


NTT DATA

CITY TALENT INDEX 2022

Talent attracts talent

In collaboration with:  Barcelona
Global

ABOUT THE STUDY

This study is promoted by Barcelona Global and NTT DATA.

Barcelona Global is a private, independent, non-profit association made up of 243 of the city's leading companies, research centres, entrepreneurs, business schools, universities and cultural institutions, along with more than 930 professionals who want to make Barcelona one of the best cities in the world for impactful talent and economic activity.

The association also has a network of more than 160 members who live and work outside Spain, and 16% of international members who have chosen to live and work in Barcelona.

Barcelona Global develops strategic proposals for the future of Barcelona, works with its partners to promote specific projects, and mobilizes them to better learn about, understand and support the Barcelona of impact talent to which we aspire.

NTT DATA, headquartered in Tokyo, is one of the world's Top 10 IT service providers, employing 150,000 professionals and operating in more than 50 countries. **NTT DATA** Europe & Latam) Europe & Latam) is the corporate region for 26 countries, focused on bringing transformation and innovation to customers in Europe and Latin America.

NTT DATA provides digital development support to its customers through a range of strategic consulting and advisory services, cutting-edge technologies, applications, infrastructure, IT service modernisation and BPOs.

The company is committed to building a unique and open **community of people, led by shared values**, which has been growing as a **huge network of collective talent** capable of multiplying its capabilities and knowledge, to respond with agility to customers' changing needs and to smartly anticipate the future.

NTT DATA **seeks to build a unique environment of collaboration, creativity, closeness and generosity that allows us to continue to evolve** as a community and as a society, and to thrive on a day-to-day basis. To find out more, visit en.nttdata.com



Contents

00

(01)

Executive summary

page 06

(02)

Context

page 10

The importance of talent in modern societies

What is meant by talent?

How is talent defined in this study?

Framework for cities to promote,
attract and retain talent

(03)

**Structure and scope
of the report**

page 14

An index that measures the ability
of cities to attract and retain talent

History

Methodology and limitations

(04)

Results

page 20

On the ability of cities to attract
and retain talent

By area

A two-speed Europe in talent
attraction and retention

By profile

(05)

Towards a new Barcelona

page 46

Recommendations for improving
Barcelona's talent attraction and retention

Talent attracts talent

(06)

Annex

page 58

Annex 1

Annex 2

Executive summary

EXECUTIVE SUMMARY



The ability to attract and recruit talent is nowadays a key factor for countries, cities and companies. There is global competition to attract skilled workers, particularly in the fields of science and technology, and no one wants to be left behind.

NTT DATA created the City Talent Index in 2016 to holistically measure the ability of major European cities to attract and retain talent. This is an index that makes it possible to assess the main themes of competitiveness (business excellence, education system, research and development, quality of life, etc.) analysed on the basis of more than 50 quantitative indicators and which distance themselves from analyses of perceptions or trends. Unlike the majority of studies on this subject on the market, synthetic indicators are analysed, mainly from highly regarded sources such as Eurostat, World Bank, OECD and UNICEF.

In this edition, the index has evolved and has been updated with new cities and indicators such as sustainability, gender equality and technology adoption. Thirty-two European cities have been selected on the basis of population and GDP for the purpose of comparison. These cities meet the requirements of being in the top 50 European cities with the highest level of population and the highest level of regional GDP.

At the European level, the overall results of the City Talent Index highlight a rift between Northern Europe and Eastern and Southern Europe, separating the most advanced cities in terms of their ability to attract and retain talent. This gap is mainly explained by the fact that Northern European cities lead the continent in economic aspects and consequently by the correlation that exists between the determining economic factors of geographic mobility and the capacity to attract and retain talent.

In the specific case of Barcelona, during the last year under review the city is the leader in terms of attractive lifestyle. It has improved its overall position compared to the rest of the analysed European cities, thanks to its wide range of public services for citizens, particularly its transport and infrastructure connections and its sanitation network, as well as the fact that it is an essential tourist destination that generates a pull effect for attracting talent. It also needs to consolidate the positive progress seen in recent years in the global positioning of its tertiary and post-graduate education system, and to reinforce the environmental policies that are being put in place in the city. However, it needs to improve on macroeconomic aspects, such as improving unemployment and youth unemployment rates, strengthening confidence in the government system and political stability, and improving business productivity. This report proposes a series of aspects for improving the city, such as promoting and attracting major business and technological initiatives, making the education system more international, becoming a benchmark in effective sustainability policies and encouraging digital administration.

Highly talented societies with strong educational potential become centres of knowledge creation, and thus highly attractive ecosystems of highly qualified talent. Talent attracts talent.



Context

CONTEXT



The importance of talent in modern societies

More than 100 years ago, the economist Alfred Marshall had already anticipated that of all the capitals available to economies, **the most valuable is human capital**, both in terms of the contribution of working time and the added value generated by skilled labour (Marshall, 2013). However, it was not until the 1950s and 1960s that the importance of human capital in economic development began to be studied in depth, when it was defined as **the set of knowledge, skills and competencies that are useful for production, built up by individuals and organisations** (Schultz, 1961).

Since then, many economists have investigated the contribution and impact of human capital on the economic growth and development of countries or cities. For example, Edward Denison identified knowledge, as measured by the **educational levels** of individuals, as the **fundamental factor** in the **differences in growth dynamics between Western countries**, relative to others, over several decades after the Second World War (Denison, 1962).

In 1996, Nelson and Phelps also demonstrated the **feedback** effect between the **increase in human capital and the capacity** of territories for **innovation and economic growth**. They argued that more educated individuals are better able to discriminate between good and bad ideas, solve problems and face entrepreneurial activities with less fear, such that they encourage innovation in the business world and are better able to assimilate innovations from outside.

However, it is only with the emergence of the **new digital and knowledge economy** that the importance of human capital has become even more crucial. Studies suggest that **skilled workers** in a digitised economy are **key** to the **economic success** of developed countries. In other words, those countries or cities with the highest concentration of qualified personnel correspond to areas with the greatest economic growth.

