presence
Environmental	Rising environmental awareness	Problems regarding sustainable growth High pressure on nature patrimony
Social	Higher standards of living	
Technologic	High technologic connectivity	
Geo-political		
Economic	Lower unemployment rates	High property value High cost of living Low paying jobs
Spatial	Improved infrastructure	

WEAKNESSES

In general, one of the most pronounced weaknesses of Resort cities is their specialisation in one exclusive industry. As a result, Resort cities carry very limited resilience towards fluctuation. Built heritage holds a major barrier for refurbishment. Out-dated assets (buildings) are often in need of expensive retrofitting interventions to match today's standards. Older buildings have however a stronger resilience towards heat waves and they also create a strong identity. This identity is also translated into social cohesion.

Resort cities have unique, authentic cultural assets that represent their most important competitive advantage.

Opportunities & threats

This table gives an overview of the main extrinsic characteristics of the city typology. These are here referred as opportunities and threats and divided by the themes defined in the Part I of this research document.

OPPORTUNITIES

	OPPORTUNITIES	THREATS
Demographic	Migration & Immigration	Lack of critical mass Lack of programme
Environmental		Climate change Exploitation of environment
Social	Social capital & entrepreneurship Emerging middle class	Massive tourism vs Local life
Technologic	High level of maturity and acceptance of technologies	
Geo-political		De-nationalization
Economic		Growing competition in cultural sectors
Spatial		Gentrification Privatization Spatial specialization

THREATS

In Resort cities, there are more and more temporary residents and tourists and fewer permanent residents. This reduces the critical mass of this typology. Also from an economic point of view, this specialisation carries a risk when tourism becomes the key activity. This represents a factor of lower-resilience for the whole city economy.
Similar to Historical cities, the preservation of historical heritage also creates a lot of opportunities such as the urbanistic rules to respect in infrastructural projects.
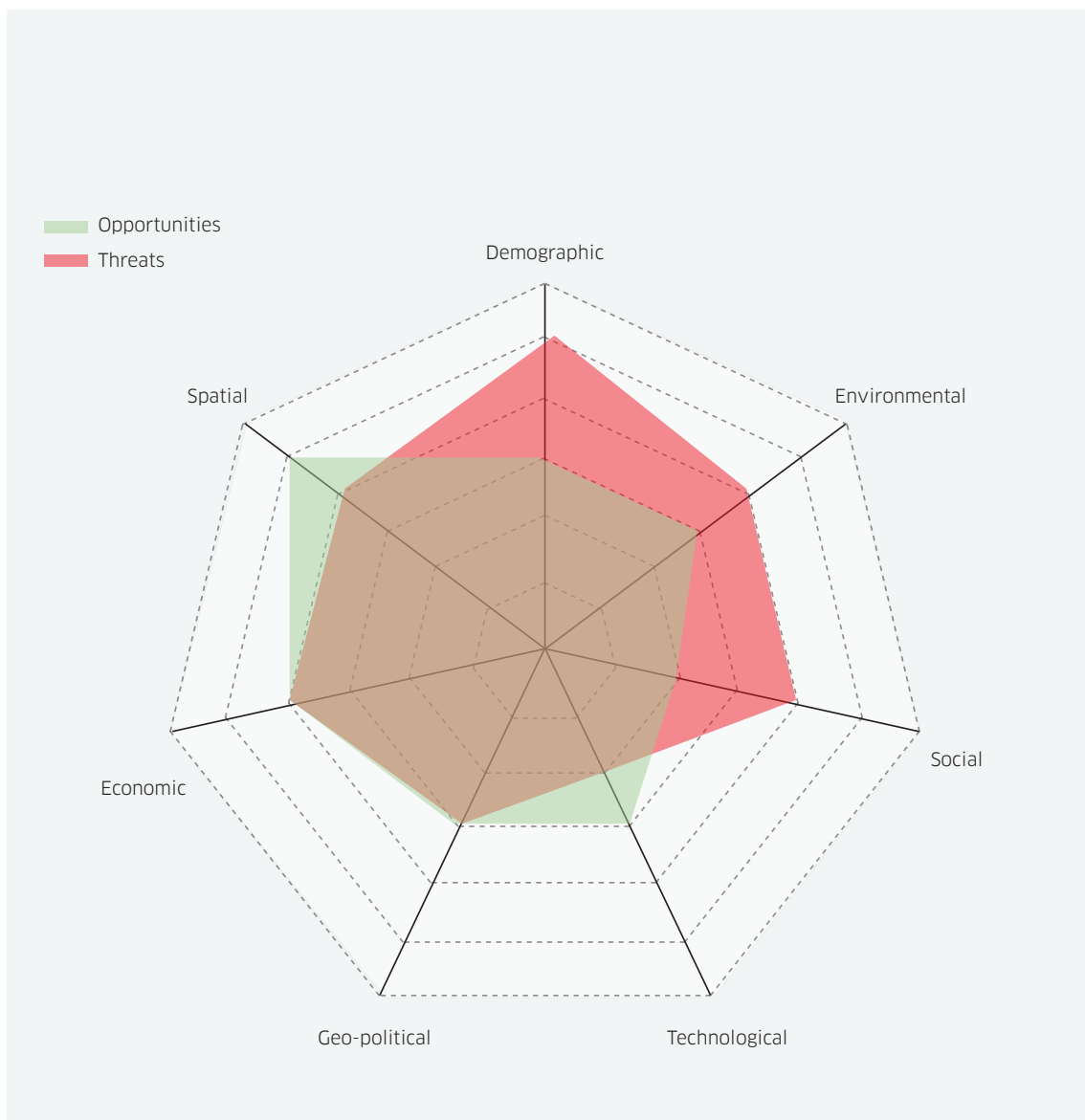
Description per theme

Presented here is a synthesis of the main characteristics of the city typology derived from the previously presented SWOT analysis.

Demographic

Environmental

Social

Technologic

Geo-political

Economic

Spatial

Demographic characteristics

In Resort cities, population is constituted by a minor part of local residents (village effect during the year) and a large part of tourist during specific periods of the year.

Environmental characteristics

Resort cities are characterised by a high awareness on the environment and a willingness to decrease the impact of activities (especially services) on the environment

Geo-political characteristics

Resort cities are usually implanted in areas far from geo-political potential troubles. However they are in general highly dependent on external resources (limited self-production of resources).

Social characteristics

In Resort cities, tourists expect to be delivered high-end services and quality of life during their stay.

Technologic characteristics

Resort cities have high technological and flexible infrastructures mostly aiming at improving tourism experience and quality.

Economical characteristics

An economic paradox characterises Resort cities as on the one hand tourists are looking for high-value property and on the other hand local resident are working on low-value/paid jobs.

Spatial characteristics

Resort cities have a flexible infrastructure and develop in a coherent spatial design development scheme (tourism / local urban fabric).

Description per sector

Presented here is a synthesis of the main characteristics of the city typology related to three key sectors: the energy sector, the mobility and the buildings & infrastructure sectors.

Energy

In the vast majority of cases, energy requirements of Resort cities (e.g. tourism resort destinations) are met by importing energy from outside the destination in the form of fossil fuels such as oil and natural gas. Moreover, energy use is normally disproportionately greater than what is typically associated with other similar cities because of energy-intensive technologies that deliver tourist amenities. Tourism destinations rely on considerable amounts of energy for importing food and other material goods and the operation of accommodation facilities. But the biggest portion of tourism energy is associated with travel (e.g. aircrafts, cruise ships). Nevertheless, even though travel (by air and sea) will remain a challenge in terms of fossil fuel usage,

Resort cities can embrace many green energy opportunities. Renewable energy sources potential (solar and wind) is usually high and numerous energy-efficiency measures in all tourist accommodation buildings are possible (LED lighting in streetlights, optimized HVAC system, solar thermal for DHW). Benidorm city, for instance, has reduced energy consumption by more than 75% with 'LED' technology in public lighting and has converted a photovoltaic pumping station to achieve energy savings and reduction in CO_2 emissions.

Mobility

The surroundings of the tourist areas in a Resort city must be walkable and cyclable in order to increase the availability of public spaces and the quality of life in those highly exposed areas and to generate bustling areas with art galleries, events, artisan shops, coffee shops, restaurants and creative industries that help restore the city economy and tourist appeal. Public spaces in Resort cities can be used to improve works of art and event locations in the open air. In addition to attracting tourists, better accessibility by public transport also generates improved mobility for employees, residents and suppliers. To avoid passenger cars in the city, Park&Ride facilities can be proposed with advantageous rates in the peri-urban environment. Mobility offers for tourists can be combined with e.g. museum tickets. Bicycles options for tourists and citizens must be safe and comfortable.

Mobility & Building infrastructure

Tourist buildings and sites in Resort cities must be easily accessible and capable of handling large flows of people visiting the city's attractions or events such as festivals and traveling from international transport hubs such as airports, international bus or train stations. Parking spaces for coaches should be distributed throughout the city.

Good sized and adaptive solutions for mass transit and a well-considered parking policy are essential in Resort cities. Shared mobility can also help to increase the transport offer without requiring a major investment. Public transportation must be easy to understand, and rates must be uniform, even if several operators implement them. In the case of ski resorts, cable cars can be integrated into public transport and made available for all users (not only for the ski populations). Safe and comfortable bicycle parking facilities and cycle paths all over the city are key.

The city in a picture...

② Seasonal presence of tourists, residents and work activities

④ Limited services for inclusivity

⑤ Low cultural identity and pro-active citizenship

⑥ Declining population and economy

⑦ Natural and cultural patrimonium under pressure and increasing stress

③ Green "must-run" buildings and infrastructures

❽ Multiple close by congested infrastructure

❶ Efficient and innovative services to tourist and citizen.

KEY CHARACTERISTICS

Derived from the SWOT analysis, and showing the main weaknesses and threats of the city typology

SOLUTIONS & OPPORTUNITIES

- Urban
- Energy
- Mobility
- Building & Infrastructures

360 CITY SCAN

Key perspectives that are linked with the key characteristics and the related solutions and opportunities

1 Efficient and innovative services to tourist and citizen.

- Facility Management, including restaurant
- Smart buildings
- Digital apps for information and management (e.g. Passenger information system)
- Integrated urban design & planning
- Sport & leisure facilities
- Parks
- Pedestrian accessibility

ATTRACTIVE CITY
- Green
- Vibrant public space
- Health and environment

2 Seasonal presence of tourists, residents and work activities

- Smart Space allocation and de-sign
- Efficient / seasonal services to tourists
- Temporary use outside of high season
- Flexibility and resilient spaces

CIRCULAR CITY
- Energy
- Water

PRODUCTIVE CITY
- Diverse economy
- New economies

3 Green "must-run" buildings and infra-structures

- Local production of energy
- Energy & water efficiency in buildings
- Waste water collection & water efficiency
- Green services
- Energy Storage (batteries)

CONNECTED CITY
- Transportation

CIRCULAR CITY
- Energy

4 Limited services for inclusivity

- Infrastructure (public transport) or road/highways to join key cities in the neighbourhood

INCLUSIVE CITY
- Education
- Health

5 Low cultural identity and pro-active citizen activism

- Collaboration between stakeholders
- Regulating the construction of new buildings
- Opening up vacant sites
- Temporary use

CONNECTED CITY
- Partnerships

CIRCULAR CITY
- Land

6 Declining population and economy

- Investments in public spaces
- Broaden the market
- Spin off companies

INCLUSIVE CITY
- Citizen engagement

ATTRACTIVE CITY
- Vibrant public space

7 Natural and cultural patrimonium under pressure and increase stress

- Investments in natural conservation
- Investments in cultural conservation
- Investments in slow tourism

ATTRACTIVE CITY
- Green
- Healthy environment

RESILIENT CITY
- Green economy

8 Multiple close by congested infrastructure

- Green & smart mobility
- Micro mobility
- MaaS
- Mobility plans to optimise modal share
- Investments in sustainable transport and services

CONNECTED CITY
- Transportation

Cultural
City

Cultural cities put the promotion of culture and creativity at the core of their development. They are characterised by a strong focus on delivering cultural, social and economic benefits to the local community while strengthening the civic identity, the attraction of talent, job creation and enhance innovation and competitiveness.

Examples

The following 9 Cultural cities are presented as representative examples of the category, without being exhaustive and without covering all the possible range and types of Cultural cities worldwide.

Tel Aviv [IL]

Shenzhen [CHN]

Copenhagen [DK]

Buenos Aires [AR]

Cape Town [ZA]

Melbourne [AU]

New Orleans [US]

Cork [IE]

Venice [IT]

Other cities within this category are: Paris, Munich, Prague, Milan, Brussel, Lisbon, Stockholm, Dublin, Edinburgh, Utrecht, Florence, Linz, Heidelberg, Pilsen, Austin, Montreal, Toronto, New York, Los Angeles, Rio de Janeiro, Instanbul, Dubai, Singapore, Shanghai, Seoul, Taipei, Tokyo, Hong Kong and Sydney

Economic category

Cultural cities are normally situated in the developed economies. A developed economy is defined as an advanced economy (GDP, GNP, the per-capita income, level of industrialisation, amount of infrastructure and general standard of living) with the service sector provides more wealth than the industrial sector.

Developing economies	Economies in transition	Developed economies
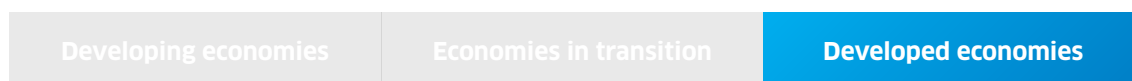
Fragile states index

Cultural cities are normally situated in the range of 'sustainable' fragile state index. The index's ranks are based on twelve indicators of state vulnerability, grouped by category: Cohesion, Economic, Political and Social. Considered together in the index, the indicators are a way of assessing a state's vulnerability to collapse or conflict.

Alert	Warning	Stable	Sustainable
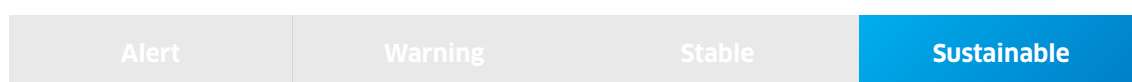
City size   Legenda   XS | < 0.5m   S | 0.5-1m   M | 1-5m   L | 5-10m   XL | >10million people

Cultural cities vary in population size, ranging from less than 500.000 citizens up to 5 million people. The most of Cultural cities stay in the middle of this extreme.

