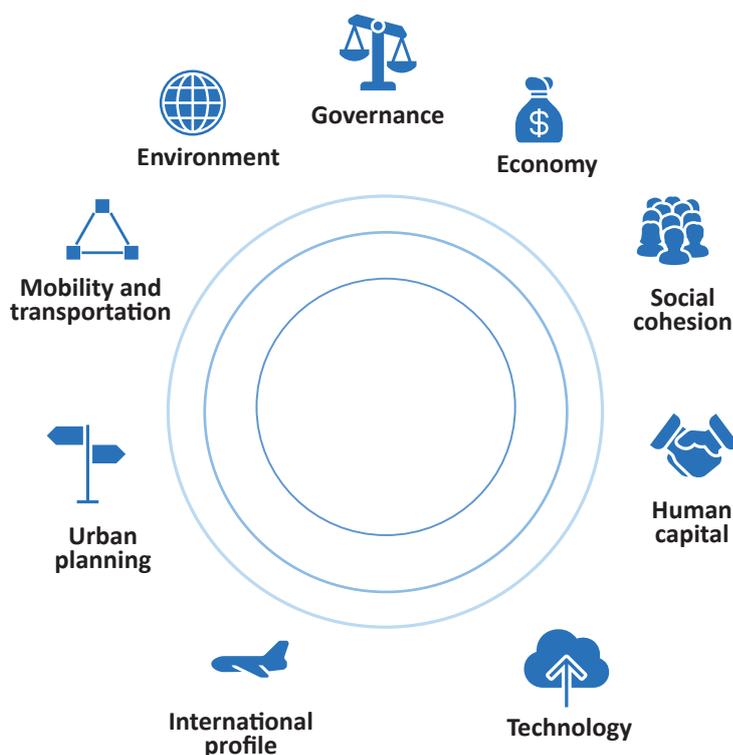


# Our Model: Cities in Motion—Conceptual Framework, Definitions and Indicators

Our platform proposes a conceptual model based on the study of a large number of success stories and in-depth interviews with city leaders, business people, academics and experts involved in city development.

The model proposes a set of steps that span diagnosis of the existing situation, the development of a strategy, and its subsequent implementation. The first step in making a good diagnosis is to analyze the situation with respect to the key dimensions. In the following sections, we will describe each of these dimensions and the indicators used to calculate the **CIMI**.



## Human capital

The main objective of any city should be to improve its human capital. A city with smart governance must be capable of attracting and retaining talent, creating plans to improve education, and fostering creativity and research.

**Table 1** shows the indicators used for the human capital dimension, a description of each one, the units of measurement, and the information sources used.

Although human capital includes factors that make it broader than what can be measured using these indicators, there is an international consensus that level of education and access to culture are essential components for measuring it. One of the pillars of human development is this capital. Moreover, given that the Human Development Index (HDI), published annually by the United Nations Development Program (UNDP), includes education and culture as dimensions, there is a sound basis for taking these indicators as explanatory of differences in a city’s human capital.

To define this dimension, the **CIMI** includes the 10 variables listed in **Table 1**. Most of the variables are incorporated into the index with a positive sign due to their contribution to the development of human capital. Private expenditure on education per capita is an exception.

To measure access to culture, the number of museums, art galleries and theaters, as well as consumer expenditure on leisure and recreation, are considered. These indicators reflect a city’s commitment to culture and human capital. Cities that are considered creative and dynamic on a global scale typically have museums and art galleries that are open to the public, offer visits to art collections, and take action to conserve such collections. The presence of cultural and recreational offerings in a city increases spending on these activities by the population.

Finally, expenditure on education per capita represents what each citizen pays to attain an adequate level of education. A high figure indicates that state expenditure on education is insufficient, and that citizens must therefore bear this cost to attain an adequate education. That is why this variable is included with a negative sign.



## Social cohesion

In recent decades, rapid urbanization has led to segregation of social groups, with little or no social mixing. This pattern of urbanization has negative impacts on urban areas, leading to social fragmentation in cities.

This phenomenon is more evident in urban settings in developing countries, where the division built into the spatial configuration of cities is immediately apparent. However, it is also becoming a major challenge in urban areas of developed countries, where social and economic differences are accentuated by social conflicts.

**Table 1. Human Capital Indicators**

| No. | Indicator  | Description / Unit of measurement  | Source                 |
|-----|--|--|------------------------|
| 1   | Secondary and higher education                   | Proportion of population with secondary and higher education.                          | Euromonitor            |
| 2   | Schools  | Number of public and private schools in a city.  | OpenStreetMap          |
| 3   | Business schools                                 | Number of business schools in the city included in the <i>Financial Times</i> TOP 100. | <i>Financial Times</i> |
| 4   | Expenditure on education                         | Annual private expenditure on education per capita.                                    | Euromonitor            |
| 5   | Expenditure on leisure and recreation            | Consumer expenditure on leisure and recreation as a percentage of GDP.                 | Euromonitor            |
| 6   | Expenditure on leisure and recreation per capita | Annual consumer expenditure on leisure and recreation per capita.                      | Euromonitor            |
| 7   | Student mobility                                 | International flow of mobile students at the tertiary level. Number of students.       | UNESCO                 |
| 8   | Museums and art galleries                        | Number of museums and art galleries in a city.   | OpenStreetMap          |
| 9   | Number of universities                           | Number of TOP 500 universities.  | QS Top Universities    |
| 10  | Theaters   | Number of theaters in a city.  | OpenStreetMap          |

With the COVID-19 pandemic, these differences have become even more pronounced and have particularly affected the most vulnerable people in urban areas. Many cities measure their intelligence only in terms of technological advances. However, the number of cities that include social cohesion as a key element for their development is growing. In their smart city strategies, cities such as New York and Tokyo have included concrete actions that allow them to be inclusive, taking into account the diversity of citizens and the needs of each social group.

Social cohesion is a sociological dimension of cities that can be defined as “the degree of consensus of the members of a social group” or “the perception of belonging to a common project or situation.” It is a measure of the intensity of social interaction within a group.

In the urban context, social cohesion refers to the level of social harmony between groups of people who live in the same city but differ in terms of their income, culture, age or occupations. Concern for a city’s social environment requires that we consider factors such as immigration, community development, care for the elderly, health system efficiency, and public safety and inclusion. In the age of COVID-19, particular emphasis is placed on evaluating and measuring the efficiency and universality of health systems, and the hope is that the health crisis has served to better understand the importance of these systems and strengthen them.

The presence of various groups in the same space, and mixing and interaction between them, are essential in a

state in which citizens and the government have a shared vision of a model of society based on social justice, the primacy of the rule of law, and social solidarity. This underscores the importance of policies that promote and strengthen social cohesion based on democratic values.

**Table 2** shows the indicators selected to analyze this dimension, a description of each one, the units of measurement, and the information sources used. The selected indicators are intended to incorporate all the sociological sub-dimensions of social cohesion, bearing in mind the variables available.

Within the group of variables used, death rate per 100,000 inhabitants and crime rate are both incorporated with a negative sign when this dimension is generated. The Health Care Index and the number of hospitals (public and private) and health centers in a city are added with a positive sign, given that access and coverage provided by basic social services contribute to strengthening social cohesion.

Employment is fundamental to any society. Indeed, history shows that its scarcity can break the implicit consensus or social contract. The unemployment rate is therefore incorporated with a negative sign in the social cohesion dimension. The rate of female employment in the public sector is incorporated with a positive sign, given that it is an indicator of gender equality in access to government jobs.

The Gini Index is calculated based on the Gini coefficient and measures social inequality. A value of 0 expresses perfectly equality of income distribution (everyone has

**Table 2. Social Cohesion Indicators**

| No. | Indicator              | Description / Unit of measurement  | Source  |
|-----|------------------------|--|---|
| 11  | Female-friendly        | This variable indicates whether a city provides a friendly environment for women (on a scale of 1 to 5). Cities with a value of 1 have a more hostile environment for women; those with a value of 5 are very female-friendly.                     | Nomad List  |
| 12  | Hospitals              | Number of public and private hospitals in a city. Includes health centers.   | OpenStreetMap   |
| 13  | Crime rate             | Estimation of the general level of crime in a city.  | Numbeo  |
| 14  | Slavery Index          | The variable represents the national government's response to situations of slavery in the country. The countries that rank highest are the ones dealing with the problem most effectively.  | Walk Free Foundation  |
| 15  | Happiness Index        | Countries with a higher value are those where the level of overall happiness is higher.  | World Happiness Index                                       |
| 16  | Gini Index             | Index values range from 0 to 100. A value of 0 expresses perfect equality of income distribution, and 100, maximal inequality.   | Euromonitor   |
| 17  | Global Peace Index     | This index measures the level of peace/violence in a country or region. Countries with a high level of violence rank lowest.   | Centre for Peace and Conflict Studies, University of Sydney |
| 18  | Health Care Index      | Estimation of the overall quality of the health care system, health care professionals, equipment, personnel, costs, etc.  | Numbeo  |
| 19  | LGBT-friendly          | This variable indicates whether a city provides a friendly environment for the LGBT community (on a scale of 1 to 5). Cities with a value of 1 have a more hostile environment for this community; those with a value of 5 are very LGBT-friendly. | Nomad List  |
| 20  | Price of property      | Property price as a proportion of income. Calculated as the ratio of the average price of a home to average annual disposable household income.  | Numbeo  |
| 21  | Female employment rate | Rate of female employment in the public sector. Value from 0 to 1.   | International Labor Organization                            |
| 22  | Death rate             | Death rate per 100,000 city inhabitants.   | Euromonitor   |
| 23  | Unemployment rate      | Unemployment rate (unemployed/labor force).  | Euromonitor   |
| 24  | Murder rate            | Murder rate per 100,000 city inhabitants.  | Nomad List  |
| 25  | Suicide rate           | Suicide rate per 100,000 city inhabitants.   | Nomad List  |
| 26  | Terrorism              | Number of terrorist incidents in a city in the last three years.   | Global Terrorism Database, University of Maryland           |
| 27  | Racial tolerance       | Index of racial tolerance in a city.   | Nomad List  |

the same income); a value of 100 expresses maximal inequality (one person has all the income and all the others have none). This indicator is included in the dimension with a negative sign since a higher index value has a negative effect on social cohesion in a city.

The price of property as a percentage of income is also negatively related to the **CIMI**, given that as the proportion of income that must be spent to buy a property increases, the incentives to belong to the society of a given city decrease.

As for happiness, it is increasingly seen as an appropriate measure of social progress and has become a goal of government policy. According to the World Happiness Report, people say they are happy if they have a stable job and good health, and when wealth is more evenly distributed within the country or city where they live. To represent this level of satisfaction, the Happiness Index is included in the **CIMI**. This variable is incorporated with a

positive sign since countries that are “happier” (i.e., with high values in the index) are those that pay particular attention to freedom, employment, health, income and good governance. Therefore, the happiness of a country or a city is also likely to be reflected in greater social harmony.

Slavery is considered a crime. The proportion of people in slavery in a country is therefore incorporated into the ranking with a negative sign, given that slavery does not contribute to the development of a just and socially cohesive city.

The terrorism variable, which reflects the number of terrorist incidents that have occurred in a city in the last three years, is included with a negative sign as such incidents represent a threat to social peace in a city.

The female-friendly variable is intended to measure the degree to which cities are spaces where women can pursue their lives and move about freely and safely. Cities

are assigned to categories, scored from 1 to 5, where the highest score corresponds to the cities that are most female-friendly. This variable is therefore included in the index with a positive sign.

The variables suicide rate and murder rate are included in the index with a negative sign to reflect their impact on this dimension. The higher the murder rate, the more insecure a city is; and the higher the suicide rate, the less attractive it is to live in.

This year, two new variables have been added: LGBT-friendly and racial tolerance. These variables represent how welcoming a city is to diversity. Both are incorporated with a positive sign. In each case, the higher the value, the greater the level of tolerance.



## Economy

This dimension includes all elements that support the economic development of a territory: local economic development plans, transition plans, strategic industrial plans, cluster development, innovation and entrepreneurial initiatives.

**Table 3** shows the indicators used to represent a city's performance in this dimension, a brief description of each one, their units of measurement, and the information sources used.

The **CIMI** aims to measure, via multiple dimensions, the future sustainability of the world's major cities and the quality of life of their inhabitants, and real GDP is a measure of a city's economic power and the income of its inhabitants. In fact, in numerous studies, GDP is considered the only (or most important) measure of the performance of a city or country. However, in this report it is not considered the sole or most significant measure, but rather one more indicator for one of the nine dimensions of the **CIMI**. It is therefore assigned a weight similar to that of other indicators. If a city with a high or relatively high GDP does not perform well on other indicators, it may not hold one of the top positions in the ranking. Thus, a city that is highly productive but has problems related to transportation, inequality, weak public finances, or a production process that uses polluting technology will probably not hold one of the top positions in the ranking. The variable projected annual GDP growth serves as a measure of a city's future progress.

Labor productivity is a measure of the strength, efficiency and technological level of the production system. As regards local and international competitiveness, productivity will naturally have an impact on real wages, capital income and business profits (which is why it is very important to consider this factor in the economy dimension: different productivity levels can explain differences in the quality of life of workers). Labor productivity will also affect the sustainability of the production system over time.

**Table 3. Economy Indicators**

| No. | Indicator   | Description / Unit of measurement  | Source                                |
|-----|---|--|---------------------------------------|
| 28  | Ease of starting a business   | Top positions in the ranking are held by cities that have a more favorable regulatory environment for setting up and operating a local business.   | World Bank                            |
| 29  | Mortgage  | Mortgage as a percentage of income is the monthly mortgage cost as a proportion of household income (the lower the better).  | Numbeo                                |
| 30  | Motivation of individuals to undertake early-stage entrepreneurial activity | The percentage of opportunity-driven early-stage entrepreneurs divided by the percentage of necessity-driven early-stage entrepreneurs.  | Global Entrepreneurship Monitor       |
| 31  | Number of headquarters  | Number of headquarters of publicly traded companies.   | Globalization and World Cities (GaWC) |
| 32  | GDP   | Gross domestic product in millions of USD.   | Euromonitor                           |
| 33  | Estimated GDP   | Projected GDP growth for the next year.  | Euromonitor                           |
| 34  | GDP per capita  | Gross domestic product per capita.   | Euromonitor                           |
| 35  | Purchasing power  | Purchasing power in buying goods and services in the city (based on the average salary), compared to that of New York City residents. If local purchasing power is 40, this means that inhabitants with an average salary can afford to buy 60% less goods and services than New York City residents with an average salary. | Numbeo                                |
| 36  | Productivity  | Labor productivity calculated as GDP/employed population (in thousands).   | Euromonitor                           |
| 37  | Hourly wage in USD  | Hourly wage in the city (in USD).  | Euromonitor                           |
| 38  | Time required to start a business   | Number of calendar days needed to complete the procedures to legally operate a business.   | World Bank                            |

Other indicators selected to represent this dimension enable us to measure aspects of a city's business landscape. These include the number of headquarters of publicly traded companies; the entrepreneurial capacity and opportunities available to inhabitants, represented by the percentage of entrepreneurs who launch their activity due to a personal motivation to improve their lives; the time required to start a business; and the ease of setting up a business (in terms of regulatory requirements). These indicators measure a city's capacity for sustainability over time and its potential to improve the quality of life of its inhabitants. The time required to start a business and the ease of starting a business are incorporated into the economy dimension with a negative sign given that lower values indicate that it is easier to start a business. The number of headquarters of publicly traded companies, the entrepreneurial capacity and opportunities available to a city's inhabitants, and the number of entrepreneurs all have a positive bearing on this dimension; high values for these indicators point to a city's economic dynamism and the ease of setting up and running new businesses.

The mortgage as a percentage of household income variable is incorporated to supplement the information captured by the private property price variable. It is intended to measure how affordable a 20-year mortgage (set at this term for the purposes on this report) is for a middle-income family. The higher the percentage of household income that goes to mortgage payments, the worse a family's financial situation will be. The variable is therefore incorporated with a negative sign.

Finally, the variables hourly wage and purchasing power in buying goods and services in the city (compared to the purchasing power of New York City residents) are incorporated with a positive sign as higher values for these indicators reflect a better employment situation.



## Governance

"Governance" is the term commonly used to refer to the effectiveness, quality and proper orientation of state intervention. Given that citizens have a central role to play in solving all the challenges cities face, factors such as the level of citizen participation, the ability of authorities to engage business leaders and local actors, and implementation of e-government plans must be considered. This dimension also encompasses all actions aimed at improving the efficiency of public administration, including the design of new organizational and management models. In this area, significant opportunities open up for private initiative, which can deliver greater efficiency.

In this study, we consider governance as highly correlated with the state of a city or country's public finances. Public accounts have a very significant impact on the quality of life of the population and the sustainability of a city as they determine the level of present and future taxes to be paid by citizens and the production system. They also affect expected growth of the general price level, scope for public investment in basic social infrastructure, and incentives for private investment. Moreover, if the state needs financing, it will compete with the private sector for funds available in the financial system, which will affect investment.

**Table 4** shows the indicators that represent the governance dimension in this report, a description of each one, the units of measurement, and the information sources used.

Cities that have ISO 37120 certification are committed to improving the services they offer and quality of life. ISO 37120 establishes smart city standards based on 100 indicators and aims to provide a benchmark for comparing all cities on equal terms. This variable is incorporated with a positive sign.

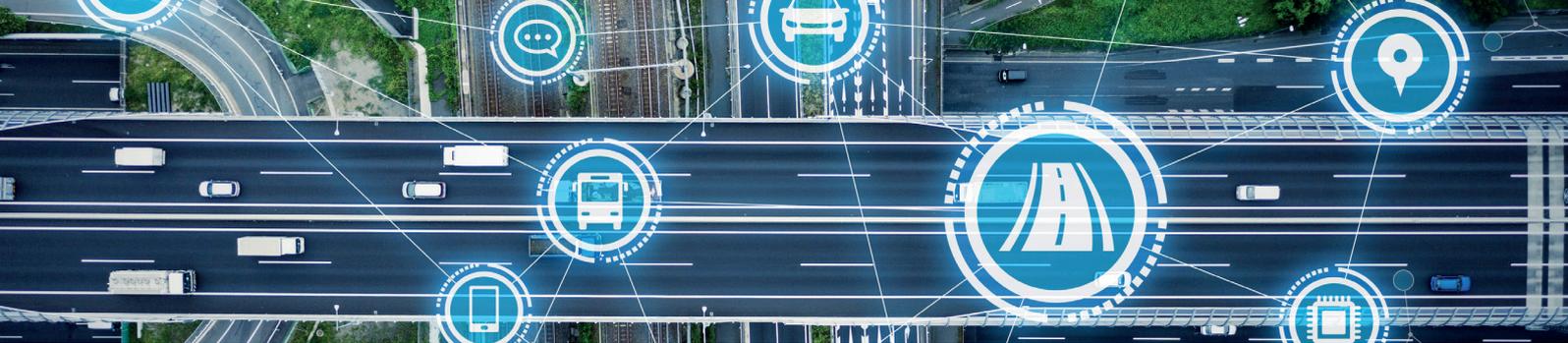
The number of research offices and the number of government buildings show how responsive the local government is to the needs of citizens in terms of dealing with queries and carrying out administrative, regulatory and other functions. These variables are included with a positive sign in the **CIMI** calculation. Similarly, the number of embassies and consulates (i.e., the number of embassies foreign countries assign to a city) is an indicator of its international importance by global standards.

Percentage of public sector employment—in education, defense, health and other areas—is a variable incorporated into this dimension with a positive sign, given that it is an indicator of human capital in the public sector.

The E-Government Development Index (EGDI) incorporates the access characteristics, such as the infrastructure and educational levels, to reflect how a country is using information technologies to promote access and inclusion of its citizens. It is a measure composed of four important dimensions of e-government, which are included as independent variables this year. These variables (included with a positive sign) are: provision of online services, telecommunication connectivity, the ability of individuals to use available e-government services, and the development status of telecommunication infrastructure (by the government). The E-Participation Index, which supplements these four variables and measures the means used by each country to involve its citizens in decision-making, is also included this year.

**Table 4. Governance Indicators**

| No. | Indicator                              | Description / Unit of measurement  | Source                              |
|-----|--|--|-------------------------------------|
| 39  | Bitcoin legal                          | Whether or not Bitcoin is legal in the city.   | Nomad List                          |
| 40  | ISO 37120 certification                | Whether or not the city has ISO 37120 certification. Certified cities are committed to improving urban services and quality of life. This variable is coded from 0 to 6. The highest value is assigned to the cities that have been certified for the longest time. A value of 0 is assigned to cities that are not certified. | World Council on City Data (WCCD)   |
| 41  | Government buildings                   | Number of government buildings and premises in a city.   | OpenStreetMap                       |
| 42  | Embassies                              | Number of embassies in a city.   | OpenStreetMap                       |
| 43  | Public sector employment               | Percentage of employed population working in public administration and defense; education; health; community, social and personal service activities; and other activities.  | Euromonitor                         |
| 44  | E-Participation Index                  | This index supplements the EGDl and focuses on the use of online services to facilitate provision of information by governments to citizens (“e-information sharing”), interaction with stakeholders (“e-consultation”), and engagement in decision-making processes (“e-decision-making”).                                    | United Nations                      |
| 45  | Human Capital Index                    | The E-Government Development Index (EGDI) is a composite measure of three important dimensions of e-government: provision of online services, telecommunication connectivity and human capacity. This variable captures the human capacity component.  | United Nations                      |
| 46  | Strength of Legal Rights Index         | This index measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate access to loans. The index ranges from 0 (low) to 12 (high), with higher scores indicating that these laws are better designed to expand access to credit.                              | World Bank                          |
| 47  | Telecommunication Infrastructure Index | The E-Government Development Index (EGDI) is a composite measure of three important dimensions of e-government: provision of online services, telecommunication connectivity and human capacity. This variable captures the development status of telecommunication infrastructure (by the government).                        | United Nations                      |
| 48  | Corruption Perceptions Index           | Countries with values close to 0 are perceived as very corrupt and those with values close to 100 are perceived as very transparent.   | Transparency International          |
| 49  | Online Service Index                   | The E-Government Development Index (EGDI) is a composite measure of three important dimensions of e-government: provision of online services, telecommunication connectivity and human capacity. This variable reflects the scope and quality of e-government services.  | United Nations                      |
| 50  | Research offices                       | Number of research and technology offices in a city.   | OpenStreetMap                       |
| 51  | Open data platform                     | Whether or not the city has an open data system.   | CTIC Foundation and Open World Bank |
| 52  | Democracy Index                        | The top-ranked countries are the ones considered most democratic.  | Economist Intelligence Unit         |
| 53  | Reserves                               | Total reserves in millions of current USD. City-level estimate according to population.  | World Bank                          |
| 54  | Reserves per capita                    | Reserves per capita in millions of current USD.  | World Bank                          |



The Strength of Legal Rights Index measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate access to loans. Index values range from 0 to 12, with higher scores indicating that laws are better designed to expand access to credit. Establishing appropriate conditions and ensuring enforcement of the rights of citizens and companies based in their territory are functions of national or local governments and cannot be delegated. The perception that legal rights are enforced influences all aspects of the life of a country or city, including the business climate, incentives for investment, and legal security, among others. This index has therefore been incorporated with a positive sign when creating the indicator for this dimension.

The Corruption Perceptions Index serves to measure the quality of governance. A high societal perception of corruption in public bodies indicates that state intervention is not efficient from the standpoint of the social economy (because public services, broadly understood, entail higher costs than they would in the absence of corruption). Moreover, incentives to invest or settle in countries or cities with a high perception of corruption will be lower than in others with low levels of perceived corruption, which has a negative impact on sustainability. For the **CIMI**, this index is used as an explanatory indicator for the governance dimension. Transparency International assigns a value of 0 to countries with high levels of corruption and 100 to those that are highly transparent, so this variable is incorporated with a positive sign.

The Democracy Index shows the level of democracy in a country as reflected in its electoral system, freedom of expression, government functioning, and political participation and culture. Values are included with a negative sign since the countries in the top positions are the ones considered most democratic.

The variable that assesses whether the government of a city has an open data platform is an indicator of transparency in management by the local executive and the existence of a channel for communicating with citizens and a platform for generating new business models. A value of 1 is assigned if the city has an open data platform; otherwise, a value of 0 is assigned. The indicator is therefore incorporated into this dimension with a positive sign.

The level of reserves (total and per capita) is an indicator of the short- and medium-term strength of public finances, the ability to cope with changing economic cycles, and the soundness and sustainability of the economic structure as regards the state. This variable is incorporated with a positive sign.

Finally, in view of the widespread use of virtual currency, this year the variable Bitcoin legal (with a positive sign) is included to indicate whether or not a city has legalized the use of Bitcoin.



## Environment

In relation to cities, sustainable development can be defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Improving environmental sustainability through anti-pollution plans, support for green buildings and alternative energies, efficient water and waste management, and policies that help counteract the effects of climate change are essential to ensure the sustainability of cities over time.

Since the **CIMI** also aims to measure environmental sustainability, the environment is included as one of the key dimensions for quantitative assessment. **Table 5** shows the indicators selected for this dimension, a brief description of each one, their units of measurement, and the information sources used.

The indicators selected include measures of air pollutants and water quality in cities (clear indicators of the quality of life of their inhabitants) and of the sustainability of a city’s production and urban development structure.

CO<sub>2</sub> emissions are generated by the use of fossil fuels and the manufacture of cement, while methane emissions are produced by human activities such as agriculture and industrial production. These two types of emissions are the main measures commonly used to quantify the level of air pollution, given that these gases are closely linked to the greenhouse effect. In fact, reducing the values of these indicators is one of the objectives of the Kyoto Protocol.

Other key indicators for measuring air pollution in cities are PM<sub>2.5</sub> and PM<sub>10</sub>, which are small particles (solid or

**Table 5. Environment Indicators**

| No. | Indicator  | Description / Unit of measurement   | Source                        |
|-----|--|---|-------------------------------|
| 55  | CO <sub>2</sub> emissions                            | Carbon dioxide emissions from the use of fossil fuels and the manufacture of cement. Measured in kilotons (kt).                                   | World Bank                    |
| 56  | Methane emissions                                    | Methane emissions caused by human activities such as agriculture and industrial methane production. Measured in kt of CO <sub>2</sub> equivalent. | World Bank                    |
| 57  | Environmental Performance Index                      | Environmental Performance Index (from 1 = poor to 100 = good).  | Yale University               |
| 58  | CO <sub>2</sub> Emission Index                       | Index of CO <sub>2</sub> emissions.   | Numbeo                        |
| 59  | Pollution Index                                      | Index of pollution.   | Numbeo                        |
| 60  | PM <sub>10</sub>                                     | A measure of particles in the air with a diameter of less than 10 µm. Annual mean.  | Global Residence Index        |
| 61  | PM <sub>2.5</sub>                                    | A measure of particles in the air with a diameter of less than 2.5 µm. Annual mean.   | IQAir                         |
| 62  | Percentage of population with access to water supply | Percentage of the population with reasonable access to an adequate amount of water from improved water sources.                                   | World Bank                    |
| 63  | Renewable water resources                            | Renewable water sources per capita.   | FAO                           |
| 64  | Solid waste  | Average amount of municipal solid waste generated annually per person (kg/year).  | Waste Management for Everyone |
| 65  | Climate vulnerability                                | Risk to the city due to climate change.   | National Geographic           |

liquid) of dust, ash, soot, metal, cement and pollen dispersed in the atmosphere, with a diameter of 2.5 µm or less in the case of PM<sub>2.5</sub> and 10 µm or less in the case of PM<sub>10</sub>. Such particles are mainly composed of inorganic compounds such as silicates and aluminates, heavy metals, and organic material associated with carbon particles (soot). These indicators are commonly used in indexes that aim to measure environmental pollution. They are supplemented by information provided by a city's pollution index, which estimates overall pollution. The greatest weight is given to the cities with the most polluted air.

The Environmental Performance Index (EPI), calculated by Yale University, is an indicator based on the measurement of two major dimensions related to the environment, namely, environmental health and ecosystem vitality. The former is divided into three sub-dimensions: effects of air pollution on human health, water quality, and the environmental burden of disease. Ecosystem vitality, in turn, encompasses seven sub-dimensions that take account of the effects on the ecosystem of air pollution, water quality, biodiversity and habitat, deforestation, fisheries, agriculture and climate change. Given that this indicator is very comprehensive (covering almost all factors related to measuring the status and evolution of a city's environment and supplemented by the other indicators included in the **CIMI**), we believe the environment dimension is represented in a proportionate manner in the index.

Water is a renewable resource that has a highly important role to play in dealing with climate change and its devastating effects. The variable total renewable water sources per capita takes account of both internal and external renewable surface water resources and represents the resources that a country has available to ensure a sustainable future. Water is also a vital resource for the population. Therefore, the variable percentage of population with access to water supply is considered a critical element in the development of a city. Both variables are incorporated with a positive sign in the calculation of the index.