Governments are therefore increasingly concerned with raising the levels of highly skilled human capital and, to achieve this, greater efforts and resources are being devoted to **education, and attracting and retaining talent**. For example, they are welcoming private organisations with a high economic impact or designing training systems that **encourage reskilling towards strategic sectors**.

Therefore, this study seeks to assess the ability of major European cities to attract and retain talent as a key distinguishing feature for their growth.

What is meant by talent?

It is important to clearly define the concept of talent used in this study. Gagné defined it as the **ability to perform an activity to a degree that places one's achievement in the top 10% of one's peers** in the same field. Similarly, Thorne and Pellant in 2007 defined it as someone who has an ability that is superior to others and does not need to work hard to use it. It seems then that **the concept of talent refers to those individuals who have the potential to reach high levels of achievement (Tansley, 2011 [17]), and who have skills that cannot be easily replaced (Kang, Sato and Ueki, 2017 [18]).**



How is talent defined in this study?

This City Talent Index distinguishes between four types of talent:

- **Entrepreneurial talent.** Directly contributes to job creation, economic growth, innovation and productivity.
- **Research talent with tertiary education.** One of the profiles that the most policies focus on attracting, and plays a key role in innovation and development.
- **Digital talent with tertiary education.** This is one of the most sought-after new profiles on which new talent attraction policies are focusing.
- **Young talent.** International undergraduate and postgraduate students.

Framework for cities to promote, attract and retain talent

International talent mobility is becoming increasingly important. This is a common situation in many sectors, particularly in the digital economy. We live in a global and interconnected world, where professionals from different fields, motivated by professional and life projects, are willing to embark on career paths open to geographical mobility. On the other hand, companies and governments are increasingly interested in attracting and retaining talent.

As a result, **there is global competition for attracting skilled workers**, especially in the fields of science and technology. This is why several countries are adopting immigration and talent attraction policies (*Ortega and Sparber, 2016 [3]*), and developing specific programmes. Notable examples include the following: El programa **“Talent Boost”** de Finlandia tiene como objetivo dar a conocer este país y hacerlo más atractivo para el talento internacional. Sus medidas incluyen el **desarrollo de servicios públicos y privados para apoyar la contratación internacional**, así como el establecimiento de escuelas internacionales en las grandes ciudades.

- Finland's **“Talent Boost”** programme aims to raise Finland's profile and make it more attractive to international talent. Its measures include the **development of public and private services to support international recruitment**, as well as the setting up of international schools in major cities.
- The **“Expatcenter Procedure”** in the Netherlands **helps highly qualified foreign workers and their families to integrate easily and quickly** in their new country, through personalised online helpdesks.
- France's **“French Tech Ticket”** programme, set up to attract international start-ups, provides **financial support of €45,000** and helps team members obtain residence permits. It also offers and provides **assistance with administrative procedures**.
- Spain's **“Plan to attract and retain scientific and innovative talent 2022”** includes a set of regulatory reforms, new calls for proposals and information and communication tools, which aim to **promote the retention and attraction of scientific and innovative talent and its return to Spain**. Another example is

the **“Rising Up in Spain”** programme, which offers comprehensive support to foreign start-ups that want to set up and grow in Spain.

These initiatives are not limited to the national level, but increasingly local and regional authorities are also promoting talent attraction policies. In fact, this new model became even more prominent after the pandemic crisis, when large cities had to take on new responsibilities as the level of government closest to the citizens.

In this sense, the city of Barcelona promoted a set of municipal policies to generate, develop, attract and retain talent. This led to the creation of the Barcelona International Welcome Desk, an office for welcoming international talent, aimed at helping newcomers with paperwork and providing a soft landing.

Similarly, the private sector also drives the attraction of talent. Companies make careful choices about where to locate their headquarters or technology hubs. And they have a major influence on the recruitment of digital professionals and on attracting highly qualified profiles when they choose one city over another to run their business.

As an illustration, Nestlé decided to build its technology hub in Barcelona because of “the city's proven innovative capacity and technological ecosystem”, and also because it considered it “an attractive place to host young talent”, as explained in its implementation statement. Five years later, the Nestlé Global IT HUB has 600 experts from different countries in Europe, covering all areas of IT¹.

Other examples are the online bank N26 and CISCO, which set up offices and a technology centre in Barcelona, hiring more than 100 engineers and experts in fintech products and microchip technology.

¹ For more information see the report prepared by NTT DATA for the Mobile World Capital, ACCIO and Barcelona City Council *“Tech Hubs Overview, Barcelona European Capital of Technology Hubs”*

Structure and scope of the report

STRUCTURE AND SCOPE OF THE REPORT



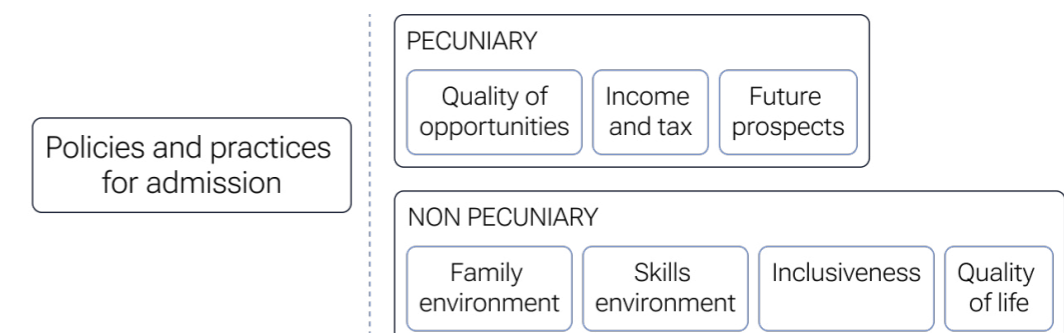
An index that measures the ability of cities to attract and retain

The **City Talent Index** was created with the aim of holistically **measuring** the **ability** of major European cities to **attract and retain talent** by assessing the main areas of competitiveness.