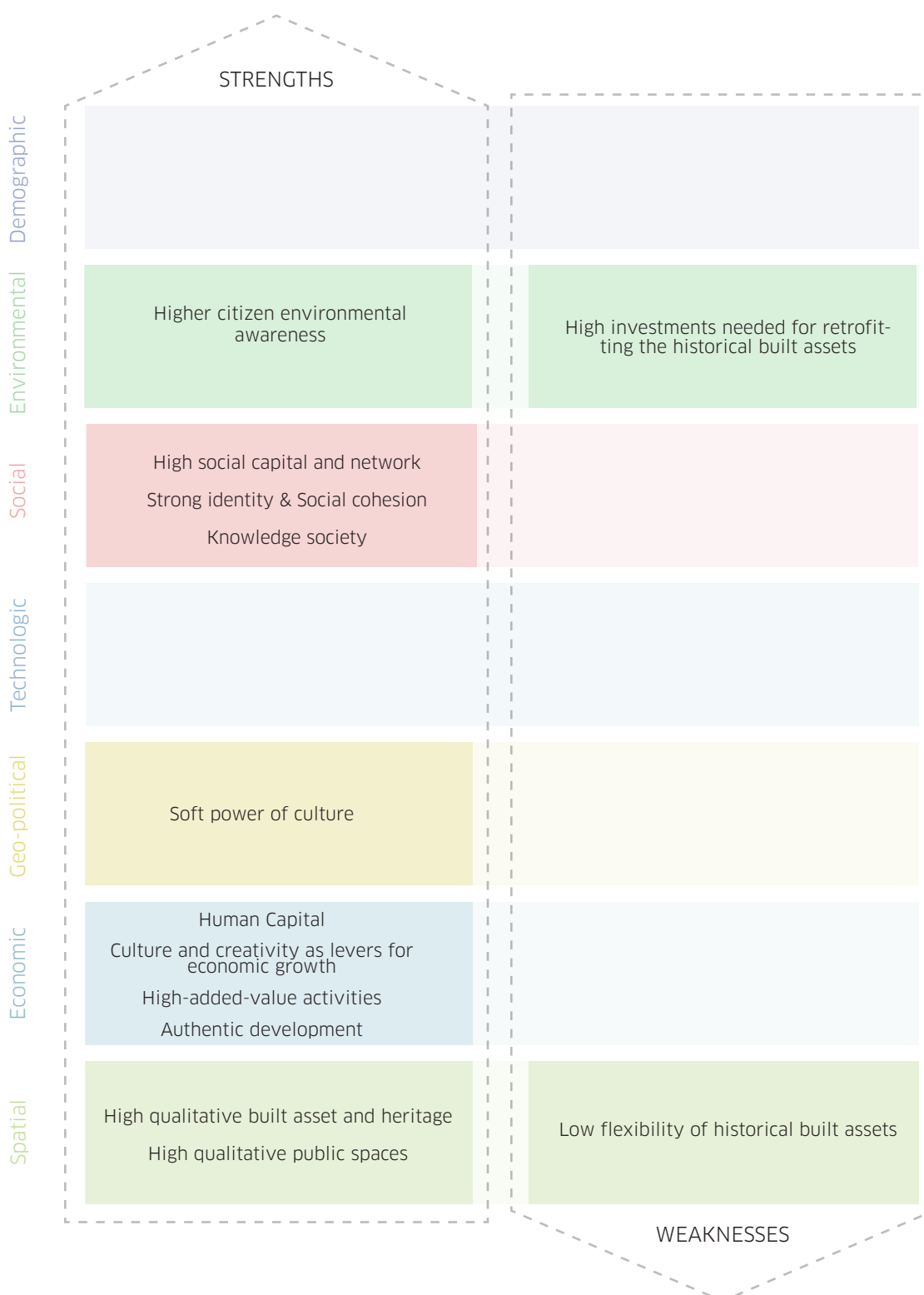| XS	S	M	L	XL

Morphology

Cultural cities vary in terms of morphologies, being mostly compact cities with a development pathway towards polycentric cities or/and with a diffuse morphology characterising the more recent urban growth outside the original core.

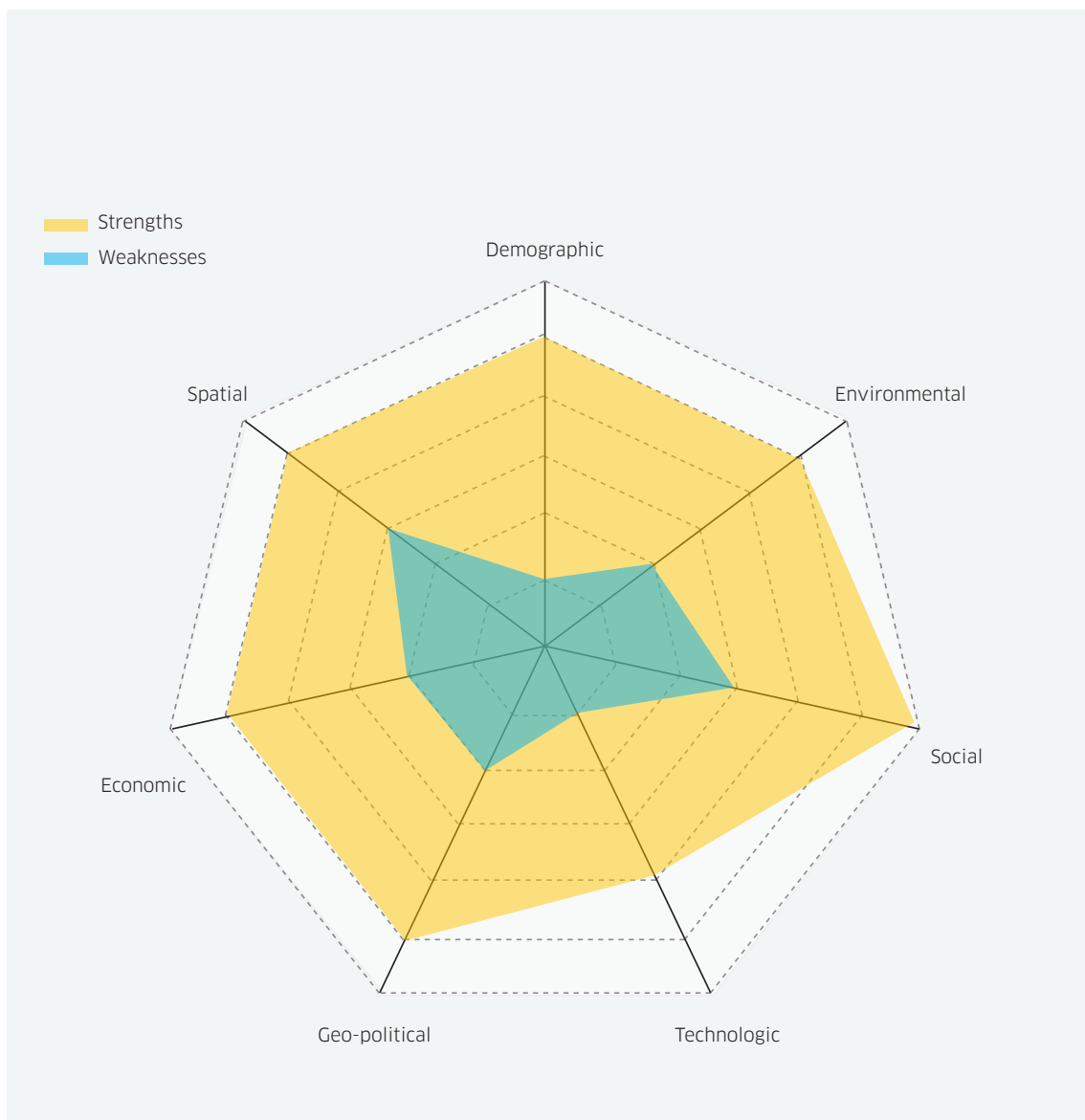| Compact	Sprawl	Diffuse	Polycentric	Mega

Strengths & weaknesses

This table gives an overview of the main intrinsic characteristics of the city typology. These are here referred to as weaknesses or strengths and divided by the themes defined in the Part I of this research document.

STRENGTHS

	Demographic	
Environmental	Higher citizen environmental awareness	High investments needed for retrofitting the historical built assets
Social	High social capital and network Strong identity & Social cohesion Knowledge society	
Technologic		
Geo-political	Soft power of culture	
Economic	Human Capital Culture and creativity as levers for economic growth High-added-value activities Authentic development	
Spatial	High qualitative built asset and heritage High qualitative public spaces	Low flexibility of historical built assets

WEAKNESSES

The main strengths of Cultural cities are related to the high quality of the built assets and heritage that also represents an economical source of wealth and a soft political power. Thanks to the high human-capital, Cultural cities have lots of high-added-value activities with creative and cultural sectors as main levers for economic growth. They are normally characterised by strong identity and social cohesion and environmental awareness. Their main weaknesses are related to the low flexibility of the built assets, both in terms of hosting new activities or related to the transition towards high energy performances of buildings and infrastructures.

Opportunities & threats

This table gives an overview of the main extrinsic characteristics of the city typology. These are here referred as opportunities and threats and divided by the themes defined in the Part I of this research document.

OPPORTUNITIES

	OPPORTUNITIES	THREATS
Demographic	Migration & Immigration	
Environmental	Openness to circular economy & zero-carbon actions Ethical consumption	Climate change
Social	Increasing demand of participation Social capital & entrepreneurship Emerging middle class	Increasing demand of participation Massive tourism vs Local life
Technologic	High level of maturity and acceptance of technologies	
Geo-political	Autonomy Bottom-up participation	De-nationalization Bottom-up participation
Economic	Sharing economy	Growing competition in cultural sectors
Spatial	New ownership models (private-public)	Gentrification Privatization Spatial specialization

THREATS

For Cultural cities, opportunities are stronger than threats. The main opportunities are related to demographic and social trends, as the growing population, due to international and/or internal migration flows, the emerging middle class and the high-social capital and activisms of citizens (both in terms of economical entrepreneurship and social/political engagement). Cultural cities are normally up-front regarding new economic models (sharing, ethical economies) and technologies acceptance.
The main threats relates to environmental issues (climate change) and the increasing tension between massive tourism and local life and economies. The growing competition in the cultural sector and the spatial trends of gentrification and specialisation are also potential threats.
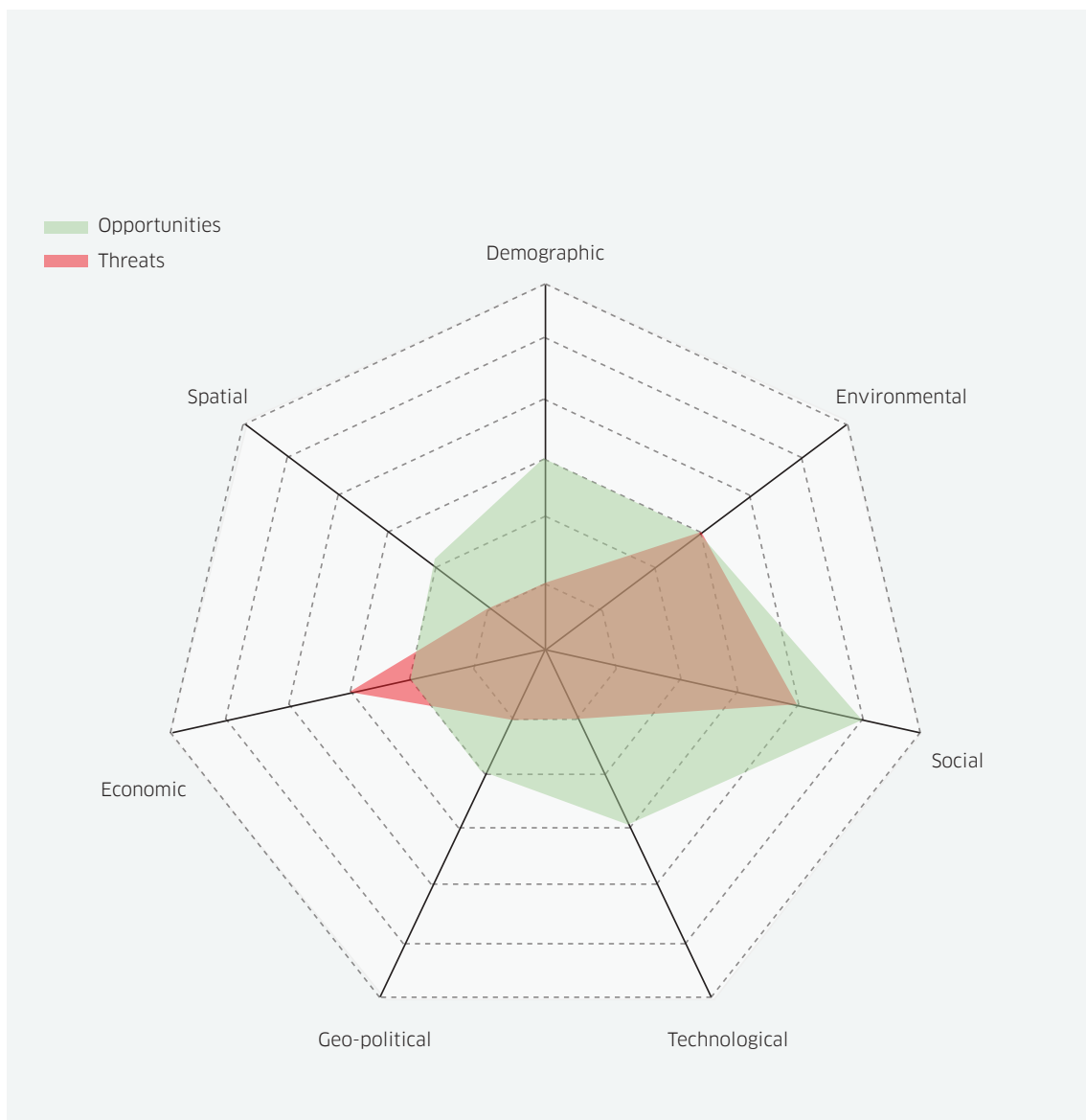
Description per theme

Presented here is a synthesis of the main characteristics of the city typology derived from the previously presented SWOT analysis.

Demographic
Environmental
Social
Technologic
Geo-political
Economic
Spatial

Demographic characteristics

In Cultural cities, hosting generally well-educated and multicultural citizens, the quality of life is high. A growing population due to (international) migration is one of Cultural cities' biggest demographic challenges and opportunities; large, sometimes historical, demographic diversity can lead to tensions and pressure on the labour market as well as to economic boost.

Environmental characteristics

Cultural cities are equipped to face environmental challenges given the high environmental awareness of their citizens. Important challenges are related to climate change adaptability related to their heritage (natural or cultural)

Geo-political characteristics

Cultural cities are becoming more autonomous, -less dependent from the national state -and growing bottom-up participation makes the realisation of large projects more difficult.

Social characteristics

Cultural cities are characterised by an increasing demand of citizen participation, a high social capital and a strong identity, but mass tourism can clash with the local life and social cohesion.

Technologic characteristics

Cultural cities are an ideal environment for showcasing (new) technologies as they are fully ready to include and accept new and advanced technologies, e.g. in the field of adaptive transportation.

Economical characteristics

The presence of social capital in Cultural cities enables the great potential of the sharing economy to thrive, in alignment with their cultural identities.

Spatial characteristics

Cultural cities face an increasing form of gentrification, and are characterised by generally low-energy performing built-assets and a low flexibility of historical built assets to be re-used with new functions or purposes.

Description per sector

Presented here is a synthesis of the main characteristics of the city typology related to three key sectors: the energy sector, the mobility and the buildings & infrastructure sectors.

Energy

Due to the inherent places of interest, Cultural cities have relatively efficient technical infrastructure in terms of electrical power grids, heating and cooling grids, mobility, public lighting, buildings and waste and water management. However, their crucial connection to the outside world makes them fossil-fuel energy intensive - mainly for transportation (aviation, passenger vehicles, road freight) and electricity dependent for heating and cooling in buildings. At the same time, Cultural cities can capitalise on the advantage of their worldwide attractiveness. They have a great opportunity to engage in the energy transition and make it a new 'cultural' competitive advantage. Their size and their developed economy represent an excellent place for selecting the optimal clean energy mix and implementing energy efficiency measures (i.e. ambitious energy performance standards for new buildings) and state-of-art flexible energy systems (i.e. collective heating and cooling). Copenhagen, for instance, is determined to become the world's first carbon-neutral capital by year 2025

Mobility

In a more than ever globalised world, more and more cities compete for the opportunities of artistic and cultural events to attract tourists and business events. Cultural cities' mobility policies are different depending on the localisation of the cultural attractions: scattered throughout the city or concentrated in one or several "cultural art districts" (which can be situated in the city centre or in peri-urban areas). Cultural districts are often located in historic locations with narrow streets and are therefore ideally walkable. This walkability generates vibrant areas with art galleries, events, craft shops, coffee shops, restaurants and creative industries that help regenerate the city economy and the touristic appeal. To prevent tourists entering Cultural cities with their cars, Park & Ride facilities with advantageous rates can be provided in the peri-urban area. Cultural cities lend themselves perfectly to offering mobility solutions for visitors combined with museum cards. The (use of the) public transport system must be easily accessible and understandable, and public transport rates must be unified even if several operators run it. In case that Cultural cities offer (shared) bicycles to their citizens and tourists, it is important that this service is safe and comfortable.