Given the prevalence of poor solid waste management, the average amount of municipal solid waste (garbage) generated annually per person (kg/year) in a city represents potential harm to its inhabitants and the environment. In many cities, poor waste management poses an additional health risk to people who work with waste materials. The variable is therefore incorporated into the index with a negative sign.

This year, the climate vulnerability variable, which is calculated by National Geographic and measures how vulnerable a city is to climate change, has been added to the index. This variable takes into account current temperatures in a city and the temperature projected for the year 2070. Indicator values range from 1 to 5, with the highest value assigned to the most vulnerable cities.



## Mobility and transportation

Cities of the future face two major challenges in the area of mobility and transportation: facilitating travel (often over large territories) and access to public services.

Mobility and transportation (in terms of road and route infrastructure, the vehicle fleet, public transit and air transport) affect the quality of life of a city's inhabitants and can be key to its sustainability over time. However, perhaps the most important issues to consider are the externalities generated in the production system, whether due to the need of the labor force to commute or the need to distribute production.

**Table 6** shows the indicators used for the mobility and transportation dimension, a description of each one, the units of measurement, and the information sources used.

Variables related to bicycle, moped and scooter rental services (collected by the New Urban Mobility Alliance, NUMO) capture the impact of micromobility in cities. These three variables are binary and indicate the presence or absence of these services in a city. They are incorporated into the index with a positive sign.

The indexes for time in traffic (considered in exponential terms), traffic commute time, and traffic inefficiency are estimates of traffic dysfunction caused by long driving times and the dissatisfaction that these situations generate in the population. These indicators enable us to measure the safety of roads and public transit, which, if it is effective and has good infrastructure, contributes to reducing vehicular road traffic and the number of accidents. They are all included with a negative sign in the calculation of the **CIMI** as they have a negative impact on the development of a sustainable city.

The bike sharing indicator captures information regarding the bicycle sharing system in a city, which allows residents to get around using public bicycles. Indicator values range from 0 to 8, where 0 indicates the absence of such a system in a city and 8 denotes the presence of a highly developed system. This indicator is incorporated into the **CIMI** with a positive sign.

The number of metro stations and the length of the subway system are indicators of a commitment to city development and investment in relation to the size of the population. Similarly, the number of air routes (inbound) and the presence of high-speed rail represent the level of development in mobility. A highly developed city will favor the incorporation of new commercial air routes

**Table 6. Mobility and Transportation Indicators**

| No. | Indicator                  | Description / Unit of measurement  | Source                    |
|-----|----------------------------|--|---------------------------|
| 66  | Bicycle rental             | Whether or not the city has a bicycle rental system.   | NUMO                      |
| 67  | Moped rental               | Whether or not the city has a moped rental system.   | NUMO                      |
| 68  | Scooter rental             | Whether or not the city has a scooter rental system.   | NUMO                      |
| 69  | Bicycles per household     | Percentage of bicycles per household.  | Euromonitor               |
| 70  | Bike sharing               | Shows automated services for public use of shared bicycles that provide transportation from place to place in a city. Indicator values range from 0 to 8 according to how developed the system is. | Bike-Sharing World Map    |
| 71  | Metro stations             | Number of metro stations in a city.  | Metrobits (metrobits.org) |
| 72  | Traffic Inefficiency Index | This index is an estimate of traffic inefficiencies. High values represent high driving inefficiencies, such as long travel times.   | Numbeo                    |
| 73  | Traffic Commute Time Index | An index based on the time it takes to commute to work (in minutes).   | Numbeo                    |
| 74  | Exponential Traffic Index  | This index is estimated by considering time spent in traffic. It is assumed that travel time dissatisfaction increases exponentially beyond 25 minutes.  | Numbeo                    |
| 75  | Length of metro system     | Length of the metro system in a city.  | Metrobits (metrobits.org) |
| 76  | High-speed train           | Binary variable that shows whether the city has a high-speed train or not.   | OpenRailwayMap            |
| 77  | Vehicles in the city       | Number of commercial vehicles in a city.   | Euromonitor               |
| 78  | Flights                    | Number of inbound flights (air routes) in a city.  | OpenFlights               |

and the movement and transit of passengers in different modes of transportation. These indicators are included with a positive sign in the calculation of the index due to their positive effect in this dimension.

The variable vehicles in the city (number of commercial vehicles) is included with a negative sign due to its negative effect on traffic and traffic congestion. Conversely, the variable percentage of bicycles per household is included with a positive sign given its positive effect on traffic.



## Urban planning

Urban planning in cities has always been considered a driver of development and poverty reduction. Today, it is a collective exercise that must involve all stakeholders, including citizens, civil society organizations, the public and the private sector, multilateral agencies and academia.

Urban planning, in turn, is closely related to sustainability. To improve the livability of any territory, it is important to take into account local master plans and the design of green areas and spaces for public use while also focusing on smart growth. New urban planning methods should focus on creating compact, well-connected cities with accessible public services.

Based on the information available, several points related to urban development plans, the quality of health infrastructure, and housing policy are included as indicators for this dimension. **Table 7** shows the indicators included in this dimension, a description of each one, the units of measurement, and the information sources used.

Bicycles are an efficient, fast, economical, healthy and environmentally friendly mode of transportation. Their use has a positive impact on a city's sustainable development because they do not pollute or use fuel, among other benefits. Given this positive effect, the **CIMI** incorporates the number of bike-rental or bike-sharing points, based on docking stations where they can be picked up and dropped off (the number of bicycle stations). Cities that have historically been labeled as "smart" tend to have high bicycle use. This variable is therefore incorporated with a positive sign.

The quality of sanitation services indicator refers to the percentage of the urban population with improved sanitation facilities that are not shared with other households. This indicator is highly correlated with urban planning since it can be shown that poor planning inevitably leads to sanitation problems in the short and medium term.

Also, from an urban planning and housing perspective, a city with proper urban planning generally presents few or no problems of household overcrowding because housing policy, in relation to the estimated growth of the urban population, is a determining factor in urban planning. Therefore, within the explanatory indicators of this dimension, the number of occupants in each household is included with a negative sign.

The number of completed buildings and the percentage of high-rises contribute to creating compact, organized cities. These variables are incorporated into the index with a positive sign.

**Table 7. Urban Planning Indicators**

| No. | Indicator  | Description / Unit of measurement   | Source                  |
|-----|--|---|-------------------------|
| 79  | Bike Advance   | Whether or not a city has a bike sharing system.  | The Bike Share Map      |
| 80  | Buildings  | The number of completed buildings in a city. The count includes structures such as high-rises, towers and low-rise buildings, but excludes other miscellaneous structures and buildings of different statuses (under construction, proposed, etc.). | Skyscraper Source Media |
| 81  | Bicycle stations   | Bicycle station locations in a city.  | Bike-Sharing World Map  |
| 82  | Electric charging stations   | Electric car charging points in a city.   | OpenStreetMap           |
| 83  | Number of people per household                                       | Average number of people per household.   | Euromonitor             |
| 84  | Percentage of the urban population with adequate sanitation services | Percentage of the urban population that uses at least basic sanitation services—that is, improved sanitation facilities that are not shared with other households.  | World Bank              |
| 85  | Artificial intelligence (AI) projects                                | Whether or not a city has AI projects.  | AI Localism             |
| 86  | High-rises   | Percentage of buildings classified as high-rises. A high-rise is a multi-floored building of at least 12 stories or 35 m in height (115 feet).  | Skyscraper Source Media |



Due to increasing use of electric cars, this year a variable that captures information on charging stations for vehicles of this kind in a city has been added.

AI is now playing a key role in improving the development of cities. Among other benefits, it is helping local authorities collect information about city inhabitants, thereby facilitating efficient management of resources. For example, a city that uses AI to reduce traffic problems is in a good position to solve its mobility problems. AI tools make it possible to collect traffic information in real time, predict traffic jams, improve mobility, and decongest key areas.

In light of these positive impacts, the number of AI projects underway in a city has been included in the calculation of the **CIMI** for the first time this year (with a positive sign).



## International profile

Cities that want to make progress must achieve a prominent position in the world. To maintain a high profile globally, they must improve their brand and level of international recognition through strategic tourism plans, by attracting foreign investment, and by ensuring that they are represented abroad.

Cities in the same country can vary in terms of the strength of their international profile, but a city's global stature is not independent of the degree of openness at the national level. This dimension is intended to reflect

such differences and measure the international profile of cities.

To this end, we have included the following indicators: airports, number of passengers per airport, number of hotels in a city, and number of meetings and congresses held (based on data from the International Congress and Convention Association, ICCA). This last of these indicators is important in relation to a city's international profile, given that events of this kind are generally held in cities with international hospitality services, specially equipped venues, frequent international flights, and adequate security measures. Given when the index was calculated, it should be noted that values for this indicator do not reflect the impact of the COVID-19 pandemic on events of this kind. The data source (ICCA) is working to incorporate these modifications in the near future.

**Table 8** shows the indicators for this dimension, a description of each one, their units of measurement, and the information sources used.

The higher the values for these indicators, the stronger a city's profile in the world. Therefore, all the indicators for this dimension are incorporated into the calculation of the **CIMI** with a positive sign. The Restaurant Price Index variable compares the price of restaurants in a city with prices in New York. As an indicator of international culinary variety, this variable is incorporated with a positive sign.

**Table 8. International Profile Indicators**

| No. | Indicator                         | Description / Unit of measurement   | Source  |
|-----|-----------------------------------|---|---|
| 87  | Number of passengers per airport  | Annual number of passengers per airport in thousands.   | Euromonitor                                       |
| 88  | Hotels                            | Number of hotels per capita.  | OpenStreetMap                                     |
| 89  | Restaurant Price Index            | The Restaurant Price Index compares the price of meals and drinks in restaurants and bars in a city to prices in New York City. | Numbeo  |
| 90  | McDonald's                        | Number of McDonald's establishments in a city.  | OpenStreetMap                                     |
| 91  | Number of congresses and meetings | Number of international congresses and meetings held in a city.   | International Congress and Convention Association |



## Technology

Though not the only important issue for cities, information and communication technologies (ICT) are part of the backbone of any society that aims to achieve “smart” status.

Technology, a dimension included in the **CIMI**, is an aspect of society that improves quality of life in the present, while the level of development or extent of ICT use is an indicator of current or potential quality of life. Technological development also allows cities to be sustainable over time and to maintain or further develop the competitive advantages of their production system and the quality of employment. A technologically backward city has comparative disadvantages with respect to others, in terms of security, education and health (all key to the sustainability of a society) and also with respect to its production system. If a city falls short in this dimension, production functions become outdated and, in the absence of protective measures, competitiveness is undermined, which has a negative impact on a city’s consumption and investment capacity and reduces labor productivity.

The indicators selected to measure the performance of cities in terms of the extent and growth of technology use are presented in **Table 9** below.

The indicators that represent the number of Twitter and LinkedIn users are combined in a variable called social media, which is incorporated into the **CIMI** with a positive sign since it shows the degree to which a city’s inhabitants are connected with technology.

The variables percentage of households with Internet, mobile phone penetration rate, and subscriptions to fixed telephony and broadband services show the degree of technological development in a city, given that these services provide households and businesses with the means required to make efficient use of technology.

The Innovation Cities Index (ICI) is calculated by considering various factors related to technological innovation in cities, in sectors such as health, the economy in general, and the broader population. The ICI, which has become the most comprehensive indicator for measuring the degree of innovation development in cities, is methodologically divided into three aspects or dimensions: cultural assets, human infrastructure and networked markets.

**Table 9. Technology Indicators**

| No. | Indicator                     | Description / Unit of measurement   | Source                                |
|-----|-------------------------------|---|---------------------------------------|
| 92  | Mobile broadband              | Active mobile broadband subscriptions.  | International Telecommunication Union |
| 93  | Innovation Cities Index       | The Innovation Cities Index (ICI) is a ranking of leading cities in innovation.                                       | 2thinknow                             |
| 94  | Internet                      | Percentage of households with Internet access.  | Euromonitor                           |
| 95  | LTE/WiMAX                     | Percentage of the population covered by at least an LTE/WiMAX mobile network.   | Euromonitor                           |
| 96  | Computers/PCs                 | Percentage of households with a personal computer.  | Euromonitor                           |
| 97  | Mobile phone penetration rate | Number of mobile phones per 100 inhabitants.  | International Telecommunication Union |
| 98  | Social media                  | Registered Twitter users in a city (in thousands of individuals) + number of registered LinkedIn members in the city. | Twitter and LinkedIn                  |
| 99  | Broadband subscriptions       | Broadband subscriptions per 100 inhabitants.  | International Telecommunication Union |
| 100 | Telephony                     | Percentage of households with some kind of telephone service.   | Euromonitor                           |
| 101 | Internet speed                | Fixed-line Internet speed in megabytes per second (country).  | World Population Review               |
| 102 | Mobile speed                  | Mobile speed in megabytes per second (country).   | World Population Review               |
| 103 | WiFi hotspots                 | Total number of WiFi hotspots. This variable represents options for connecting to the Internet in a city.             | WiFi Map app                          |



The total number of WiFi hotspots represents the connectivity options available to a city's inhabitants when they are away from home. This variable shows a city's level of commitment to technological development.

Together with those described above, the variables percentage of households with some type of telephone service, percentage of households with personal computers, Internet speed and mobile speed are intended to show the degree of technology penetration in a city. All these variables are incorporated into this dimension with a positive sign.

Finally, the LTE/WiMAX variable reflects the percentage of the population covered by at least an LTE/WiMAX mobile network. This variable is intended to more precisely capture the use of new technologies in cities and is incorporated into this dimension with a positive sign.

There is also a group of variables (see rows 104 to 114 of **Appendix 1**) that are related to population and to expenditure and income in cities. These variables were used in the analysis to group the cities into clusters for estimation purposes.

## Limitations of the Indicators

The geographic coverage and breadth of the **CIMI** dimensions pose certain challenges and problems, and the results should therefore be interpreted with caution. One of the most significant limitations of the indicators used to calculate the **CIMI** is data availability and comparability. It would be ideal to have data directly from original sources

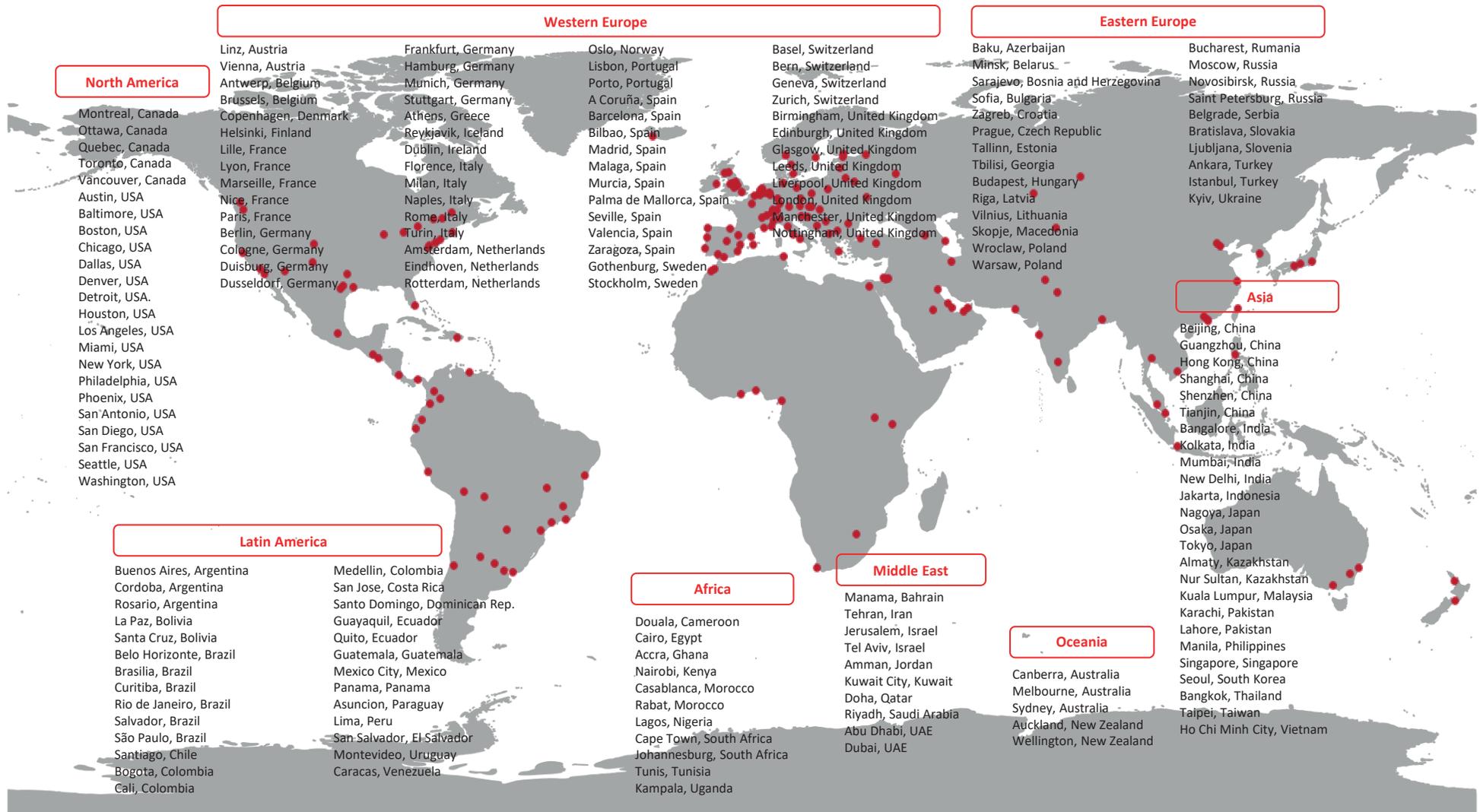
and for those data to be directly comparable. However, this is not feasible and we must rely on secondary data sources. Such sources have the advantage of offering indicators that are similar across cities, but they may not provide the desired level of precision. Moreover, the number of variables we include may not be sufficient to capture the complexity of each dimension, and the associated data are sometimes incomplete. We have tried to minimize the impact of these limitations. Thus, in developing the index, when data for a particular indicator were not available for the entire period analyzed, extrapolation techniques were used. When indicator values were available at the country level but not at the city level, individual values were assigned to each city by establishing a relationship to the values at the country level based on another variable, linked in theory to the city level. Finally, when data were not available for a given city or group of cities for the entire period considered, statistical clustering techniques were used. The scope and details of these tools are explained in detail in the supplementary report *IESE Cities in Motion Index: Metodología y modelización* (2014). A list of all the indicators used can also be found in **Appendix 1**.

At the **CIMI** platform, we continue working to obtain more comprehensive and accurate indicators. We also urge cities to allow access to the information they generate, given that analysis of such information will facilitate progress on aspects of cities where there is room for improvement.

## Geographic Coverage

For the calculation of the **CIMI**, 183 cities have been included, 85 of which are national capitals. Their geographic distribution is shown in **Figure 1** below.

**Figure 1. Geographic Distribution of Cities Included in the Index**





## Cities in Motion. Ranking

The **CIMI** is a composite indicator—a function based on the partial indicators available.

This composite indicator was created through the weighted aggregation of partial indicators representing each of the nine dimensions that make up the theoretical model that underpins the **CIMI**. The dimensions selected to describe the situation of cities in terms of sustainability and the quality of life of their inhabitants, both in the present and in the future, are as follows: governance, urban planning, technology, environment, international profile, social cohesion, human capital, mobility and transportation, and economy.

The partial indicators that represent each dimension are also composite indicators, which are defined as “weighted aggregations of each of the selected indicators representing various factors related to each dimension.”

Given the type of indicator and the data available, the DP2 method—the most widely used procedure internationally and, in our view, the most appropriate one for this analysis—was used to calculate the **CIMI**. The methodology is based on distance—that is, the difference between a given indicator value and another value taken as a benchmark or target. The method also seeks to correct dependence between partial indicators, which would artificially increase the sensitivity of an indicator to variations in certain partial values. The correction entails applying the same factor to each partial indicator on the assumption that there is a linear dependence function between them.

Given the partial indicators, the factors are given by the complement of the coefficient of determination ( $R^2$ ) for each indicator with respect to the rest of the partial indicators. The order in which the indicators for each

dimension were included and their relative weight in the **CIMI** are as follows: economy (1.000), human capital (0.508), international profile (0.533), urban planning (0.430), environment (0.333), technology (0.646), governance (0.726), social cohesion (0.538), and mobility and transportation (0.508).

While the order in which the composite index for each dimension is incorporated does influence the **CIMI** value, sensitivity studies carried out indicate that there are no significant variations in the index. For further details on the methodology applied, see the supplementary publication *IESE Cities in Motion Index: Metodología y modelización* (mentioned above).

**Table 10** shows the **CIMI** ranking of the cities and their index value. The cities are also grouped according to their performance, based on composite indicator values. The cities are classified by performance as follows: high (H) for cities with an index value over 90; relatively high (RH) for those in the 60–90 range; medium (M) for those in the 45–60 range; and low (L) for cities with an index value below 45.

For 2021, the performance of 31.69% (58) of the cities is classified as H or RH, and the top three cities are London, New York and Paris (in that order). The performance of 30.60% (56) of the cities is classified as M, and those classified as L account for 36.61% (67) of the selected cities. Finally, two cities (1.10%)—Karachi and Lagos—score very low this year. The category of cities with high or relatively high performance consists mostly of European and North American cities and capitals, while the low-performance category is mostly made up of African, Middle Eastern and Latin American cities.

**Table 10. Ranking of Cities**

| Ranking | City                        | Performance | ICIM   | Ranking | City                             | Performance | ICIM  |
|---------|-----------------------------|-------------|--------|---------|----------------------------------|-------------|-------|
| 1       | London - United Kingdom     | A           | 100.00 | 62      | Warsaw - Poland                  | M           | 59.48 |
| 2       | New York - USA              | A           | 98.25  | 63      | Dubai - United Arab Emirates     | M           | 59.15 |
| 3       | Paris - France              | RA          | 84.99  | 64      | Düsseldorf - Germany             | M           | 59.09 |
| 4       | Tokyo - Japan               | RA          | 80.30  | 65      | Rome - Italy                     | M           | 59.03 |
| 5       | Berlin - Germany            | RA          | 76.42  | 66      | Glasgow - United Kingdom         | M           | 59.01 |
| 6       | Washington - USA            | RA          | 74.27  | 67      | Brussels - Belgium               | M           | 58.67 |
| 7       | Singapore - Singapore       | RA          | 73.33  | 68      | Baltimore - USA                  | M           | 58.62 |
| 8       | Amsterdam - Netherlands     | RA          | 73.03  | 69      | Leeds - United Kingdom           | M           | 58.48 |
| 9       | Oslo - Norway               | RA          | 73.01  | 70      | Wellington - New Zealand         | M           | 57.26 |
| 10      | Copenhagen - Denmark        | RA          | 71.47  | 71      | Nottingham - United Kingdom      | M           | 57.14 |
| 11      | Munich - Germany            | RA          | 71.33  | 72      | Tallinn - Estonia                | M           | 56.64 |
| 12      | Seoul - South Korea         | RA          | 71.22  | 73      | Antwerp - Belgium                | M           | 56.63 |
| 13      | Chicago - USA               | RA          | 70.22  | 74      | Detroit - USA                    | M           | 56.38 |
| 14      | Zurich - Switzerland        | RA          | 69.96  | 75      | Santiago - Chile                 | M           | 56.23 |
| 15      | Vienna - Austria            | RA          | 69.20  | 76      | Marseille - France               | M           | 56.16 |
| 16      | San Francisco - USA         | RA          | 69.03  | 77      | Quebec - Canada                  | M           | 55.90 |
| 17      | Hamburg - Germany           | RA          | 69.00  | 78      | Lisbon - Portugal                | M           | 55.79 |
| 18      | Dublin - Ireland            | RA          | 68.42  | 79      | Phoenix - USA                    | M           | 55.69 |
| 19      | Rotterdam - Netherlands     | RA          | 68.40  | 80      | Nagoya - Japan                   | M           | 55.54 |
| 20      | Helsinki - Finland          | RA          | 68.12  | 81      | San Antonio - USA                | M           | 55.28 |
| 21      | Toronto - Canada            | RA          | 67.88  | 82      | Osaka - Japan                    | M           | 55.26 |
| 22      | Los Angeles - USA           | RA          | 67.83  | 83      | Nice - France                    | M           | 55.07 |
| 23      | Seattle - USA               | RA          | 67.69  | 84      | Lille - France                   | M           | 54.77 |
| 24      | Boston - USA                | RA          | 67.37  | 85      | Budapest - Hungary               | M           | 54.63 |
| 25      | Stockholm - Sweden          | RA          | 66.84  | 86      | Valencia - Spain                 | M           | 54.60 |
| 26      | Hong Kong - China           | RA          | 66.67  | 87      | Bratislava - Slovakia            | M           | 53.82 |
| 27      | Madrid - Spain              | RA          | 66.49  | 88      | Linz - Austria                   | M           | 53.81 |
| 28      | Bern - Switzerland          | RA          | 66.14  | 89      | Las Vegas - USA                  | M           | 53.66 |
| 29      | Basel - Switzerland         | RA          | 65.59  | 90      | Duisburg - Germany               | M           | 52.95 |
| 30      | Houston - USA               | RA          | 65.19  | 91      | Tel Aviv - Israel                | M           | 52.53 |
| 31      | Barcelona - Spain           | RA          | 65.13  | 92      | Istanbul - Turkey                | M           | 52.00 |
| 32      | Manchester - United Kingdom | RA          | 64.81  | 93      | Malaga - Spain                   | M           | 51.01 |
| 33      | Reykjavik - Iceland         | RA          | 64.73  | 94      | Riga - Latvia                    | M           | 50.75 |
| 34      | Taipei - Taiwan             | RA          | 64.64  | 95      | Seville - Spain                  | M           | 50.73 |
| 35      | Edinburgh - United Kingdom  | RA          | 63.67  | 96      | Vilnius - Lithuania              | M           | 50.68 |
| 36      | Sydney - Australia          | RA          | 63.41  | 97      | Turin - Italy                    | M           | 49.78 |
| 37      | Beijing - China             | RA          | 63.20  | 98      | Moscow - Russia                  | M           | 49.75 |
| 38      | Melbourne - Australia       | RA          | 63.07  | 99      | Ljubljana - Slovenia             | M           | 49.56 |
| 39      | Lyon - France               | RA          | 62.84  | 100     | Wroclaw - Poland                 | M           | 49.53 |
| 40      | Canberra - Australia        | RA          | 62.62  | 101     | Zagreb - Croatia                 | M           | 49.19 |
| 41      | Frankfurt - Germany         | RA          | 62.33  | 102     | Guangzhou - China                | M           | 48.29 |
| 42      | Miami - USA                 | RA          | 62.30  | 103     | Buenos Aires - Argentina         | M           | 48.25 |
| 43      | Prague - Czech Republic     | RA          | 62.26  | 104     | Florence - Italy                 | M           | 48.24 |
| 44      | Cologne - Germany           | RA          | 61.84  | 105     | Kuala Lumpur - Malaysia          | M           | 48.07 |
| 45      | Montreal - Canada           | RA          | 61.78  | 106     | Palma de Mallorca - Spain        | M           | 48.04 |
| 46      | Dallas - USA                | RA          | 61.38  | 107     | A Coruña - Spain                 | M           | 48.04 |
| 47      | Geneva - Switzerland        | RA          | 61.36  | 108     | Zaragoza - Spain                 | M           | 48.03 |
| 48      | Stuttgart - Germany         | RA          | 61.19  | 109     | Shenzhen - China                 | M           | 47.42 |
| 49      | Eindhoven - Netherlands     | RA          | 61.06  | 110     | Bilbao - Spain                   | M           | 47.31 |
| 50      | Ottawa - Canada             | RA          | 60.87  | 111     | Bucharest - Romania              | M           | 47.23 |
| 51      | Birmingham - United Kingdom | RA          | 60.77  | 112     | Murcia - Spain                   | M           | 46.05 |
| 52      | Austin - USA                | RA          | 60.74  | 113     | Porto - Portugal                 | M           | 45.88 |
| 53      | Gothenburg - Sweden         | RA          | 60.60  | 114     | Abu Dhabi - United Arab Emirates | M           | 45.76 |
| 54      | Denver - USA                | RA          | 60.59  | 115     | Mexico City - Mexico             | B           | 44.75 |
| 55      | Vancouver - Canada          | RA          | 60.48  | 116     | Jerusalem - Israel               | B           | 44.10 |
| 56      | Shanghai - China            | RA          | 60.41  | 117     | Kyiv - Ukraine                   | B           | 43.92 |
| 57      | Milan - Italy               | RA          | 60.33  | 118     | Bangkok - Thailand               | B           | 43.62 |
| 58      | San Diego - USA             | RA          | 60.18  | 119     | Sofia - Bulgaria                 | B           | 43.41 |
| 59      | Auckland - New Zealand      | M           | 59.84  | 120     | Panama - Panama                  | B           | 43.13 |
| 60      | Philadelphia - USA          | M           | 59.79  | 121     | Athens - Greece                  | B           | 42.44 |
| 61      | Liverpool - United Kingdom  | M           | 59.66  | 122     | Naples - Italy                   | B           | 41.90 |