In order to determine these areas of competitiveness, we have reflected on the factors that influence the decision of talent to settle in a given territory. Taking into account the conceptual framework of Solimano (2008[25]) and Silvanto and Ryan (2014[2]), two main groups of **determining factors** that motivate skilled people to **move cities** have been identified:

- **(1) Financial motivations:** stimuli directly related to economic aspects, such as the quality of job opportunities, average income level, tax burden and growth expectations.
- **(2) Non-financial motivations and comforts:** stimuli not related to economic aspects, such as the perception of quality of life, the level of inclusion in society, a family-friendly environment and the learning of new competences and skills.








Figura 3.2. Determinants of talent attractiveness



Source: OECD Secretariat

Functional scope

We have analysed **54 indicators** split into **seven analysis dimensions**, which we will call domains, covering both financial and non-financial motivations.

DRIVERS	 Business excellence	 Economics and public policy	 Education system and lifelong learning	 Attractive lifestyle	 Research, innovation and society	 Diverse society	 Digital society
OBJECTIVE	Analyse the possibilities offered by the city in terms of employment and business environment for workers and companies	Diagnose the political stability and economic situation of the cities	Assess the educational opportunities that the city can offer to young people, university students or adults in their personal and professional development	Analyse the quality of life and environment as well as access to and scope of leisure and public services, such as mobility and the health system	Measure the city's ability to make its mark on the innovation map and attract research investment, talent, recognition and benefits for citizens	Show the degree of modernisation of the city taking into account the factors that promote a cohesive and inclusive city	Calculate the level of digitalisation of the city based on factors such as a digital government, the digitalisation of the business fabric or the city's IT infrastructure
SUB-DRIVERS	Labour market Business fabric Entrepreneurial environment	Governability Economics and regulation	Education system University education system Postgraduate education system	Public services Health system Quality of life Environmental impact	Investment on R+D Research personnel Innovation production	International population Gender	Technological adoption in society Administration and digital companies

Territorial scope

Thirty-two European cities have been selected, according to population and GDP criteria, for a comparison between them. These cities meet the following criteria: being in the top 50 European cities with the highest level of population and the highest level of regional GDP. To maximise the scope of countries to be compared, the number of cities per country has been limited to a total of four locations, thus avoiding countries like Germany being over-represented.

Furthermore, with the exception of London, Leeds and Manchester due to their recent exit from the European Union, all the analysed cities are inside the Schengen area. This decision allows the index to avoid the negative effects of migration policies on access to countries and to eliminate the determining factor of barriers to accessing the country, such as visa fees or bureaucratic procedures.



History

This index is the result of the evolution of the two previous documents, published in 2016 and 2018. Both studied the capacity of 25 cities, seven fewer than in the current edition. Also, this latest version has seen a **broadening of the functional scope of the analysis** to respond to the new transformations that have taken place, with **two additional areas, diverse society and digital society**, as well as new indicators in all areas.

These evolutions were the result of an exercise that sought to emphasise **robustness levers** around which work was undertaken to **make the index consistent** and position it as a benchmark in the areas of action it assesses. The following main actions have been carried out:

- **Justify the choice of cities with proven indicators**, allowing for a selection based on up-to-date data, and for comparison between the cities in the study.

- **Analyse the consistency of indicators**, by reviewing their coherence and representativeness to ensure high quality results.
- **Include new factors**, which social transformations have brought to light.
- **Introduce an additional analysis**, which brings dynamism to the index to modulate its result according to different variables such as the segment of talent to be attracted.

This year's edition aims to improve on previous publications by reinforcing the results obtained and including a qualitative perspective through the vision of leading figures in the different fields of study, which has helped to define recommendations and courses of action.

Given the changes outlined above, no comparison is made with the reports produced in previous editions.

Methodology and limitations

In order to understand how the index was constructed, it is important to explain the methodology (with more details in the annex to this document) used to obtain the ratings of the indicators, as well as their positioning for each area of analysis and in the overall calculation of the index.

First of all, it is worth noting that this index is itself a **synthetic indicator**, as it is the result of cross-referencing 54 indicators. Moreover, it does not collect indicators or qualitative data that could distort the analysis.

Therefore, as this is a calculation requiring a significant amount of data processing, the **CRISP-DM (Cross-Industry Standard Process for Data Mining) methodology** has been used to allow the following:

1. An understanding of the data for further standardisation

Most of the information needed to compile the index has been obtained from public international organisation sources. In particular, more than **75% of the analysed data comes from only four agencies**: Eurostat, the World Bank, the OECD and the International Monetary Fund. The remaining 25% comes from high quality sources such as the *Financial Times*, UNICEF and Yale University, among others.

After extracting the information, the **data was audited** and a number of limitations were found. For example, cities for which no information was available for a particular indicator. In this case, the average of the rest of the cities was used in order not to skew the analysis.

Similarly, an annual data window between 2016 and 2022 was used to adjust the index to disparity in terms of the year of publication of the different data tables and the timing of availability, as well as to mitigate the effects of structural impacts caused by external factors such as war or COVID-19. Therefore, **the most recent information possible has been used, depending on the availability of the data.**

2. Selecting the standardisation / classification criterion

For the construction of the global indicator and the partial indicators, the **data were standardised or classified** due to the high dispersion and differences in the data measurement scale. For example, these techniques are used because the percentage of the population with higher education is not comparable with a ranking of universities.