Mobility & Building infrastructure

Accessibility to cultural premises, districts, major projects and events (e.g. festivals, sport or art events) in Cultural cities is a key factor: access must be easy, and the accessibility must be aimed at accommodating large flows of people via large international transport hubs like airports, international bus or train stations. Parking places for touristic coaches must be spread across the city. Well-sized and adaptive mass transit solutions and a well-considered parking policy are essential. Shared mobility solutions can also help to increase the transportation offer without requiring a major investment. Secure and comfortable bike parking and bike lanes must be created all around the city.

Cultural cities are generally well maintained and the inhabitants are proud to live there. These cities are characterized by prestigious buildings that are progressive in terms of architecture, energy performance, sustainability... Architecture has the highest priority. The buildings are often large (large volume, related to floor space) and have a high energy demand, but are also highly variable in shape, function, occupation... In Cultural cities, buildings are specifically designed for their purpose, and therefore more difficult to adapt in/to the future. Earlier architectural choices can also have a limiting effect on future adjustments. Reducing energy demand in Cultural cities requires a building-specific approach. However, Cultural cities are in any case difficult to decarbonize.

The city in a picture...

① Authentic development with high-added value activities

③ Gentrification

④ Increasing demand for bottom-up participation

⑤ Sharing, Circular and Green economy initiatives

⑨ Migration Immigration and population growth

② High quality of built assets, heritage and public spaces

⑧ Resource scarcity

⑦ Ideal showcase environment for innovative practices and technologies

⑥ Low-energy performances & low flexibility of (historical) built asset

KEY CHARACTERISTICS

Derived from the SWOT analysis, and showing the main weaknesses and threats of the city typology

SOLUTIONS & OPPORTUNITIES

- ● Urban
- ● Energy
- ● Mobility
- ● Building & Infrastructures

360 CITY SCAN

Key perspectives that are linked with the key characteristics and the related solutions and opportunities

1 Authentic development with high-added value activities

- • Improving city performances
- • Stimulate excellences
- • Increase global and local connectivity

ATTRACTIVE CITY
- • Culture and heritage

PRODUCTIVE CITY
- • Dynamic economies
- • Diverse economies

2 High quality of built assets, heritage and public spaces

- • Building and Heritage assets management
- • Integrated urban design

ATTRACTIVE CITY
- • Healthy environment
- • Vibrant public space

3 Gentrification

- • Urban (re) development
- • Eco-Districts and Social housing

INCLUSIVE CITY

4 Increasing demand for bottom-up participation

- • City governance (boosting local economies and activities, new collective decision processes, co-creation digital platforms,..)
- • Social innovations platforms

PRODUCTIVE CITY
- • Green economy

5 Sharing, Circular and Green economy initiatives

- • Energy transition initiatives (energy communities,..)
- • Community involvement (energy saving apps)
- • Focus on (car) sharing initiatives
- • Social innovations platforms

PRODUCTIVE CITY
- • Local economy

RESILIENT CITY
- • Green economy

6 Low-energy performances & low flexibility of (historical) built asset

- • Buildings & Infrastructures Retrofit
- • BIM
- • Improving city performances (facility management, maintenance and operation,..)
- • New technologies for heritage buildings and sites

RESILIENT CITY
- • Protective ecosystems

7 Ideal showcase environment for innovative practices and technologies

- • Improving city performances (governance, services, start-up, raise funds, boost innovative sectors..)
- • Maximizing city data value

PRODUCTIVE CITY
- • New economies

8 Resource scarcity

- • Resource management
- • Improving city performances (productive circular economies, connections with local productive economies, reduce externalities,..)

RESILIENT CITY
- • Protective ecosystems

PRODUCTIVE CITY
- • Dynamic economy
- • Divers economy

9 Migration/Immigration and population growth

- • Integrated Urban planning
- • Urban developments (Eco-districts, Social housing,...)

INCLUSIVE CITY

Administrative City

Administrative cities host a large number of national and international governing entities as government institutions, embassies and NGOs. They represent political and decision-making centers of power that could range from regional to national and supranational level. Administrative cities serve complex symbolic and identity functions, translating the vast structure beyond nation-state (or supranational institutions) into a tangible community-scale artefact.

Examples

The following 9 Administrative cities are representative examples of the category, without being exhaustive and without covering all the possible range and types of Administrative cities worldwide.

Den Haag [NL]

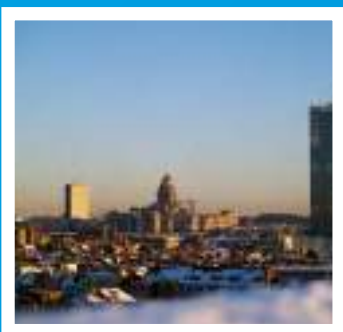Canberra [AU]

Ottawa [CA]

Brasilia [BR]

Washington D.C. [US]

Strasbourg [FR]

Brussels [BE]

Putrajaya [MY]

Astana [KZ]

Other cities within this category are: Rome, London, Berlin, Tokyo, Brasilia, Canberra, Ankara, Belmopan, Gaborone and Naypyidaw

Economic category

Administrative cities are present in all countries worldwide, from developing economies to economies in transition and developed economies.

Developing economies	Economies in transition	Developed economies

Fragile states index

Administrative cities cover the entire spectrum of the UN fragile state index. The index is based on twelve indicators of vulnerability, grouped by category: Cohesion, Economic, Political and Social. Considered together, the indicators are a way of assessing a state's vulnerability to collapse or conflict.

Alert	Warning	Stable	Sustainable

City size   Legenda   XS | < 0.5m   S | 0.5-1m   M | 1-5m   L | 5-10m   XL | >10million people

Administrative cities vary in population size, ranging from less than 500.000 citizens up to 5 million people. The most of the Administrative cities stay in the middle of this extreme.

XS	S	M	L	XL

Morphology

Administrative cities vary in terms of morphologies, being mostly compact cities with a development pathway towards polycentric cities or/and with a diffuse morphology characterising the more recent urban growth outside the original core. A group of them are clearly marked by the modern planning movement resulting in highly planned cities.

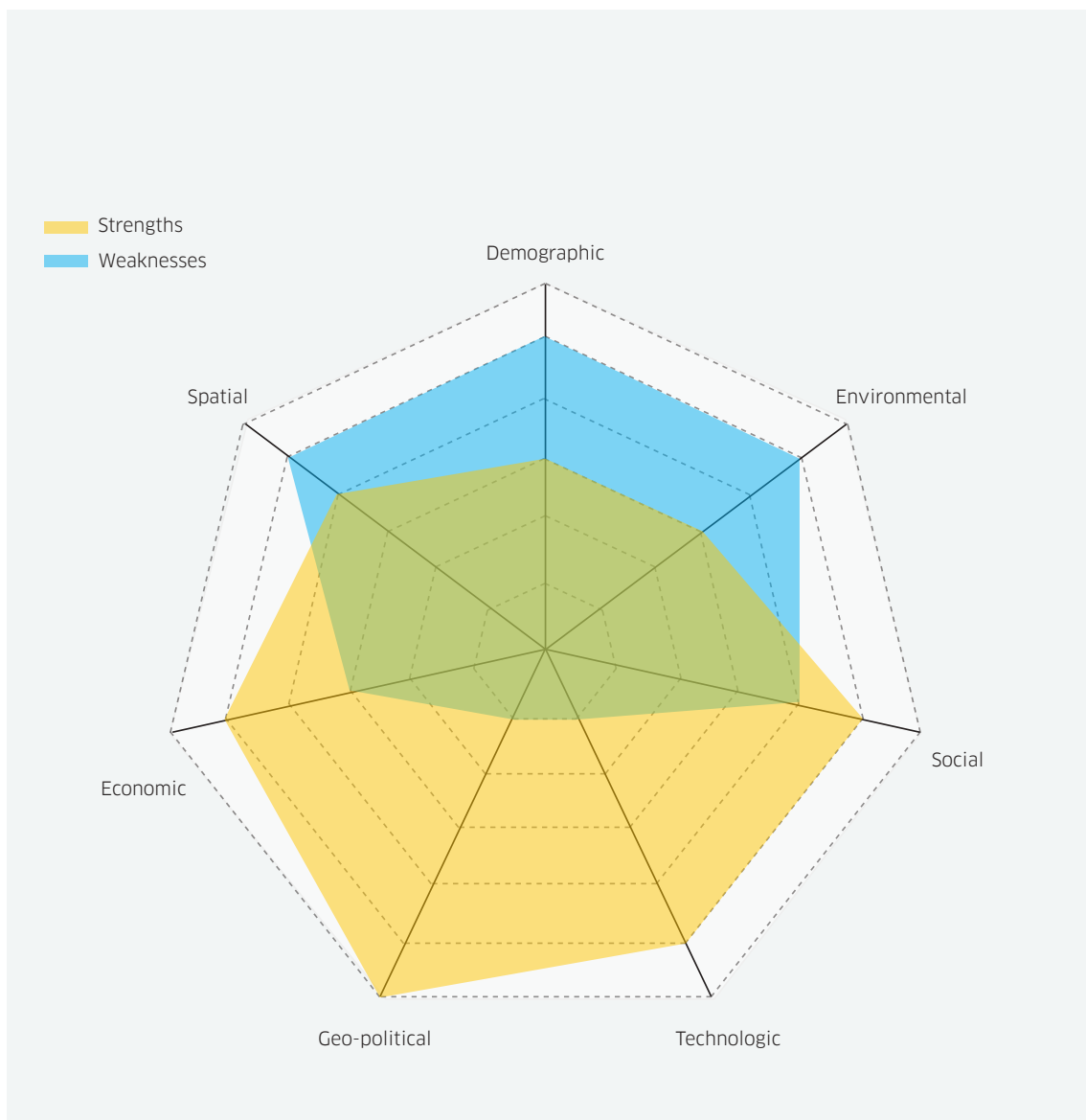| Compact	Sprawl	Diffuse	Polycentric	Mega

Strengths & weaknesses

This table gives an overview of the main intrinsic characteristics of the city typology. These are here referred to as weaknesses or strengths and divided by the themes defined in the Part I of this research document.

STRENGTHS

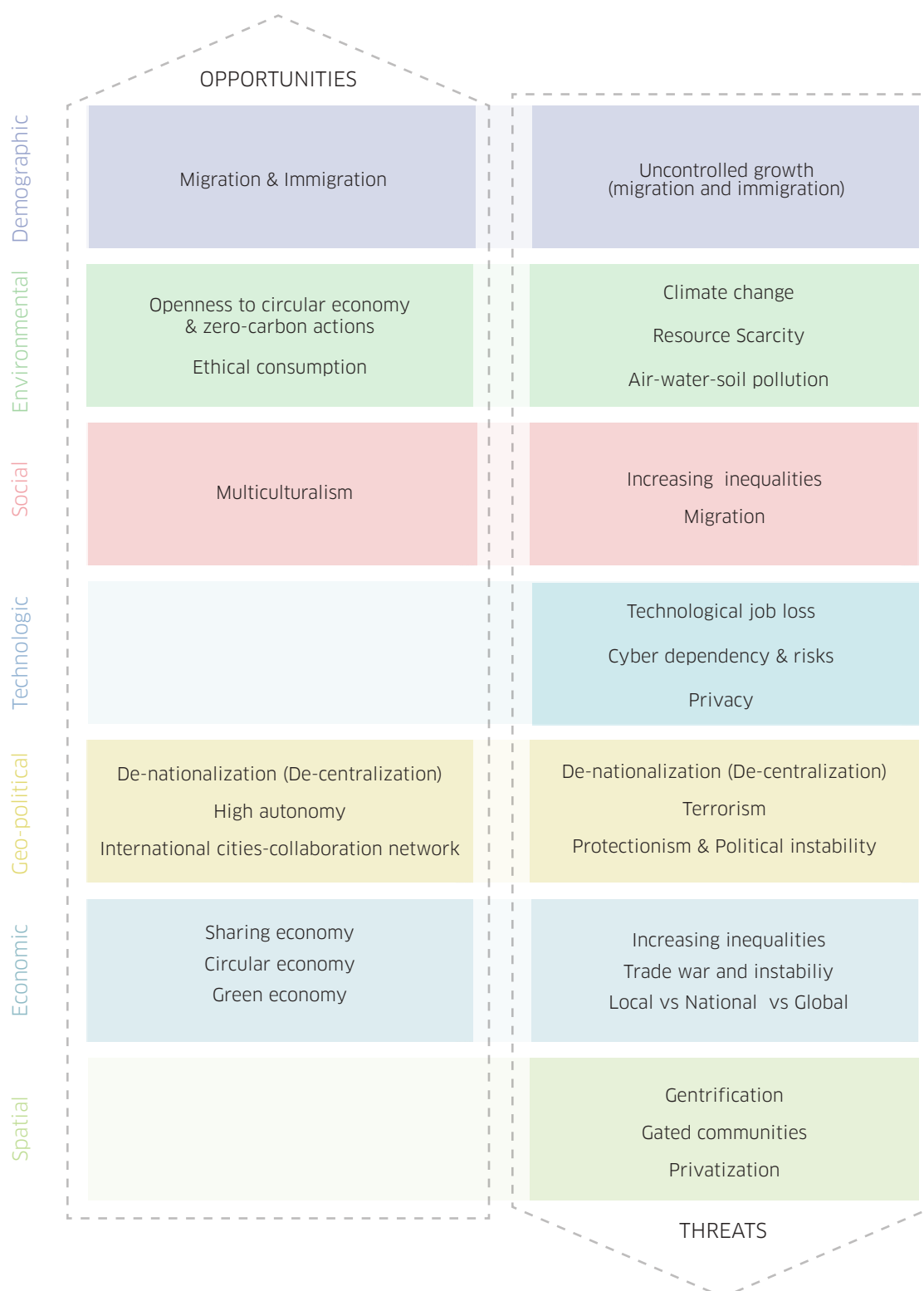|	STRENGTHS	WEAKNESSES
Demographic		
Environmental	Higher citizen environmental awareness	Resource Scarcity Air-water-soil pollution
Social	High social capital and network Strong identity & Social cohesion	
Technologic	High level of maturity and acceptance of technologies Information city	
Geo-political	Power and decision makings center Symbolic character High level of political autonomy	Symbolic character
Economic	Strong base of public sector employers Network of business development and support structures	Local economy
Spatial	High qualitative built asset and heritage High qualitative public spaces Symbolic character	Mobility issues Inefficient space-use

WEAKNESSES

Administrative cities' main strengths are mainly related to their political, economic and technological dimensions. As centres of power and economic activity, Administrative cities attract highly-educated citizens. They host complex governance structures and are normally well connected with international networks of cities and countries. Administrative cities have a higher level of maturity and acceptance of technologies and a high environmental awareness when compared with other cities of the same country. Their main weaknesses relates to their lack of connection with local economies as they rely mainly on national / supranational economies. They also face important issues related to mobility as they attract consistent numbers of workers/commuters.

Opportunities & threats

This table gives an overview of the main extrinsic characteristics of the city typology. These are here referred as opportunities and threats and divided by the themes defined in the Part I of this research document.