**Table 10. Ranking of Cities (Continued)**

| Ranking | City                               | Performance | ICIM  |
|---------|------------------------------------|-------------|-------|
| 123     | Ankara - Turkey                    | B           | 41.44 |
| 124     | Belgrade - Serbia                  | B           | 41.42 |
| 125     | Doha - Qatar                       | B           | 40.29 |
| 126     | Montevideo - Uruguay               | B           | 39.77 |
| 127     | Tbilisi - Georgia                  | B           | 38.77 |
| 128     | Minsk - Belarus                    | B           | 38.71 |
| 129     | Almaty - Kazakhstan                | B           | 38.56 |
| 130     | São Paulo - Brazil                 | B           | 36.43 |
| 131     | Saint Petersburg - Russia          | B           | 35.98 |
| 132     | Bogota - Colombia                  | B           | 35.58 |
| 133     | Rosario - Argentina                | B           | 35.40 |
| 134     | Ho Chi Minh City - Vietnam         | B           | 35.31 |
| 135     | Cordoba - Argentina                | B           | 34.93 |
| 136     | Rio de Janeiro - Brazil            | B           | 34.42 |
| 137     | Tianjin - China                    | B           | 34.08 |
| 138     | Medellin - Colombia                | B           | 33.93 |
| 139     | Nur Sultan - Kazakhstan            | B           | 33.88 |
| 140     | Baku - Azerbaijan                  | B           | 33.80 |
| 141     | Cape Town - South Africa           | B           | 33.61 |
| 142     | Novosibirsk - Russia               | B           | 33.44 |
| 143     | Lima - Peru                        | B           | 32.88 |
| 144     | Santo Domingo - Dominican Republic | B           | 31.84 |
| 145     | Kuwait City - Kuwait               | B           | 31.29 |
| 146     | Sarajevo - Bosnia-Herzegovina      | B           | 31.05 |
| 147     | Skopje - Macedonia                 | B           | 30.97 |
| 148     | Cali - Colombia                    | B           | 29.89 |
| 149     | Delhi - India                      | B           | 29.72 |
| 150     | Riyadh - Saudi Arabia              | B           | 29.68 |
| 151     | Manama - Bahrain                   | B           | 29.67 |
| 152     | Jakarta - Indonesia                | B           | 29.48 |
| 153     | Curitiba - Brazil                  | B           | 28.89 |

| Ranking | City                        | Performance | ICIM  |
|---------|-----------------------------|-------------|-------|
| 154     | San Jose - Costa Rica       | B           | 28.85 |
| 155     | Quito - Ecuador             | B           | 28.66 |
| 156     | La Paz - Bolivia            | B           | 28.59 |
| 157     | San Salvador - El Salvador  | B           | 28.49 |
| 158     | Tunis - Tunisia             | B           | 28.23 |
| 159     | Brasilia - Brazil           | B           | 28.16 |
| 160     | Santa Cruz - Bolivia        | B           | 28.03 |
| 161     | Amman - Jordan              | B           | 27.59 |
| 162     | Mumbai - India              | B           | 27.47 |
| 163     | Rabat - Morocco             | B           | 27.46 |
| 164     | Johannesburg - South Africa | B           | 27.22 |
| 165     | Asuncion - Paraguay         | B           | 26.98 |
| 166     | Bangalore - India           | B           | 26.85 |
| 167     | Guayaquil - Ecuador         | B           | 26.45 |
| 168     | Tehran - Iran               | B           | 26.45 |
| 169     | Salvador - Brazil           | B           | 26.05 |
| 170     | Casablanca - Morocco        | B           | 25.81 |
| 171     | Nairobi - Kenya             | B           | 25.50 |
| 172     | Belo Horizonte - Brazil     | B           | 24.07 |
| 173     | Guatemala City - Guatemala  | B           | 23.87 |
| 174     | Kolkata - India             | B           | 21.88 |
| 175     | Douala - Cameroon           | B           | 21.00 |
| 176     | Manila - Philippines        | B           | 20.87 |
| 177     | Cairo - Egypt               | B           | 20.29 |
| 178     | Kampala - Uganda            | B           | 17.97 |
| 179     | Caracas - Venezuela         | B           | 15.50 |
| 180     | Lahore - Pakistan           | B           | 15.34 |
| 181     | Accra - Ghana               | B           | 13.98 |
| 182     | Karachi - Pakistan          | MB          | 11.48 |
| 183     | Lagos - Nigeria             | MB          | 4.65  |



## Cities in Motion: Ranking by Dimension

This section presents a ranking of cities according to the dimensions of the index, including each city's overall position and its rank in each dimension. The dark green shading corresponds to top positions in the **CIMI** ranking, and the dark red shading is used to indicate the bottom-ranking cities. Intermediate positions are shaded in yellow tones.

The ranking is headed by London and New York, two highly developed and smart cities. This year, London (UK) tops the overall ranking thanks to its performance in the dimensions of human capital (rank #1), international profile (#1), urban planning (#1), governance (#2), and mobility and transportation (#4). However, the city does not perform as well in the dimensions of social cohesion (rank #25) and environment (#17). Although London does not occupy a top position in these dimensions, it shows a marked improvement with respect to its rank in previous editions of the index. This progress reflects work being done to make it a smart city in all respects and improve its overall position.

For its part, New York City (USA) ranks second overall thanks to its performance in the dimensions of economy (rank #1), mobility and transportation (#1), urban planning (#2), human capital (#3) and international profile (#3). The city performs poorly in social cohesion (rank #121) and environment (#105), areas that the city's leaders are working to improve by 2050.

Paris ranks third overall. The city performs very well in international profile (rank #2), mobility and transportation (#3), and human capital (#5). It also ranks in the top 20 in the economy and governance dimensions.

**Table 11** shows the rank, overall and by dimension, of the 183 cities included in the index. This table is very important when it comes to analyzing the results as it shows the relative position of each city in each of the dimensions. **Figure 2** (below the table) shows the location of the cities on a world map.

**Table 11. Ranking by Dimension**

| City                        | Cities in Motion | Economy | Human capital | Social cohesion | Environment | Governance | Urban planning | International profile | Technology | Mobility and transportation |
|-----------------------------|------------------|---------|---------------|-----------------|-------------|------------|----------------|-----------------------|------------|-----------------------------|
| London - United Kingdom     | 1                | 7       | 1             | 25              | 17          | 2          | 1              | 1                     | 18         | 4                           |
| New York - USA              | 2                | 1       | 3             | 121             | 105         | 10         | 2              | 3                     | 6          | 1                           |
| Paris - France              | 3                | 9       | 5             | 67              | 49          | 17         | 34             | 2                     | 27         | 3                           |
| Tokyo - Japan               | 4                | 2       | 10            | 41              | 25          | 9          | 112            | 6                     | 9          | 62                          |
| Berlin - Germany            | 5                | 94      | 7             | 40              | 21          | 3          | 5              | 14                    | 39         | 7                           |
| Washington - USA            | 6                | 11      | 4             | 73              | 131         | 8          | 9              | 41                    | 7          | 37                          |
| Singapore - Singapore       | 7                | 20      | 40            | 31              | 78          | 24         | 26             | 4                     | 4          | 58                          |
| Amsterdam - Netherlands     | 8                | 38      | 35            | 48              | 14          | 40         | 13             | 18                    | 10         | 20                          |
| Oslo - Norway               | 9                | 25      | 18            | 21              | 2           | 11         | 33             | 37                    | 28         | 33                          |
| Copenhagen - Denmark        | 10               | 46      | 45            | 4               | 3           | 20         | 23             | 25                    | 22         | 31                          |
| Munich - Germany            | 11               | 62      | 39            | 8               | 18          | 48         | 8              | 42                    | 42         | 11                          |
| Seoul - South Korea         | 12               | 21      | 8             | 68              | 76          | 6          | 22             | 19                    | 25         | 41                          |
| Chicago - USA               | 13               | 10      | 13            | 103             | 118         | 34         | 25             | 10                    | 13         | 56                          |
| Zurich - Switzerland        | 14               | 17      | 25            | 13              | 22          | 16         | 69             | 31                    | 23         | 49                          |
| Vienna - Austria            | 15               | 77      | 34            | 83              | 11          | 22         | 11             | 20                    | 87         | 8                           |
| San Francisco - USA         | 16               | 5       | 28            | 101             | 132         | 46         | 14             | 33                    | 5          | 121                         |
| Hamburg - Germany           | 17               | 83      | 12            | 43              | 29          | 37         | 6              | 58                    | 57         | 13                          |
| Dublin - Ireland            | 18               | 6       | 93            | 49              | 42          | 70         | 56             | 29                    | 121        | 65                          |
| Rotterdam - Netherlands     | 19               | 56      | 76            | 39              | 38          | 42         | 4              | 90                    | 14         | 28                          |
| Helsinki - Finland          | 20               | 41      | 63            | 10              | 7           | 21         | 20             | 46                    | 49         | 42                          |
| Toronto - Canada            | 21               | 48      | 36            | 55              | 65          | 36         | 3              | 23                    | 47         | 113                         |
| Los Angeles - USA           | 22               | 4       | 6             | 72              | 161         | 12         | 36             | 11                    | 8          | 179                         |
| Seattle - USA               | 23               | 8       | 68            | 82              | 102         | 32         | 17             | 49                    | 12         | 81                          |
| Boston - USA                | 24               | 12      | 2             | 78              | 120         | 15         | 59             | 43                    | 29         | 109                         |
| Stockholm - Sweden          | 25               | 37      | 47            | 60              | 6           | 30         | 80             | 39                    | 16         | 19                          |
| Hong Kong - China           | 26               | 24      | 23            | 158             | 101         | 27         | 27             | 7                     | 1          | 69                          |
| Madrid - Spain              | 27               | 80      | 51            | 36              | 68          | 25         | 46             | 17                    | 40         | 6                           |
| Bern - Switzerland          | 28               | 39      | 79            | 6               | 26          | 1          | 70             | 73                    | 37         | 34                          |
| Basel - Switzerland         | 29               | 19      | 91            | 20              | 28          | 5          | 92             | 45                    | 51         | 53                          |
| Houston - USA               | 30               | 3       | 46            | 93              | 148         | 49         | 30             | 32                    | 11         | 138                         |
| Barcelona - Spain           | 31               | 109     | 33            | 71              | 67          | 28         | 15             | 24                    | 48         | 10                          |
| Manchester - United Kingdom | 32               | 34      | 31            | 37              | 39          | 69         | 28             | 66                    | 61         | 43                          |
| Reykjavik - Iceland         | 33               | 79      | 85            | 19              | 1           | 87         | 135            | 60                    | 80         | 64                          |

**Table 11. Ranking by Dimension (Continued)**

| City                         | Cities in Motion | Economy | Human capital | Social cohesion | Environment | Governance | Urban planning | International profile | Technology | Mobility and transportation |
|------------------------------|------------------|---------|---------------|-----------------|-------------|------------|----------------|-----------------------|------------|-----------------------------|
| Taipei - Taiwan              | 34               | 69      | 15            | 1               | 80          | 4          | 52             | 67                    | 68         | 27                          |
| Edinburgh - United Kingdom   | 35               | 42      | 11            | 2               | 10          | 62         | 106            | 47                    | 62         | 103                         |
| Sydney - Australia           | 36               | 52      | 19            | 11              | 52          | 18         | 119            | 13                    | 43         | 128                         |
| Beijing - China              | 37               | 28      | 37            | 66              | 173         | 68         | 32             | 16                    | 50         | 2                           |
| Melbourne - Australia        | 38               | 61      | 16            | 12              | 70          | 13         | 82             | 15                    | 44         | 120                         |
| Lyon - France                | 39               | 32      | 57            | 52              | 53          | 80         | 48             | 111                   | 54         | 21                          |
| Canberra - Australia         | 40               | 35      | 9             | 3               | 8           | 29         | 130            | 97                    | 71         | 83                          |
| Frankfurt - Germany          | 41               | 71      | 41            | 54              | 27          | 64         | 57             | 56                    | 55         | 18                          |
| Miami - USA                  | 42               | 22      | 14            | 110             | 152         | 51         | 49             | 21                    | 17         | 54                          |
| Prague - Czech Republic      | 43               | 121     | 32            | 45              | 15          | 65         | 41             | 35                    | 30         | 29                          |
| Cologne - Germany            | 44               | 95      | 22            | 29              | 51          | 58         | 37             | 82                    | 63         | 17                          |
| Montreal - Canada            | 45               | 72      | 50            | 32              | 50          | 83         | 10             | 40                    | 73         | 117                         |
| Dallas - USA                 | 46               | 13      | 21            | 90              | 121         | 53         | 146            | 38                    | 33         | 39                          |
| Geneva - Switzerland         | 47               | 27      | 98            | 42              | 55          | 19         | 90             | 44                    | 35         | 104                         |
| Stuttgart - Germany          | 48               | 75      | 52            | 14              | 16          | 109        | 44             | 105                   | 66         | 23                          |
| Eindhoven - Netherlands      | 49               | 57      | 107           | 9               | 13          | 44         | 50             | 102                   | 26         | 59                          |
| Ottawa - Canada              | 50               | 74      | 55            | 7               | 23          | 33         | 19             | 86                    | 103        | 89                          |
| Birmingham - United Kingdom  | 51               | 33      | 49            | 23              | 30          | 66         | 77             | 104                   | 99         | 61                          |
| Austin - USA                 | 52               | 23      | 24            | 76              | 113         | 50         | 40             | 93                    | 20         | 55                          |
| Gothenburg - Sweden          | 53               | 54      | 69            | 53              | 4           | 73         | 68             | 77                    | 41         | 72                          |
| Denver - USA                 | 54               | 14      | 38            | 99              | 136         | 56         | 60             | 48                    | 15         | 70                          |
| Vancouver - Canada           | 55               | 73      | 96            | 30              | 35          | 93         | 12             | 54                    | 75         | 94                          |
| Shanghai - China             | 56               | 40      | 29            | 47              | 163         | 121        | 109            | 9                     | 53         | 5                           |
| Milan - Italy                | 57               | 66      | 20            | 91              | 81          | 91         | 66             | 28                    | 90         | 16                          |
| San Diego - USA              | 58               | 16      | 30            | 74              | 125         | 14         | 102            | 50                    | 21         | 76                          |
| Auckland - New Zealand       | 59               | 60      | 64            | 26              | 32          | 39         | 75             | 61                    | 74         | 68                          |
| Philadelphia - USA           | 60               | 15      | 17            | 107             | 134         | 43         | 43             | 69                    | 19         | 119                         |
| Liverpool - United Kingdom   | 61               | 49      | 58            | 16              | 19          | 74         | 74             | 96                    | 78         | 91                          |
| Warsaw - Poland              | 62               | 105     | 62            | 86              | 72          | 7          | 24             | 64                    | 76         | 26                          |
| Dubai - United Arab Emirates | 63               | 100     | 143           | 27              | 156         | 60         | 7              | 12                    | 2          | 98                          |
| Düsseldorf - Germany         | 64               | 87      | 72            | 28              | 40          | 85         | 71             | 95                    | 67         | 14                          |
| Rome - Italy                 | 65               | 88      | 66            | 102             | 91          | 26         | 47             | 22                    | 102        | 24                          |
| Glasgow - United Kingdom     | 66               | 64      | 59            | 15              | 20          | 63         | 62             | 71                    | 83         | 112                         |

**Table 11. Ranking by Dimension (Continued)**

| City                        | Cities in Motion | Economy | Human capital | Social cohesion | Environment | Governance | Urban planning | International profile | Technology | Mobility and transportation |
|-----------------------------|------------------|---------|---------------|-----------------|-------------|------------|----------------|-----------------------|------------|-----------------------------|
| Brussels - Belgium          | 67               | 59      | 110           | 112             | 60          | 35         | 61             | 51                    | 94         | 15                          |
| Baltimore - USA             | 68               | 26      | 61            | 140             | 108         | 45         | 18             | 87                    | 46         | 66                          |
| Leeds - United Kingdom      | 69               | 36      | 53            | 24              | 43          | 72         | 96             | 115                   | 91         | 88                          |
| Wellington - New Zealand    | 70               | 84      | 26            | 5               | 5           | 38         | 138            | 118                   | 60         | 77                          |
| Nottingham - United Kingdom | 71               | 55      | 48            | 17              | 31          | 75         | 85             | 114                   | 89         | 118                         |
| Tallinn - Estonia           | 72               | 82      | 80            | 22              | 9           | 86         | 73             | 98                    | 70         | 85                          |
| Antwerp - Belgium           | 73               | 76      | 104           | 46              | 64          | 98         | 54             | 83                    | 119        | 25                          |
| Detroit - USA               | 74               | 29      | 27            | 138             | 143         | 57         | 21             | 88                    | 31         | 102                         |
| Santiago - Chile            | 75               | 58      | 75            | 100             | 75          | 71         | 55             | 59                    | 109        | 47                          |
| Marseille - France          | 76               | 43      | 101           | 58              | 69          | 81         | 95             | 110                   | 88         | 45                          |
| Quebec - Canada             | 77               | 78      | 88            | 18              | 36          | 52         | 45             | 119                   | 96         | 110                         |
| Lisbon - Portugal           | 78               | 122     | 125           | 69              | 61          | 84         | 39             | 26                    | 56         | 36                          |
| Phoenix - USA               | 79               | 18      | 60            | 95              | 135         | 61         | 94             | 53                    | 34         | 114                         |
| Nagoya - Japan              | 80               | 44      | 105           | 57              | 24          | 112        | 104            | 134                   | 36         | 78                          |
| San Antonio - USA           | 81               | 31      | 42            | 124             | 107         | 54         | 58             | 81                    | 38         | 107                         |
| Osaka - Japan               | 82               | 63      | 97            | 84              | 37          | 67         | 105            | 74                    | 24         | 87                          |
| Nice - France               | 83               | 47      | 102           | 79              | 62          | 92         | 100            | 78                    | 92         | 63                          |
| Lille - France              | 84               | 45      | 113           | 56              | 46          | 90         | 84             | 122                   | 97         | 84                          |
| Budapest - Hungary          | 85               | 107     | 43            | 122             | 71          | 77         | 29             | 62                    | 116        | 51                          |
| Valencia - Spain            | 86               | 125     | 109           | 50              | 47          | 41         | 65             | 107                   | 59         | 32                          |
| Bratislava - Slovakia       | 87               | 128     | 70            | 51              | 33          | 88         | 51             | 131                   | 126        | 35                          |
| Linz - Austria              | 88               | 102     | 84            | 34              | 12          | 119        | 81             | 113                   | 124        | 48                          |
| Las Vegas - USA             | 89               | 30      | 77            | 143             | 130         | 55         | 53             | 63                    | 32         | 130                         |
| Duisburg - Germany          | 90               | 113     | 81            | 35              | 34          | 107        | 86             | 121                   | 98         | 57                          |
| Tel Aviv - Israel           | 91               | 51      | 134           | 33              | 87          | 78         | 87             | 75                    | 86         | 127                         |
| Istanbul - Turkey           | 92               | 67      | 89            | 136             | 119         | 97         | 76             | 8                     | 112        | 122                         |
| Malaga - Spain              | 93               | 134     | 74            | 77              | 59          | 110        | 108            | 125                   | 82         | 22                          |
| Riga - Latvia               | 94               | 119     | 65            | 105             | 45          | 158        | 38             | 126                   | 128        | 52                          |
| Seville - Spain             | 95               | 133     | 99            | 81              | 58          | 104        | 64             | 133                   | 100        | 40                          |
| Vilnius - Lithuania         | 96               | 85      | 67            | 141             | 44          | 101        | 63             | 130                   | 113        | 93                          |
| Turin - Italy               | 97               | 99      | 83            | 109             | 85          | 123        | 78             | 99                    | 120        | 38                          |
| Moscow - Russia             | 98               | 91      | 44            | 134             | 146         | 103        | 91             | 30                    | 81         | 60                          |
| Ljubljana - Slovenia        | 99               | 98      | 95            | 59              | 48          | 116        | 101            | 106                   | 114        | 124                         |

**Table 11. Ranking by Dimension (Continued)**

| City                             | Cities in Motion | Economy | Human capital | Social cohesion | Environment | Governance | Urban planning | International profile | Technology | Mobility and transportation |
|----------------------------------|------------------|---------|---------------|-----------------|-------------|------------|----------------|-----------------------|------------|-----------------------------|
| Wroclaw - Poland                 | 100              | 110     | 73            | 111             | 82          | 94         | 31             | 149                   | 106        | 92                          |
| Zagreb - Croatia                 | 101              | 70      | 78            | 104             | 66          | 59         | 124            | 117                   | 115        | 115                         |
| Guangzhou - China                | 102              | 65      | 140           | 63              | 164         | 157        | 103            | 65                    | 45         | 12                          |
| Buenos Aires - Argentina         | 103              | 160     | 56            | 128             | 79          | 31         | 35             | 34                    | 131        | 135                         |
| Florence - Italy                 | 104              | 106     | 82            | 127             | 84          | 125        | 107            | 89                    | 107        | 46                          |
| Kuala Lumpur - Malaysia          | 105              | 68      | 114           | 85              | 142         | 135        | 120            | 36                    | 117        | 67                          |
| Palma de Mallorca - Spain        | 106              | 135     | 112           | 65              | 59          | 120        | 79             | 100                   | 77         | 106                         |
| A Coruña - Spain                 | 107              | 127     | 115           | 80              | 41          | 117        | 83             | 150                   | 52         | 95                          |
| Zaragoza - Spain                 | 108              | 123     | 106           | 70              | 59          | 127        | 154            | 135                   | 95         | 30                          |
| Shenzhen - China                 | 109              | 50      | 145           | 108             | 158         | 170        | 113            | 79                    | 65         | 9                           |
| Bilbao - Spain                   | 110              | 129     | 132           | 75              | 57          | 118        | 88             | 127                   | 79         | 73                          |
| Bucharest - Romania              | 111              | 93      | 100           | 125             | 89          | 124        | 111            | 94                    | 93         | 71                          |
| Murcia - Spain                   | 112              | 131     | 120           | 64              | 63          | 132        | 89             | 153                   | 85         | 96                          |
| Porto - Portugal                 | 113              | 137     | 139           | 62              | 56          | 79         | 141            | 109                   | 69         | 90                          |
| Abu Dhabi - United Arab Emirates | 114              | 81      | 156           | 44              | 172         | 96         | 72             | 84                    | 3          | 105                         |
| Mexico City - Mexico             | 115              | 117     | 54            | 116             | 167         | 82         | 42             | 55                    | 148        | 79                          |
| Jerusalem - Israel               | 116              | 86      | 144           | 87              | 83          | 113        | 122            | 80                    | 123        | 151                         |
| Kyiv - Ukraine                   | 117              | 149     | 86            | 173             | 92          | 47         | 16             | 138                   | 135        | 108                         |
| Bangkok - Thailand               | 118              | 136     | 108           | 113             | 145         | 149        | 174            | 5                     | 84         | 125                         |
| Sofia - Bulgaria                 | 119              | 146     | 90            | 144             | 86          | 76         | 134            | 136                   | 105        | 50                          |
| Panama - Panama                  | 120              | 53      | 149           | 94              | 104         | 150        | 125            | 85                    | 164        | 99                          |
| Athens - Greece                  | 121              | 101     | 87            | 179             | 94          | 128        | 150            | 52                    | 58         | 74                          |
| Naples - Italy                   | 122              | 118     | 118           | 132             | 88          | 156        | 136            | 108                   | 122        | 97                          |
| Ankara - Turkey                  | 123              | 90      | 116           | 133             | 114         | 111        | 131            | 155                   | 147        | 75                          |
| Belgrade - Serbia                | 124              | 92      | 94            | 145             | 90          | 130        | 165            | 124                   | 111        | 140                         |
| Doha - Qatar                     | 125              | 104     | 180           | 38              | 159         | 169        | 67             | 92                    | 64         | 86                          |
| Montevideo - Uruguay             | 126              | 171     | 128           | 96              | 54          | 100        | 117            | 128                   | 132        | 132                         |
| Tbilisi - Georgia                | 127              | 97      | 131           | 146             | 116         | 106        | 157            | 164                   | 129        | 82                          |
| Minsk - Belarus                  | 128              | 172     | 92            | 142             | 77          | 89         | 127            | 162                   | 138        | 80                          |
| Almaty - Kazakhstan              | 129              | 103     | 124           | 135             | 129         | 141        | 93             | 167                   | 149        | 123                         |
| São Paulo - Brazil               | 130              | 151     | 123           | 147             | 126         | 122        | 133            | 27                    | 127        | 177                         |
| Saint Petersburg - Russia        | 131              | 124     | 71            | 151             | 150         | 23         | 183            | 76                    | 110        | 101                         |
| Bogota - Colombia                | 132              | 116     | 103           | 174             | 100         | 102        | 181            | 68                    | 130        | 149                         |