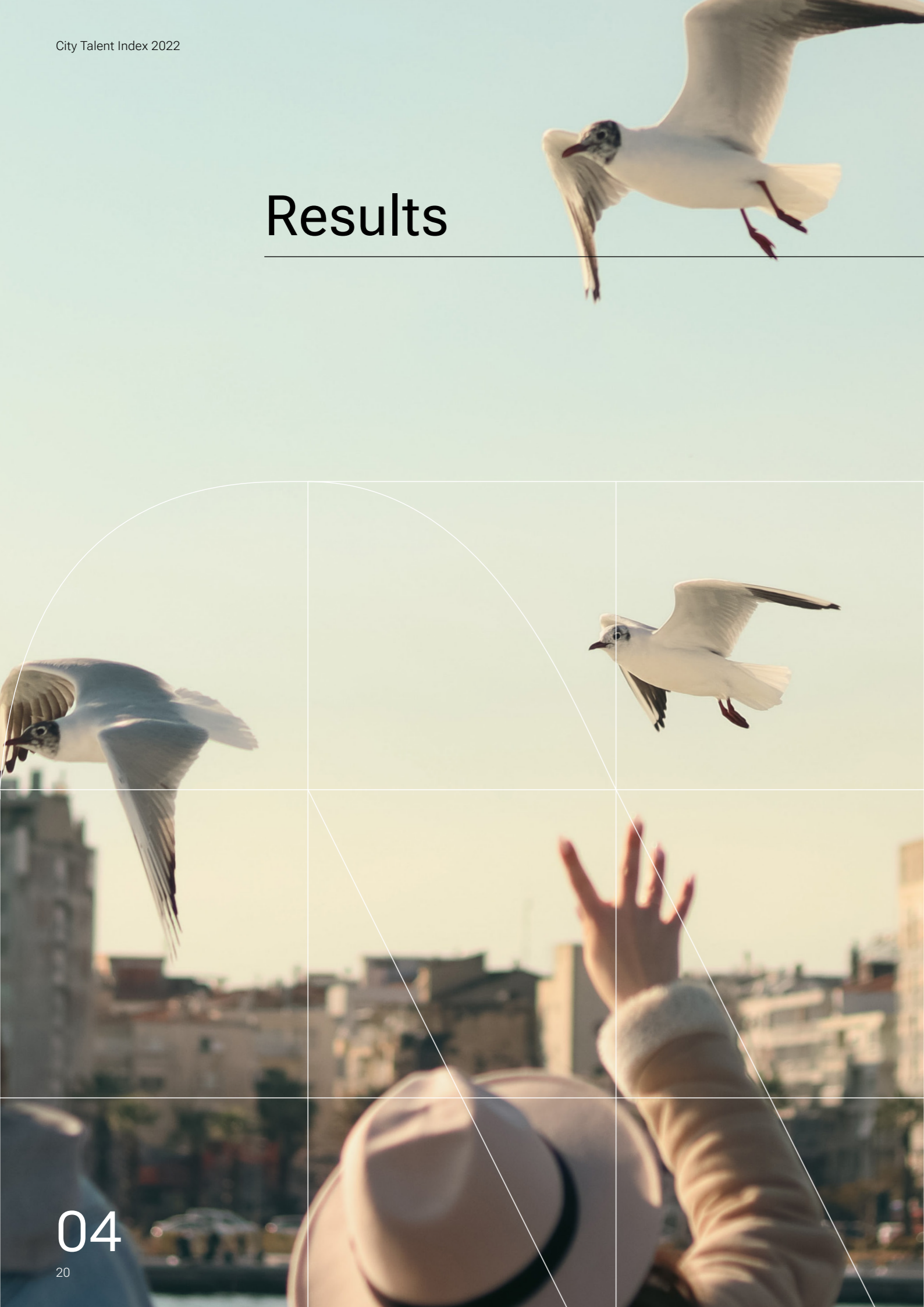
3. La generación del índice

After standardising or classifying the information for the cities that make up the index, the **partial weightings and the system for generating the city ranking were designed**. Sequentially, for each indicator, a choice was made as to whether standardisation or classification was more appropriate. Subsequently, the ranking was obtained by ordering the values from highest to lowest. In those indicators where a low value is preferable, such as worker vulnerability, the **hierarchy was reversed** to give the city with the lowest rating a better score. Finally, each indicator, domain and sub-domain was **assigned a weight or relevance** within the category to which it belongs, giving it more or less importance for the calculation of the index.