OPPORTUNITIES

	OPPORTUNITIES	THREATS
Demographic	Migration & Immigration	Uncontrolled growth (migration and immigration)
Environmental	Openness to circular economy & zero-carbon actions Ethical consumption	Climate change Resource Scarcity Air-water-soil pollution
Social	Multiculturalism	Increasing inequalities Migration
Technologic		Technological job loss Cyber dependency & risks Privacy
Geo-political	De-nationalization (De-centralization) High autonomy International cities-collaboration network	De-nationalization (De-centralization) Terrorism Protectionism & Political instability
Economic	Sharing economy Circular economy Green economy	Increasing inequalities Trade war and instabiliy Local vs National vs Global
Spatial		Gentrification Gated communities Privatization

THREATS

Administrative cities face increasing numbers of threats. As centers of power and economic activity, administrative cities attract important migration flows that represent, if wrongly managed, a possible problem for the social and political stability and if well managed, important opportunities for economic and cultural growth. The increasing numbers of citizens coupled with the increased demands in terms of mobility poses serious threats to the entire urban ecosystem; resource management and pollution levels (air, soil, water). On the other hand they are characterised by high multicultur-alism and a high-social and capital network. These cities generally also face increasing inequalities with an increasing division and gap between wealthy and privileged citizens and poor and fragile citizens. From a geopolitical point of view, they have important opportunities linked to their degree of autonomy and the de-nationalisation trend, but they remain highly dependent on the global geopolitical situation.
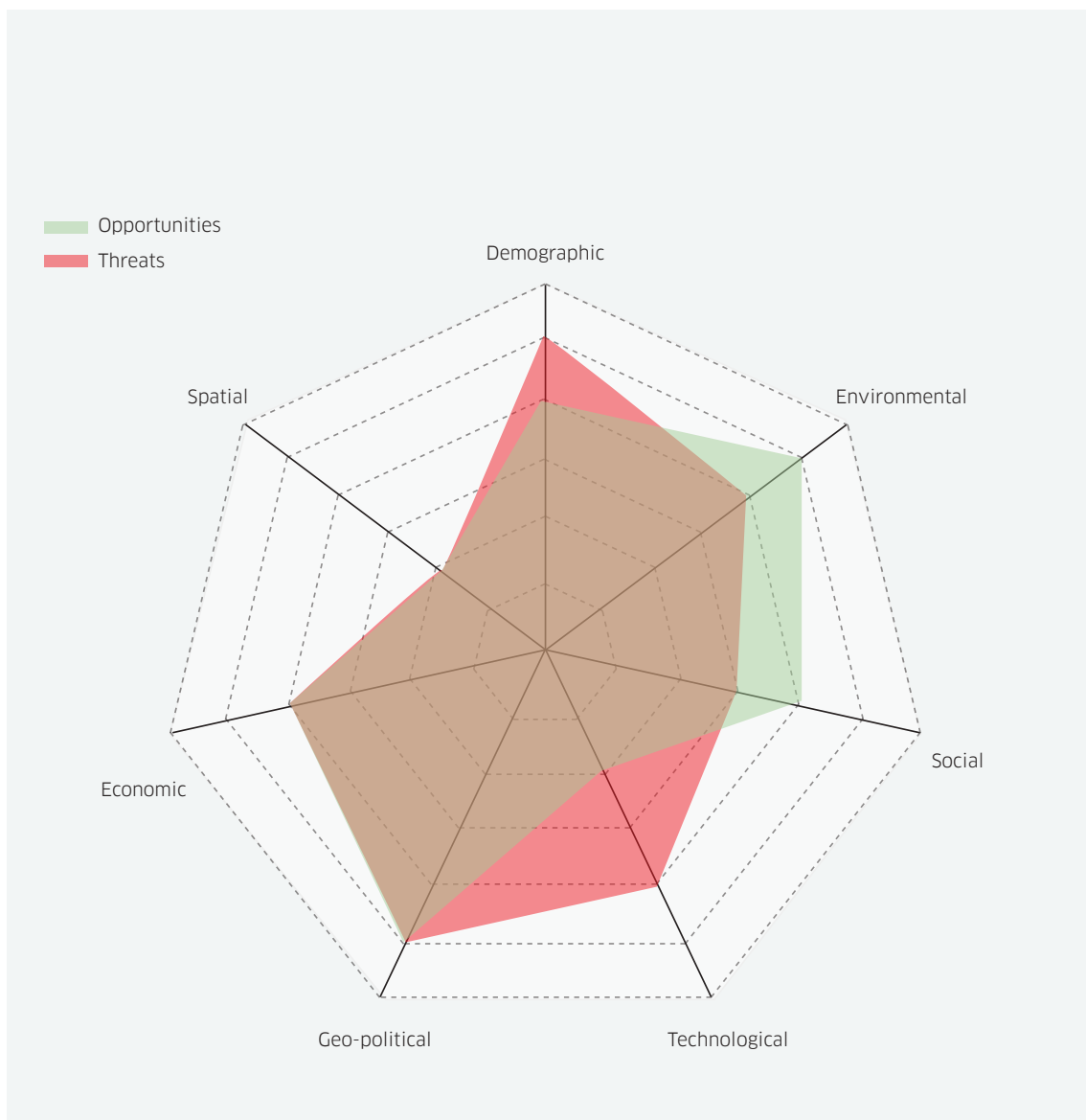
Description per theme

Presented here is a synthesis of the main characteristics of the city typology derived from the previously presented SWOT analysis.

Demographic
Environmental
Social
Technologic
Geo-political
Economic
Spatial

Demographic characteristics
As centres of power and economic activity, Administrative cities attract highly-educated and well-earning citizens but also migration flows that represent, if wrongly managed, a possible problem for the social and political stability and if well managed, important opportunities for economic and cultural growth.

Environmental characteristics
Administrative cities are equipped to face environmental challenges given the high environmental awareness of their citizens and their high economic-technological capital associated with highly-skilled workers. Important challenges are related to climate change adaptability and to solutions regarding environmental pollutions (air primarily) due to mobility issues.

Geo-political characteristics
Administrative cities generally have a complex governance structure, and also have, as power and decision making centers, a prominent symbolic character. They are often susceptible to political instability.

Social characteristics

Administrative cities are characterised by multiculturalism and a high-social and capital network. These cities generally also face increasing inequalities with an increasing division and gap between wealthy and privileged citizens, and poor and fragile citizens.

Technologic characteristics

Due to their technology-dependency, Administrative cities are vulnerable to technology-induced job loss and cyberrisks. The technological safety related to themes such as privacy and big data is especially key for Administrative cities as they are centers of collection and management of citizens data (public sector).

Economical characteristics

Administrative cities offer a good context for sharing, circular and green economy initiatives. Administrative cities sometimes lack connection with local economies as they rely mainly on national / supranational economies.

Spatial characteristics

Administrative cities commonly face the problem of inefficient use of space, illustrated by their abandoned monofunctional districts (outside working hours) and gated communities. They also normally host during the day high number of workers-commuters that requires better management and coordination of increasing mobility demands.

Description per sector

Presented here is a synthesis of the main characteristics of the city typology related to three key sectors: the energy sector, the mobility and the buildings & infrastructure sectors.

Energy

Despite their (often) small size, Administrative cities have a high energy consumption - mainly on the building and transport sector - with a population benefitting from high incomes. Nevertheless, these cities can walk-the-talk on energy transition commitments. Indeed, the highly-educated population has good awareness of fossil-fuel reserve depletions and climate change issues, so capital funds are made largely available for renewable energy investments making these compact cities an ideal place to implement green energy projects. More importantly, Administrative cities have two key roles to play in the energy transition worldwide. Firstly, they can substantially influence the future of the world's energy sector by using their concentrated power authority to take bold sustainable decisions (e.g. phase-out fossil fuel subsidies). Secondly, they can play a pioneer role in the energy transition by defining key energy policy strategies at national and supranational level with tailored financial schemes and proven successful pilot projects.

Mobility

The decision-making characteristics of Administrative cities makes them a destination for senior officials, politicians, ambassadors, and other high representatives. The mobility policy and offer in Administrative cities should consider the high-way of life of this class of population in making public transport or cycling attractive. The mobility policy is different depending on the localisation of the institutions: scattered throughout the city or concentrated in one or several "administrative districts" (whether or not situated in the city center or in the peri-urban area). In any case, opting for sustainable mobility must be inevitable for employees in government institutions as well as for e.g. politicians, who must set an example. Better accessibility by public transport also entails improved mobility for visitors, companies and their suppliers, partners and clients.
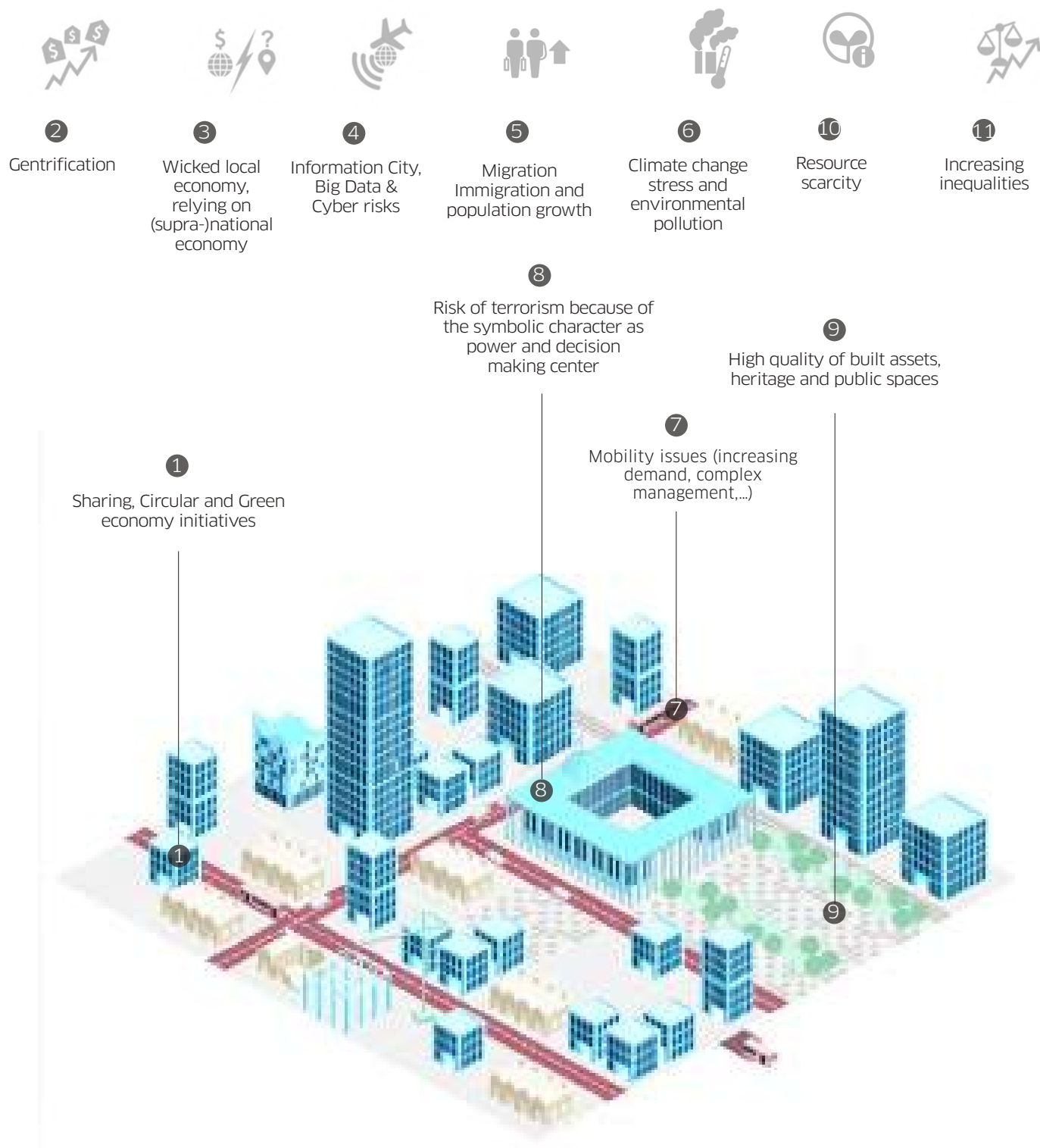
The surroundings of the administrative districts must be walkable and cyclable, in order to increase the availability of public spaces and the quality of life in these highly exposed districts. Images of Administrative cities are also often used when showing images of the entire country or region that will be spread internationally. Administrative cities are also places where international congresses are often organised and the location of the conference centers also determines the development of a coherent plan for urban mobility.

Mobility & Building infrastructure

To be a credible and attractive alternative to individual transport for citizens and visitors, the quality of the offered mobility services in Administrative cities must be very high: suitability of the route coordination, commercial speed, service frequency and comfort. The cost of living in Administrative cities is often high and force employees to commute daily, which means that public transport infrastructure must be of the right size to be competitive with the individual car. E-bikes are also causing an increase in cyclists among the richest populations, making it essential to provide comfortable cycle paths and safe and spacious bicycle parking facilities to support this positive trend.

Administrative cities are characterized by high office buildings, which often have a "curtain wall", are efficient and are technically well equipped. Most of these buildings are only used during office hours and have a large cooling demand - the energy requirements of these cities decrease at night. An administrative city wants buildings that are an example for other buildings in terms of architecture, energy performance, sustainability - in other words, setting an example is a priority. Measures that make the city low in carbon - often with an impact on building physics - will be easily taken in Administrative cities, even those with higher investment costs. Although, the practical implementation of these measures is not that easy due to the limited space: small roof areas, limited ground areas, dense buildings.

The city in a picture...

2 Gentrification

3 Wicked local economy, relying on (supra-)national economy

4 Information City, Big Data & Cyber risks

5 Migration Immigration and population growth

6 Climate change stress and environmental pollution

10 Resource scarcity

11 Increasing inequalities

8 Risk of terrorism because of the symbolic character as power and decision making center

9 High quality of built assets, heritage and public spaces

7 Mobility issues (increasing demand, complex management,...)

1 Sharing, Circular and Green economy initiatives

KEY CHARACTERISTICS

Derived from the SWOT analysis, and showing the main weaknesses and threats of the city typology

SOLUTIONS & OPPORTUNITIES

- ● Urban
- ● Energy
- ● Mobility
- ● Building & Infrastructures

360 CITY SCAN

Key perspectives that are linked with the key characteristics and the related solutions and opportunities

---

1 Sharing, Circular and Green economy initiatives

- Energy transition initiatives
- Community involvement
- (energy saving apps)
- Focus on (car) sharing initiatives

PRODUCTIVE CITY
- Local economies

RESILIENT CITY
- Green economy

---

2 Gentrification

- Urban (re) development
- Eco-Districts and Social housing

INCLUSIVE CITY

---

3 Wick local economy, relying on (supra-) national economy

- Improving city performances (governance, services, start-up, raise funds,..)

PRODUCTIVE CITY
- Dynamic economy
- Divers economy
- Local economy

---

4 Information City, Big Data & Cyber risks

- Improving city performance (government services, maximizing city data value, cybersecurity, IT infra security, data centers, crisis management tools)

PRODUCTIVE CITY
- Local economy

---

5 Migration/Immigration and population growth

- Integrated Urban planning
- Urban developments (Eco-districts, Social housing,...)