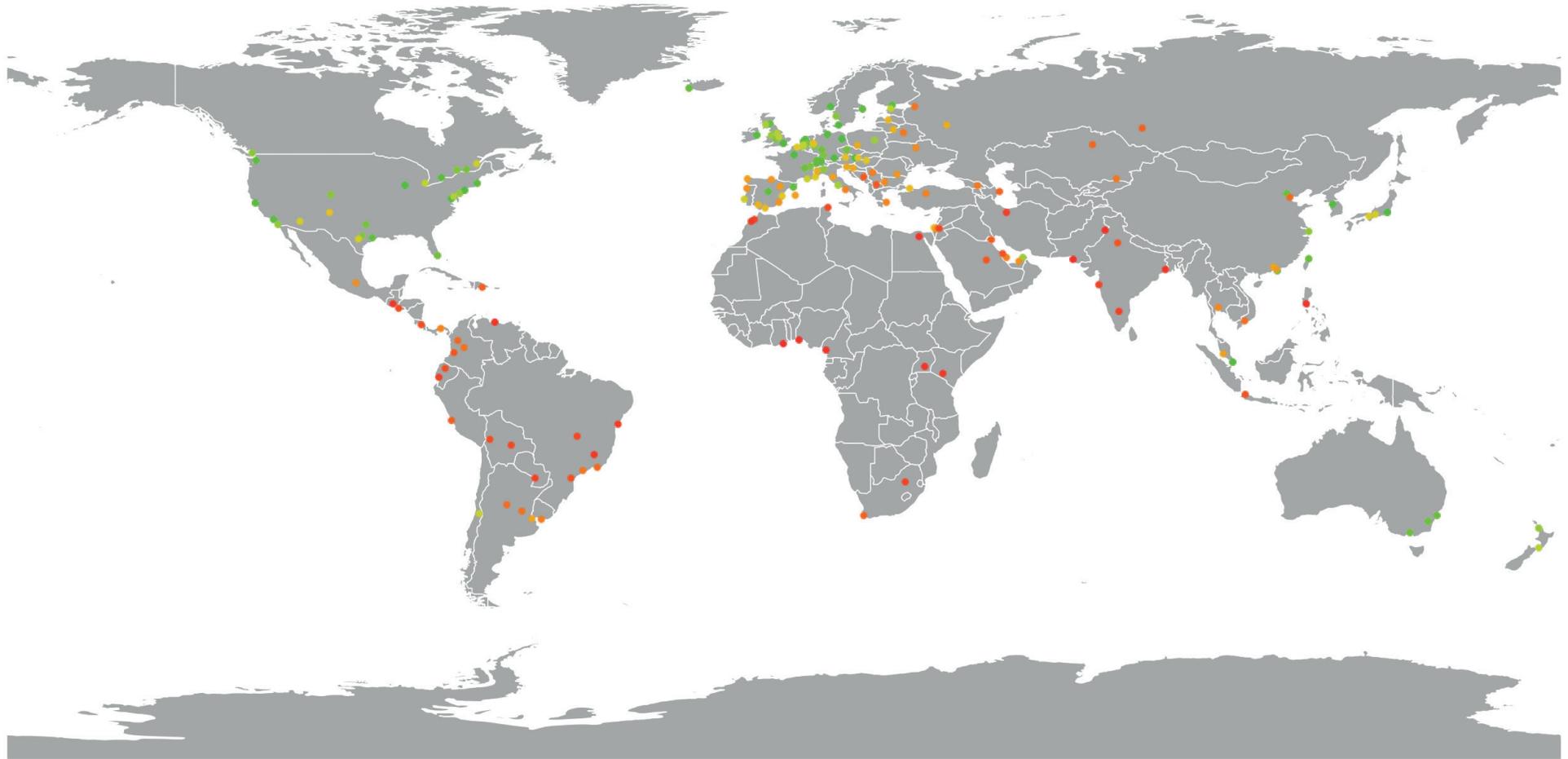
**Table 11. Ranking by Dimension (Continued)**

| City                               | Cities in Motion | Economy | Human capital | Social cohesion | Environment | Governance | Urban planning | International profile | Technology | Mobility and transportation |
|------------------------------------|------------------|---------|---------------|-----------------|-------------|------------|----------------|-----------------------|------------|-----------------------------|
| Rosario - Argentina                | 133              | 159     | 130           | 139             | 73          | 136        | 123            | 160                   | 141        | 167                         |
| Ho Chi Minh City - Vietnam         | 134              | 157     | 138           | 115             | 139         | 148        | 143            | 91                    | 125        | 126                         |
| Cordoba - Argentina                | 135              | 165     | 142           | 126             | 74          | 139        | 145            | 156                   | 144        | 133                         |
| Rio de Janeiro - Brazil            | 136              | 169     | 122           | 175             | 110         | 95         | 97             | 70                    | 143        | 157                         |
| Tianjin - China                    | 137              | 96      | 141           | 88              | 180         | 171        | 156            | 142                   | 104        | 44                          |
| Medellin - Colombia                | 138              | 115     | 146           | 155             | 95          | 138        | 172            | 148                   | 146        | 141                         |
| Astana - Kazakhstan                | 139              | 148     | 151           | 130             | 111         | 143        | 115            | 158                   | 152        | 137                         |
| Baku - Azerbaijan                  | 140              | 126     | 133           | 117             | 133         | 168        | 161            | 152                   | 140        | 146                         |
| Cape Town - South Africa           | 141              | 155     | 119           | 176             | 103         | 137        | 116            | 103                   | 137        | 172                         |
| Novosibirsk - Russia               | 142              | 140     | 117           | 162             | 149         | 114        | 155            | 177                   | 134        | 111                         |
| Lima - Peru                        | 143              | 89      | 126           | 154             | 153         | 153        | 158            | 129                   | 166        | 173                         |
| Santo Domingo - Dominican Republic | 144              | 120     | 160           | 118             | 127         | 162        | 129            | 163                   | 171        | 153                         |
| Kuwait City - Kuwait               | 145              | 156     | 181           | 97              | 154         | 154        | 110            | 151                   | 101        | 152                         |
| Sarajevo - Bosnia-Herzegovina      | 146              | 167     | 136           | 159             | 99          | 165        | 149            | 174                   | 155        | 100                         |
| Skopje - Macedonia                 | 147              | 150     | 148           | 149             | 115         | 126        | 173            | 175                   | 136        | 129                         |
| Cali - Colombia                    | 148              | 112     | 158           | 148             | 97          | 133        | 182            | 180                   | 151        | 160                         |
| Delhi - India                      | 149              | 108     | 153           | 169             | 176         | 108        | 144            | 57                    | 162        | 131                         |
| Riyadh - Saudi Arabia              | 150              | 132     | 173           | 131             | 160         | 142        | 175            | 145                   | 72         | 147                         |
| Manama - Bahrain                   | 151              | 138     | 179           | 61              | 165         | 177        | 99             | 139                   | 150        | 155                         |
| Jakarta - Indonesia                | 152              | 154     | 135           | 114             | 162         | 105        | 168            | 72                    | 133        | 181                         |
| Curitiba - Brazil                  | 153              | 173     | 162           | 156             | 93          | 129        | 164            | 171                   | 153        | 143                         |
| San Jose - Costa Rica              | 154              | 142     | 165           | 150             | 122         | 99         | 166            | 123                   | 139        | 182                         |
| Quito - Ecuador                    | 155              | 178     | 127           | 89              | 128         | 176        | 139            | 144                   | 168        | 159                         |
| La Paz - Bolivia                   | 156              | 153     | 157           | 119             | 98          | 175        | 151            | 179                   | 175        | 154                         |
| San Salvador - El Salvador         | 157              | 139     | 159           | 177             | 124         | 160        | 114            | 168                   | 161        | 144                         |
| Tunis - Tunisia                    | 158              | 158     | 166           | 129             | 138         | 152        | 153            | 181                   | 163        | 145                         |
| Brasilia - Brazil                  | 159              | 166     | 168           | 163             | 141         | 115        | 148            | 154                   | 157        | 134                         |
| Santa Cruz - Bolivia               | 160              | 152     | 150           | 98              | 96          | 180        | 167            | 170                   | 176        | 150                         |
| Amman - Jordan                     | 161              | 170     | 169           | 153             | 151         | 145        | 98             | 132                   | 167        | 164                         |
| Mumbai - India                     | 162              | 114     | 170           | 168             | 171         | 140        | 171            | 116                   | 159        | 116                         |
| Rabat - Morocco                    | 163              | 143     | 182           | 137             | 144         | 174        | 159            | 176                   | 108        | 166                         |
| Johannesburg - South Africa        | 164              | 145     | 129           | 181             | 155         | 161        | 152            | 120                   | 142        | 165                         |
| Asuncion - Paraguay                | 165              | 168     | 152           | 106             | 106         | 164        | 178            | 165                   | 170        | 139                         |

**Table 11. Ranking by Dimension (Continued)**

| City                       | Cities in Motion | Economy | Human capital | Social cohesion | Environment | Governance | Urban planning | International profile | Technology | Mobility and transportation |
|----------------------------|------------------|---------|---------------|-----------------|-------------|------------|----------------|-----------------------|------------|-----------------------------|
| Bangalore - India          | 166              | 111     | 155           | 123             | 175         | 131        | 177            | 112                   | 165        | 175                         |
| Guayaquil - Ecuador        | 167              | 179     | 163           | 92              | 112         | 173        | 163            | 159                   | 169        | 148                         |
| Tehran - Iran              | 168              | 174     | 121           | 180             | 147         | 147        | 121            | 147                   | 145        | 171                         |
| Salvador - Brazil          | 169              | 175     | 147           | 164             | 123         | 159        | 147            | 172                   | 160        | 163                         |
| Casablanca - Morocco       | 170              | 141     | 175           | 157             | 157         | 179        | 160            | 161                   | 118        | 158                         |
| Nairobi - Kenya            | 171              | 144     | 171           | 160             | 140         | 151        | 118            | 146                   | 180        | 180                         |
| Belo Horizonte - Brazil    | 172              | 176     | 161           | 167             | 117         | 134        | 176            | 173                   | 156        | 170                         |
| Guatemala City - Guatemala | 173              | 147     | 164           | 161             | 170         | 167        | 128            | 143                   | 179        | 169                         |
| Kolkata - India            | 174              | 130     | 167           | 171             | 169         | 144        | 162            | 169                   | 174        | 178                         |
| Douala - Cameroon          | 175              | 180     | 174           | 120             | 137         | 182        | 140            | 140                   | 182        | 161                         |
| Manila - Philippines       | 176              | 164     | 137           | 172             | 177         | 155        | 169            | 101                   | 158        | 176                         |
| Cairo - Egypt              | 177              | 181     | 154           | 170             | 166         | 178        | 132            | 141                   | 154        | 174                         |
| Kampala - Uganda           | 178              | 163     | 183           | 152             | 174         | 172        | 142            | 166                   | 177        | 162                         |
| Caracas - Venezuela        | 179              | 182     | 111           | 183             | 109         | 166        | 179            | 137                   | 181        | 136                         |
| Lahore - Pakistan          | 180              | 161     | 178           | 165             | 179         | 183        | 126            | 183                   | 178        | 142                         |
| Accra - Ghana              | 181              | 183     | 177           | 166             | 168         | 146        | 170            | 157                   | 173        | 156                         |
| Karachi - Pakistan         | 182              | 162     | 176           | 182             | 181         | 181        | 137            | 182                   | 172        | 168                         |
| Lagos - Nigeria            | 183              | 177     | 172           | 178             | 178         | 163        | 180            | 178                   | 183        | 183                         |

**Figure 2. Map of Cities in the CIMI Ranking**



**Table 12** shows the top 10 positions in the ranking for each dimension. This makes it easier to see the extent to which particular regions are represented in each dimension.

**Table 12. Top 10 by Dimension**

|  |  |  |
|---|---|---|
| <b>ECONOMY</b>  | <b>HUMAN CAPITAL</b>  | <b>SOCIAL COHESION</b>  |
| 1 <b>New York</b> - USA   | 1 <b>London</b> - United Kingdom  | 1 <b>Taipei</b> - Taiwan  |
| 2 <b>Tokyo</b> - Japan  | 2 <b>Boston</b> - USA   | 2 <b>Edinburgh</b> - United Kingdom   |
| 3 <b>Houston</b> - USA  | 3 <b>New York</b> - USA   | 3 <b>Canberra</b> - Australia   |
| 4 <b>Los Angeles</b> - USA  | 4 <b>Washington</b> - USA   | 4 <b>Copenhagen</b> - Denmark   |
| 5 <b>San Francisco</b> - USA  | 5 <b>Paris</b> - France   | 5 <b>Wellington</b> - New Zealand   |
| 6 <b>Dublin</b> - Ireland   | 6 <b>Los Angeles</b> - USA  | 6 <b>Bern</b> - Switzerland   |
| 7 <b>London</b> - United Kingdom  | 7 <b>Berlin</b> - Germany   | 7 <b>Ottawa</b> - Canada  |
| 8 <b>Seattle</b> - USA  | 8 <b>Seoul</b> - South Korea  | 8 <b>Munich</b> - Germany   |
| 9 <b>Paris</b> - France   | 9 <b>Canberra</b> - Australia   | 9 <b>Eindhoven</b> - Netherlands  |
| 10 <b>Chicago</b> - USA   | 10 <b>Tokyo</b> - Japan   | 10 <b>Helsinki</b> - Finland  |

Although the indexes are not comparable from one edition to the next, New York City (USA) continues to lead the ranking in this dimension, particularly because of its high GDP and the number of headquarters of publicly traded companies. While its indicator values make the city hard to beat at the moment, Tokyo and other American cities are not far behind.

The top 10 in this dimension includes six US cities, mainly due to their high GDP per capita and the growth they have experienced in recent years. Tokyo, Dublin, London and Paris also hold top positions in the economy dimension. Dublin's strong GDP growth during the period 2019–21 has positioned it as the second-ranked city in Europe and made it stand out strongly in this dimension.

It is important to stress the great variability shown by some cities in this dimension for the period analyzed. The COVID-19 effect caused ups and downs from one year to the next in both growth forecasts and GDP. This directly affects the ranking for this dimension.

The top position in the human capital dimension is held by London (UK), which has achieved this status because it has the largest number of top-level business schools and the largest number of universities in the world's top 500. The city also has a large number of secondary schools (both public and private), a high proportion of people with secondary and higher education, and a wide range of cultural offerings in theaters, museums and art galleries.

American cities also perform well in this dimension, with four in the top 10, along with three European and two Asian cities.

Taipei leads this year's social cohesion ranking. The city stands out especially for its high tolerance for diversity. Taipei creates a very friendly environment for women, the LGBT community and racial diversity. Over the last few years, the Expat Insider survey has ranked Taipei as the most expat-friendly city in the world: 94% of expats rate the overall friendliness of local residents positively (compared to 62% globally).

Copenhagen and Wellington are also in the top 10 in this dimension. These cities were ranked among the top 10 in the 2021 Liveability Index (produced by the Economist Intelligence Unit). They also have one of the highest happiness scores in the world and the highest rating as a favorable environment for women to pursue their lives. In this dimension, six of the top 10 cities are European. No US cities stand out in this ranking.

**Table 12. Top 10 by Dimension (Continued)**

| <br><b>ENVIRONMENT</b>   | <br><b>GOVERNANCE</b>  | <br><b>URBAN PLANNING</b>  |
|---|---|---|
| <ol style="list-style-type: none"> <li>1 <b>Reykjavik</b> - Iceland</li> <li>2 <b>Oslo</b> - Norway</li> <li>3 <b>Copenhagen</b> - Denmark</li> <li>4 <b>Gothenburg</b> - Sweden</li> <li>5 <b>Wellington</b> - New Zealand</li> <li>6 <b>Stockholm</b> - Sweden</li> <li>7 <b>Helsinki</b> - Finland</li> <li>8 <b>Canberra</b> - Australia</li> <li>9 <b>Tallinn</b> - Estonia</li> <li>10 <b>Edinburgh</b> - United Kingdom</li> </ol> | <ol style="list-style-type: none"> <li>1 <b>Bern</b> - Switzerland</li> <li>2 <b>London</b> - United Kingdom</li> <li>3 <b>Berlin</b> - Germany</li> <li>4 <b>Taipei</b> - Taiwan</li> <li>5 <b>Basel</b> - Switzerland</li> <li>6 <b>Seoul</b> - South Korea</li> <li>7 <b>Warsaw</b> - Poland</li> <li>8 <b>Washington</b> - USA</li> <li>9 <b>Tokyo</b> - Japan</li> <li>10 <b>New York</b> - USA</li> </ol> | <ol style="list-style-type: none"> <li>1 <b>London</b> - United Kingdom</li> <li>2 <b>New York</b> - USA</li> <li>3 <b>Toronto</b> - Canada</li> <li>4 <b>Rotterdam</b> - Netherlands</li> <li>5 <b>Berlin</b> - Germany</li> <li>6 <b>Hamburg</b> - Germany</li> <li>7 <b>Dubai</b> - United Arab Emirates</li> <li>8 <b>Munich</b> - Germany</li> <li>9 <b>Washington</b> - USA</li> <li>10 <b>Montreal</b> - Canada</li> </ol> |

Once again, this year, the city of Reykjavik (Iceland) leads the ranking in this dimension, followed by Oslo (Norway) and Copenhagen (Denmark). These cities rank very highly on the Environmental Performance Index (EPI) and have low pollution rates. The Icelandic capital also stands out for its water and renewable energy sources. This is another dimension in which no US city ranks high.

The top position in this dimension is occupied by Bern (Switzerland), which performs well in the Corruption Perceptions Index, reserves per capita, and number of embassies. The top 10 for this ranking includes three other Western European and two US cities.

This year, London ranks first in urban planning, taking the top position from New York, which is relegated to second place. The English city stands out for having a large number of electric car charging stations, its AI projects, and its infrastructure, with a large number of buildings and high-rises and a very advanced system for bicycle rental/shared use. It is also noteworthy that four of the top 10 cities in this dimension are North American, and two—Toronto and Montreal—are Canadian.

**Table 12. Top 10 by Dimension (Continued)**



**INTERNATIONAL PROFILE**

- 1 **London** - United Kingdom
- 2 **Paris** - France
- 3 **New York** - USA
- 4 **Singapore** - Singapore
- 5 **Bangkok** - Thailand
- 6 **Tokyo** - Japan
- 7 **Hong Kong** - China
- 8 **Istanbul** - Turkey
- 9 **Shanghai** - China
- 10 **Chicago** - USA



**TECHNOLOGY**

- 1 **Hong Kong** - China
- 2 **Dubai** - United Arab Emirates
- 3 **Abu Dhabi** - United Arab Emirates
- 4 **Singapore** - Singapore
- 5 **San Francisco** - USA
- 6 **New York** - USA
- 7 **Washington** - USA
- 8 **Los Angeles** - USA
- 9 **Tokyo** - Japan
- 10 **Amsterdam** - Netherlands



**MOBILITY AND TRANSPORTATION**

- 1 **New York** - USA
- 2 **Beijing** - China
- 3 **Paris** - France
- 4 **London** - United Kingdom
- 5 **Shanghai** - China
- 6 **Madrid** - Spain
- 7 **Berlin** - Germany
- 8 **Vienna** - Austria
- 9 **Shenzhen** - China
- 10 **Barcelona** - Spain

London is the top city in this dimension, while Paris and New York rank second and third, respectively. London stands out for its large number of hotels and the number of international meetings held in the city. It also has the highest number of airline passengers, which is consistent with its status as the city with the largest number of air routes. Paris shows very similar performance to the British capital in terms of the number of hotels and is one of the cities where most international meetings are held.

This year's top 10 for this dimension includes cities that had not previously attained this level. It is important to bear in mind the effect of the pandemic. Not all countries were affected equally. Many that previously occupied top positions were affected by restrictions related to COVID-19, the gradual opening of borders, and other pandemic-related factors.

Hong Kong ranks first in the technology dimension this year, followed by Dubai. Hong Kong stands out in terms of the number of mobile phones per capita (99.8% of the city's population has at least one). Similarly, 99.3% of the population is covered by at least an LTE/WiMAX mobile network.

In second place is Dubai, which has been a test city for automation technology since 2017. Drones, robots and autonomous vehicles are part of everyday life in the city, which stands out for the high level of mobile connectivity of its inhabitants and the number of WiFi hotspots.

New York is the top-ranked city in this dimension. It has a highly developed subway system, with the largest number of stations. The city also has a good system for bicycle, scooter and moped rental, and ranks fifth in number of inbound air routes. Beijing and Paris rank second and third, respectively. Beijing stands out for its great subway system, which is among the world's best in terms of length and the number of stations. For its part, Paris is second in number of inbound air routes and has a well-developed bicycle sharing system. Six European cities, including Madrid and Barcelona, hold top 10 positions in this ranking.



**“City resilience will take on unprecedented significance in urban agendas, but it can only be achieved if all social actors—the public sector, private companies, civic organizations and academic institutions—contribute and collaborate to reach this shared goal.”**

Pascual Berrone

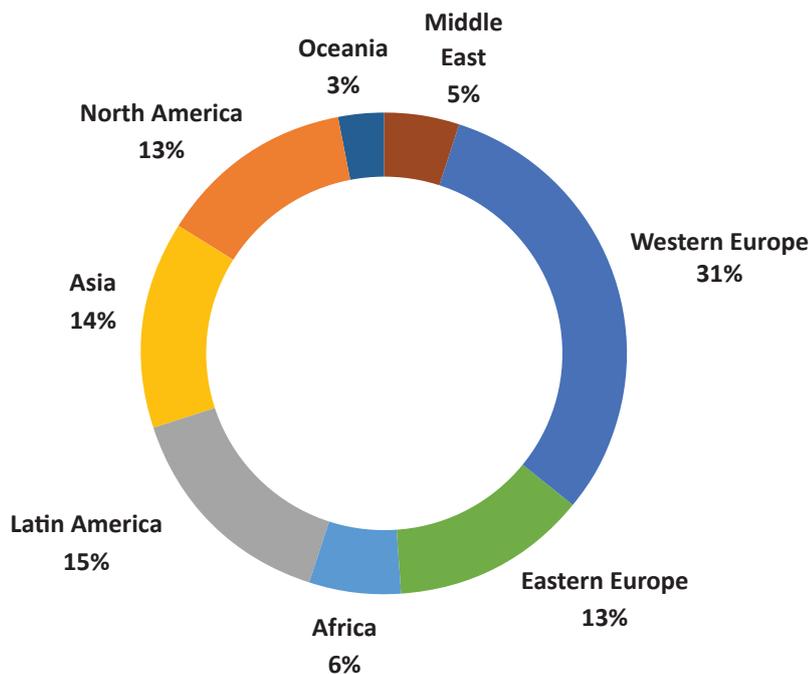


## Cities in Motion: Regional Distribution

In this section, we discuss the index results by geographic region. One of the limitations of our index is that it does not provide equal coverage for all regions. This is mainly due to the limited information available for certain regions in the case of cities that are not capitals or that do not have a significant population. Despite this limitation, each new edition of the **CIMI** aims to expand its coverage in order to achieve greater balance if new information is available.

In this regard, **Figure 3** shows the extent to which each region is represented in the ranking. As this chart shows, 31% of the cities covered are in Western Europe, which is the most represented region, followed by Latin America (15% of the cities), and Asia and Eastern Europe (13% in each case). Nine new cities have been included this year, including two in Africa (Kampala and Accra), one in the Middle East (Tehran), Canberra (the Australian capital), and Nur-Sultan in Asia. These additions are intended to

**Figure 3. Percentage of Cities in Each Geographic Region in the CIMI**



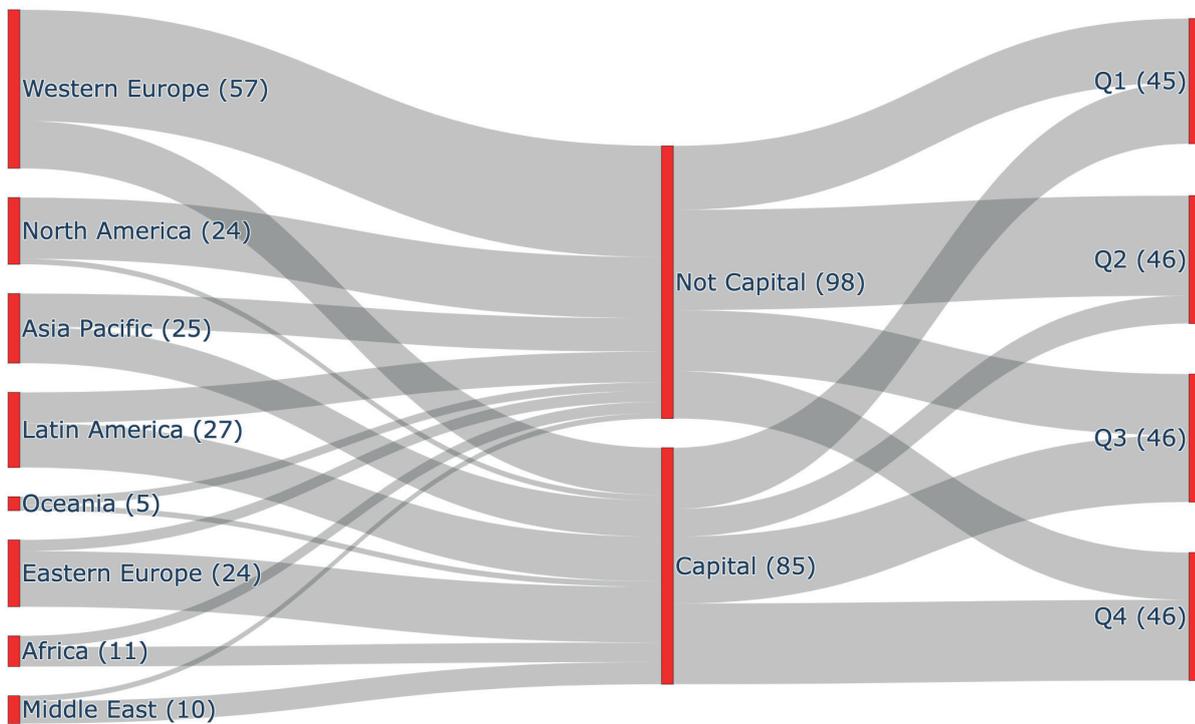
increase representation of some of the regions included the index and expand its coverage.

**Figure 4** below shows the distribution of cities by geographic region (left), whether or not they are capitals of a country (center), and their position in the ranking (right). For the grouping by position in the ranking, the cities are classified as Q1, Q2, Q3 or Q4. The Q1 group is composed of the top 25% of cities in the ranking, and the Q4 group is composed of the worst-performing 25%. The most represented region is Western Europe, with 57 cities, 33% of those included in the ranking. It is followed

by Latin America, with 27 (15% of the total), and Eastern Europe and Asia, with 24 and 25 cities respectively (13% and 14% of the total). As the chart shows, most of the cities in Western Europe and North America are not country capitals. In contrast, most of Eastern European and Middle Eastern cities included in the ranking are capitals.

Finally, the cities that are not country capitals are most represented in the Q2 group, which is made up of those that occupy positions 46 to 91 in the **CIMI** ranking.

**Figure 4. Type of City by Region and Rank**



An aerial, top-down view of a city street. The street is marked with a grid of white lines, and the ground is a mix of light and dark grey. Numerous people are walking in various directions across the street. The lighting is bright, creating strong shadows. The overall scene is a busy urban environment.

**“The current health crisis reminds us that cities are about people and therefore about human development. This crisis will change people’s real needs, and cities will have to change their urban policies and strategies accordingly.”**

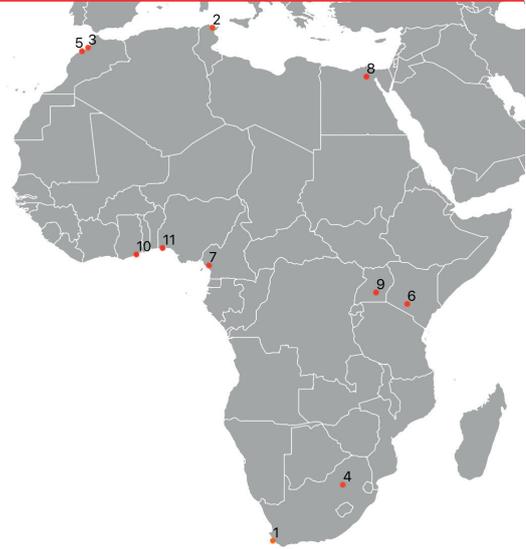
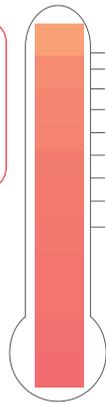
Joan Enric Ricart

# Cities in Motion. Regional Ranking

Below we present a series of tables that show the top 5 cities in each region and their evolution in the overall ranking over the last three years. The accompanying maps show the location of each city in that region. The colors indicate each city's overall rank.

## Top 5 Africa

- 01- Cape Town
- 02- Tunis
- 03- Rabat
- 04- Johannesburg
- 05- Casablanca
- 06- Nairobi
- 07- Douala
- 08- Cairo
- 09- Kampala
- 10- Accra
- 11- Lagos

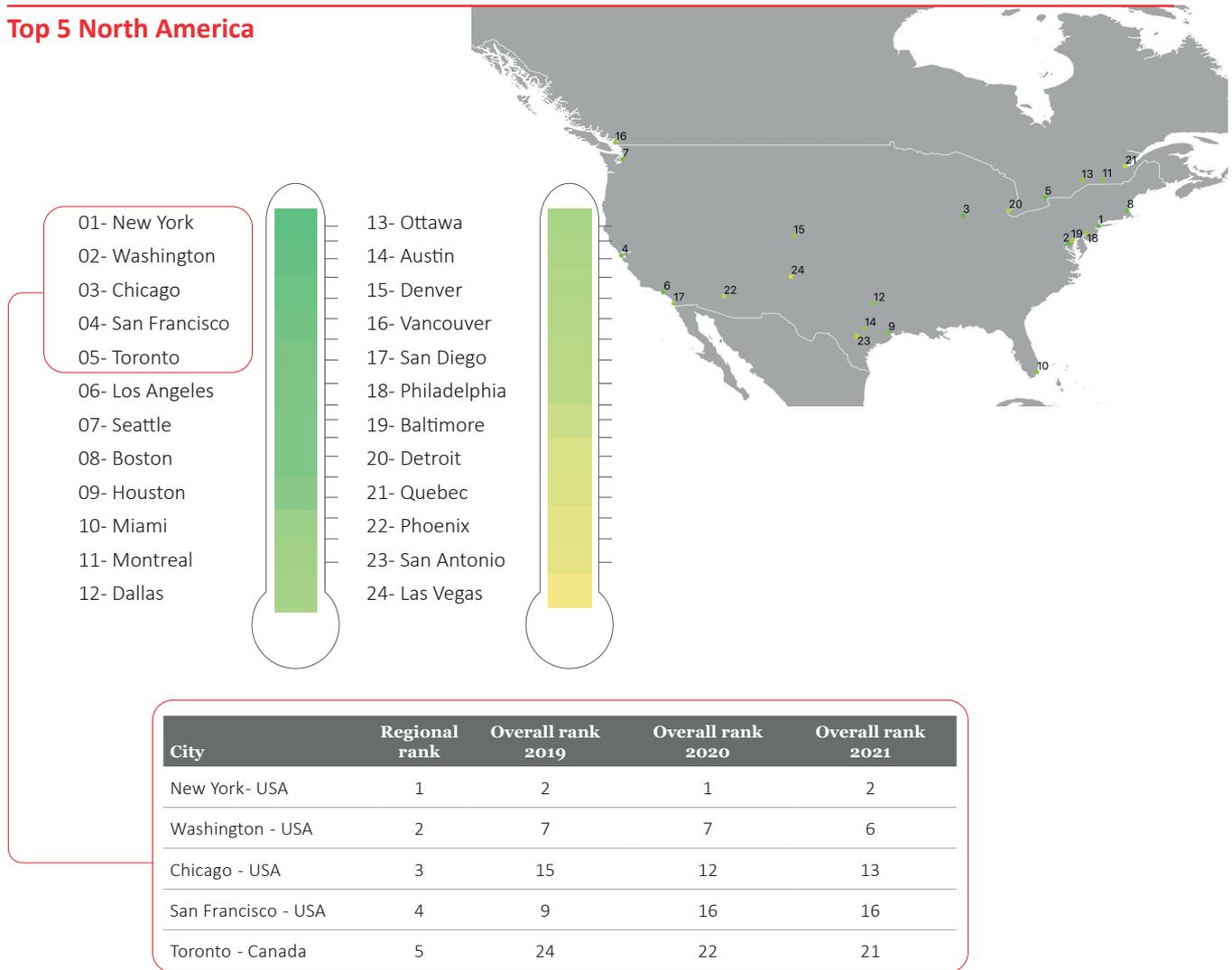


| City                        | Regional rank | Overall rank 2019 | Overall rank 2020 | Overall rank 2021 |
|-----------------------------|---------------|-------------------|-------------------|-------------------|
| Cape Town - South Africa    | 1             | 142               | 133               | 141               |
| Tunis - Tunisia             | 2             | 152               | 158               | 158               |
| Rabat - Morocco             | 3             | 161               | 165               | 163               |
| Johannesburg - South Africa | 4             | 162               | 162               | 164               |
| Casablanca - Morocco        | 5             | 164               | 168               | 170               |

Cape Town tops the ranking for Africa, followed by Tunis. Rabat, Johannesburg and Casablanca occupy the remaining top 5 positions. All the African cities included in the index are at the bottom of the overall ranking. This year, two new cities, Accra and Kampala, were added to increase representation of the Africa region.