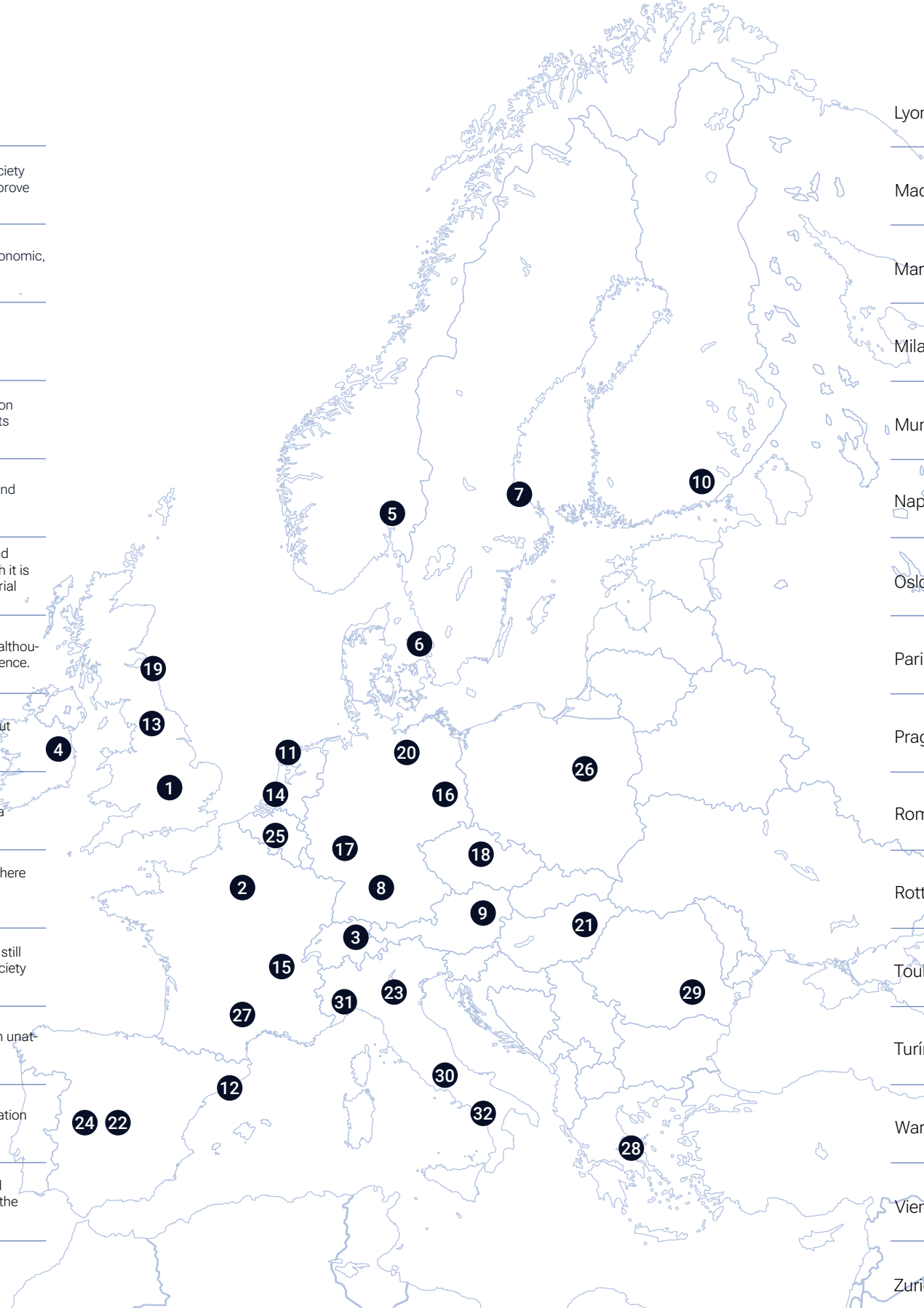































Results

RESULTS



On the ability of cities to attract and retain talent

Map of cities

	11	Amsterdam	It has one of the best lifelong learning systems on the continent, although there is room for improvement in areas related to gender equality.		Lyon	Lifestyle and its commitment to research are its main strengths, but it needs to improve in areas such as the digitalisation of its society.	15	
	28	Athens	It is one of the top five cities in terms of the digitalisation of society and scores well in terms of attractive lifestyle, but needs to improve on aspects of public policy and the education system.		Madrid	It stands out for having one of the best postgraduate university systems and a high level of business demographics, with room for improvement in areas such as innovation output and unemployment rate.	22	
	12	Barcelona	It leads in attractive lifestyle, but needs to improve on macroeconomic, governmental and business excellence.		Manchester	It has one of the best education systems, but projects an unattractive image of a city in terms of lifestyle.	13	
	16	Berlin	It stands out as one of the cities that is most committed to innovation and research, despite having a government that is not very digitised.		Milan	It is one of the most attractive cities in terms of lifestyle and business fabric, but is unattractive in terms of governance and the university system.	23	
	25	Brussels	It ranks in the top 10 for social diversity, but needs to improve on aspects related to business excellence and the positioning of its private industry.		Munich	The leader in research and innovation and with a productive business environment, but it is a city that is less digital and less diverse than the rest.	8	
	29	Bucharest	Although it has room for improvement in terms of innovation and research, it ranks in the top 10 in business excellence.		Naples	It has room for improvement in business excellence and digitisation, but stands out for its attractive lifestyle.	32	
	21	Budapest	The education and lifelong learning system, research talent and research grants are areas for improvement in the city, although it is positioned as a very attractive city in terms of the entrepreneurial environment.		Oslo	High stability, democratic and economic quality of the city, and it is one of the most diverse cities.	5	
	6	Copenhagen	Good education system and one of the most digital societies, although there is still much room for improvement in business excellence.		Paris	It is well ahead in four of the seven areas of analysis, such as business excellence, lifestyle, education system, and research and innovation.	2	
	4	Dublin	It leads in the areas of diverse and digital society and stands out as an attractive city due to its low tax burden.		Prague	A stable jobs market with low unemployment is its greatest asset, although it still has much room for improvement in areas such as education and diversity in society.	18	
	7	Stockholm	It is one of the cities with the best capacity to integrate a migrant population, although at the same time it is a city with a lifestyle that is perceived as unattractive.		Rome	It has room for improvement in the economy and public policies, although it stands out as an attractive city for its quality of life.	30	
	17	Frankfurt	Innovation production is one of its main attractions, although there is room for improvement in aspects related to migration or the digitalisation of government.		Rotterdam	It stands out for its university and lifelong learning system, but has much room for improvement in terms of business excellence.	14	
	20	Hamburg	Good positioning in research and innovation, although there is still room for improvement in areas such as the digitalisation of society and gender equality.		Toulouse	Despite having ample room for improvement in most of the analysed aspects, particularly social diversity, it stands out for its position in research and innovation.	27	
	10	Helsinki	One of the cities with the best digital government, but with an unattractive lifestyle and business environment for talent.		Turin	The business environment, the education system and the digitalisation of society are areas for improvement, although it is well positioned in research and innovation.	31	
	19	Leeds	An unattractive lifestyle for talent, but has a good school education system as a factor in talent retention.		Warsaw	It is in the first tier of business excellence after the top 3. However, it has plenty of room for improvement with regard to investment in innovation and research.	26	
	24	Lisbon	It still has much room for improvement in macroeconomic and research areas, but is making progress in other areas such as the digitalisation of its economy and government.		Vienna	The city stands out for its attractive lifestyle and diverse society, but has much room for improvement in macroeconomic and business aspects.	9	
	1	Londres	Strong leadership in business excellence and the education system, making it the city with the greatest capacity to attract and retain talent.		Zurich	It stands out as a diverse city with the highest percentage of the labour force with tertiary education and strong private sector investment in training.	3	