INCLUSIVE CITY

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6 Climate change stress and environmental pollution

- Energy Transition initiatives
- Zero-Carbon solutions
- Green mobility
- Climate adaptation integrated planning and urban design
- Decontamination projects (air, soil, water remediation)
- Integrated risk management

PRODUCTIVE CITY
- Local economy

ATTRACTIVE CITY
- Healthy environment

---

7 Mobility issues (increasing demand, complex management,...)

- Integrated urban planning
- Mobility management Infrastructure interventions

CONNECTED CITY
- Transportation

---

8 Risk of terrorism because of the symbolic character as power and decision making center

- Improving city performance (risk management plans, maximizing city data value, cybersecurity, IT infra security, data centers, crisis management tools)

RESILIENT CITY
- Safety city

---

9 High quality of built assets, heritage and public spaces

- Resource management
- Improving city performances (productive circular economies, connections with local productive economies, reduce externalities,..)

ATTRACTIVE CITY
- Healthy environment
- Vibrant public space

---

10 Resource scarcity

- Steering collaboration with closer towns/cities and territories

PRODUCTIVE CITY
- Local economy
- Resilient economy

---

11 Increasing inequalities

- Social housing
- City governance (boosting welfare efficiency and impact, encourage social impact business, ONG, voluntaries organizations,..)

PRODUCTIVE CITY
- Healthy environment
- Productive local economy

Mega
City

A mega city is usually defined as a metropolitan area with a total population of more than 10 million. It is often made of two or more metropolitan areas that due to their urban growth without boundaries tend to converge, connect and merge. Mega cities are considered exemplary of the uncontrolled and massive urbanisation that is characterising the 21st century. They are the places where most of the urgent issues coming from the global crisis become tangible: environmental problems and climate change vulnerability, increasing inequalities and spatial injustice.

Examples

The following 9 Mega cities are presented as representative examples of the category, without being exhaustive and without covering all the possible range and types of mega-cities worldwide.

Mexico City [MX]

Lagos [NG]

Kinshasa [CD]

Jakarta [ID]

Delhi [IN]

Caracas [VE]

Manila [PH]

Dar es Salaam [TZ]

Mumbai [IN]

Other cities within this category are: Sao-Paulo, Rocinha, Karachi, Indaba, Tuscan and Bogota.

Economic category

Mega cities are normally located in countries defined as 'economies in transition'. An economy in transition is defined as one that is changing from a centrally planned economy to a market economy. Transition economies undergo a set of structural trans-formations intended to develop market-based institutions.

Developing economies	Economies in transition	Developed economies

Fragile states index

Mega cities are normally situated in the range of 'warning' fragile state index, neverthe-less some of them fit within other categories. The index is based on twelve indicators of vulnerability, grouped by category: Cohesion, Economic, Political and Social. Considered together they assess a state's vulnerability to collapse or conflict.

Alert	Warning	Stable	Sustainable

City size   Legenda XS | < 0.5m   S | 0.5-1m   M | 1-5m   L | 5-10m   XL | >10million people

Mega cities are huge in population size, with more than 10 million people.

XS	S	M	L	XL

Morphology

Mega cities fit within the morphological category of 'mega' city. This term defines a huge urban structure hosting a diverse set of morphologies with high degree of complexity, low level of readability and high densities.

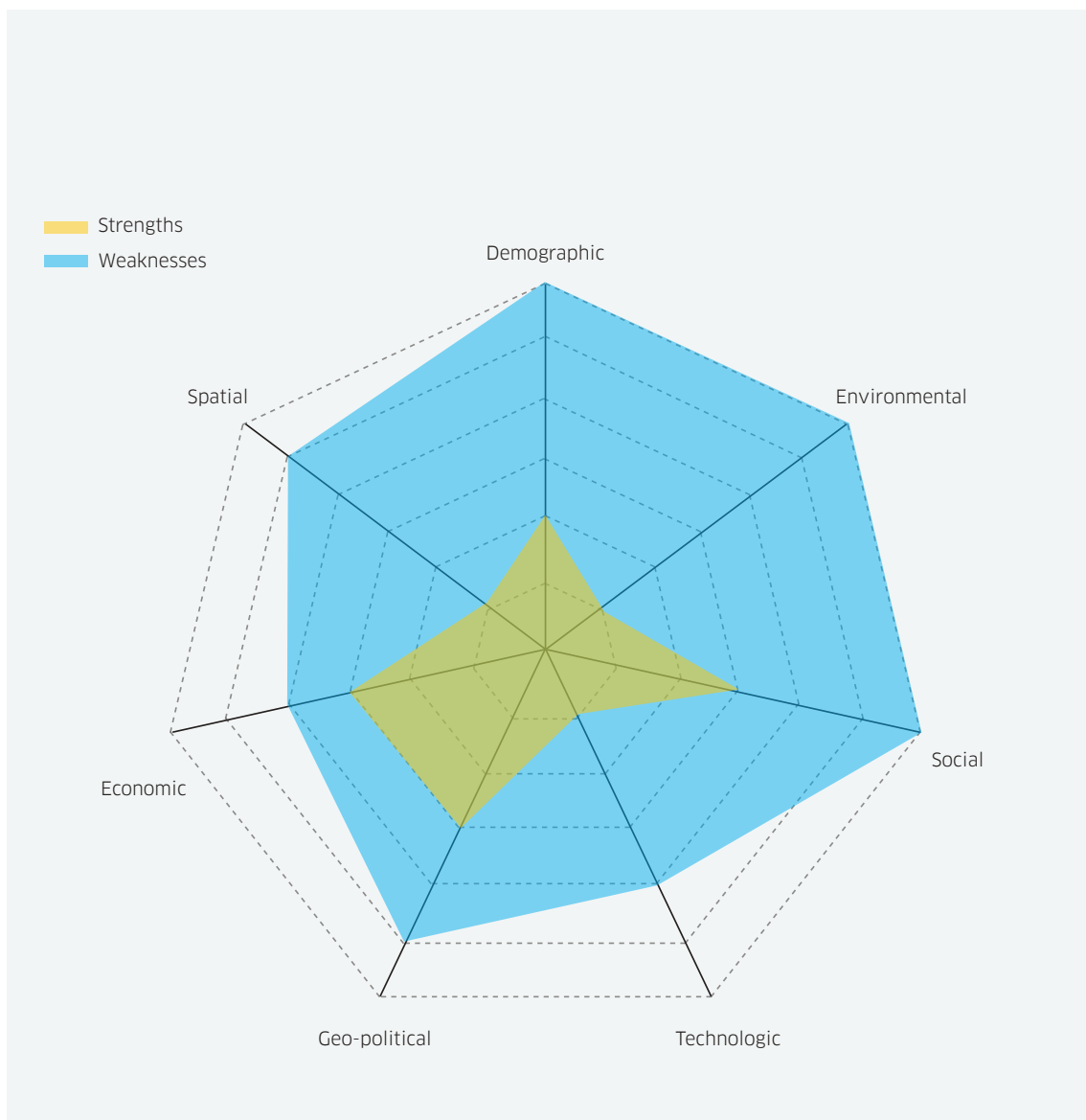| Compact	Sprawl	Diffuse	Polycentric	Mega

Strengths & weaknesses

This table gives an overview of the main intrinsic characteristics of the city typology. These are here referred to as weaknesses or strengths and divided by the themes defined in the Part I of this research document.

STRENGTHS

	STRENGTHS	WEAKNESSES
Demographic		Uncontrolled growth (migration and immigration) Health problems & life expectancy
Environmental		Air-water-soil pollution Resource scarcity
Social	Community based society Dynamic society	Extreme poverty Basic infrastructures deficit
Technologic		Low level of maturity Exclusion due to high direct costs Lack of know how
Geo-political	Global power shift	High complexity Political instability
Economic	Growing economy Fast-learning environment	Lack of infrastructures Exclusion processes (non-affordability) Unemployment
Spatial		Mobility issues Uncontrolled & informal urbanization

WEAKNESSES

Mega cities main strengths are related to their social structure based on coherent communities and the economical prospect of growth.
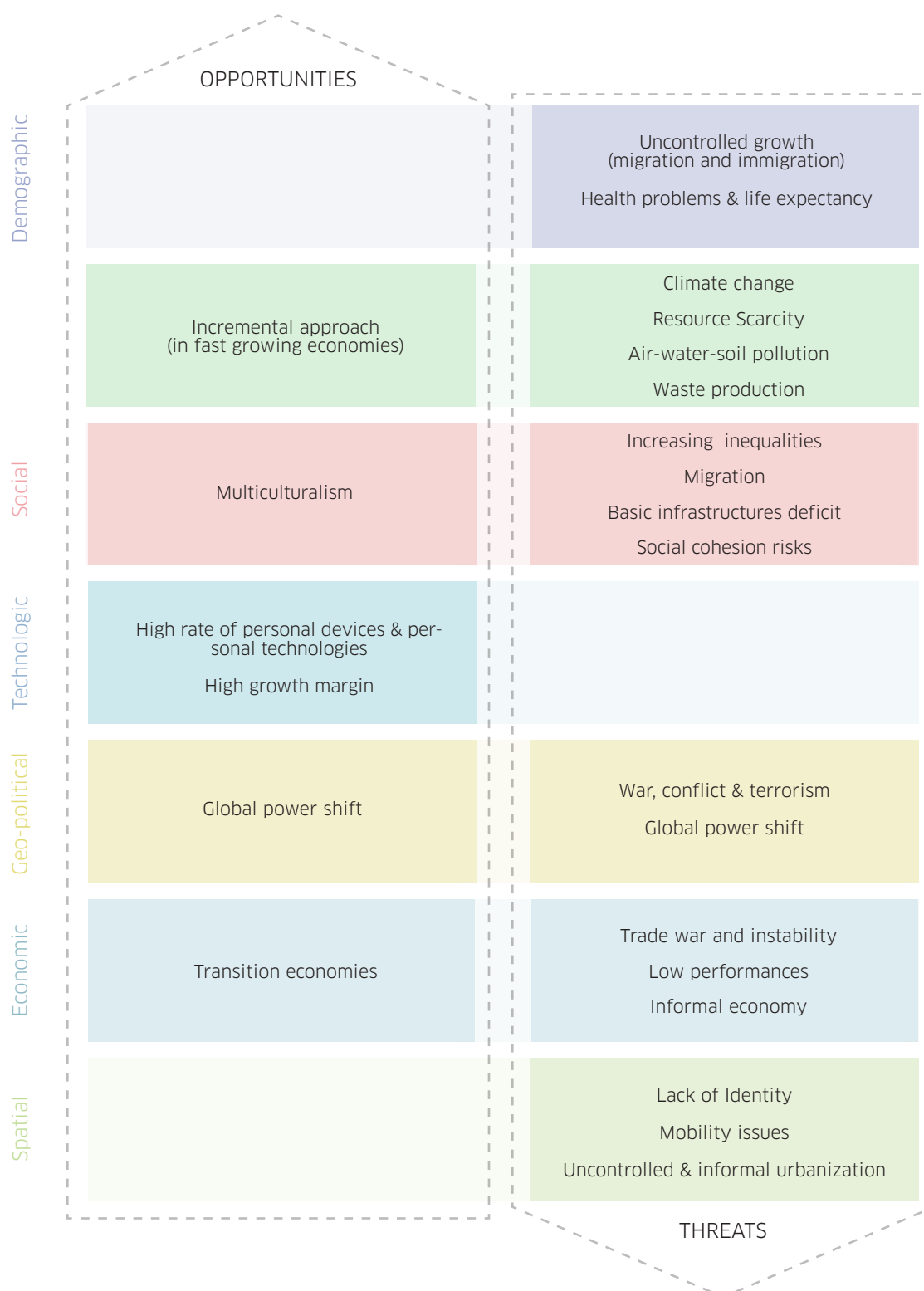
Their main weaknesses are distributed in all the seven dimensions that we are taking into account. They face an uncontrolled urban growth and demographic pattern of development leading to health problems and reduced life expectancy.

Their environmental situation is poor, with huge emerging problems related to the cycles of resources, climate change vulnerabilities and increasing pollution. From a social perspective, the increasing inequalities and extreme poverty combined with the basic infrastructure deficit reflect their key problem of wealth production and distribution. Mega cities with their economic/political low level of maturity have a high risk of failure, of political instability, war and conflicts. They face enormous spatial problems. The massive and uncontrolled urbanisation that characterise them lead to a lack of identity, mobility issues, spatial injustice and a non-efficient and fair use of space.

Opportunities & threats

This table gives an overview of the main extrinsic characteristics of the city typology. These are here referred as opportunities and threats and divided by the themes defined in the Part I of this research document.

OPPORTUNITIES

Theme	Opportunities	Threats
Demographic		Uncontrolled growth (migration and immigration) / Health problems & life expectancy
	Incremental approach (in fast growing economies)	Climate change / Resource Scarcity / Air-water-soil pollution / Waste production
Social	Multiculturalism	Increasing inequalities / Migration / Basic infrastructures deficit / Social cohesion risks
Technologic	High rate of personal devices & personal technologies / High growth margin	
Geo-political	Global power shift	War, conflict & terrorism / Global power shift
Economic	Transition economies	Trade war and instability / Low performances / Informal economy
Spatial		Lack of Identity / Mobility issues / Uncontrolled & informal urbanization

THREATS

Mega cities are both the field of big threats as well as interesting opportunities. The main opportunities are related to their population size and the huge impact that every good practice, no matters its scale, could have. The incremental approach correlated to their economic development could work to solve the manifold issues they face. Mega cities sustainability is severely threatened by their uncontrolled urban and population growth, with the consequences in terms of health distribution, resource management and the increasing inequalities and wealth distribution. The environmental question is, in Mega cities, more urgent and severe than in other cities. The effects of climate change and resource scarcity could be incredibility severe affecting millions of people. The same consideration could be applied to the geopolitical, economic, social and demographic sphere.
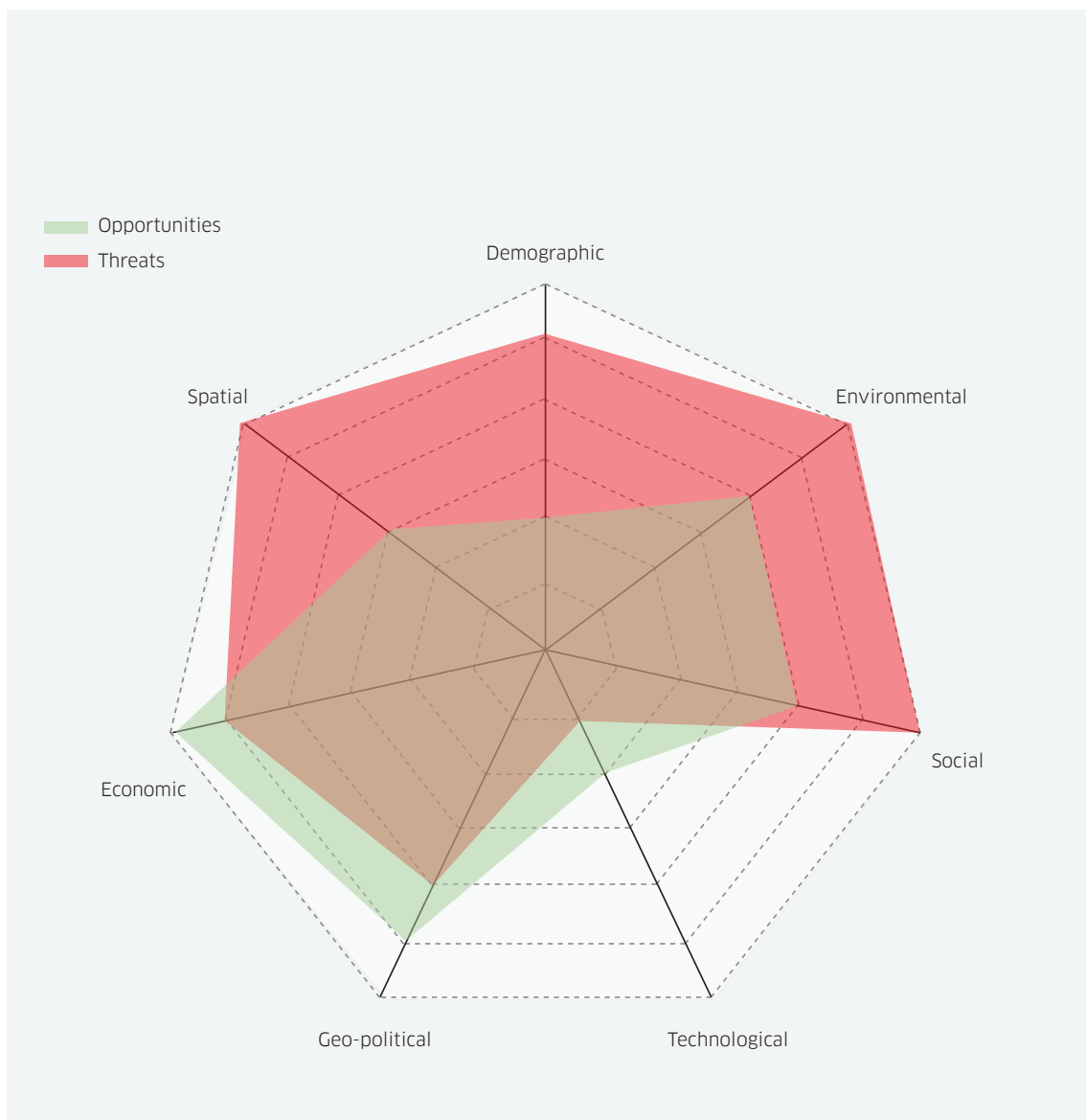
Description per theme

Presented here is a synthesis of the main characteristics of the city typology derived from the previously presented SWOT analysis.