Although the Africa region was not as badly affected by the pandemic as initially expected, the health crisis has had very serious consequences in economic, political and social terms, and the region will need to make an even greater effort to improve its current situation.

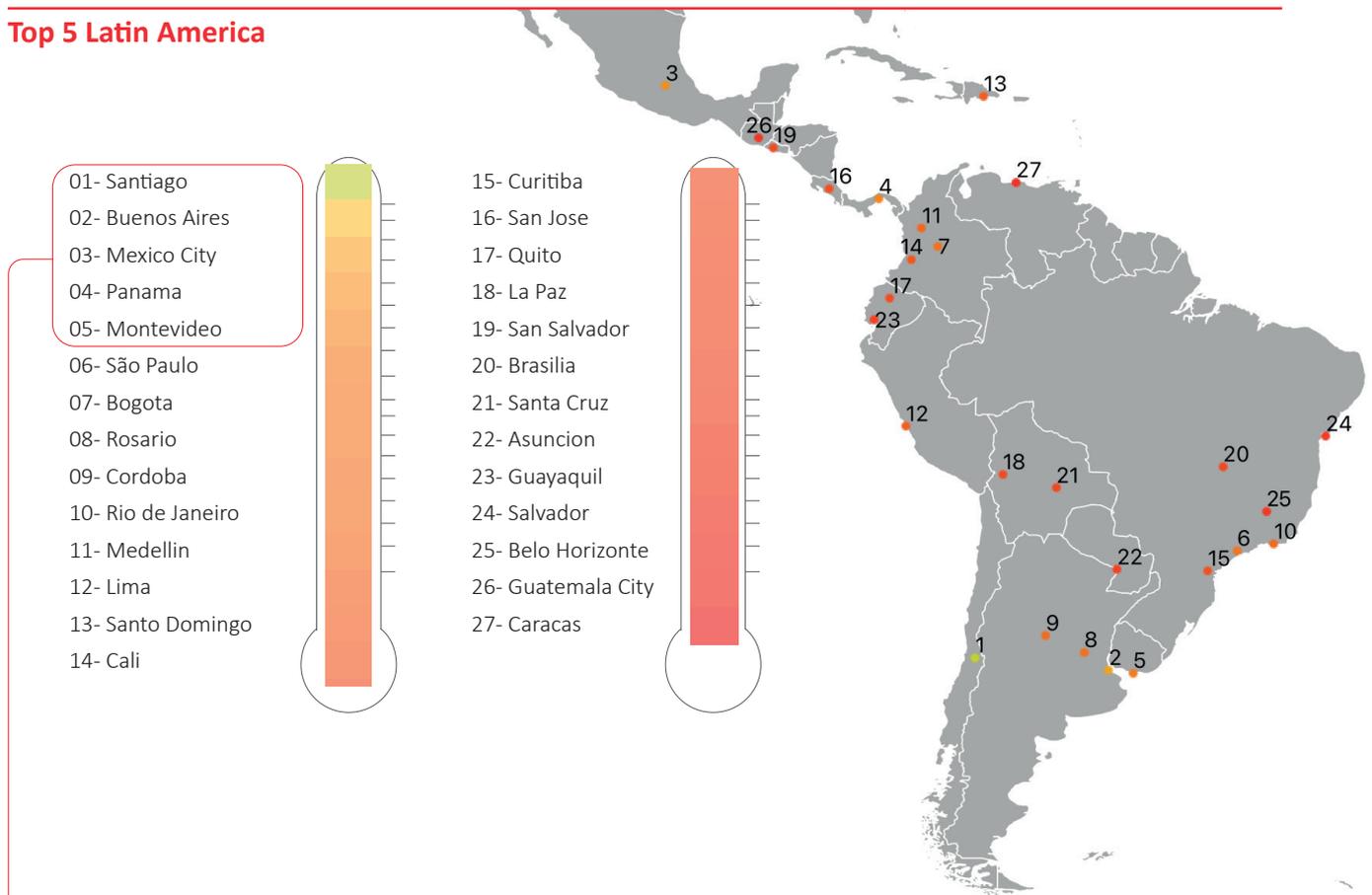
## Top 5 North America



New York tops the ranking for North America and ranks second overall. It is followed this year by Washington, which ranks sixth overall, ahead of Chicago, which ranks 13th. The regional top 5 is rounded out by San Francisco and the Canadian city of Toronto.

As the table above shows, North American cities occupy prominent positions in the overall ranking. This year, three new US cities (Austin, Detroit and Las Vegas) have been added to the ranking, bringing the total to 19. All of them rank highly, especially in the economy dimension, where they are in the top 30.

## Top 5 Latin America



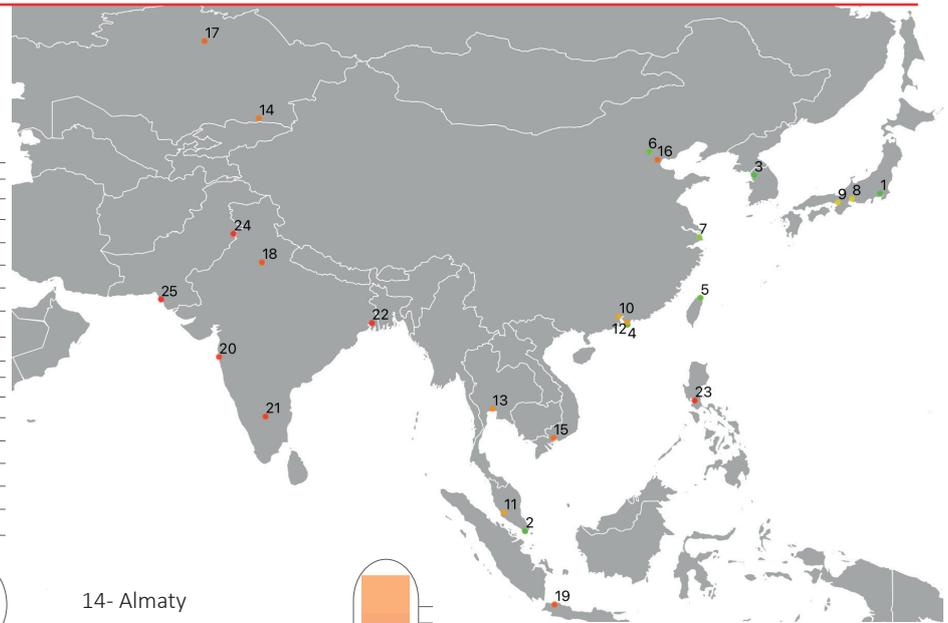
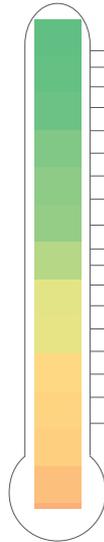
| City                     | Regional rank | Overall rank 2019 | Overall rank 2020 | Overall rank 2021 |
|--------------------------|---------------|-------------------|-------------------|-------------------|
| Santiago - Chile         | 1             | 92                | 95                | 75                |
| Buenos Aires - Argentina | 2             | 113               | 111               | 103               |
| Mexico City - Mexico     | 3             | 119               | 120               | 115               |
| Panama - Panama          | 4             | 128               | 142               | 120               |
| Montevideo - Uruguay     | 5             | 120               | 119               | 126               |

Over the years, two cities have vied for the top position in the regional ranking for Latin America. In the current edition, Santiago (Chile) outperforms Buenos Aires (Argentina) in mobility and transportation, social cohesion, and especially in the economy dimension, where the Argentine capital's poor performance places it well below Santiago. Buenos Aires performs better than Santiago in governance, urban planning and international profile. Mexico City, Panama and Montevideo also perform well in the region ranking.

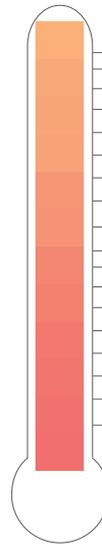
As the table above shows, most of the Latin American cities do not occupy top positions in the overall ranking. Santiago is the exception. Latin America is one of the regions with the highest urban concentration on the planet, so the challenges facing these cities are increasingly global, and there are problems they all share, particularly in the wake of the pandemic.

## Top 5 Asia Pacific

- 01- Tokyo
- 02- Singapore
- 03- Seoul
- 04- Hong Kong
- 05- Taipei
- 06- Beijing
- 07- Shanghai
- 08- Nagoya
- 09- Osaka
- 10- Guangzhou
- 11- Kuala Lumpur
- 12- Shenzhen
- 13- Bangkok



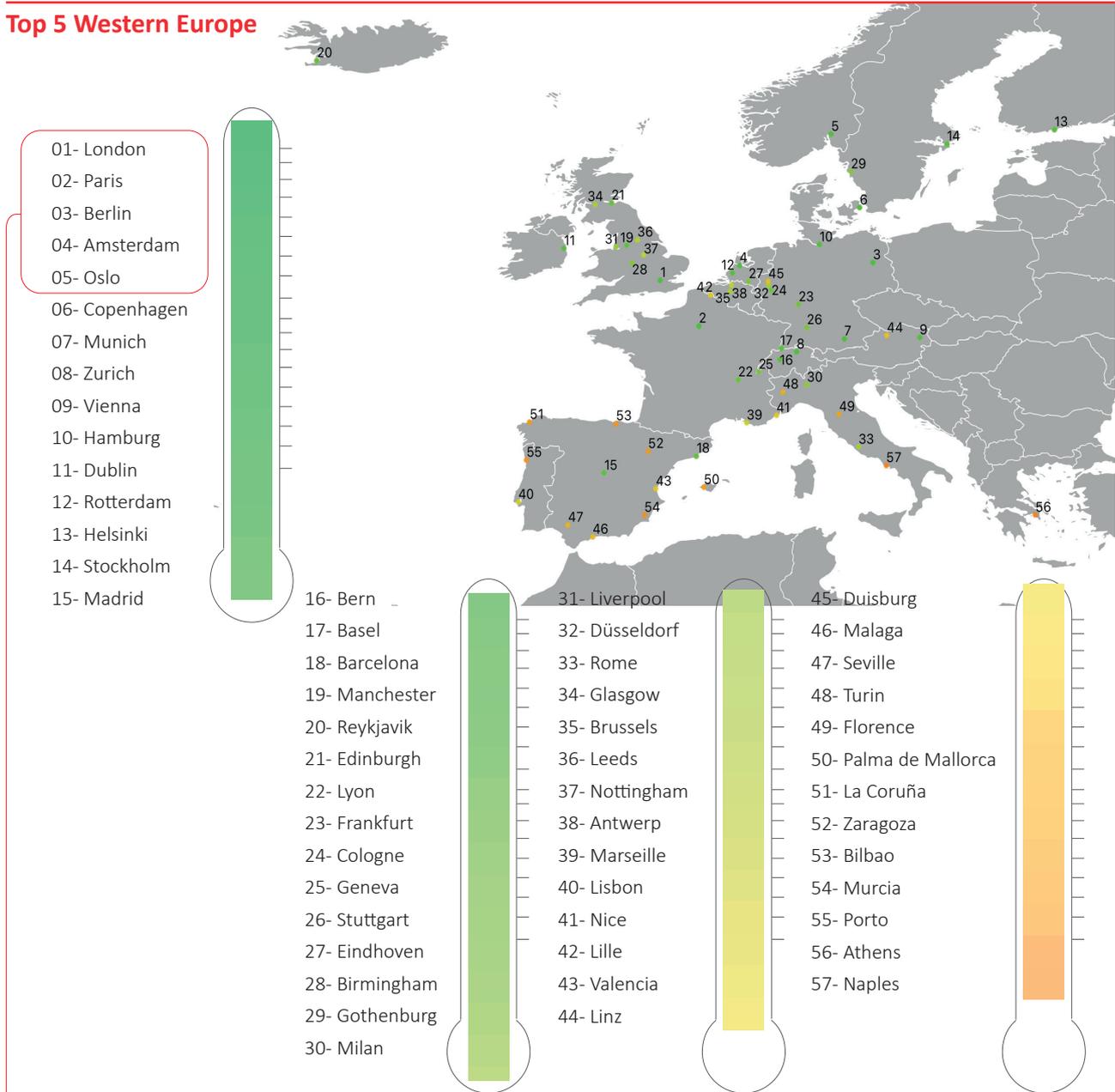
- 14- Almaty
- 15- Ho Chi Minh City
- 16- Tianjin
- 17- Nur Sultan
- 18- Delhi
- 19- Jakarta
- 20- Mumbai
- 21- Bangalore
- 22- Kolkata
- 23- Manila
- 24- Lahore
- 25- Karachi



| City                  | Regional rank | Overall rank 2019 | Overall rank 2020 | Overall rank 2021 |
|-----------------------|---------------|-------------------|-------------------|-------------------|
| Tokyo - Japan         | 1             | 4                 | 3                 | 4                 |
| Singapore - Singapore | 2             | 16                | 11                | 7                 |
| Seoul - South Korea   | 3             | 8                 | 6                 | 12                |
| Hong Kong - China     | 4             | 30                | 20                | 26                |
| Taipei - Taiwan       | 5             | 33                | 26                | 34                |

Tokyo leads the ranking for the Asia region and ranks fourth overall. The Japanese capital performs particularly well in the dimensions of economy (rank #2), international profile (#6) and governance and technology (#9). The second ranked city in the region is Singapore, which ranks seventh overall. The city-state performs particularly well in the dimensions of technology and international profile, where it ranks fourth in each case. Seoul, Hong Kong and Taipei occupy the remaining positions in the regional top 5.

## Top 5 Western Europe

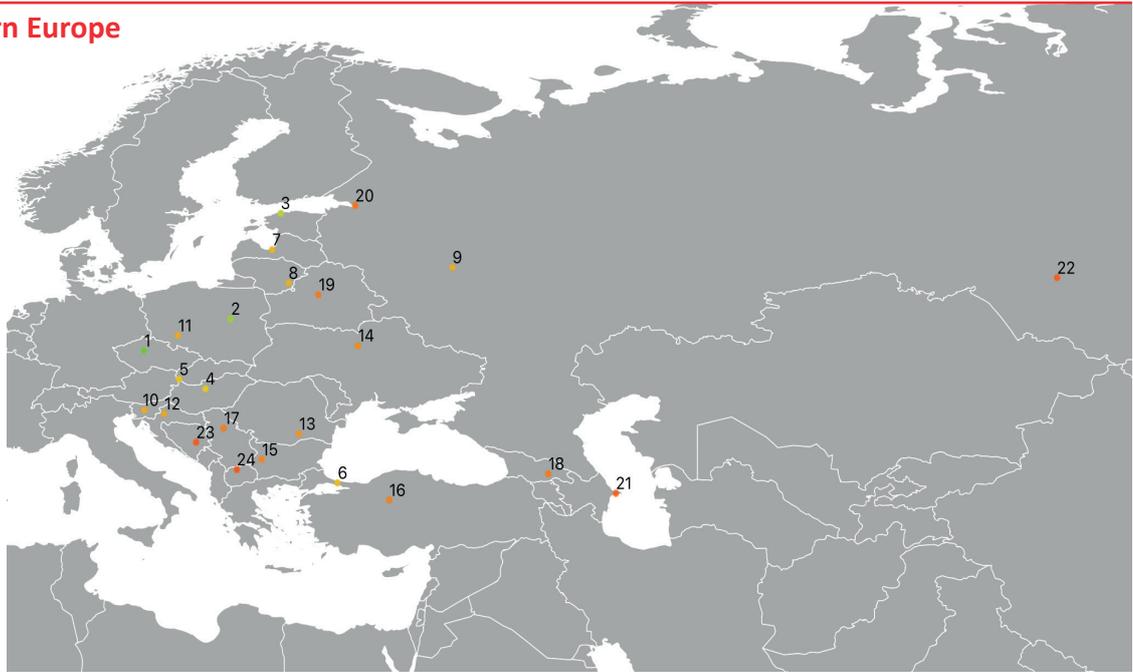


| City                    | Regional rank | Overall rank 2019 | Overall rank 2020 | Overall rank 2021 |
|-------------------------|---------------|-------------------|-------------------|-------------------|
| London - United Kingdom | 1             | 1                 | 2                 | 1                 |
| Paris - France          | 2             | 3                 | 4                 | 3                 |
| Berlin - Germany        | 3             | 5                 | 5                 | 5                 |
| Amsterdam - Netherlands | 4             | 6                 | 8                 | 8                 |
| Oslo - Norway           | 5             | 14                | 9                 | 9                 |

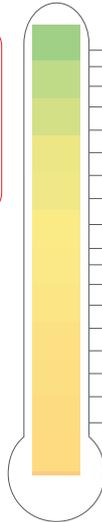
London tops the European ranking and occupies first place in the world ranking. This year, the next three spots go to Paris, Berlin and Amsterdam, which occupy second, third and fourth place, respectively. Oslo occupies the last position among the regional leaders this year. As the table above shows, all the cities in the regional top 5 rank in the overall top 10.

As the map shows, most of the Western European cities perform well in the overall ranking.

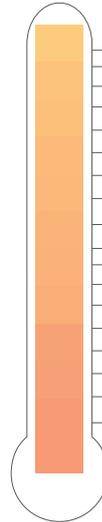
## Top 5 Eastern Europe



- 01- Prague
- 02- Warsaw
- 03- Tallinn
- 04- Budapest
- 05- Bratislava
- 06- Istanbul
- 07- Riga
- 08- Vilnius
- 09- Moscow
- 10- Ljubljana
- 11- Wroclaw
- 12- Zagreb



- 13- Bucharest
- 14- Kyiv
- 15- Sofia
- 16- Ankara
- 17- Belgrade
- 18- Tbilisi
- 19- Minsk
- 20- Saint Petersburg
- 21- Baku
- 22- Novosibirsk
- 23- Sarajevo
- 24- Skopje

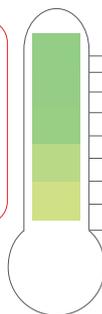


| City                    | Regional rank | Overall rank 2019 | Overall rank 2020 | Overall rank 2021 |
|-------------------------|---------------|-------------------|-------------------|-------------------|
| Prague - Czech Republic | 1             | 37                | 50                | 43                |
| Warsaw - Poland         | 2             | 60                | 54                | 62                |
| Tallinn - Estonia       | 3             | 73                | 70                | 72                |
| Budapest - Hungary      | 4             | 71                | 68                | 85                |
| Bratislava - Slovakia   | 5             | 90                | 79                | 87                |

The ranking for Eastern Europe is led by Prague. In addition to being the top city at the regional level, Prague is in the top 30 in the dimensions of environment (rank #15), mobility and transportation (#29), and technology (#30). Warsaw, Tallinn, Budapest and Bratislava occupy the remaining top positions in the regional ranking.

## Top 3 Oceania

- 01- Sydney
- 02- Melbourne
- 03- Canberra
- 04- Auckland
- 05- Wellington

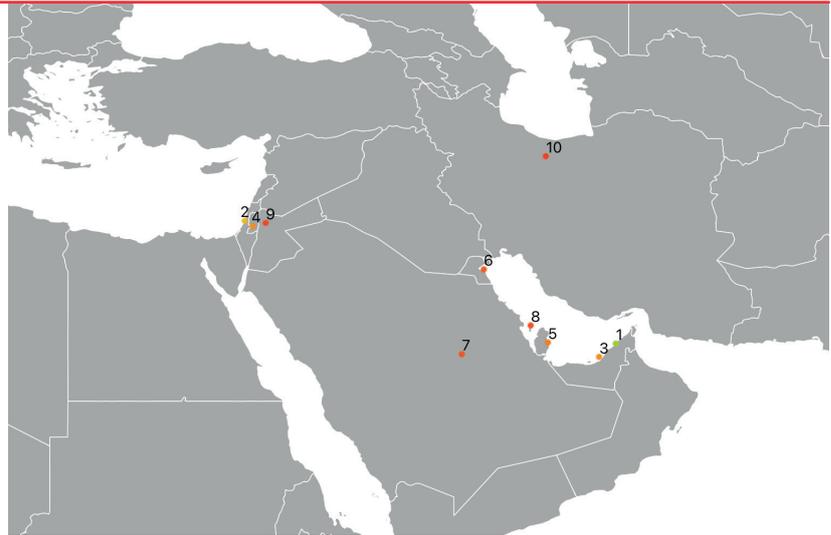
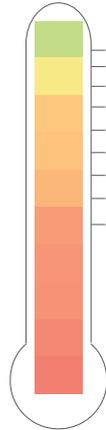


| City                  | Regional rank | Overall rank 2019 | Overall rank 2020 | Overall rank 2021 |
|-----------------------|---------------|-------------------|-------------------|-------------------|
| Sydney - Australia    | 1             | 27                | 23                | 36                |
| Melbourne - Australia | 2             | 38                | 30                | 38                |
| Canberra - Australia  | 3             | 48                | 38                | 40                |

The Oceania ranking is led by Sydney, which ranks in the overall top 20 in four dimensions: social cohesion (rank #11), international profile (#13), governance (#18) and human capital (#19). This year, the top 3 are all Australian cities. This edition of the index includes the capital, Canberra, which performs very well in social cohesion, environment and human capital, taking the third podium position for the region.

## Top 5 Middle East

- 01- Dubai
- 02- Tel Aviv
- 03- Abu Dhabi
- 04- Jerusalem
- 05- Doha
- 06- Kuwait City
- 07- Riyadh
- 08- Manama
- 09- Amman
- 10- Tehran



| City                             | Regional rank | Overall rank 2019 | Overall rank 2020 | Overall rank 2021 |
|----------------------------------|---------------|-------------------|-------------------|-------------------|
| Dubai - United Arab Emirates     | 1             | 69                | 67                | 63                |
| Tel Aviv - Israel                | 2             | 88                | 88                | 91                |
| Abu Dhabi - United Arab Emirates | 3             | 109               | 104               | 114               |
| Jerusalem - Israel               | 4             | 115               | 116               | 116               |
| Doha - Qatar                     | 5             | 124               | 124               | 125               |

Dubai tops the Middle East ranking and ranks 63rd overall. The city stands out for its strong performance in the dimensions of technology (rank #2), urban planning (#7) and international profile (#12). It is followed by Tel Aviv, Abu Dhabi, Jerusalem and Doha, which take the remaining top 5 positions for the region.

**Stand-Out Cities**



# Stand-Out Cities

In this section, we present individual analyses of a series of cities that occupy prominent positions in the overall ranking or in one of the dimensions.

The tables show the evolution of each city in the overall ranking, the dimensions in which it performs especially well, the position it holds within its region, and its classification by performance.

The bar chart shows the number of positions the city would have to advance in each dimension to reach first place. This analysis makes it possible to visualize a city's strengths and weaknesses and identify the dimensions where work could be done to improve its performance.



## BARCELONA

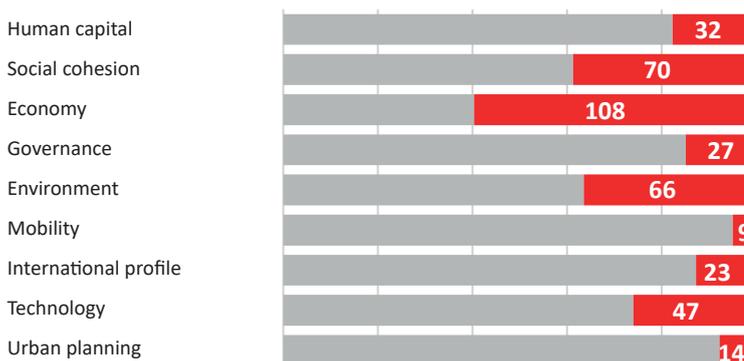
Barcelona ranks second among Spanish cities and 31st overall. The city stands out in the dimensions of mobility and transportation and urban planning, where it ranks among the top 15. According to the Index of Sustainable Mobility in Spanish Cities (Spanish acronym: IMSCE), Barcelona's mobility system ranks second (after Madrid). The city stands out for being among the top 5 in the dimensions of physical structure of the territory, availability of mobility services, demand for mobility services, and management and governance. In a study of the city's seven Integrated Public Transit Areas conducted by the IMSCE to evaluate interaction between Barcelona and surrounding municipalities, the Catalan capital was found to be the best-connected city with respect to its metropolitan area.

|                  |                      |                                    |                                      |
|------------------|----------------------|------------------------------------|--------------------------------------|
| <b>31</b>        | <b>18</b>            | <b>10</b>                          | <b>RH</b>                            |
| <b>CIMI rank</b> | <b>Regional CIMI</b> | <b>Mobility and transportation</b> | <b>Classification by performance</b> |

### Evolution of CIMI rank over the last three years

|      | 2019 | 2020 | 2021 |
|------|------|------|------|
| Rank | 26   | 34   | 31   |

### Positions that Barcelona would have to gain to be a leader in each dimension





### CAPE TOWN

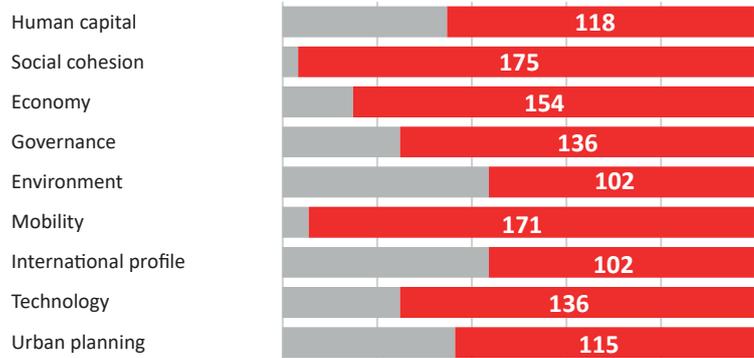
Cape Town ranks 141st overall and is the leader in its region, where it performs especially well in the dimensions of international profile, environment and urban planning. It is the second largest city in South Africa by population. Despite the city’s limitations, it has always been interested in creative innovations. The *Smart City Playbook*—a report documenting the best practices of cities around the world (produced by Machina Research and sponsored by Nokia)—named Cape Town the smartest city in Africa, noting its potential to make progress by applying IoT (Internet of Things) technology. Finally, South Africa has seven active ports, including Cape Town, which ranks second in importance (after Durban).

|                  |                      |                                      |
|------------------|----------------------|--------------------------------------|
| <b>141</b>       | <b>1</b>             | <b>B</b>                             |
| <b>CIMI rank</b> | <b>Regional CIMI</b> | <b>Classification by performance</b> |

#### Evolution of CIMI rank over the last three years

|      | 2019 | 2020 | 2021 |
|------|------|------|------|
| Rank | 142  | 133  | 141  |

#### Positions that Cape Town would have to gain to be a leader in each dimension





## COPENHAGUEN

Copenhagen is the capital of Denmark and the country's most populous city. The city ranks 10th overall (fourth in social cohesion and third in the environment dimension). It was rated the safest city in the Safe Cities Index 2021 thanks to its low crime rate, relatively narrow wealth gap, and high level of social cohesion. Seventy-five percent of the city's inhabitants get around on foot, by bicycle or on public transit. The Danish capital has set the goal of achieving carbon neutrality and becoming one of the healthiest cities by 2025. In order to cut emissions, it has been promoting the use of bicycles for personal transportation for many years and working to reduce pollutant emissions.

|                  |                    |                        |                                      |
|------------------|--------------------|------------------------|--------------------------------------|
| <b>10</b>        | <b>3</b>           | <b>4</b>               | <b>RH</b>                            |
| <b>CIMI rank</b> | <b>Environment</b> | <b>Social cohesion</b> | <b>Classification by performance</b> |