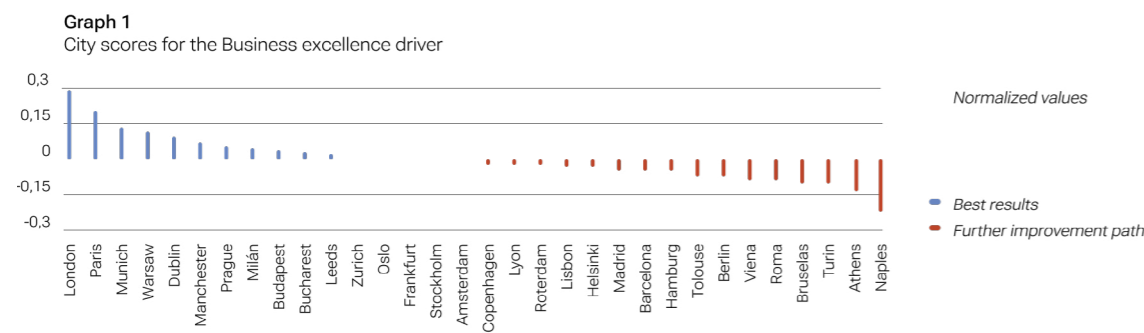
Results by area

1. Business excellence

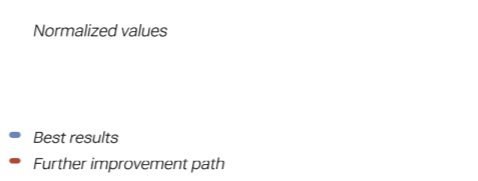
The domain of business excellence aims to **assess** the capacity of the city's **labour market to offer opportunities, as well as those aspects that foster a thriving business fabric, that promote a productive and entrepreneurial environment, and that can be appealing for attracting or retaining talented individuals.**

Thus, on the one hand, labour market indicators such as the **unemployment rate, the average wage or the vulnerability or social protection of the worker** are analysed and, on the other hand, **productive fabric factors such as productivity and business density are measured, or the number of companies created that last for at least three years.**

In this domain, it can be observed, firstly, that those cities that have committed to promoting and **facilitating the development of an entrepreneurial ecosystem have a competitive advantage over others in terms of attracting and retaining talent.** Clear examples are London and Paris, which lead the ranking in this domain, standing out in aspects such as the number of companies created annually, average wage remuneration and business productivity. The leadership of both is reflected in their status as cities where a large part of the economic activity of their respective countries is concentrated.



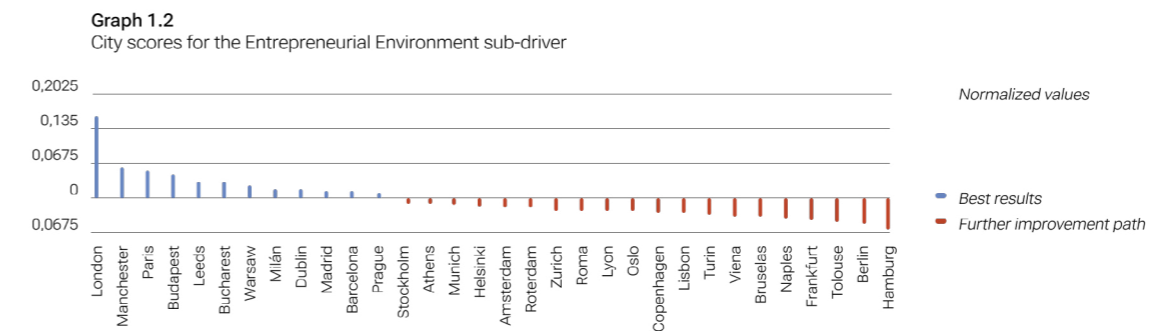
Sub-area	Indicator
Labour market	Unemployment rate
	Youth unemployment rate
	Employee remuneration
	Vulnerability of workers
Business fabric	Business productivity
	Business demographics
	Talented migrant population
Entorno emprendedor	No. of start-ups
	No. of start-ups with t +3 years
	Tax burden on companies



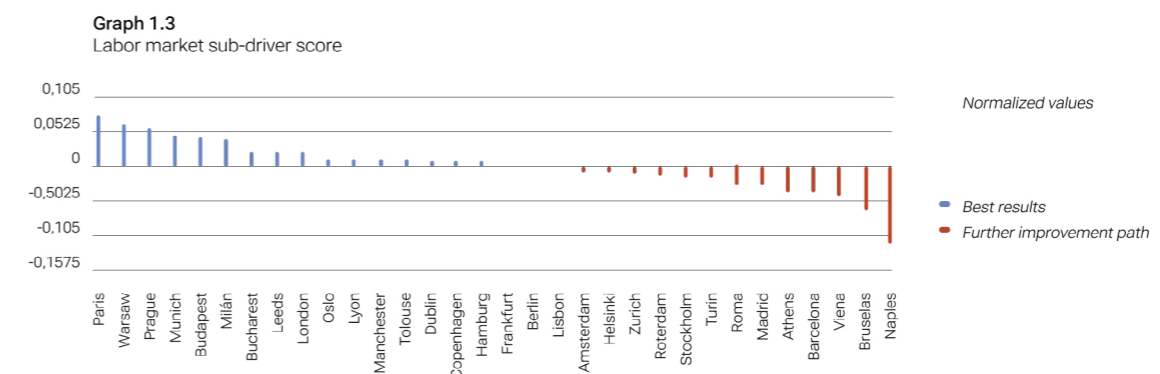
Throughout the different areas, to show the scores of the cities, a value normalization exercise has been carried out, which makes it possible to standardize the data from different units so that they are on the same scale and thus can be compared.



It should also be noted that the commitment to fostering an entrepreneurial ecosystem has had a very positive impact on the positioning of other cities, as can be seen in figure 1.2, which shows, in ascending order, the cities with the highest entrepreneurial environment scores. In fourth place is Budapest. The Hungarian capital is not one of the most attractive cities in global terms, but its success in creating an entrepreneurial environment means that it is ranked as the 10th best city for business excellence. So much so that **Budapest** has become the **capital of start-ups in Central and Eastern Europe** thanks to its various digital pool creation policies, or due to the fact that it attracts and facilitates the establishment of start-ups in its territory, such as the success stories of Prezi, Ustream, NNG, Logmein and Gravity.