Demographic
Environmental
Social
Technologic
Geo-political
Economic
Spatial

Demographic characteristics
Mega cities have an uncontrolled urban growth and demographic patterns of development. This specific way of developing leads to health problems and reduced life expectancy.

Environmental characteristics
Mega cities are not mature and prepared to face their environmental challenges. The resource scarcity and the increasing high level of consumption and waste production are key elements for concern.

Geo-political characteristics
Mega cities are sometimes protagonist of the actual global power shift towards east, this meaning an increasing political power but also, given their low level of maturity, a high risk of failure, political instability, war and conflicts.

Social characteristics

Increasing inequalities and extreme poverty combined with the basic infrastructure deficit strongly characterise Mega cities. This reflects the key problem of wealth production and distribution.

Technologic characteristics

Mega cities are characterized by low level of technological maturity, high rate of personal devices & personal technologies, exclusion due to high direct costs and lack of know how. For this reasons and depending on their economical performances they have a huge growth margin.

Economical characteristics

Mega cities normally have positive GDP growing performances, but with a low efficient economy based on primary sectors, with lack of infrastructures, subject to instability, with exclusion processes (non-affordability) and high rate of informal economies.

Spatial characteristics

Mega cities face enormous spatial problems. The massive and uncontrolled urbanisation that characterise them leads to a lack of Identity, mobility issues, spatial injustice and a non-efficient and fair use of space.

Description per sector

Presented here is a synthesis of the main characteristics of the city typology related to three key sectors: the energy sector, the mobility and the buildings & infrastructure sectors.

Energy

With the steady rising proportion of people living in urban areas, the number of Mega cities will obviously continue to progress (19 in 2004 and 47 in 2017). GDP grows faster in these cities and is strongly correlated to energy use. Indeed, Mega cities usually consume more energy to cover all their different consumption uses - particulary electricity use and for transportation. Few of them with strong economies based on industries have a shift in energy share toward the industrial sector (mainly in China and India). However, the energy requirements for heating are relatively low due to the warm to hot climates of most Mega cities. Even though much attention has been paid to the world's Mega cities, they are not leaders in the energy transition.

Innovation in technologies, new energy efficiency policies and pilot projects are more likely to occur in mid-size cities. Whether Mega cities can develop as sustainable cities will largely depend on how they obtain, share and manage their energy and material resources. For instance, on the outskirts of the city of

Mobility

Mega cities are very densely populated and expect rapid growth. They face the challenge of offering their citizens massive public transport. Congestion is one of the problems in all Mega cities, regardless of their economic status or urban structure.

As a result, the associated external congestion (e.g, accidents, travel time losses and pollution) is at the top of the list of issues to be addressed in all Mega cities. Some paradigms prevent the situation from evolving positively, for example the image of the car as a sign of social status - whereas public transport is "for the poor". In dense areas in Mega Cities, safe pedestrian areas need to be improved to allow access to healthcare, education, work and social activities for the entire population. It is also important to underline that solutions do not always have to be accompanied by new investments in infrastructure. Often some management of existing resources or cheap measures such as communication can create new sustainable solutions. Mega cities have the potential to make significant improvements to their transportation systems and mobility services, and to become examples of best practices for other cities in both the developing and the developed world.

Mobility & Building infrastructure

The focus in Mega cities should be on a good-sized and well-designed mass transit development, including flexible transport services for the elderly and people with disabilities. Integrated services are required to realise an efficient transport network. The challenge is to have a strong institutional organisation and management to realise a sustainable urban transport system. Walking and cycling require a comfortable and safe infrastructure. Technologies, information and communication should also be used to improve the quality and performance of urban mobility services and to reduce the costs and consumption of resources. Mega cities must be approached as multiple (types of) cities in one big city. There are districts with high-rise buildings, districts with cultural heritage, districts for universities… The buildings in Mega Cities vary in heritage value, architectural value, age, height, energy performance, sustainability, etc. Mega cities have the advantage that there are differences in the energy demand and that they have a high density, so energy can be exchanged by linking districts to compatible energy profiles.

The city in a picture...

1 — Migration

2 — Climate change & Environmental disasters

3 — Demographic increase

5 — Basic infrastructures deficit

6 — Health risks and issues

7 — Traffic congestion

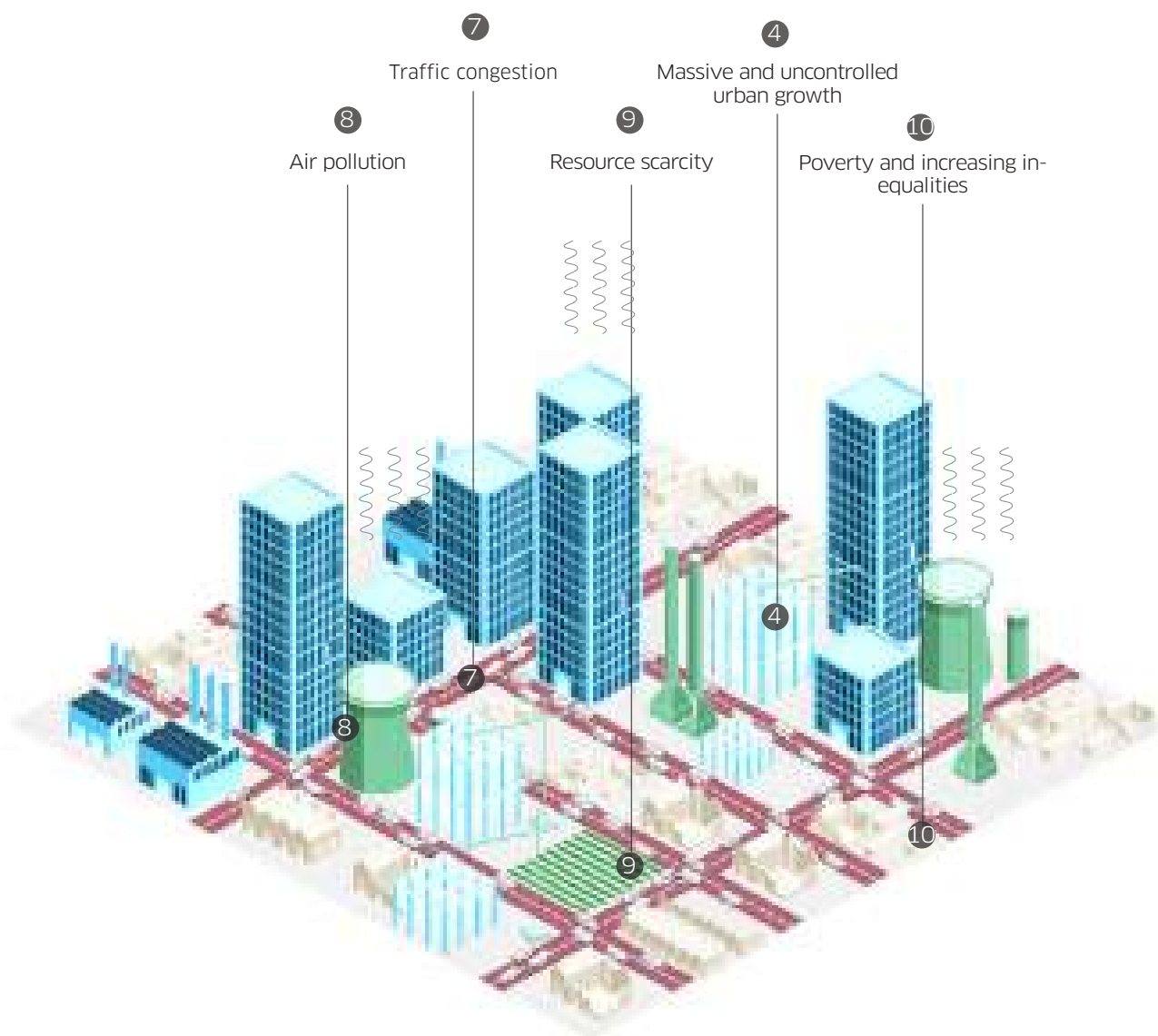4 — Massive and uncontrolled urban growth

8 — Air pollution

9 — Resource scarcity

10 — Poverty and increasing in-equalities

KEY CHARACTERISTICS

Derived from the SWOT analysis, and showing the main weaknesses and threats of the city typology

SOLUTIONS & OPPORTUNITIES

- ● Urban
- ● Energy
- ● Mobility
- ● Building & Infrastructures

360 CITY SCAN

Key perspectives that are linked with the key characteristics and the related solutions and opportunities

1 Migration

- ● • Crisis plan and management (forecast, prevention and action-plans)
- ● • National/Regional/Urban planning

INCLUSIVE CITY
- • Housing

2 Climate change & Environmental disasters

- ● • Hazard plan and management (forecast, prevention and action-plans)
- ●

RESILIENT CITY
- • Productive ecosystems
- • Climate change

3 Demographic increase

- ● • Housing developments

INCLUSIVE CITY
RESILIENT CITY

4 Massive and uncontrolled urban growth

- ● • Metropolitan-level authority (policy related, technical, political,..) with decentralized centers
- • Urban planning & policy framework

CONNECTED CITY
INCLUSIVE CITY
RESILIENT CITY

5 Basic infrastructures deficit

- ● • Upgrade of sanitation infrastructures & services
- ●

INCLUSIVE CITY
- • Health care

6 Health risks and issues

- ● • Investments in public spaces
- • Broaden the market
- • Spin off companies

INCLUSIVE CITY
- • Citizen engagement

PRODUCTIVE CITY
- • Diverse economies
- • New economies
- • Dynamic economies

7 Traffic congestion

- ● • Urban planning + Mobility management + Infrastructure interventions
- ●

CONNECTED CITY
- • Transportation

8 Air pollution

- ● • Remediation project

ATTRACTIVE CITY
- • Healthy environment

9 Resource scarcity

- ● • Resource scarcity
- ●

CIRCULAR CITY

10 Poverty and increasing inequalities

- ● • Welfare and public services distribution

INCLUSIVE CITY
- • Housing
- • Education
- • Health care

PRODUCTIVE CITY
- • Local economies

Local City

Local cities are often small to mid-sized cities whose main characteristic is a strong connection with a local and site-specific dimension. They have often a less pronounced character and are less-know worldwide. Despite their limited scale, they are important: they host a huge number of the worldwide population and are normally linked with productive territories. Being less complex urban systems subject to lower levels of pressure, allows them to be field of experimentation and innovation.
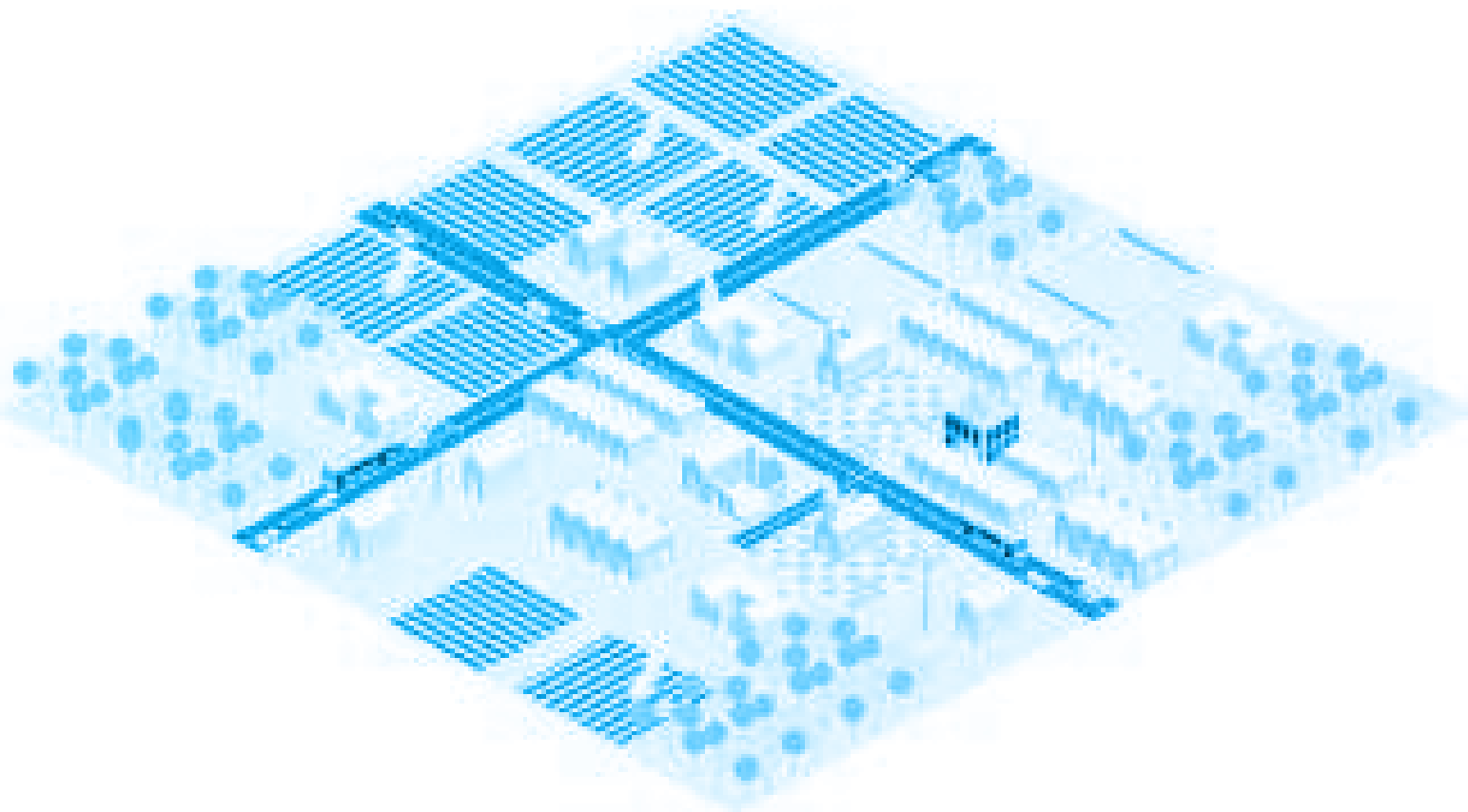
Examples

The following 9 Local cities are presented as representative examples of the category, without being exhaustive and without covering all the possible range and types of local cities worldwide.