### Evolution of CIMI rank over the last three years

|      | 2019 | 2020 | 2021 |
|------|------|------|------|
| Rank | 12   | 13   | 10   |

### Positions that Copenhagen would have to gain to be a leader in each dimension

|                       |    |
|-----------------------|----|
| Human capital         | 44 |
| Social cohesion       | 3  |
| Economy               | 45 |
| Governance            | 19 |
| Environment           | 2  |
| Mobility              | 30 |
| International profile | 24 |
| Technology            | 21 |
| Urban planning        | 22 |



## DUBAI

Dubai is one of the seven emirates that make up the United Arab Emirates. The city leads the ranking for its region and is among the top 15 in the dimensions of technology (rank #2), urban planning (#7) and international profile (#12). As one of the main epicenters for research and development (R&D) in emerging sectors, Dubai has been called the “city of the future.” The city is home to a thriving community of start-up incubators and accelerators, as well as regulatory sandboxes for developing and testing new models for technology businesses. It has an ecosystem of facilities to enable innovation by companies in all sectors. A range of long-term, forward-looking strategies have been deployed, integrating AI, blockchain, 3D printing and IoT technologies.

|                  |                      |                   |                                      |
|------------------|----------------------|-------------------|--------------------------------------|
| <b>63</b>        | <b>1</b>             | <b>2</b>          | <b>M</b>                             |
| <b>CIMI rank</b> | <b>Regional CIMI</b> | <b>Technology</b> | <b>Classification by performance</b> |

### Evolution of CIMI rank over the last three years

|      | 2019 | 2020 | 2021 |
|------|------|------|------|
| Rank | 69   | 67   | 63   |

### Positions that Dubai would have to gain to be a leader in each dimension

|                       |     |
|-----------------------|-----|
| Human capital         | 142 |
| Social cohesion       | 26  |
| Economy               | 99  |
| Governance            | 59  |
| Environment           | 155 |
| Mobility              | 97  |
| International profile | 11  |
| Technology            | 1   |
| Urban planning        | 6   |



## DUBLIN

Dublin is Ireland’s capital and largest city. It has a service-driven economy, with services accounting for around 80% of business activity. Companies such as Google, Amazon, Facebook and Salesforce, among others, are headquartered in the capital. The city has been one of the biggest beneficiaries of Brexit-related relocations, and in 2020 employment at multinational companies reached a record high. Dublin ranks sixth in the economy dimension and 18th overall.

|                  |                      |                |                                      |
|------------------|----------------------|----------------|--------------------------------------|
| <b>18</b>        | <b>11</b>            | <b>6</b>       | <b>RH</b>                            |
| <b>CIMI rank</b> | <b>Regional CIMI</b> | <b>Economy</b> | <b>Classification by performance</b> |

### Evolution of CIMI rank over the last three years

|      | 2019 | 2020 | 2021 |
|------|------|------|------|
| Rank | 40   | 33   | 18   |

### Positions that Dublin would have to gain to be a leader in each dimension

|                       |     |
|-----------------------|-----|
| Human capital         | 92  |
| Social cohesion       | 48  |
| Economy               | 5   |
| Governance            | 69  |
| Environment           | 41  |
| Mobility              | 64  |
| International profile | 28  |
| Technology            | 120 |
| Urban planning        | 55  |



## LONDON

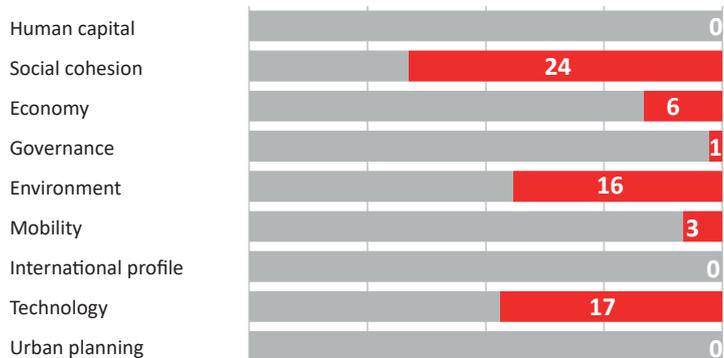
London, the capital of the United Kingdom, is the largest city in the country and one of the largest in Europe. It is also one of the world's leading economies and the most important in the country, among other reasons, because it contributes around 20% of the national GDP. The British capital hosts more start-ups than any other city in the world. The city recently launched the Smarter London Together project, which is intended to serve as a flexible digital master plan for making London the smartest city in the world. The city ranks well in almost all dimensions: first in human capital, urban planning and international profile; fourth in mobility and transportation; and seventh in economy. It performs worst in the social cohesion dimension (rank #25).

|                              |                      |                                      |
|------------------------------|----------------------|--------------------------------------|
| <b>1</b>                     | <b>1</b>             | <b>H</b>                             |
| <b>CIMI rank</b>             | <b>Regional CIMI</b> | <b>Classification by performance</b> |
| <b>1</b>                     | <b>1</b>             | <b>1</b>                             |
| <b>International profile</b> | <b>Human capital</b> | <b>Urban planning</b>                |

### Evolution of CIMI rank over the last three years

|      | 2019 | 2020 | 2021 |
|------|------|------|------|
| Rank | 1    | 2    | 1    |

### Positions that London would have to gain to be a leader in each dimension





## MADRID

Madrid is the capital of Spain and the country's most populous city. It is also the top Spanish city in the overall ranking, where it holds 27th place. The city ranks high in the dimensions of mobility and transportation (rank #6), and international profile (#17). The Sustainable Mobility Ordinance (approved in October 2018) establishes a regulatory framework under which the entire territory of Madrid will become a low emission zone and mandates a set of measures to promote sustainable travel in the city. It also introduces a series of incentives aimed at promoting sustainable mobility in order to reduce greenhouse gas emissions and improve air quality in the Community of Madrid. Grants will cover up to 50% of the purchase price of electric vehicles, up to a maximum that varies according to the vehicle type (electric motorcycles, mopeds, bicycles and scooters).

|                  |                      |                                    |                                      |
|------------------|----------------------|------------------------------------|--------------------------------------|
| <b>27</b>        | <b>15</b>            | <b>6</b>                           | <b>RH</b>                            |
| <b>CIMI rank</b> | <b>Regional CIMI</b> | <b>Mobility and transportation</b> | <b>Classification by performance</b> |

### Evolution of CIMI rank over the last three years

|      | 2019 | 2020 | 2021 |
|------|------|------|------|
| Rank | 23   | 32   | 27   |

### Positions that Madrid would have to gain to be a leader in each dimension

|                       |    |
|-----------------------|----|
| Human capital         | 50 |
| Social cohesion       | 35 |
| Economy               | 79 |
| Governance            | 24 |
| Environment           | 67 |
| Mobility              | 5  |
| International profile | 16 |
| Technology            | 39 |
| Urban planning        | 45 |



## NEW YORK

New York is considered a global city given its worldwide influence on media, politics, education and leisure. In this edition, New York ranks second overall. However, it is the top-ranked city in the dimensions of economy and mobility and transportation, second in urban planning, and third in human capital and international profile. Social cohesion and the environment are weak points that remain to be addressed. In relation to the environment dimension, in mid-2019, with the aim of reducing environmental pollution, the municipality of New York approved a new regulation that requires large buildings, which account for about half of pollution in the city, to cut their greenhouse gas emissions by 40% by 2030 and continue making further reductions so that they emit 80% less polluting gases by 2050. These are the most ambitious emissions reduction targets ever set by a city.

|                  |                                    |                                      |
|------------------|------------------------------------|--------------------------------------|
| <b>2</b>         | <b>1</b>                           | <b>A</b>                             |
| <b>CIMI rank</b> | <b>Regional CIMI</b>               | <b>Classification by performance</b> |
| <b>1</b>         | <b>1</b>                           | <b>2</b>                             |
| <b>Economy</b>   | <b>Mobility and transportation</b> | <b>Urban planning</b>                |

### Evolution of CIMI rank over the last three years

|      | 2019 | 2020 | 2021 |
|------|------|------|------|
| Rank | 2    | 1    | 2    |

### Positions that New York would have to gain to be a leader in each dimension

|                       |     |
|-----------------------|-----|
| Human capital         | 2   |
| Social cohesion       | 120 |
| Economy               | 0   |
| Governance            | 9   |
| Environment           | 104 |
| Mobility              | 0   |
| International profile | 2   |
| Technology            | 5   |
| Urban planning        | 1   |



## SANTIAGO

Santiago ranks 75th overall, is the leader in the Latin America region, and stands out in the dimensions of urban planning, economy and international profile. The Government of Chile created the “Sé Santiago Smart City” program with the aim of activating and coordinating the generation of solutions around mobility, security and environment for Greater Santiago (the capital and suburbs), using digital technologies in a smart city framework. The city is currently in the second phase of the program (the consolidation stage), which includes seven flagship projects: Waste Management Center, Water Consortium, Circular Economy Consortium, Accelerator and International Coordination Nodes, Quality Seal for Delivery, Electromobility Development Center, and Data Smart City Project.

|                             |                               |
|-----------------------------|-------------------------------|
| <b>75</b>                   | <b>1</b>                      |
| CIMI rank                   | Regional CIMI                 |
| <b>47</b>                   | <b>M</b>                      |
| Mobility and transportation | Classification by performance |

### Evolution of CIMI rank over the last three years

|      | 2019 | 2020 | 2021 |
|------|------|------|------|
| Rank | 92   | 95   | 75   |

### Positions that Santiago would have to gain to be a leader in each dimension

|                       |     |
|-----------------------|-----|
| Human capital         | 74  |
| Social cohesion       | 99  |
| Economy               | 57  |
| Governance            | 70  |
| Environment           | 74  |
| Mobility              | 46  |
| International profile | 58  |
| Technology            | 108 |
| Urban planning        | 54  |



## SEOUL

Seoul, the capital of South Korea, ranks 12th overall and is among the top 25 in the dimensions of economy, human capital, governance, urban planning, international profile and technology. Information technology and electronics industries have been gradually replacing traditional mainstays such as textile and garment manufacturing, machinery and chemicals. Some of the world's largest companies such as Samsung, LG Group, Hyundai, Kia Motors, Ssangyong, Daelim, Lotte and Pantech Curitel are based in Seoul. The city's main exports are electronic products, automobiles and machinery. Seoul is also the country's finance center: Major banks—including Citigroup, HSBC, Deutsche Bank, Goldman Sachs, JP Morgan Chase, Santander Group, UBS and ING Group—have offices in the city.

|                  |                      |                   |                                      |
|------------------|----------------------|-------------------|--------------------------------------|
| <b>12</b>        | <b>3</b>             | <b>6</b>          | <b>RH</b>                            |
| <b>CIMI rank</b> | <b>Regional CIMI</b> | <b>Governance</b> | <b>Classification by performance</b> |

### Evolution of CIMI rank over the last three years

|      | 2019 | 2020 | 2021 |
|------|------|------|------|
| Rank | 8    | 6    | 12   |

### Positions that Seoul would have to gain to be a leader in each dimension

|                       |    |
|-----------------------|----|
| Human capital         | 7  |
| Social cohesion       | 67 |
| Economy               | 20 |
| Governance            | 5  |
| Environment           | 75 |
| Mobility              | 40 |
| International profile | 18 |
| Technology            | 24 |
| Urban planning        | 21 |



## SYDNEY

Sydney ranks 36th overall and first in its region. The city performs particularly well in the dimensions of social cohesion and international profile. In 2008, the city government published Sustainable Sydney 2030, a strategic plan based on the vision of making the city as green, global and connected as possible by 2030. The plan came to life after residents, visitors, workers and businesses were asked what kind of city they wanted. Respondents said they wanted a city that cares about the environment, has a strong economy, supports the arts, and connects its citizens to each other and to the rest of the world. Public consultation is currently underway to build the 2030–50 vision.

|                  |                      |                        |                                      |
|------------------|----------------------|------------------------|--------------------------------------|
| <b>36</b>        | <b>1</b>             | <b>11</b>              | <b>RH</b>                            |
| <b>CIMI rank</b> | <b>Regional CIMI</b> | <b>Social cohesion</b> | <b>Classification by performance</b> |

### Evolution of CIMI rank over the last three years

|      | 2019 | 2020 | 2021 |
|------|------|------|------|
| Rank | 27   | 23   | 36   |

### Positions that Sydney would have to gain to be a leader in each dimension

|                       |     |
|-----------------------|-----|
| Human capital         | 18  |
| Social cohesion       | 10  |
| Economy               | 51  |
| Governance            | 17  |
| Environment           | 51  |
| Mobility              | 127 |
| International profile | 12  |
| Technology            | 42  |
| Urban planning        | 118 |



## TOKYO

Tokyo ranks fourth overall and second in the economy dimension. The city ranks sixth in international profile, ninth in governance and technology, and 10th in human capital. It is also the leading city in its region. The Japanese capital is one of the smartest cities in the world, offering its inhabitants an excellent quality of life, which is reflected in the various technologies the city deploys in its impressive infrastructure, the range of different forms of transportation on offer, and its environmentally friendly practices. In the world's largest city, urban planning is a challenging task. To make any changes, geospatial thinking is required, and Tokyo is committed to mobility and connectivity. Since 2016, the city has been working on the construction of a new train station which will be the departure point for a maglev train that will travel at up to 500 kilometers per hour. It is anticipated that the first phase, to be completed by 2027, will connect 70 million people.

|                  |                      |                |                                      |
|------------------|----------------------|----------------|--------------------------------------|
| <b>4</b>         | <b>1</b>             | <b>2</b>       | <b>RH</b>                            |
| <b>CIMI rank</b> | <b>Regional CIMI</b> | <b>Economy</b> | <b>Classification by performance</b> |

### Evolution of CIMI rank over the last three years

|      | 2019 | 2020 | 2021 |
|------|------|------|------|
| Rank | 4    | 3    | 4    |

### Positions that Sydney would have to gain to be a leader in each dimension

|                       |     |
|-----------------------|-----|
| Human capital         | 9   |
| Social cohesion       | 40  |
| Economy               | 1   |
| Governance            | 8   |
| Environment           | 24  |
| Mobility              | 61  |
| International profile | 5   |
| Technology            | 8   |
| Urban planning        | 111 |



## Cities in Motion. Evolution

The way a city is being transformed is of vital importance when it comes to understanding the goal it is working towards in terms of development. Accordingly, **Table 13** shows the evolution of the index over the last three years for the top 50 cities in the **CIMI 2021** ranking.

The results show a certain stability, especially in the top positions. However, from 17th place on, some cities show abrupt changes in both directions over the period. Almost all these ups and downs are due to variations in the economy dimension. From 2019 to 2020, many cities show sharp economic declines, probably due to the COVID-19 pandemic. They then begin to recover, albeit at a slow pace, the following year. Cities that exhibit this pattern include Barcelona, which fell eight places from 2019 to 2020 and then moved up three places from 2020

to 2021. The Catalan capital has a GDP growth forecast of -11.1% for the period 2019–20 but a positive forecast of 4.6% for 2020–21, resulting in the observed changes in its ranking over the period considered. Another example is Manchester, which has a GDP growth forecast of -10.4% for 2020 and a positive growth forecast of 6.8% for 2021. The same pattern holds for cities such as Reykjavik, Sydney and Seattle, among others.

However, there are cities that show a positive trend over the entire 2019–21 period, including Dublin, where the evolution is particularly noteworthy. In this case, the GDP growth forecast almost triples from 2019 to 2021, from 5.6% to 14.6%, and the city's GDP per capita grows by almost 20%. This growth enables the city to move up 22 places from 2019 to 2021.

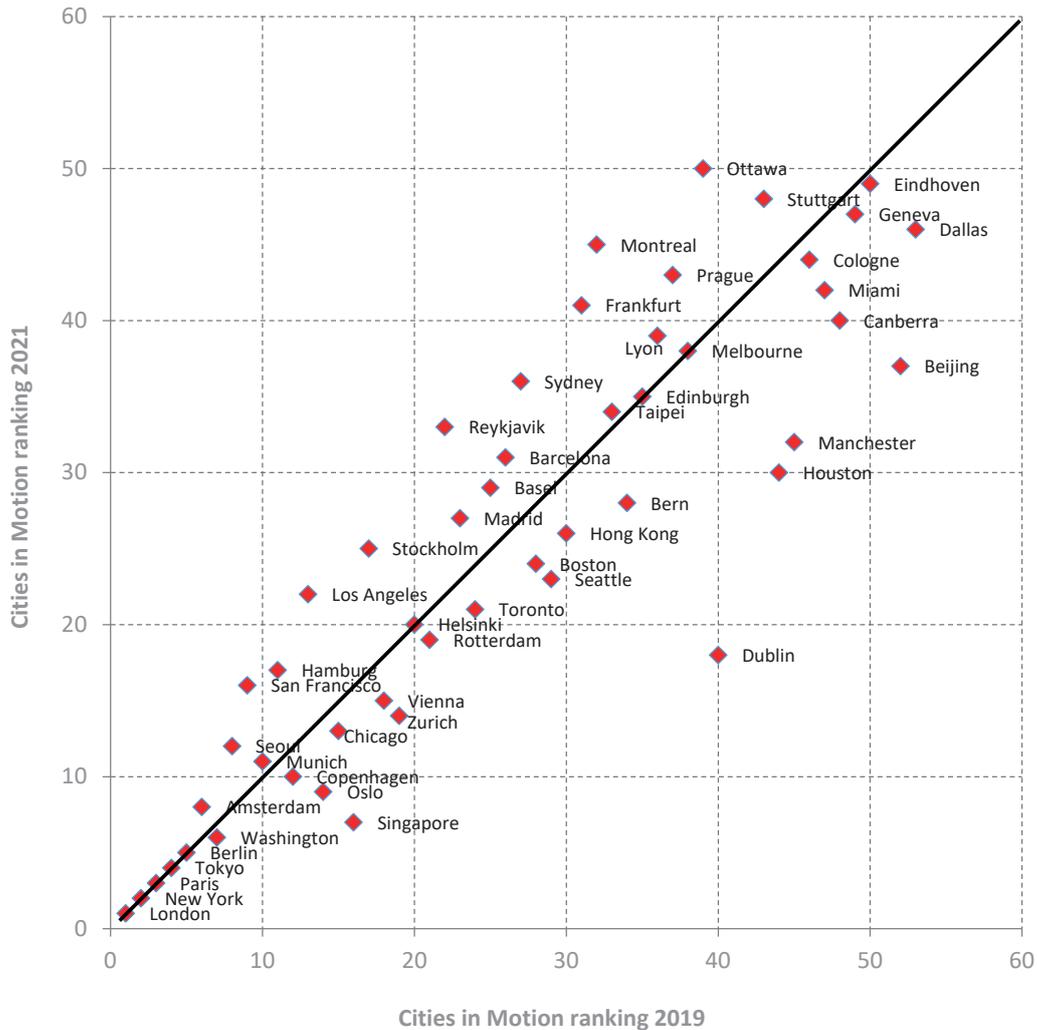
**Table 13. Evolution of the Index for the Top 50 Cities in the 2021 Ranking (Last Three Years)**

| City                        | 2019 | 2020 | 2021 | 2019-2020 | 2020-2021 |
|-----------------------------|------|------|------|-----------|-----------|
| London - United Kingdom     | 1    | 2    | 1    | ↓         | ↑         |
| New York - USA              | 2    | 1    | 2    | ↑         | ↓         |
| Paris - France              | 3    | 4    | 3    | ↓         | ↑         |
| Tokyo - Japan               | 4    | 3    | 4    | ↑         | ↓         |
| Berlin - Germany            | 5    | 5    | 5    | →         | →         |
| Washington - USA            | 7    | 7    | 6    | →         | ↑         |
| Singapore - Singapore       | 16   | 11   | 7    | ↑         | ↑         |
| Amsterdam - Netherlands     | 6    | 8    | 8    | ↓         | →         |
| Oslo - Norway               | 14   | 9    | 9    | ↑         | →         |
| Copenhagen - Denmark        | 12   | 13   | 10   | ↓         | ↑         |
| Munich - Germany            | 10   | 10   | 11   | →         | ↓         |
| Seoul - South Korea         | 8    | 6    | 12   | ↑         | ↓         |
| Chicago - USA               | 15   | 12   | 13   | ↑         | ↓         |
| Zurich - Switzerland        | 19   | 17   | 14   | ↑         | ↑         |
| Vienna - Austria            | 18   | 19   | 15   | ↓         | ↑         |
| San Francisco - USA         | 9    | 16   | 16   | ↓         | →         |
| Hamburg - Germany           | 11   | 14   | 17   | ↓         | ↓         |
| Dublin - Ireland            | 40   | 33   | 18   | ↑         | ↑         |
| Rotterdam - Netherlands     | 21   | 21   | 19   | →         | ↑         |
| Helsinki - Finland          | 20   | 18   | 20   | ↑         | ↓         |
| Toronto - Canada            | 24   | 22   | 21   | ↑         | ↑         |
| Los Angeles - USA           | 13   | 25   | 22   | ↓         | ↑         |
| Seattle - USA               | 29   | 36   | 23   | ↓         | ↑         |
| Boston - USA                | 28   | 31   | 24   | ↓         | ↑         |
| Stockholm - Sweden          | 17   | 15   | 25   | ↑         | ↓         |
| Hong Kong - China           | 30   | 20   | 26   | ↑         | ↓         |
| Madrid - Spain              | 23   | 32   | 27   | ↓         | ↑         |
| Bern - Switzerland          | 34   | 28   | 28   | ↑         | →         |
| Basel - Switzerland         | 25   | 27   | 29   | ↓         | ↓         |
| Houston - USA               | 44   | 49   | 30   | ↓         | ↑         |
| Barcelona - Spain           | 26   | 34   | 31   | ↓         | ↑         |
| Manchester - United Kingdom | 45   | 59   | 32   | ↓         | ↑         |
| Reykjavik - Iceland         | 22   | 24   | 33   | ↓         | ↓         |
| Taipei - Taiwan             | 33   | 26   | 34   | ↑         | ↓         |
| Edinburgh - United Kingdom  | 35   | 40   | 35   | ↓         | ↑         |
| Sydney - Australia          | 27   | 23   | 36   | ↑         | ↓         |
| Beijing - China             | 52   | 39   | 37   | ↑         | ↑         |
| Melbourne - Australia       | 38   | 30   | 38   | ↑         | ↓         |
| Lyon - France               | 36   | 55   | 39   | ↓         | ↑         |
| Canberra - Australia        | 48   | 38   | 40   | ↑         | ↓         |
| Frankfurt - Germany         | 31   | 29   | 41   | ↑         | ↓         |
| Miami - USA                 | 47   | 52   | 42   | ↓         | ↑         |
| Prague - Czech Republic     | 37   | 50   | 43   | ↓         | ↑         |
| Cologne - Germany           | 46   | 46   | 44   | →         | ↑         |
| Montreal - Canada           | 32   | 35   | 45   | ↓         | ↓         |
| Dallas - USA                | 53   | 42   | 46   | ↑         | ↓         |
| Geneva - Switzerland        | 49   | 47   | 47   | ↑         | →         |
| Stuttgart - Germany         | 43   | 44   | 48   | ↓         | ↓         |
| Eindhoven - Netherlands     | 50   | 58   | 49   | ↓         | ↑         |
| Ottawa - Canada             | 39   | 43   | 50   | ↓         | ↓         |

**Figure 5** below shows the positions held by the top 50 cities in the 2019 and 2021 rankings. The cities that show a positive evolution are below the 45-degree angle formed by the diagonal line, while those that did not move in a positive direction are above the line. Here we can see the evolution of the cities shown in **Table 13** in

graphic form. The ones that suffered a sharp drop over this period (and therefore appear above the diagonal line) are Reykjavik, Sydney, Ottawa and Montreal. Conversely, Dublin, Manchester, Houston and Beijing are some of the cities that showed a significant positive evolution over the same period.

**Figure 5. Evolution of the Top 50 Cities in the Ranking (2019–21)**



# Cities in Motion Versus Other Indexes

In this section, we compare the **CIMI** and other indexes. **Table 14** shows the top 10 cities in this ranking (2021) and the top 10 in six other indexes. Cities that appear in the **CIMI** top 10 are shown with shading.

Although the rankings considered vary in their methodology and indicators, they are all based on the understanding that a city is more powerful, prosperous and competitive if it is able to develop in different dimensions: from the economy and finance to cultural relevance (which can be measured through the promotion of music and fashion), the ease of setting up a new business, quality of life, and the use of high technology. As a result, all the **CIMI** top 10 cities, with the exception of Washington and Oslo, appear repeatedly in the top 10 of the other indexes considered.

The city-state of Singapore, which ranks seventh in the **CIMI**, is in the top 10 of three of the five rankings we looked at. It also stands out for its strong performance in the dimensions of international profile, technology

and economy. Other cities, such as New York, London, Paris and Tokyo, frequently appear in the top 10 most prosperous cities or those with the best quality of life in the world. Tokyo, in particular, appears in all the rankings considered, with the exception of the Livability Ranking (published by the Economist Intelligence Unit), which does not include the city in its top 10 this year but has in previous editions.

Unlike many of the indexes with which it is compared, the **CIMI** has a wide geographical coverage, in addition to considering a total of 183 cities, and every year an effort is made to increase coverage of underrepresented regions.

Finally, once again, the top two positions in the Global Cities Index, the Global Financial Centres Index (Z/Yen) and the Global Power City Index (MMF) are occupied by the same cities that hold the top two positions in the **CIMI** (in the same or reverse order).

**Table 14. Comparison With Other Indexes (Top 10)**

| City rank | 2022 CIMI (IESE) | Global Cities Index 2021 (A.T. Kearney) | Global Financial Centres Index 2022, GFCI (Z/Yen) | Global Power City Index 2021 (MMF) | Liveability Ranking 2022 (EIU) | Sustainable Cities Index 2022 The Arcadis |
|-----------|------------------|---|---|------------------------------------|--------------------------------|---|
| 1         | London           | New York                                | New York  | London                             | Vienna                         | Oslo                                      |
| 2         | New York         | London                                  | London  | New York                           | Copenhagen                     | Stockholm                                 |
| 3         | Paris            | Paris                                   | Hong Kong   | Tokyo                              | Zurich                         | Tokyo                                     |
| 4         | Tokyo            | Tokyo                                   | Shanghai  | Paris                              | Calgary                        | Copenhagen                                |
| 5         | Berlin           | Los Angeles                             | Los Angeles                                       | Singapore                          | Vancouver                      | Berlin                                    |
| 6         | Washington       | Beijing                                 | Singapore   | Amsterdam                          | Geneva                         | London                                    |
| 7         | Singapore        | Hong Kong                               | San Francisco                                     | Berlin                             | Frankfurt                      | Seattle                                   |
| 8         | Amsterdam        | Chicago                                 | Beijing   | Seoul                              | Toronto                        | Paris                                     |
| 9         | Oslo             | Singapore                               | Tokyo   | Madrid                             | Amsterdam                      | San Francisco                             |
| 10        | Copenhagen       | Shanghai                                | Shenzhen  | Shanghai                           | Osaka                          | Amsterdam                                 |

# Cities in Motion: City Ranking by Population Size

Below we rank the cities included in the **CIMI** in relation to others in the same population category. To this end, the 183 cities included in the index have been classified by population. The classification takes into account various sources consulted, including *The Economist* and the United Nations. **Table 15** shows the various categories and the number of **CIMI** cities included in each one.

**Table 15. Classification of Cities by Population**

| Category             |                     | Number of cities |
|----------------------|---------------------|------------------|
| Less than 600,000    | Smallest cities     | 9                |
| 600,000 to 1,000,000 | Small cities        | 17               |
| 1 to 5 million       | Medium-sized cities | 98               |
| 5 to 10 million      | Large cities        | 25               |
| Over 10 million      | Megacities          | 34               |

## RANKING OF SMALLEST CITIES

The top 5 ranking of *smallest cities*—defined for the purposes of this analysis as those with a population of less than 600,000—is led by Bern, which ranks 28th overall. Bern’s performance in the overall ranking is quite similar to that of other comparably-sized cities, which rank between 30th and 40th, with the exception of Wellington, which ranks 70th this year. In second place is Basel, while Reykjavik, Canberra and Wellington—cities that stand out for their strong performance in the environment and social cohesion dimensions—take the remaining top 5 places.

### Top 5 cities with pop. under 600,000

| City                     | Regional rank | Overall rank 2019 | Overall rank 2020 | Overall rank 2021 |
|--------------------------|---------------|-------------------|-------------------|-------------------|
| Bern - Switzerland       | 1             | 34                | 28                | 28                |
| Basel - Switzerland      | 2             | 25                | 27                | 29                |
| Reykjavik - Iceland      | 3             | 22                | 24                | 33                |
| Canberra - Australia     | 4             | 48                | 38                | 40                |
| Wellington - New Zealand | 5             | 63                | 48                | 70                |

## RANKING OF SMALL CITIES

The table below shows the top 5 *small cities*, defined as those with a population of between 600,000 and 1,000,000. This ranking is led by Edinburgh, followed by Geneva and Eindhoven, while Nottingham and Quebec City hold the two remaining top 5 places. The first four stand out for their performance in social cohesion and environment.