Furthermore, an analysis of another of the determining aspects of the domain of business excellence, the labour market, shows that there is still much **room for improvement in southern European cities** in terms of making their **labour markets** attractive to foreign talent. In this sense, the cities that lagged furthest behind in the overall score for business excellence are those with the least competitive labour markets, mainly due to **high youth unemployment rates** or **low average employee remuneration**, such as Barcelona, Madrid, Rome and Turin. At the other end of the spectrum is Warsaw, a success story with an attractive jobs market. In overall terms, **Warsaw** ranks as an unattractive city (23rd in the global ranking) but is nevertheless **the fourth most attractive in terms of business excellence.** This differential is explained by effective unemployment policies, meaning that unemployment currently stands at less than 3%, one of the lowest rates in the continent.



2. Economics and public policy



The **economics and public policies** domain mainly **measures the political and economic stability of the city**, which depends on a number of factors. Firstly, **governability**, which provides an understanding of the effectiveness of public institutions and their role as an enforcer and legislator in society. Secondly, the global **economy**, which focuses on aspects such as the city's **macroeconomic** position and the impact of its economic **regulations**.

Analysis of the economic and public policy domain shows two distinct trends. On the one hand, graph 2.1 shows the **difference** between **Northern** and **Southern European cities** in all results related to the **governance of cities**. The above-average northern European cities, especially the Scandinavian ones (Oslo, Helsinki, Copenhagen, Stockholm), are the cities with the highest scores in aspects such as legislative quality, political stability and government effectiveness.

However, cities in the Mediterranean basin, such as Barcelona, Madrid, Rome, Toulouse and Turin, show considerable room for improvement in governance aspects, where governments can increase their score in the trust they convey to their citizens, as well as in the quality and stability of their democracies.

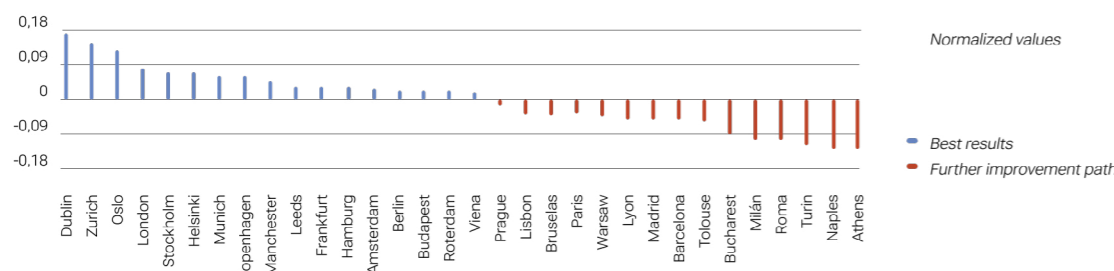
It should be noted that the **governance** of cities is not a factor that determines whether they attract and retain talent, since, although there are cities with room for improvement, the results are very similar among the analysed European cities, so it does **not represent a distinctive aspect**.

Sub-area	Indicator
Governability	Political stability and absence of violence
	Rule of law
	Government effectiveness
	Legislative quality
Economics and regulation	Tax burden over GDP
	Average cost of living
	Foreign direct investment inflows

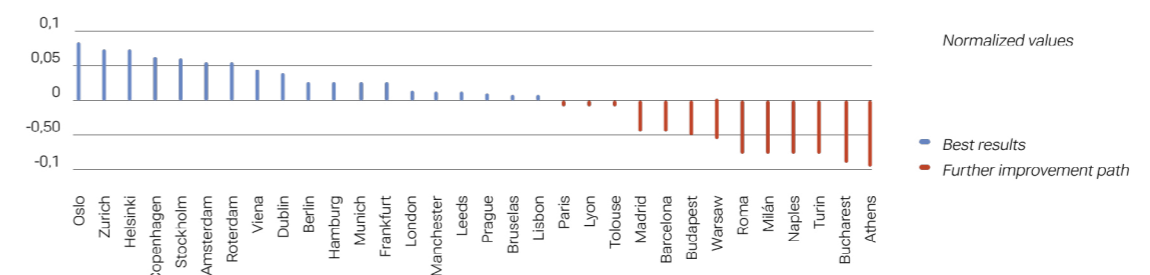
Consequently, the strengths of cities when it comes to attracting and retaining talent in the economic and public policy domain are based on aspects related to their macroeconomic performance. Similarly, cities that are able to maintain a **low tax burden** relative to gross domestic product, such as Dublin or Zurich, are better positioned in terms of their **ability to attract and retain talent**. Another key issue is the capacity of cities to **receive foreign investment**. In this respect, Budapest, Munich and Dublin are at the top of the ranking. In short, **a low tax burden and attracting significant foreign investment are two key instruments to generate competitive advantages in attracting and retaining talent**.

Similarly, looking at the macroeconomic aspects that need to be improved leads to other conclusions. First of all, Zurich, Amsterdam and Rotterdam have the chance to improve in this domain by adopting policies that facilitate the attraction of foreign investment. Secondly, Toulouse and Brussels would position themselves as more attractive cities if they were able to reduce the tax burden on their populations.