Belém [BR]

Caceres [ES]

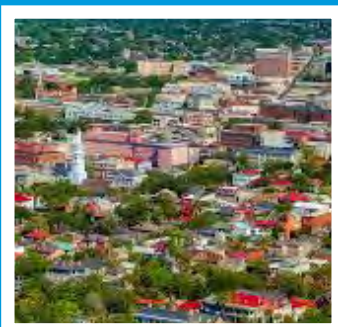Parma [IT]

Stone Town [zA]

Bristol [UK]

Sint Niklaas [BE]

Breda [NL]

Charleston [USA]

Santa Marta [CO]

Other cities within this category are: Charlottesville, Wenatchee, Prescott, Valparaíso, Rimini, Pistoia, Trapani, Campobasso, Toulouse, Biarritz, Pamplona, Albacete, Turnhout, Dienst and Meißen.

Economic category

Local cities are normally present in every country. As there is a consistent lack of studies on them (minimal data) is not easy to define whether they are concentrated more in certain economies. This also depends on the definition of 'city' that is not considering within this category all towns and villages.

Developing economies	Economies in transition	Developed economies

Fragile states index

Local cities are normally situated in all ranges of the 'fragile state index'. The index is based on twelve indicators of state vulnerability, grouped by category: Cohesion, Economic, Political and Social. Considered together they assess the state's vulnerability to collapse or conflict.

Alert	Warning	Stable	Sustainable

City size   Legenda   XS | < 0.5m   S | 0.5-1m   M | 1-5m   L | 5-10m   XL | >10million people

Local cities are small in population size, with less than 500.000 citizens.

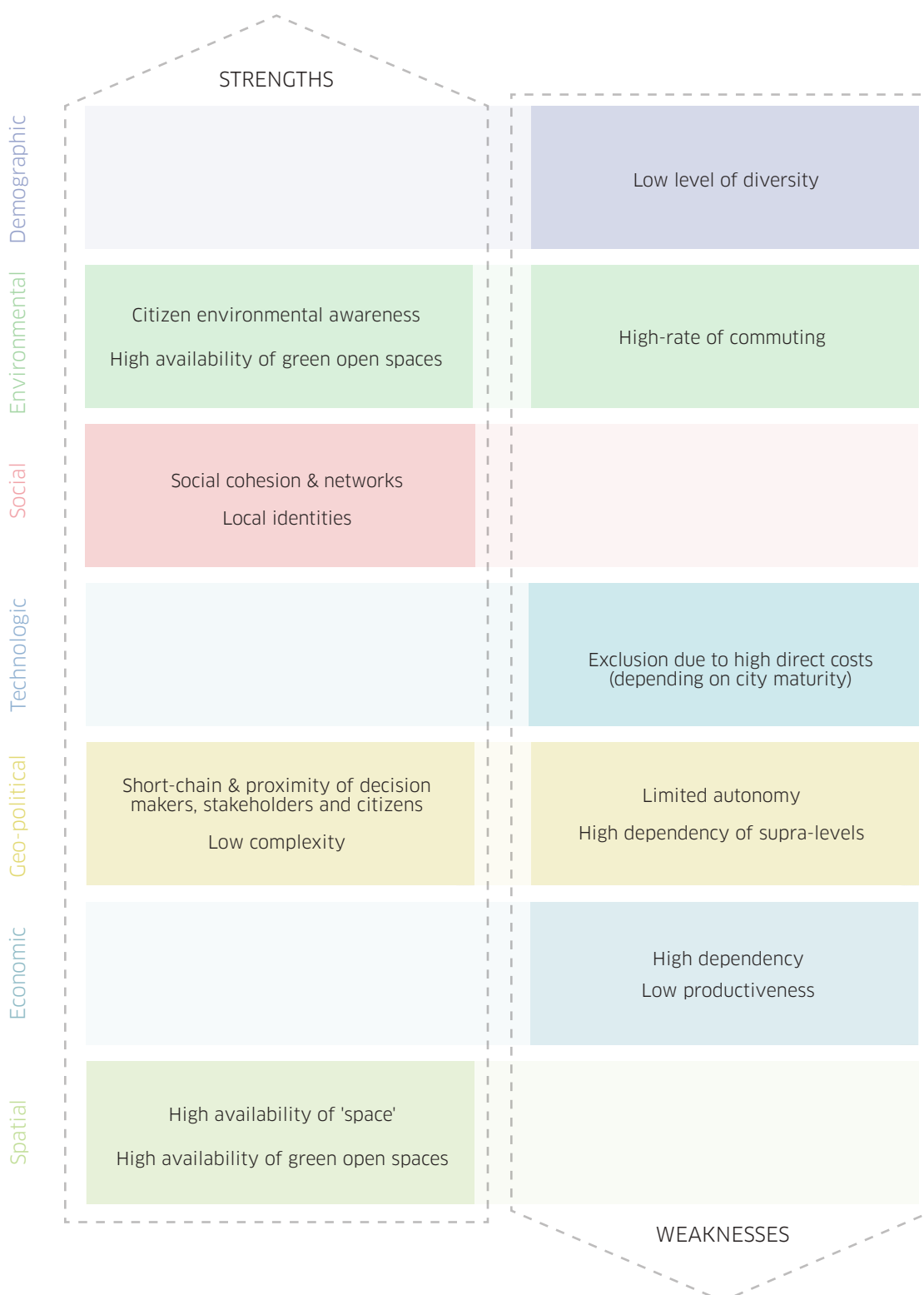| XS	S	M	L	XL

Morphology

Local cities are normally compact urban systems, sometimes with sprawl development depending on their main economic structure. In cases where they are being sustained by rural economy, they are often organised with a sprawl urban organisation.

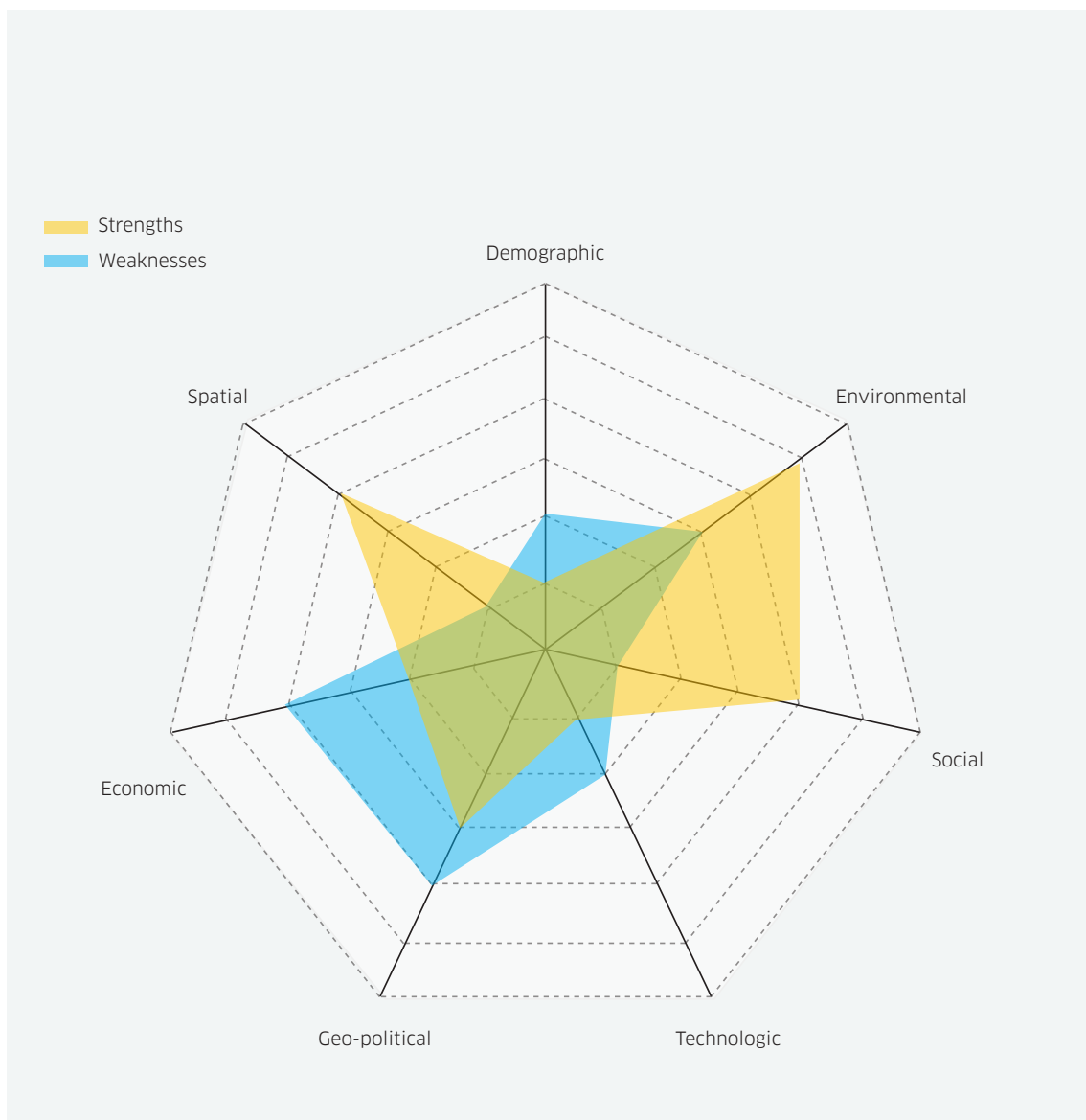| Compact	Sprawl	Diffuse	Polycentric	Mega

Strengths & weaknesses

This table gives an overview of the main intrinsic characteristics of the city typology. These are here referred to as weaknesses or strengths and divided by the themes defined in the Part I of this research document.

STRENGTHS

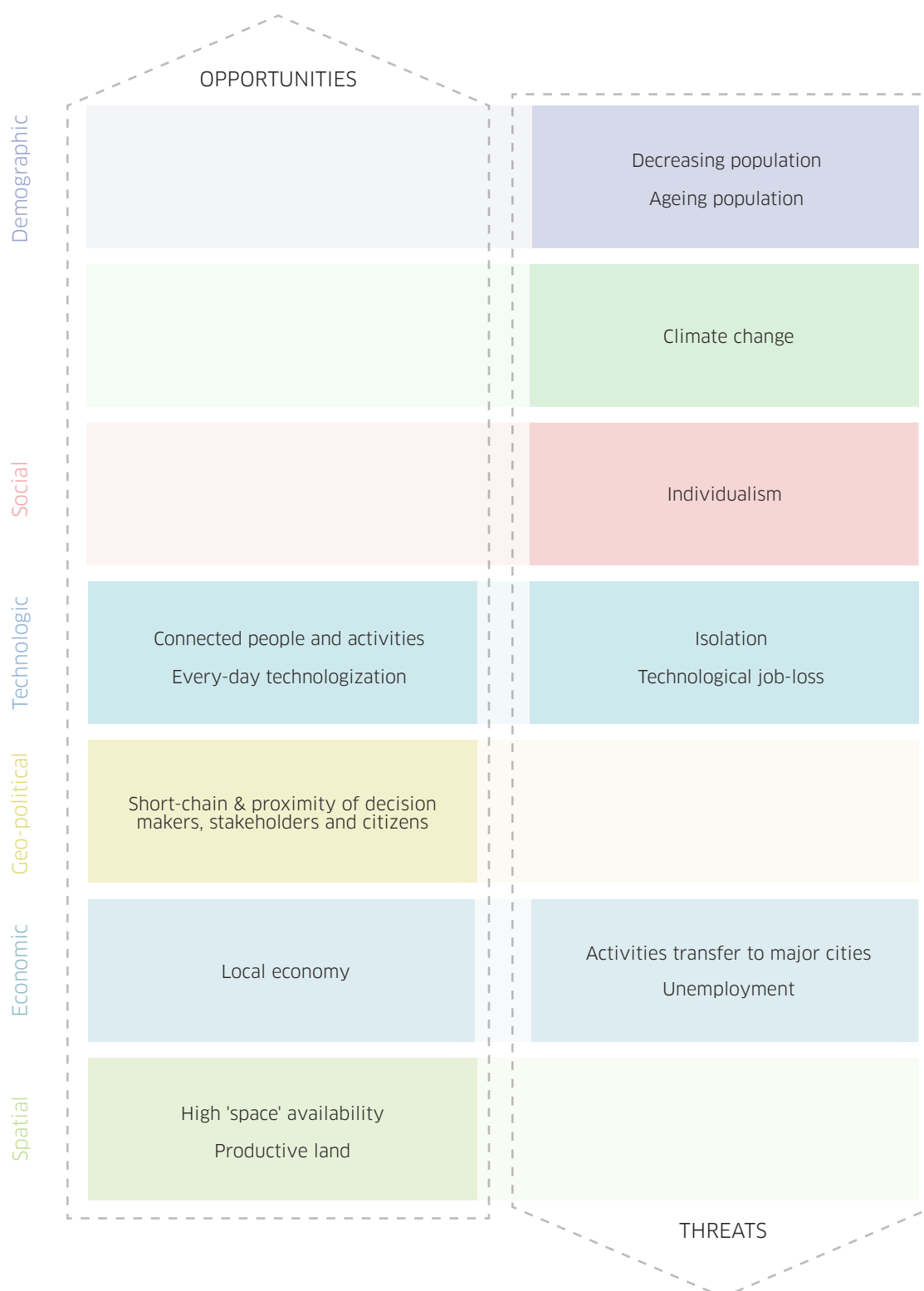|	STRENGTHS	WEAKNESSES
Demographic		Low level of diversity
Environmental	Citizen environmental awareness High availability of green open spaces	High-rate of commuting
Social	Social cohesion & networks Local identities	
Technologic		Exclusion due to high direct costs (depending on city maturity)
Geo-political	Short-chain & proximity of decision makers, stakeholders and citizens Low complexity	Limited autonomy High dependency of supra-levels
Economic		High dependency Low productiveness
Spatial	High availability of 'space' High availability of green open spaces	

WEAKNESSES

Local cities strengths relate mainly to their environmental, social and spatial conditions. They have usually a high availability or proximity with green open spaces, a strong local identity and social cohesion, a low level of complexity of their social and political processes and a short chain and proximity between citizens, stakeholders and decision makers.

On the other side, their weaknesses relates mainly to a low dynamism and diversity, a high economical dependency on bigger urban centres in their region, a limited political maturity and autonomy (with high dependency on supra levels) and low economic productiveness.

Opportunities & threats

This table gives an overview of the main extrinsic characteristics of the city typology. These are here referred as opportunities and threats and divided by the themes defined in the Part I of this research document.