---

### Top 5 cities with pop. 600,000 to 1,000,000

| City                        | Regional rank | Overall rank 2019 | Overall rank 2020 | Overall rank 2021 |
|-----------------------------|---------------|-------------------|-------------------|-------------------|
| Edinburgh - United Kingdom  | 1             | 35                | 40                | 35                |
| Geneva - Switzerland        | 2             | 49                | 47                | 47                |
| Eindhoven - Netherlands     | 3             | 50                | 58                | 49                |
| Nottingham - United Kingdom | 4             | 75                | 80                | 71                |
| Quebec - Canada             | 5             | 72                | 77                | 77                |

## RANKING OF MEDIUM-SIZED CITIES

Below we present the top 5 *medium-sized cities*, defined as those with a population of between one and five million. This ranking is led by Amsterdam, followed by Oslo, Copenhagen, Munich and Zurich, which rank among the top 15 cities overall and stand out in almost all dimensions, occupying very similar positions.

---

### Top 5 cities with pop. 1 to 5 million

| City                    | Regional rank | Overall rank 2019 | Overall rank 2020 | Overall rank 2021 |
|-------------------------|---------------|-------------------|-------------------|-------------------|
| Amsterdam - Netherlands | 1             | 6                 | 8                 | 8                 |
| Oslo - Norway           | 2             | 14                | 9                 | 9                 |
| Copenhagen - Denmark    | 3             | 12                | 13                | 10                |
| Munich - Germany        | 4             | 10                | 10                | 11                |
| Zurich - Switzerland    | 5             | 19                | 17                | 14                |

## RANKING OF LARGE CITIES

Berlin leads the ranking of *large cities*, defined as those with a population of between five and 10 million. It is followed by Washington, Singapore and Chicago, while Toronto holds the fifth position.

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### Top 5 cities with pop. 5 to 10 million

| City                  | Regional rank | Overall rank 2019 | Overall rank 2020 | Overall rank 2021 |
|-----------------------|---------------|-------------------|-------------------|-------------------|
| Berlin - Germany      | 1             | 5                 | 5                 | 5                 |
| Washington - USA      | 2             | 7                 | 7                 | 6                 |
| Singapore - Singapore | 3             | 16                | 11                | 7                 |
| Chicago - USA         | 4             | 15                | 12                | 13                |
| Toronto - Canada      | 5             | 24                | 22                | 21                |

## RANKING OF MEGACITIES

The ranking of *megacities* includes those with a population of over 10 million. This group is led by London, followed by New York, Paris, Tokyo and Seoul, which are among the top 20 in the overall ranking and stand out in most dimensions, with the exception of social cohesion and environment, where New York performs poorly.

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### Top 5 cities with pop. over 10 million

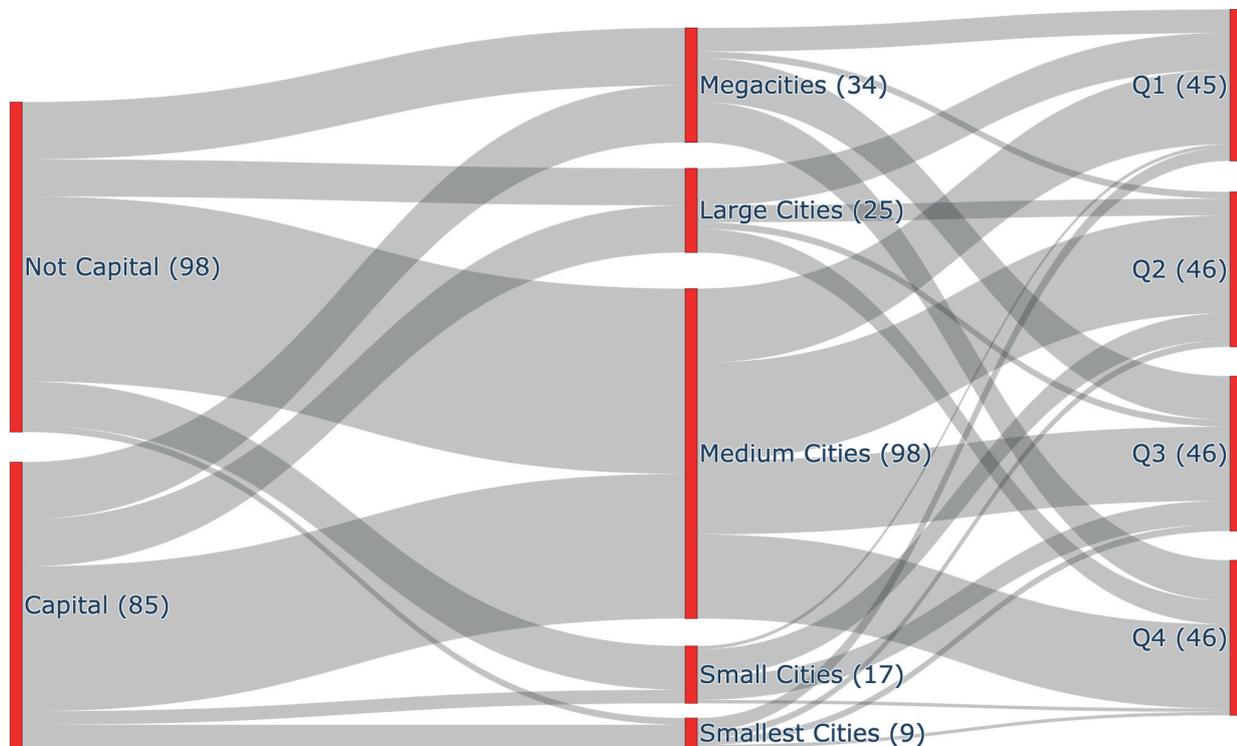
| City                    | Regional rank | Overall rank 2019 | Overall rank 2020 | Overall rank 2021 |
|-------------------------|---------------|-------------------|-------------------|-------------------|
| London - United Kingdom | 1             | 1                 | 2                 | 1                 |
| New York - USA          | 2             | 2                 | 1                 | 2                 |
| Paris - France          | 3             | 3                 | 4                 | 3                 |
| Tokyo - Japan           | 4             | 4                 | 3                 | 4                 |
| Seoul - South Korea     | 5             | 8                 | 6                 | 12                |

**Figure 6** below shows the distribution of cities according to whether or not they are country capitals (left), the size of their population (center), and their position in the ranking (Q1 to Q4, right). This figure is based on the same classification by rank used in **Figure 4** and incorporates the classification of cities by population size defined in this section.

The diagram shows the high proportion of *medium-sized cities* in the ranking, which are distributed equally between the group of capital and non-capital cities.

As for the performance of the cities, in the Q1 group (those that rank first to 45th overall), there is a high proportion of cities classified as *medium-sized*, followed by a significant group of those classified as *large cities*. Similarly, in the top 45 of the overall ranking, we find a notable proportion of *smallest cities*, including Reykjavik, Basel and Bern (which rank in the top 5 for this population category).

**Figure 6. Type of City by Size and Rank**



# Cities in Motion: Analysis of Dimensions in Pairs

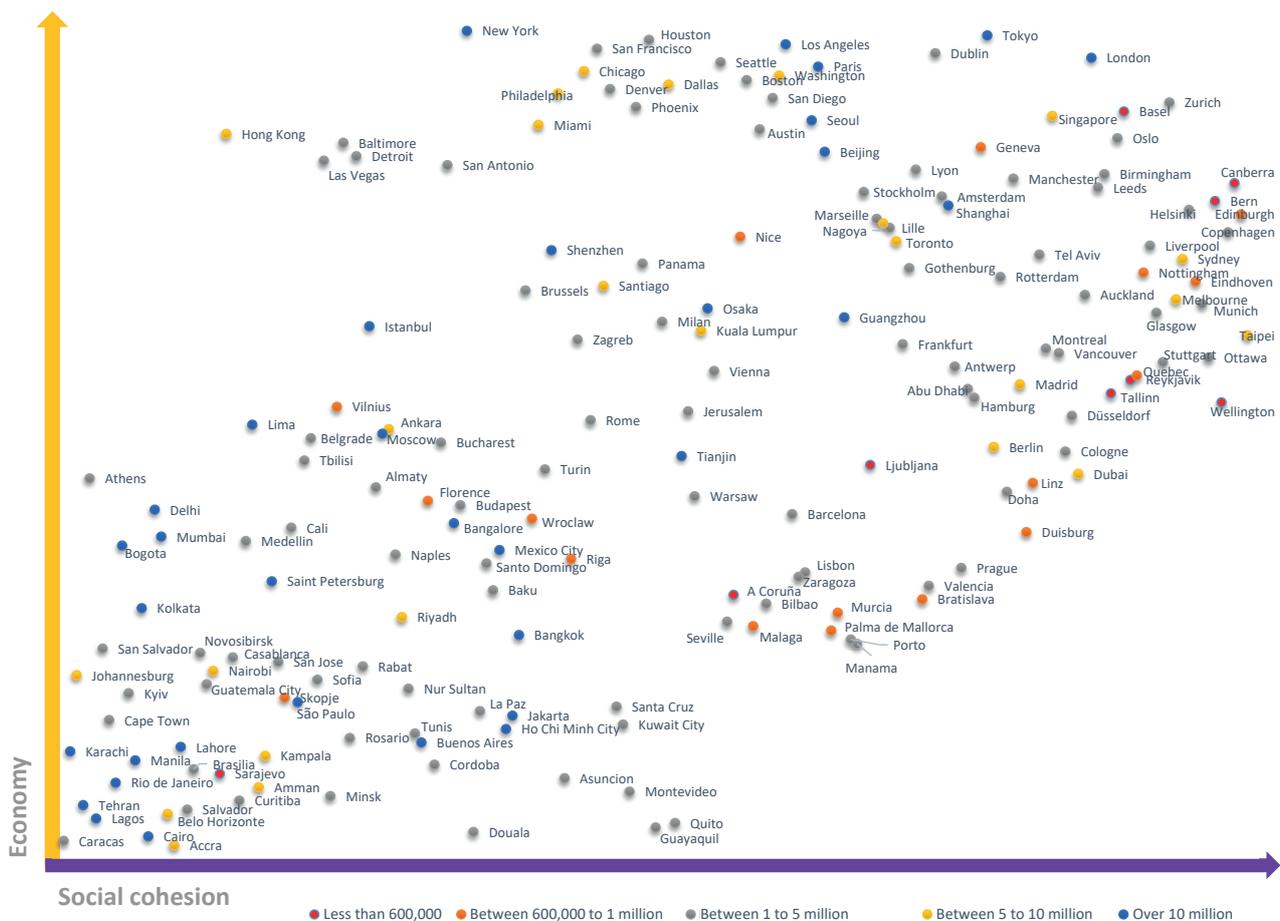
In this section, we analyze the position of cities with respect to two dimensions simultaneously to see if there is any relationship between them. Cities are also considered according to their population, based on the classification described in the previous section.

It is important to note that in this edition of the index (as mentioned in previous sections) all analyses involving the economy dimension have been disrupted due to the effects of the COVID-19 pandemic.

**Figure 7** shows the dimensions of economy (on the y-axis) and social cohesion (on the x-axis). As one can observe, cities with populations of under 600,000 (*smallest cities*) perform very well in the social cohesion dimension and

are located on the right side of the chart. In this position, we find cities such as Quebec, Reykjavik and Wellington. In contrast, those classified as *megacities* appear on the left side of the chart, which corresponds to poor performance in this dimension. Here we find New York, Detroit, Las Vegas and Hong Kong, among others. The upper part of the chart shows the cities that perform well in the economy dimension, including Tokyo, New York, Los Angeles, San Francisco, London and Paris. At the other extreme, in the lower area, we find the cities that rank lowest in this dimension, including Guayaquil, Quito, Douala and Accra. Caracas occupies a position at the bottom of both rankings and therefore appears in the lower left corner of the chart.

**Figure 7**

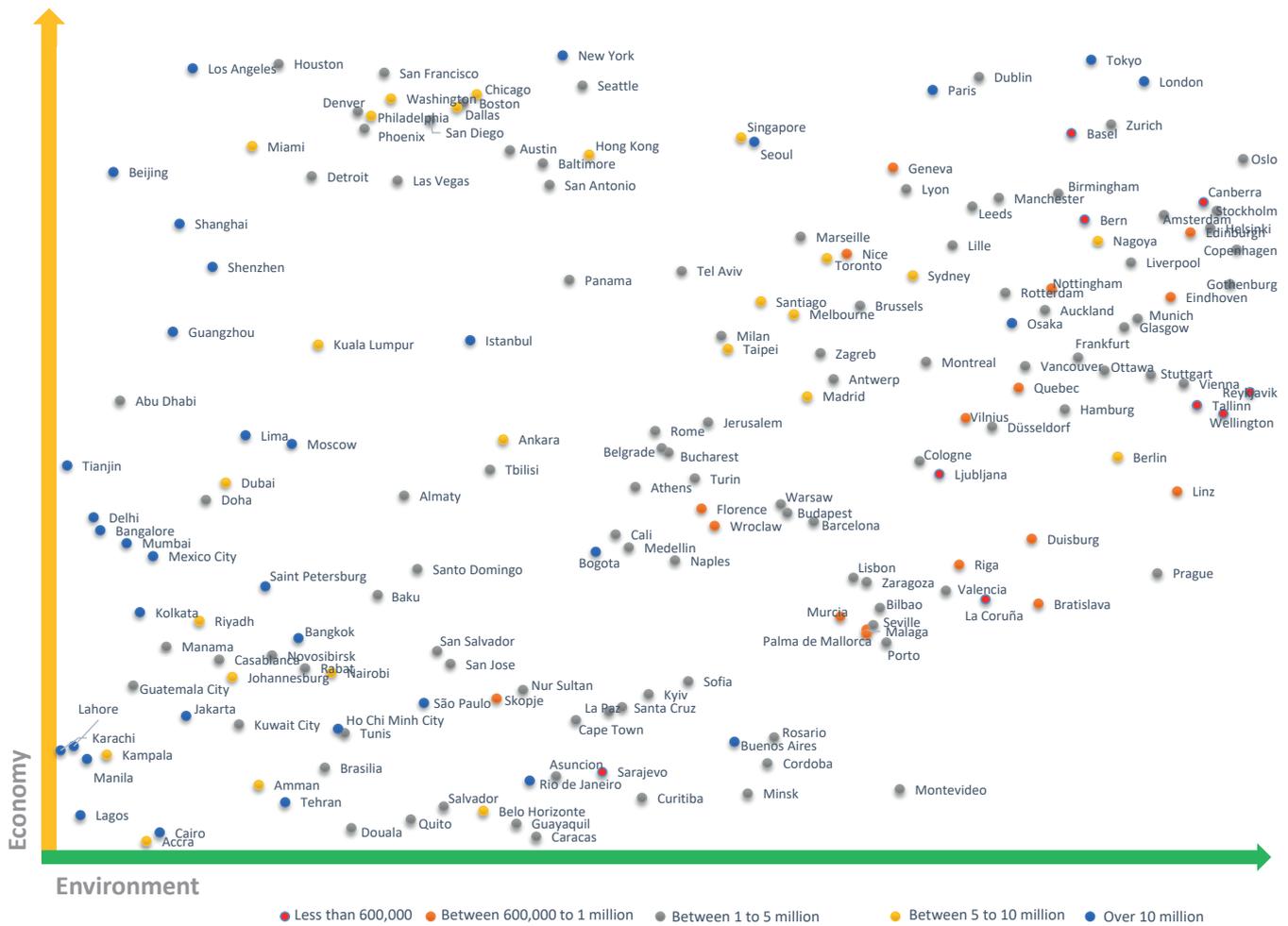


**Figure 8** focuses on the economy and environment dimensions. The former is shown on the y-axis and the latter on the x-axis.

In the upper left area of the chart are several Asian and American cities that stand out for their strong performance in the economy dimension but perform poorly in the environment dimension. This suggests that a high level of economic development may be detrimental to environmental well-being if cities fail to take environmental considerations into account when pursuing economic development. In the lower left corner, we find cities that perform poorly in both of these dimensions, including Lagos, Cairo, Accra, Kampala and Manila. The lower right area shows cities

with a low level of economic development but good environmental performance. In this group, we find several Latin American cities, including Buenos Aires, Rosario, Cordoba and Montevideo, among others. In this case, one might conclude that cities with a lower level of economic development do a better job of preserving the environment. Finally, the cities that appear in the upper right area are those that perform well in both dimensions. In this group, we find a large number of European cities, including Zurich, Basel, London, Oslo and Dublin; Asian cities, such as Tokyo; and cities in Oceania, such as Canberra. These cities demonstrate that it is possible to break the tension between economy and environment.

**Figure 8**





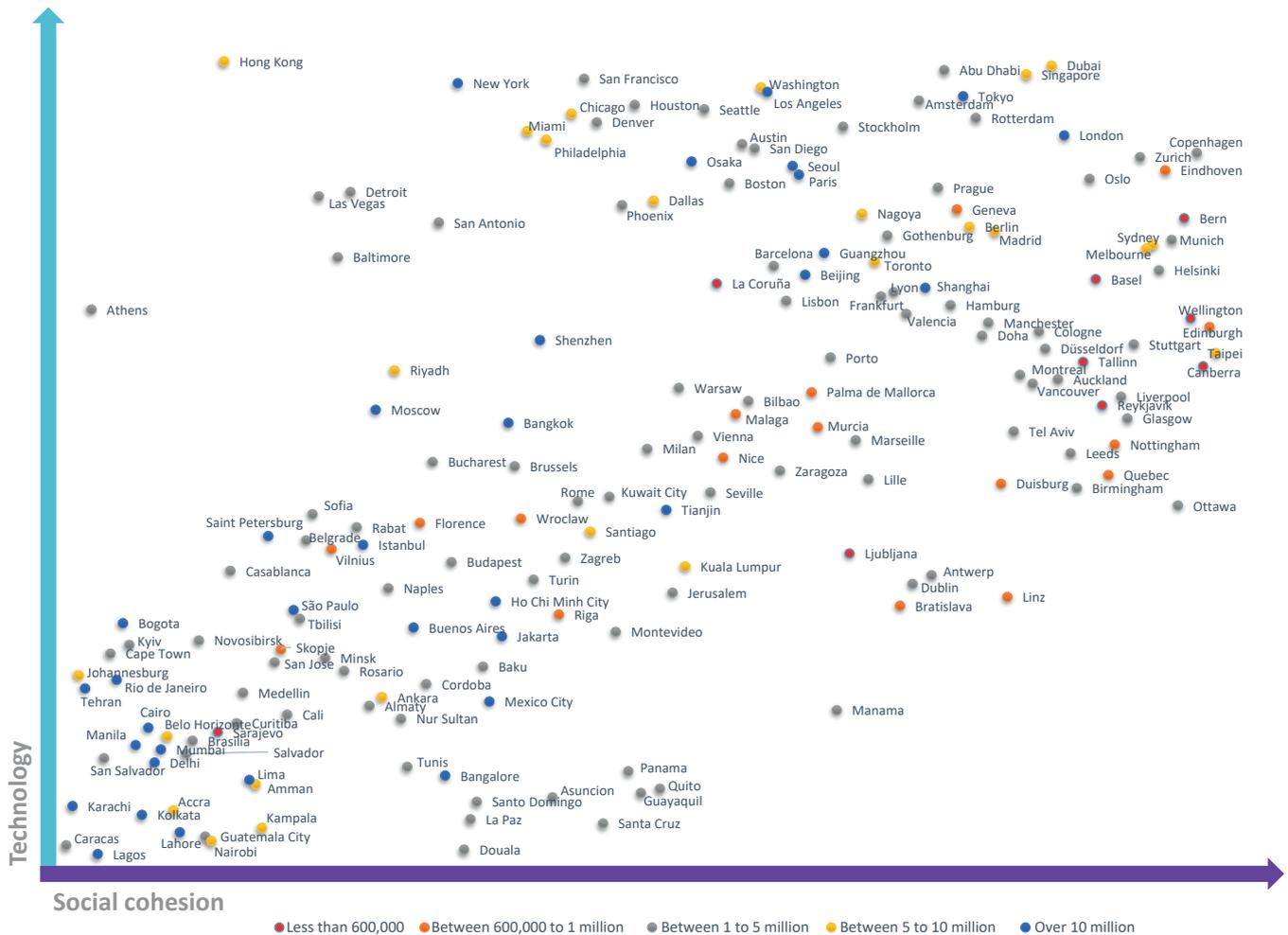


**Figure 11** shows the relationship between the dimensions of technology and social cohesion. Broadly speaking, cities with larger populations perform well in technology but poorly in social cohesion. This holds true for cities such as Hong Kong, Las Vegas, Detroit and Baltimore. In the upper right area, we find the cities that achieve good performance in both dimensions. This group includes Copenhagen, Abu Dhabi, Dubai, Singapore and

Tokyo. Furthermore, the *smallest cities* (i.e., those with a population of less than one million) show relatively good performance in social cohesion. This is the case of Eindhoven, Edinburgh, Bern and Wellington.

Finally, in the lower left quadrant we find the cities that perform poorly in both dimensions, including Lagos, Calcutta, Karachi and Caracas, which are in emerging countries.

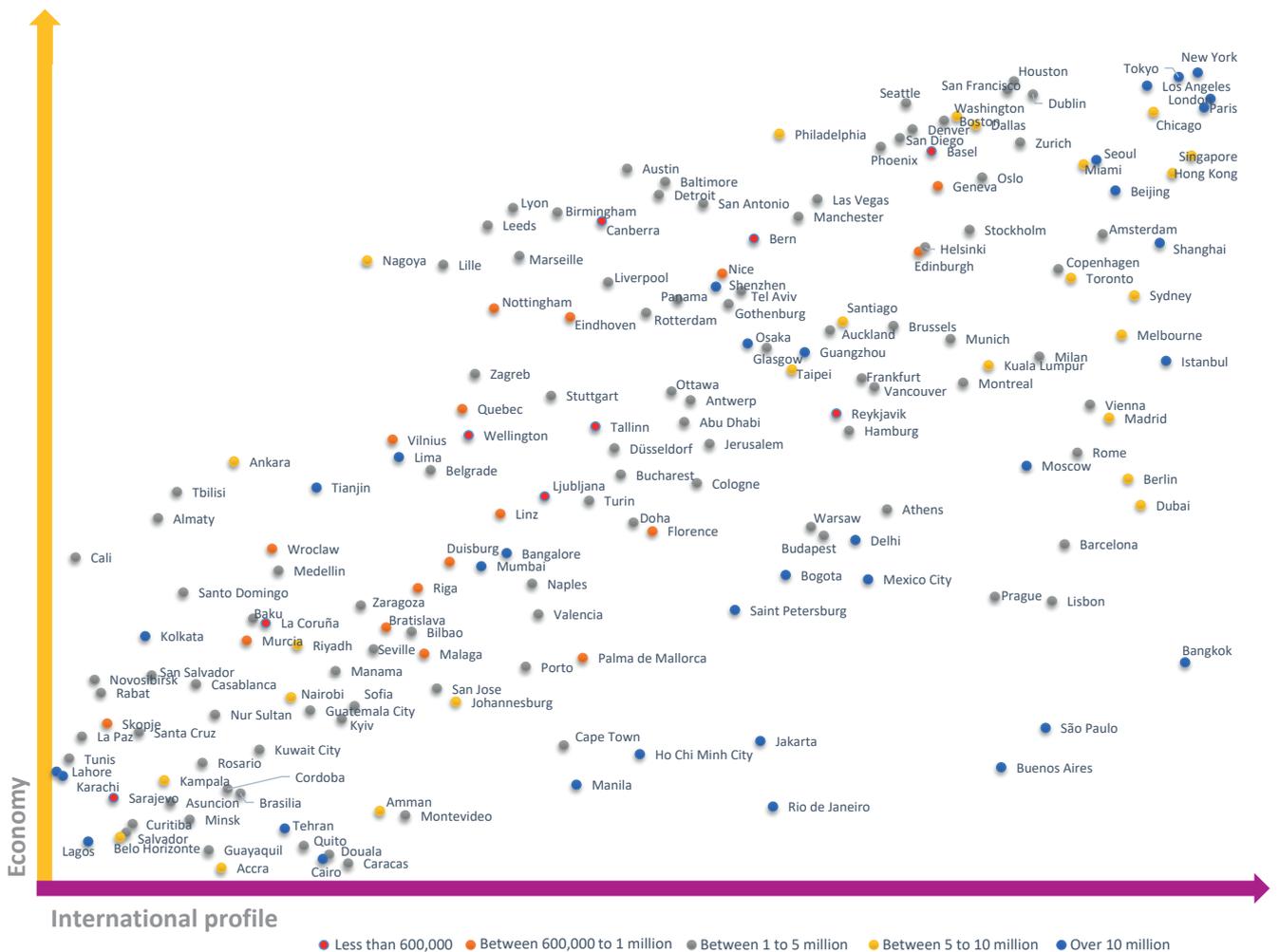
**Figure 11**



**Figure 12** shows the relationship between the economy and international profile dimensions. In this case, a pattern was generally observed: Cities either performed well in both dimensions or poorly in both. This suggests a relationship between these two dimensions. Good performance in the economy dimension could translate into a stronger international profile; or conversely, poor performance in the economy dimension results in a lower international profile. In previous editions of the index this relationship was more evident. However, this year we find a group of cities that perform poorly in the economy dimension but well in international profile. This

group includes some Brazilian cities, such as São Paulo and Rio de Janeiro, as well as Buenos Aires and Bangkok, which do not have good positions in the economy dimension but nevertheless show good performance in international profile. Cities that perform well in both dimensions include North American cities such as New York, Los Angeles, Chicago and San Francisco; European cities such as Paris, London and Dublin; and Asian cities such as Tokyo, Seoul, Singapore and Hong Kong. Cities that perform poorly in both dimensions include Lagos, Accra and the Brazilian cities of Belo Horizonte, Salvador and Curitiba.

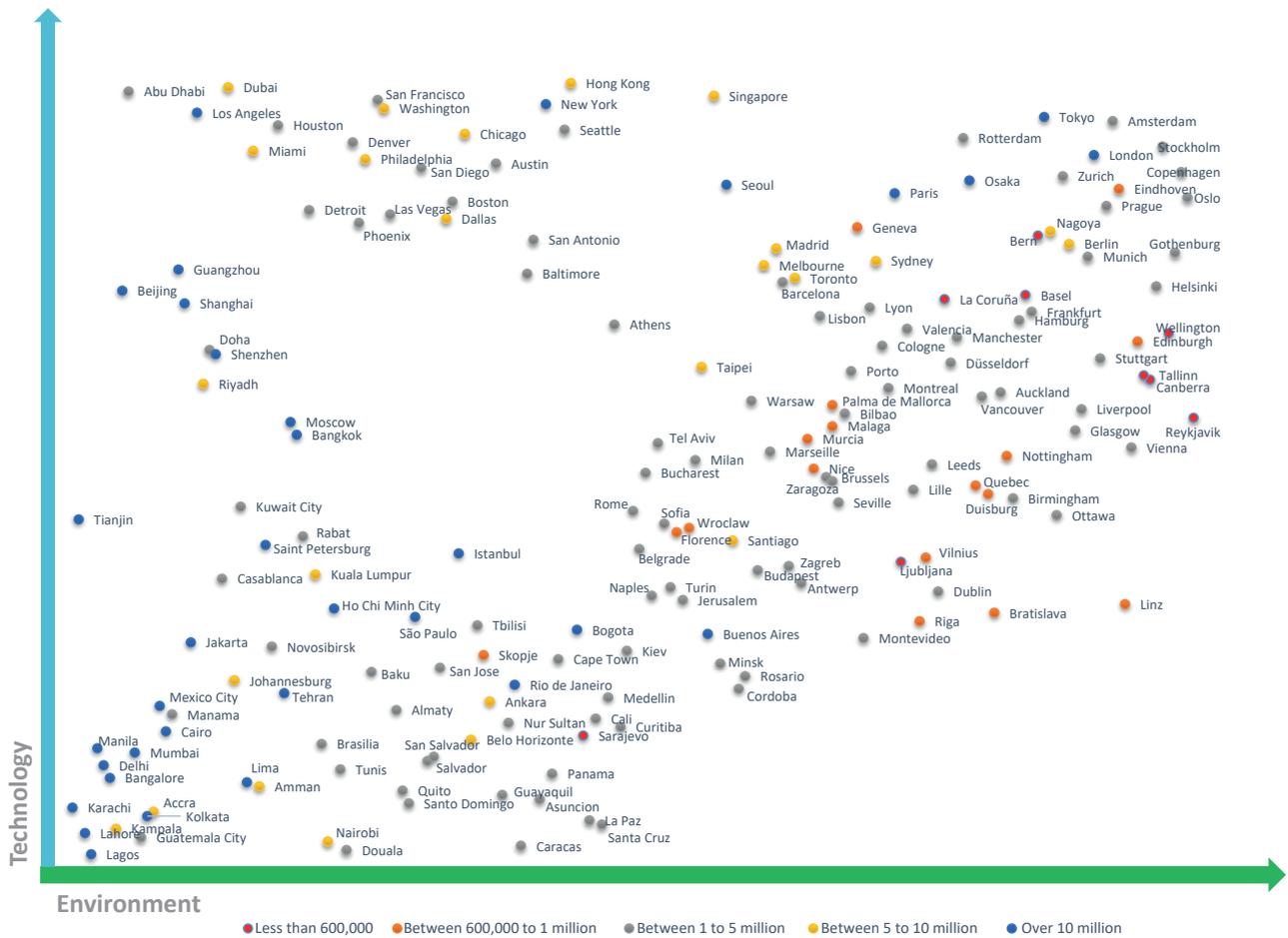
**Figure 12**



**Figure 13** focuses on the relationship between the technology and environment dimensions. Here we find four groups situated in the four quadrants of the chart. In the upper left quadrant are the cities that perform well in technology but not in the environment dimension, including US cities such as Los Angeles, Houston, Miami and Philadelphia, and Middle Eastern cities such as Dubai and Abu Dhabi. In the lower left quadrant are the cities that perform poorly in both dimensions, including

Lahore, Lagos, Karachi and Kampala. In the upper right quadrant are those that perform well in both dimensions. European cities such as London, Copenhagen, Stockholm, Zurich, Eindhoven and Amsterdam account for the largest proportion of this group. Finally, in the group of cities with poor performance in technology but good performance in the environment dimension, we find some South American cities, such as Montevideo, as well as Linz, Riga and Bratislava.