OPPORTUNITIES

Theme	Opportunities	Threats
Demographic		Decreasing population Ageing population
		Climate change
Social		Individualism
Technologic	Connected people and activities Every-day technologization	Isolation Technological job-loss
Geo-political	Short-chain & proximity of decision makers, stakeholders and citizens	
Economic	Local economy	Activities transfer to major cities Unemployment
Spatial	High 'space' availability Productive land	

THREATS

Local cities opportunities are as important as their threats. The opportunities relate mainly to the synergies between environmental, social, technological and economic conditions. The availability of resources and their proximity with productive territories is a key factor for development, especially if combined with new technologies and an increase of productivity. This to boost a strong local economy.
The threats related to Local cities come from the demographic trends that negatively affect their population size and the ageing trends that limit their economic performances. Given their low-political autonomy, they are subject to the risk of being affected by decision of supra-levels that could directly affect their development. An important challenge comes from the economical transfer of activities to major cities, such as the attraction of workers and citizens, with consequent loss of jobs and huge unemployment rates.
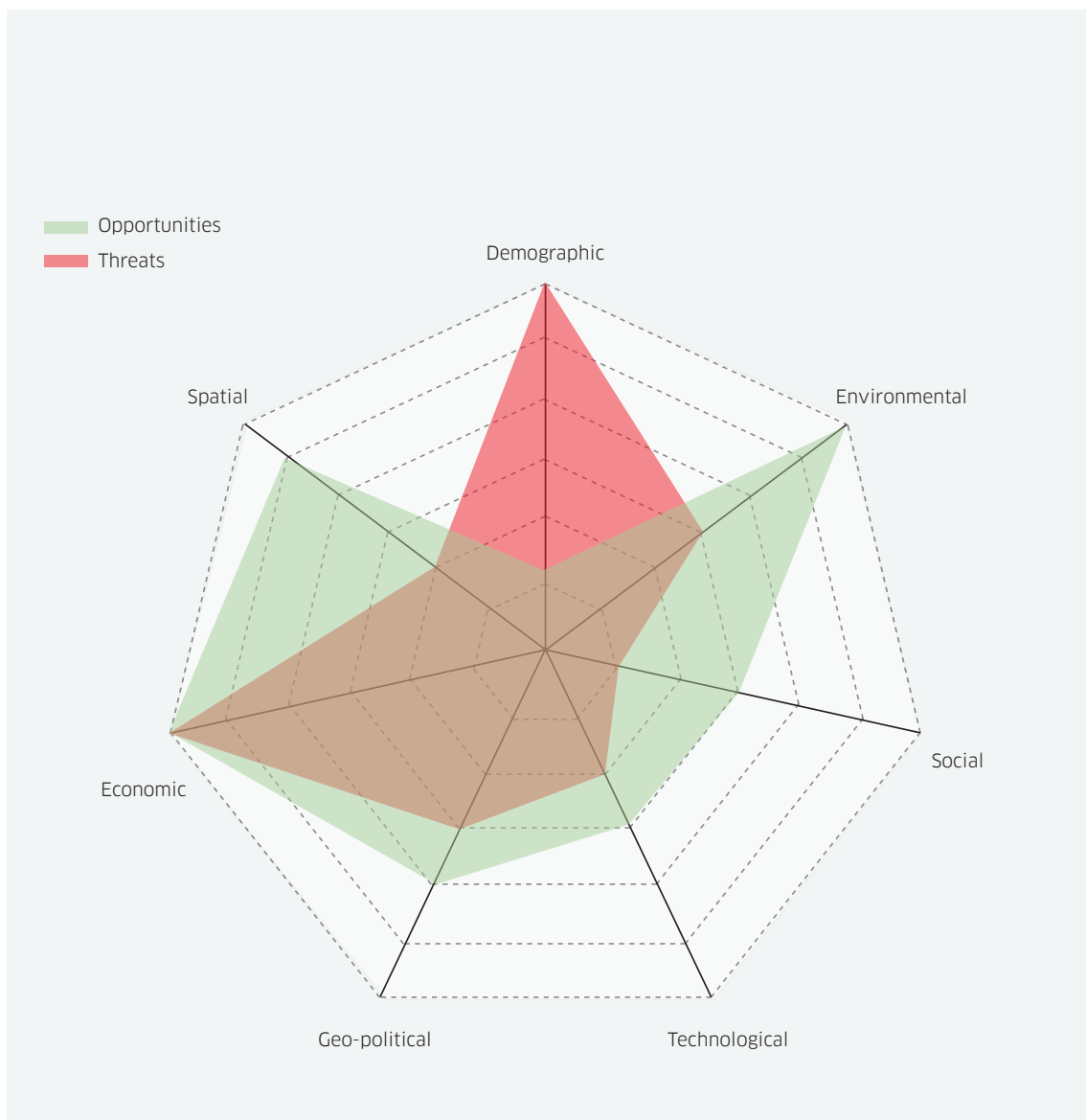
Description per theme

Presented here is a synthesis of the main characteristics of the city typology derived from the previously presented SWOT analysis.

Demographic
Environmental
Social
Technologic
Geo-political
Economic
Spatial

Demographic characteristics

Local cities are characterised by low level of diversity and strongly affected by a decreasing population (given the attraction factor of bigger cities) and the ageing trends that limit their economical performances.

Environmental characteristics

Local cities usually have a high availability or proximity with green open spaces and productive territories with large availability of resources. These are key elements of differentiation between this typology and others.

Geo-political characteristics

Local cities are political systems with low degree of complexity normally characterized by high level of dependency from supra levels and a certain degree of isolation.

Social characteristics

Local cities have a strong local identity and social cohesion, a low level of complexity of their social processes and a short chain and proximity between citizens, stake-holders and decision makers. This normally creates good conditions for business and activities.

Technologic characteristics

Local cities are generally not advanced in terms of technologies, both given their possible isolation from sources of innovation and the exclusion for direct costs. Nevertheless, they are an interesting field for experimentation and innovation given the low pressure of other urban systems and the low complexity of their political levels.

Economical characteristics

Local cities have higher levels of unemployment compared with cities of the same country and suffer the transfer of economic activities to major urban centers. They are also generally characterised by low level of productivity. On the other side, their synergies and connection with local economies could represent a key factor for their successful and sustainable development.

Spatial characteristics

Local cities normally have good environmental qualities and spatial conditions. They generally have a higher availability of green spaces and a good connection with the productive territories that surround them.

Description per sector

Presented here is a synthesis of the main characteristics of the city typology related to three key sectors: the energy sector, the mobility and the buildings & infrastructure sectors.

Energy

Local cities can be considered in the average of energy supply and consumption compared to other types of cities. Their primary energy supply is neither concentrated neither diversified; their primary energy consumption is on average in all sectors (power generation, buildings, transportation, industry) and their technical energy infrastructure is developed only to a certain extend. In addition, Local cities often play the "follow-the-leader" role in the worldwide energy transition matter, with moderate investment in decentralised renewable energy sources or in smart city programmes and balanced energy policies. Nevertheless, many provincial cities have committed to fight climate change and have started to establish robust but distinct green energy initiatives that will eventually become the cornerstone of their energy transition framework. For instance, the city of Bristol aims to be the UK's "first solar panel city" and has taken an innovative approach by using a combination of private-public partnerships, traditional financing through banks crowdfunding and bond offers to fund community-scale renewable energy projects. The progressive consolidation of their efforts will ultimately bring energy security, energy equity and environmental sustainability to its citizens.
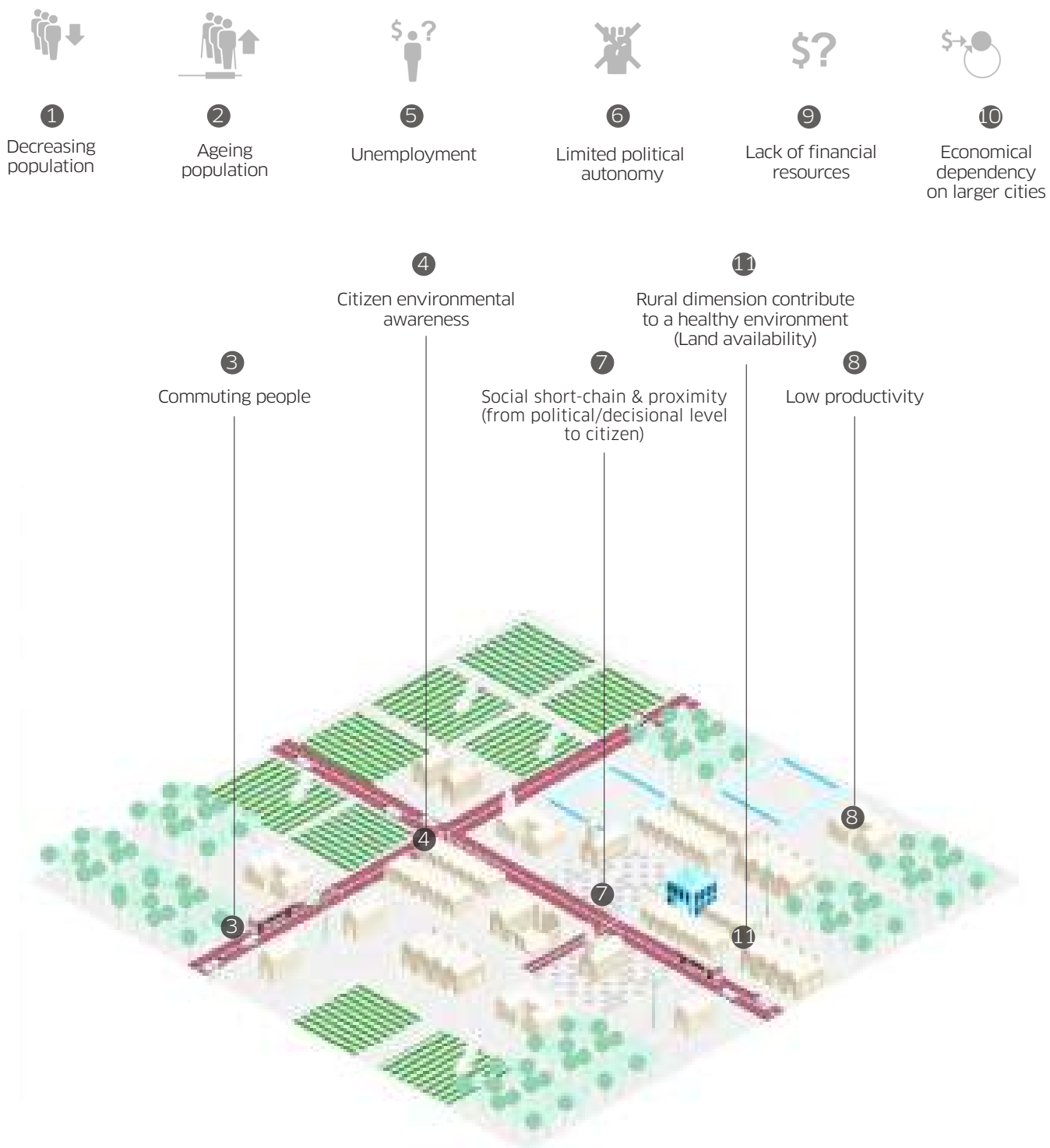
Mobility

Local cities are centers of economic growth and offer opportunities for study, innovation and employment. They are mostly concentric cities with sparsely populated areas. Investments in public transport are not profitable and lead to few modal shifts, with very few investments in transport systems as a result. The majority of (short) journeys are made by individual cars. To keep commuter cars away from the city centers, Park & Ride can be proposed in the city outskirts - a policy that is feasible if the parking spaces in the city centers are expensive and limited. Local cities usually consist of a city centers and a number of neighbourhoods, each with its own identity and accessibility, so it is important for citizens to feel safe and secure when walking and cycling to access local services and to go to other parts of the city without having to use a car. Carpooling must be promoted by providing priority lanes or special parking places for that purpose. Cycling in the city and to the residential junctions must be safe and comfortable. Local cities promote active transport, air quality and road safety and must therefore support sustainable growth by enabling efficient transport of people and goods, reducing CO2 emissions and embracing new technologies.

Mobility & Building infrastructure

The population density in Local cities is usually variable, which makes the potential of mass transit systems irrelevant. A good format and adaptive public transport solutions and a well-considered parking policy are essential. Park&Ride can combine other services to be attractive, such as a shared electric bicycles. Shared mobility can also help to increase the transport offer without having to make any major investments. Public transport must be easy to understand, and tariffs must be uniform even if offered by several operators. Safe and comfortable bicycle parking facilities and cycle paths must be created in the city center and to the residential junctions.

Local cities are characterized by a wide variety of building types: detached buildings, semi-detached buildings, attached buildings… Most buildings are decent but conventional - the inhabitants of local cities are rather traditional and reluctant to change. Because of their small scale, these cities are ideal for setting up pilot renovation / energy projects.

The city in a picture...

1
Decreasing population

2
Ageing population

5
Unemployment

6
Limited political autonomy

9
Lack of financial resources

10
Economical dependency on larger cities

4
Citizen environmental awareness

11
Rural dimension contribute to a healthy environment (Land availability)

3
Commuting people

7
Social short-chain & proximity (from political/decisional level to citizen)

8
Low productivity

KEY CHARACTERISTICS

Derived from the SWOT analysis, and showing the main weaknesses and threats of the city typology

SOLUTIONS & OPPORTUNITIES

- Urban
- Energy
- Mobility
- Building & Infrastructures

360 CITY SCAN

Key perspectives that are linked with the key characteristics and the related solutions and opportunities

---

1 Decreasing population

- Steer start-ups and scale-up, local economy and collaboration with others cities

PRODUCTIVE CITY
- Local economy

---

2 Ageing population

- Inclusive design of built environment and mobility systems
- Social inclusion and investments in social infra-structures

INCLUSIVE CITY

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3 Commuting people

- Mobility integration, higher efficiency and better "places of mobility"

CONNECTED CITY

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4 Citizen environmental awareness

- Community apps for self-organization

RESILIENT CITY
- Green economy

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5 Unemployment

- Steering collaboration with closer towns/cities and territories

PRODUCTIVE CITY
- Local economy

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6 Limited political autonomy

- Steering collaboration with closer towns/cities and territories

PRODUCTIVE CITY

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7 Social short-chain & proximity (from political/decisional level to citizen)

- Testing ground for citizen participation process in urban projects

PRODUCTIVE CITY
- Local economy
- Resilient economy

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8 Low productivity

- Steering collaboration with closer towns/cities and territories

PRODUCTIVE CITY
- Local economy
- Resilient economy

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9 Lack of financial resources

- Steering collaboration with closer towns/cities and territories
- Through collaboration enrich competences at city level to apply to subsidies from International/National/Regional/Provincial levels

PRODUCTIVE CITY
- Local economy
- Resilient economy

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10 Economical dependency on larger cities

- Steering collaboration with closer towns/cities and territories

PRODUCTIVE CITY
- Local economy
- Resilient economy

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11 Rural dimension contribute to a healthy environment (Land availability)

- Food production
- Integration of clean energy production with food production
- Steer local economy related to local resources use

ATTRACTIVE CITY
- Healthy environment
- Productive local economy

The 9 city typologies domains mapping

The 9 typologies (Global city, Knowledge city, Historical city, Industrial city, Resort city, Cultural city, Administrative city, Mega city and Local city) are mapped through three main parameters: city size in terms of population, economic category and fragile state index.

The scope of this 'mapping operation' is to understand the mutual position and relationship between each city typology and to stimulate a reflection on possible/desirable development pathways between diverse typologies or within a city typology.

This mapping operation is based on two assumptions. The first assumption is that each city typology could be described with qualitative parameters calculated as the average position/score of the group of 9 real cities that was selected for each city typology. The second assumption is that the score of each real city could be defined as the score of its national state. Both assumptions could lead to an error that is evaluated to be not relevant considering the qualitative nature of this mapping operation and its scope.

The superposition as showed in the two chart help understanding that each real city can be interpreted as the composition of characteristics of more then one typology. There are too many superposition to assume that each city typology is mutually exclusive.

The 9 cities typologies domains mapped through their population size, economic category and fragile state index

The chart below shows the diverse domain of the 9 cities typologies and their mutual relationships. The dimension of the circle represents the size in terms of population and the horizontal/vertical lines the range of extension of the city along the two dimension.

The chart shows the existence of a close-to-linear relationship between economic category and fragile state index, and the absence of a clear relationship between city size in terms of population and the two others parameters taken into account.