**Figure 13**





The information presented in the figure above is supplemented with an analysis of variance with respect to the dimensions considered. In other words, the aim is not only to understand how much cities have grown, but also how they have grown. To this end, the variation across the nine dimensions was calculated for each of the cities shown in **Figure 15** below. The cities at the bottom of the chart occupy similar positions in all the dimensions and therefore have a more homogeneous distribution, either because they are stalled or because they are balanced. In contrast, those at the top stand out in one or more dimensions but occupy a relatively low position in others. This information, combined with the rank of each city, allows us to identify four categories.

The first (lower right quadrant) is made up of what we call *balanced* cities—that is, cities positioned in the mid-upper part of the chart that present relatively high values in all the dimensions. This category includes London, Amsterdam, Copenhagen, Oslo, Zurich, Manchester, Madrid and Frankfurt.

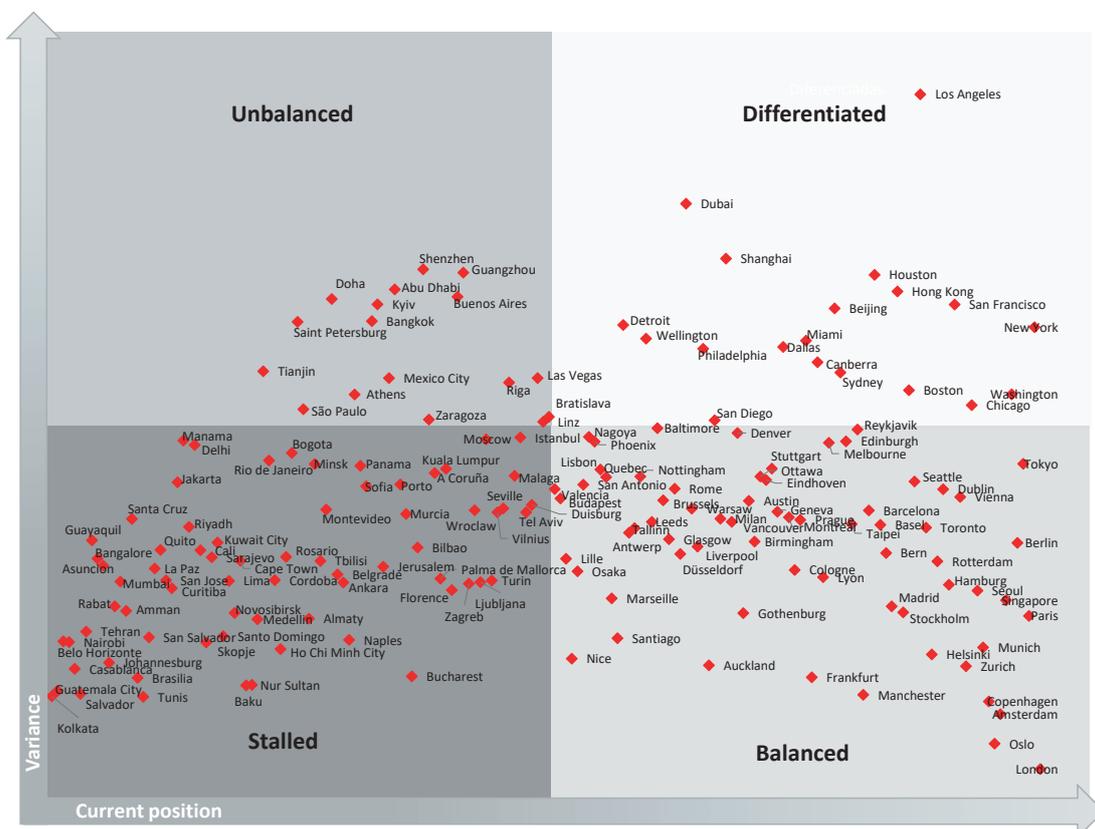
The second category (upper right quadrant) is made up of what we call *differentiated* cities—that is, cities that occupy high positions in the ranking and obtain very good results in several dimensions but relatively poor results in others. Los Angeles, for example, ranks among the top cities in economy, human capital and governance,

but near the bottom in environment and mobility and transportation. It is the city with the greatest variability across dimensions. Another example is New York, which ranks at the top in seven of the nine dimensions but very low in social cohesion and environment. Other cities in this category include Houston, San Francisco, Shanghai and Dubai.

The third (upper left) quadrant corresponds to cities that we call *unbalanced*—that is, cities that are at the bottom of the ranking but stand out in a particular dimension. This is the case of Abu Dhabi, Shenzhen, Guangzhou and Buenos Aires, which, though they rank below 100th in many dimensions, stand out in one or more areas. For example, Abu Dhabi stands out in technology (rank #3), Shenzhen and Guangzhou perform well in mobility and transportation (#9 and #12, respectively), and Buenos Aires ranks 30th in governance, urban planning and international profile. Other cities in this category include Bangkok, Saint Petersburg and Tianjin.

Finally, the fourth group (lower left quadrant) is made up of what we call *stalled* cities, which perform poorly in all, or almost all, of the dimensions analyzed. An example is Nur-Sultan, which ranks below 100th place in all nine dimensions. Other examples include Baku, Bucharest, Salvador and Tunis.

**Figure 15**





## Recommendations and Conclusions

The **CIMI** composite index provides a ranking that takes into account various aspects of cities. The dimensions analyzed offer a broad, integrative view of what a city represents and provide a better understanding of their composition and evolution over time.

This year's results cannot be interpreted in isolation; rather, they must be understood in the current context of economic and social uncertainty at the global level. The impact of the COVID-19 health crisis is reflected in many of the dimensions. However, the effects of the war in Ukraine on the real economy, society and even the environment are yet to be seen. With these points in mind, we offer the following conclusions and recommendations:

**Impact of COVID-19.** Economic and social recovery in the wake of the pandemic is probably one of the most important challenges facing our generation. Indeed, our index shows that the COVID-19 crisis has significantly affected many of the dimensions considered in our urban model. The clearest effect has been on the economy. Cities have dealt with the pandemic quite differently in terms of levels of lockdown, policies to help the most vulnerable businesses and citizens, and recovery policies. But the health crisis has also affected many other aspects of cities, such as their international profile. Cities that depend heavily on tourism have been particularly affected, since the number of international passengers has fallen drastically in recent years. Given the importance of cities in this area, they must work tirelessly to regenerate conditions that facilitate a recovery which is effective, lasting and, most importantly, driven by a sense of solidarity.

**The importance of human capital.** Our index shows that cities with high levels of human capital appear to be more resilient to crises. This observation should be reflected in the priorities of city managers, who will have to focus on long-term education policies. This point seems particularly relevant in the context of the social phenomenon known as the “Great Resignation,” a trend that has seen millions of people voluntarily give up their jobs and that poses a major challenge for cities (and the companies based in them), which will have to invest in new areas of specialization and training, design new ways of working, and improve working conditions to ensure that their human capital has the desired positive impact.

**Resilience as a new urban paradigm.** Until relatively recently, the concept of urban resilience was used only in reference to natural disaster scenarios. However, the COVID-19 pandemic has shown that the ability of cities to overcome adverse circumstances will be part of strategic thinking on the urban agenda. This is very relevant in the current economic environment, which is characterized by great uncertainty due to the war in Ukraine. In this regard, we believe it is essential to build a new form of urban resilience, which can be achieved by combining strong infrastructure with agile, efficient governance.

**The SDGs as a frame of reference.** Unfortunately, both the pandemic and the war in Ukraine have had a negative impact on the progress that had been made on the SDG 2030 Agenda. For example, levels of extreme poverty have increased, as have levels of pollution. The world's cities play a key role in achieving these global goals. It is therefore essential that they adopt the SDGs as a frame of reference and identify the areas where they can have the greatest impact. For example, given that a large fraction of global emissions come from transportation and that these emissions have serious negative effects on people, cities must be able to gauge this impact and design policies that promote sustainable mobility. The SDGs can help them identify priority areas that require

the highest level of investment, time and effort. To this end, cities need to carry out an in-depth diagnosis. The **CIMI** can serve as a good diagnostic tool for initial assessment of a city's current situation with respect to the nine dimensions covered by our model. The index can also be used to take a quick x-ray of a city in order to identify both strengths and dimensions where there is room for improvement.

**Collaboration as a key mechanism in urban transformation.** The challenges posed by the current environment and the great uncertainties reflected in forecasts require that cities redefine their strategies to adapt to this new scenario. Cities that are able to bring together different social actors—the public sector, private companies, civic organizations and academic institutions—will be better positioned to achieve success in a shorter time frame. Our experience at **IESE Cities in Motion** and the associated **PPP for Cities** platform ([www.pppcities.org](http://www.pppcities.org)) has taught us that the challenges we face are too big to solve in isolation and that addressing them effectively requires collaboration

between different social actors. Cooperation may entail different formats (from PPPs to citizen participation structures), but whatever form it takes, collaborative work is essential for long-term success. The notions of *collaboration* and *cooperation* should be central to the debate around social and economic recovery, and the goal should be to break down silos that keep us from seeing relationships and possible synergies between social actors.

In short, cities face major challenges, and tackling them will require city managers who are able to lead by example, guided by the principles of justice and collaboration and by a vision of the future that includes all citizens. This is the only way to achieve urban environments that are not only viable, but also more livable, just and resilient. In short, we will need city managers who apply the concept of *smart governance*, which includes accurate diagnosis, a clear vision, and a multidimensional approach to managing challenges. We trust that this report will help cities achieve better governance, which will undoubtedly translate into greater well-being for their citizens.

# Appendix 1. Indicators

| No. | Indicator  | Description / Unit of measurement  | Source  | Dimension       |
|-----|--|--|---|-----------------|
| 1   | Secondary and higher education                   | Proportion of population with secondary and higher education.  | Euromonitor   | Human capital   |
| 2   | Schools  | Number of public and private schools in a city.  | OpenStreetMap   | Human capital   |
| 3   | Business schools                                 | Number of business schools in the city included in the <i>Financial Times</i> TOP 100.   | <i>Financial Times</i>                                      | Human capital   |
| 4   | Expenditure on education                         | Annual private expenditure on education per capita.  | Euromonitor   | Human capital   |
| 5   | Expenditure on leisure and recreation            | Consumer expenditure on leisure and recreation as a percentage of GDP.   | Euromonitor   | Human capital   |
| 6   | Expenditure on leisure and recreation per capita | Annual consumer expenditure on leisure and recreation per capita.  | Euromonitor   | Human capital   |
| 7   | Student mobility                                 | International flow of mobile students at the tertiary level. Number of students.   | UNESCO  | Human capital   |
| 8   | Museums and art galleries                        | Number of museums and art galleries in a city.   | OpenStreetMap   | Human capital   |
| 9   | Number of universities                           | Number of TOP 500 universities.  | QS Top Universities   | Human capital   |
| 10  | Theaters   | Number of theaters in a city.  | OpenStreetMap   | Human capital   |
| 11  | Female-friendly                                  | This variable indicates whether a city provides a friendly environment for women (on a scale of 1 to 5). Cities with a value of 1 have a more hostile environment for women; those with a value of 5 are very female-friendly.                     | Nomad List  | Social cohesion |
| 12  | Hospitals  | Number of public and private hospitals in a city. Includes health centers.   | OpenStreetMap   | Social cohesion |
| 13  | Crime rate                                       | Estimation of the general level of crime in a city.  | Numbeo  | Social cohesion |
| 14  | Slavery Index                                    | The variable represents the national government's response to situations of slavery in the country. The countries that rank highest are the ones dealing with the problem most effectively.  | Walk Free Foundation  | Social cohesion |
| 15  | Happiness Index                                  | Countries with a higher value are those where the level of overall happiness is higher.  | World Happiness Index                                       | Social cohesion |
| 16  | Gini Index                                       | Index values range from 0 to 100. A value of 0 expresses perfect equality of income distribution, and 100, maximal inequality.   | Euromonitor   | Social cohesion |
| 17  | Global Peace Index                               | This index measures the level of peace/violence in a country or region. Countries with a high level of violence rank lowest.   | Centre for Peace and Conflict Studies, University of Sydney | Social cohesion |
| 18  | Health Care Index                                | Estimation of the overall quality of the health care system, health care professionals, equipment, personnel, costs, etc.  | Numbeo  | Social cohesion |
| 19  | LGBT-friendly                                    | This variable indicates whether a city provides a friendly environment for the LGBT community (on a scale of 1 to 5). Cities with a value of 1 have a more hostile environment for this community; those with a value of 5 are very LGBT-friendly. | Nomad List  | Social cohesion |

| No. | Indicator   | Description / Unit of measurement  | Source  | Dimension       |
|-----|---|--|---|-----------------|
| 20  | Price of property   | Property price as a proportion of income. Calculated as the ratio of the average price of a home to average annual disposable household income.  | Numbeo  | Social cohesion |
| 21  | Female employment rate  | Rate of female employment in the public sector. Value from 0 to 1.   | International Labor Organization                  | Social cohesion |
| 22  | Death rate  | Death rate per 100,000 city inhabitants.   | Euromonitor                                       | Social cohesion |
| 23  | Unemployment rate   | Unemployment rate (unemployed/labor force).  | Euromonitor                                       | Social cohesion |
| 24  | Murder rate   | Murder rate per 100,000 city inhabitants.  | Nomad List  | Social cohesion |
| 25  | Suicide rate  | Suicide rate per 100,000 city inhabitants.   | Nomad List  | Social cohesion |
| 26  | Terrorism   | Number of terrorist incidents in a city in the last three years.   | Global Terrorism Database, University of Maryland | Social cohesion |
| 27  | Racial tolerance  | Index of racial tolerance in a city.   | Nomad List  | Social cohesion |
| 28  | Ease of starting a business   | Top positions in the ranking are held by cities that have a more favorable regulatory environment for setting up and operating a local business.   | World Bank  | Economy         |
| 29  | Mortgage  | Mortgage as a percentage of income is the monthly mortgage cost as a proportion of household income (the lower the better).  | Numbeo  | Economy         |
| 30  | Motivation of individuals to undertake early-stage entrepreneurial activity | The percentage of opportunity-driven early-stage entrepreneurs divided by the percentage of necessity-driven early-stage entrepreneurs.  | Global Entrepreneurship Monitor                   | Economy         |
| 31  | Number of headquarters  | Number of headquarters of publicly traded companies.   | Globalization and World Cities (GaWC)             | Economy         |
| 32  | GDP   | Gross domestic product in millions of USD.   | Euromonitor                                       | Economy         |
| 33  | Estimated GDP   | Projected GDP growth for the next year.  | Euromonitor                                       | Economy         |
| 34  | GDP per capita  | Gross domestic product per capita.   | Euromonitor                                       | Economy         |
| 35  | Purchasing power  | Purchasing power in buying goods and services in the city (based on the average salary), compared to that of New York City residents. If local purchasing power is 40, this means that inhabitants with an average salary can afford to buy 60% less goods and services than New York City residents with an average salary. | Numbeo  | Economy         |
| 36  | Productivity  | Labor productivity calculated as GDP/employed population (in thousands).   | Euromonitor                                       | Economy         |
| 37  | Hourly wage in USD  | Hourly wage in the city (in USD).  | Euromonitor                                       | Economy         |
| 38  | Time required to start a business   | Number of calendar days needed to complete the procedures to legally operate a business.   | World Bank  | Economy         |

| No. | Indicator                              | Description / Unit of measurement   | Source                            | Dimension  |
|-----|--|---|-----------------------------------|------------|
| 39  | Bitcoin legal                          | Whether or not Bitcoin is legal in the city.  | Nomad List                        | Governance |
| 40  | ISO 37120 certification                | Whether or not the city has ISO 37120 certification. Certified cities are committed to improving urban services and quality of life. This variable is coded from 0 to 6. The highest value is assigned to the cities that have been certified longest. A value of 0 is assigned to cities that are not certified. | World Council on City Data (WCCD) | Governance |
| 41  | Government buildings                   | Number of government buildings and premises in a city.  | OpenStreetMap                     | Governance |
| 42  | Embassies                              | Number of embassies in a city.  | OpenStreetMap                     | Governance |
| 43  | Public sector employment               | Percentage of employed population working in public administration and defense; education; health; community, social and personal service activities; and other activities.   | Euromonitor                       | Governance |
| 44  | E-Participation Index                  | This index supplements the EGDI and focuses on the use of online services to facilitate provision of information by governments to citizens ("e-information sharing"), interaction with stakeholders ("e-consultation"), and engagement in decision-making processes ("e-decision-making").                       | United Nations                    | Governance |
| 45  | Human Capital Index                    | The E-Government Development Index (EGDI) is a composite measure of three important dimensions of e-government: provision of online services, telecommunication connectivity and human capacity. This variable captures the human capacity component.   | United Nations                    | Governance |
| 46  | Strength of Legal Rights Index         | This index measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate access to loans. The index ranges from 0 (low) to 12 (high), with higher scores indicating that these laws are better designed to expand access to credit.                 | World Bank                        | Governance |
| 47  | Telecommunication Infrastructure Index | The E-Government Development Index (EGDI) is a composite measure of three important dimensions of e-government: provision of online services, telecommunication connectivity and human capacity. This variable captures the development status of telecommunication infrastructure (by the government).           | United Nations                    | Governance |

| No. | Indicator  | Description / Unit of measurement   | Source                              | Dimension   |
|-----|--|---|-------------------------------------|-------------|
| 48  | Corruption Perceptions Index                         | Countries with values close to 0 are perceived as very corrupt and those with values close to 100 are perceived as very transparent.  | Transparency International          | Governance  |
| 49  | Online Service Index                                 | The E-Government Development Index (EGDI) is a composite measure of three important dimensions of e-government: provision of online services, telecommunication connectivity and human capacity. This variable reflects the scope and quality of e-government services. | United Nations                      | Governance  |
| 50  | Research offices                                     | Number of research and technology offices in a city.  | OpenStreetMap                       | Governance  |
| 51  | Open data platform                                   | Whether or not the city has an open data system.  | CTIC Foundation and Open World Bank | Governance  |
| 52  | Democracy Index                                      | The top-ranked countries are the ones considered most democratic.   | Economist Intelligence Unit         | Governance  |
| 53  | Reserves   | Total reserves in millions of current USD. City-level estimate according to population.   | World Bank                          | Governance  |
| 54  | Reserves per capita                                  | Reserves per capita in millions of current USD.   | World Bank                          | Governance  |
| 55  | CO <sub>2</sub> emissions                            | Carbon dioxide emissions from the use of fossil fuels and the manufacture of cement. Measured in kilotons (kt).   | World Bank                          | Environment |
| 56  | Methane emissions                                    | Methane emissions caused by human activities such as agriculture and industrial methane production. Measured in kt of CO <sub>2</sub> equivalent.   | World Bank                          | Environment |
| 57  | Environmental Performance Index                      | Environmental Performance Index (from 1 = poor to 100 = good).  | Yale University                     | Environment |
| 58  | CO <sub>2</sub> Emission Index                       | Index of CO <sub>2</sub> emissions.   | Numbeo                              | Environment |
| 59  | Pollution Index                                      | Index of pollution.   | Numbeo                              | Environment |
| 60  | PM <sub>10</sub>                                     | A measure of particles in the air with a diameter of less than 10 µm. Annual mean.  | Global Residence Index              | Environment |
| 61  | PM <sub>2.5</sub>                                    | A measure of particles in the air with a diameter of less than 2.5 µm. Annual mean.   | IQAir                               | Environment |
| 62  | Percentage of population with access to water supply | Percentage of the population with reasonable access to an adequate amount of water from improved water sources.   | World Bank                          | Environment |
| 63  | Renewable water resources                            | Renewable water sources per capita.   | FAO                                 | Environment |
| 64  | Solid waste  | Average amount of municipal solid waste generated annually per person (kg/year).  | Waste Management for Everyone       | Environment |
| 65  | Climate vulnerability                                | Risk to the city due to climate change.   | National Geographic                 | Environment |

| No. | Indicator                  | Description / Unit of measurement   | Source                    | Dimension                   |
|-----|----------------------------|---|---------------------------|-----------------------------|
| 66  | Bicycle rental             | Whether or not the city has a bicycle rental system.  | NUMO                      | Mobility and transportation |
| 67  | Moped rental               | Whether or not the city has a moped rental system.  | NUMO                      | Mobility and transportation |
| 68  | Scooter rental             | Whether or not the city has a scooter rental system.  | NUMO                      | Mobility and transportation |
| 69  | Bicycles per household     | Percentage of bicycles per household.   | Euromonitor               | Mobility and transportation |
| 70  | Bike sharing               | Shows automated services for public use of shared bicycles that provide transportation from place to place in a city. Indicator values range from 0 to 8 according to how developed the system is.  | Bike-Sharing World Map    | Mobility and transportation |
| 71  | Metro stations             | Number of metro stations in a city.   | Metrobits (metrobits.org) | Mobility and transportation |
| 72  | Traffic Inefficiency Index | This index is an estimate of traffic inefficiencies. High values represent high driving inefficiencies, such as long travel times.  | Numbeo                    | Mobility and transportation |
| 73  | Traffic Commute Time Index | An index based on the time it takes to commute to work (in minutes).  | Numbeo                    | Mobility and transportation |
| 74  | Exponential Traffic Index  | This index is estimated by considering time spent in traffic. It is assumed that travel time dissatisfaction increases exponentially beyond 25 minutes.   | Numbeo                    | Mobility and transportation |
| 75  | Length of metro system     | Length of the metro system in a city.   | Metrobits (metrobits.org) | Mobility and transportation |
| 76  | High-speed train           | Binary variable that shows whether the city has a high-speed train or not.  | OpenRailwayMap            | Mobility and transportation |
| 77  | Vehicles in the city       | Number of commercial vehicles in a city.  | Euromonitor               | Mobility and transportation |
| 78  | Flights                    | Number of inbound flights (air routes) in a city.   | OpenFlights               | Mobility and transportation |
| 79  | Bike Advance               | Whether or not a city has a bike sharing system.  | The Bike Share Map        | Urban planning              |
| 80  | Buildings                  | The number of completed buildings in a city. The count includes structures such as high-rises, towers and low-rise buildings, but excludes other miscellaneous structures and buildings of different statuses (under construction, proposed, etc.). | Skyscraper Source Media   | Urban planning              |
| 81  | Bicycle stations           | Bicycle station locations in a city.  | Bike-Sharing World Map    | Urban planning              |

| No. | Indicator  | Description / Unit of measurement  | Source  | Dimension             |
|-----|--|--|---|-----------------------|
| 82  | Electric charging stations   | Electric car charging points in a city.  | OpenStreetMap                                     | Urban planning        |
| 83  | Number of people per household                                       | Average number of people per household.  | Euromonitor                                       | Urban planning        |
| 84  | Percentage of the urban population with adequate sanitation services | Percentage of the urban population that uses at least basic sanitation services—that is, improved sanitation facilities that are not shared with other households. | World Bank  | Urban planning        |
| 85  | Artificial intelligence (AI) projects                                | Whether or not a city has AI projects.   | AI Localism                                       | Urban planning        |
| 86  | High-rises   | Percentage of buildings classified as high-rises. A high-rise is a multi-floored building of at least 12 stories or 35 m in height (115 feet).                     | Skyscraper Source Media                           | Urban planning        |
| 87  | Number of passengers per airport                                     | Annual number of passengers per airport in thousands.  | Euromonitor                                       | International profile |
| 88  | Hotels   | Number of hotels per capita.   | OpenStreetMap                                     | International profile |
| 89  | Restaurant Price Index   | The Restaurant Price Index compares the price of meals and drinks in restaurants and bars in a city to prices in New York City.                                    | Numbeo  | International profile |
| 90  | McDonald's   | Number of McDonald's establishments in a city.   | OpenStreetMap                                     | International profile |
| 91  | Number of congresses and meetings                                    | Number of international congresses and meetings held in a city.  | International Congress and Convention Association | International profile |
| 92  | Mobile broadband   | Active mobile broadband subscriptions.   | International Telecommunication Union             | Technology            |
| 93  | Innovation Cities Index  | The Innovation Cities Index (ICI) is a ranking of leading cities in innovation.  | 2thinknow   | Technology            |
| 94  | Internet   | Percentage of households with Internet access.   | Euromonitor                                       | Technology            |
| 95  | LTE/WiMAX  | Percentage of the population covered by at least an LTE/WiMAX mobile network.  | Euromonitor                                       | Technology            |
| 96  | Computers/PCs  | Percentage of households with a personal computer.   | Euromonitor                                       | Technology            |
| 97  | Mobile phone penetration rate  | Number of mobile phones per 100 inhabitants.   | International Telecommunication Union             | Technology            |
| 98  | Social media   | Registered Twitter users in a city (in thousands of individuals) + number of registered LinkedIn members in the city.  | Twitter and LinkedIn                              | Technology            |

| No. | Indicator   | Description / Unit of measurement   | Source                                | Dimension            |
|-----|---|---|---------------------------------------|----------------------|
| 99  | Broadband subscriptions                                   | Broadband subscriptions per 100 inhabitants.  | International Telecommunication Union | Technology           |
| 100 | Telephony   | Percentage of households with some kind of telephone service.   | Euromonitor                           | Technology           |
| 101 | Internet speed  | Fixed-line Internet speed in megabytes per second (country).  | World Population Review               | Technology           |
| 102 | Mobile speed  | Mobile speed in megabytes per second (country).   | World Population Review               | Technology           |
| 103 | WiFi hotspots   | Total number of WiFi hotspots. This variable represents options for connecting to the Internet in a city. | WiFi Map app                          | Technology           |
| 104 | Population  | Number of inhabitants.  | Euromonitor                           | City/country cluster |
| 105 | Percentage of population employed                         | Percentage of population employed.  | Euromonitor                           | Country cluster      |
| 106 | Expenditure on education per inhabitant.                  | Private expenditure on education per inhabitant.  | Euromonitor                           | Country cluster      |
| 107 | Expenditure on medical and health services per inhabitant | Private expenditure on medical and health services per inhabitant.  | Euromonitor                           | Country cluster      |
| 108 | Expenditure on hotel and catering services per inhabitant | Consumer expenditure on hotel and catering services per inhabitant.                                       | Euromonitor                           | Country cluster      |
| 109 | Expenditure on housing per inhabitant                     | Consumer expenditure on housing per inhabitant.   | Euromonitor                           | Country cluster      |
| 110 | Disposable income   | Disposable income (annual average). Decile 1. In USD.   | Euromonitor                           | City cluster         |
| 111 | Disposable income   | Disposable income (annual average). Decile 2. In USD.   | Euromonitor                           | City cluster         |
| 112 | Disposable income   | Disposable income (annual average). Decile 5. In USD.   | Euromonitor                           | City cluster         |
| 113 | Disposable income   | Disposable income (annual average). Decile 7. In USD.   | Euromonitor                           | City cluster         |
| 114 | Disposable income   | Disposable income (annual average). Decile 9. In USD.   | Euromonitor                           | City cluster         |