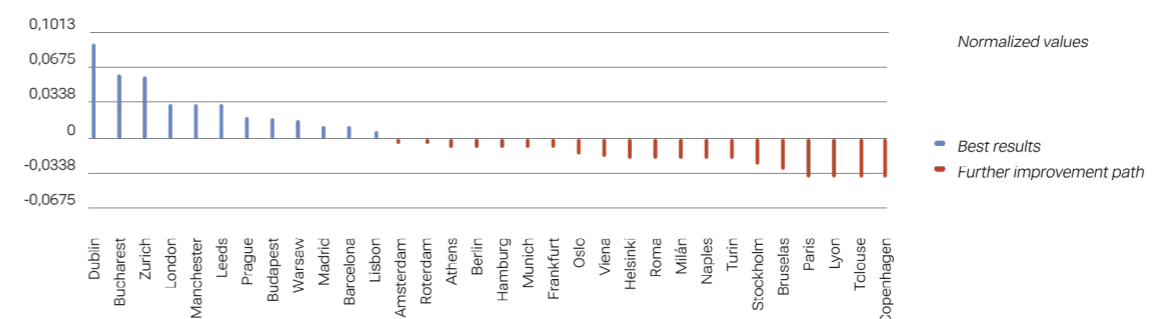
Graph 2
City scores for the Economy and public policy driver



Graph 2.1
Political stability and government effectiveness



Graph 2.2
Level of tax burden of the cities in descending order



3. Education system and lifelong learning



The domain of education and lifelong learning analyses the **educational opportunities** that a city can offer to children, young people, university students or adults for their personal and professional development. This is an analysis of **the quality of the education system at all levels** (compulsory, baccalaureate, training, university, postgraduate) and how orientated it is towards practical aspects and skills to ensure **better future employability**. In addition, the importance and weight of education in society itself, and as a factor for potential geographical mobility, is also taken into consideration.

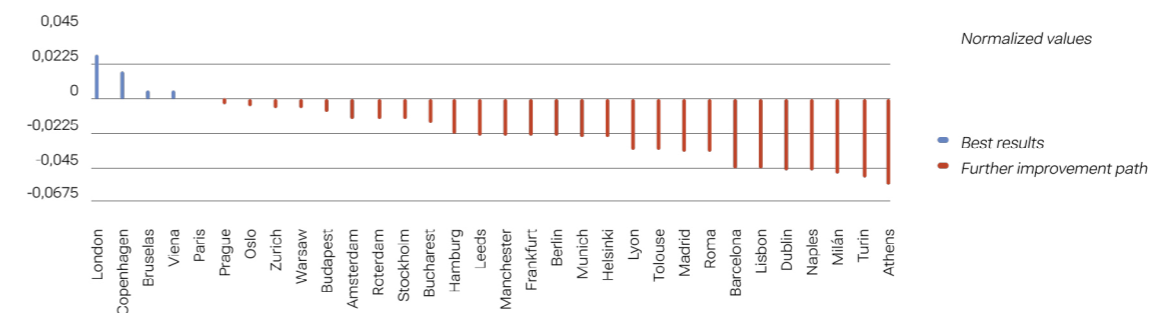
Several conclusions can be drawn from an analysis of the different indicators of the education and lifelong learning systems of the cities in the sample. In global terms, it can be seen that **education** is still an **unresolved issue** for governments and cities, given that jurisdiction over education is usually held by state or regional governments.

Despite being one of the most decisive factors in attracting and retaining talent, Figure 3 shows that **only 15% of the analysed cities have a positive rating**. Only the city of London stands out above the rest by far. The city leads in the domain of **education** and lifelong learning with one of the **strongest school systems** on the continent and the highest investment. The **best universities** and **business schools** are located in the British capital, giving it a major competitive advantage over other cities.

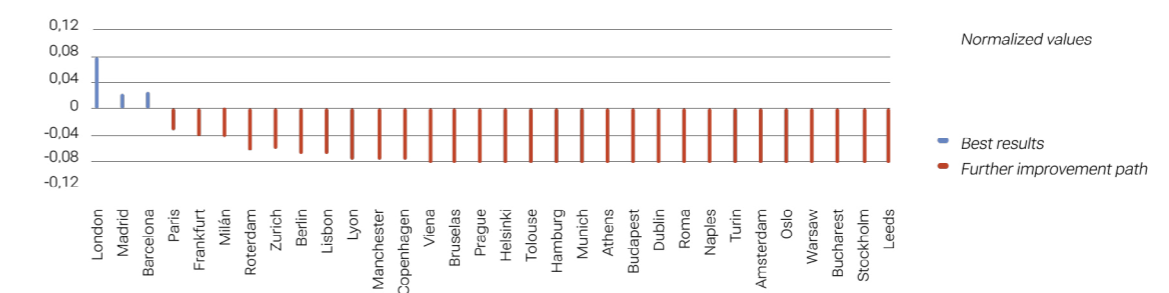
Sub-area	Indicator
Education system	Public expenditure on education Quality of the education system Student / teacher ratio
University education system	Public expenditure on university education University population University ranking
Postgraduate education system	Business school ranking
Vocational Training System	Labour force with VT qualifications Training for employees

When analysed by type of education system, Figures 3.1 and 3.2 show that the **tertiary system** is the education system with the **greatest room for improvement** in the analysed cities. The quality of the university and graduate system is key to attracting different talented migrant profiles, probably because there is a **positive correlation** between the name of the **university** or business school and **subsequent remuneration**. In this sense, only London gets positive results for both systems, although we should highlight the good score of the Spanish cities of Madrid and Barcelona in relation to their postgraduate systems, as they have some of the best business schools in the world, such as IESE, ESADE and Instituto de Empresa (the Business Institute).

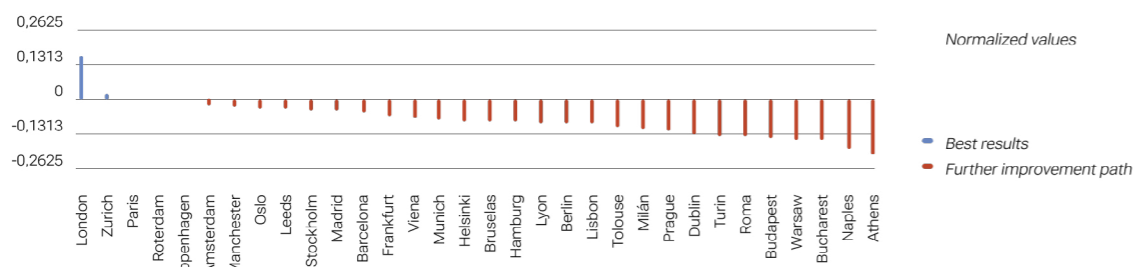
Graph 3.1
City scores for the university education system sub-driver



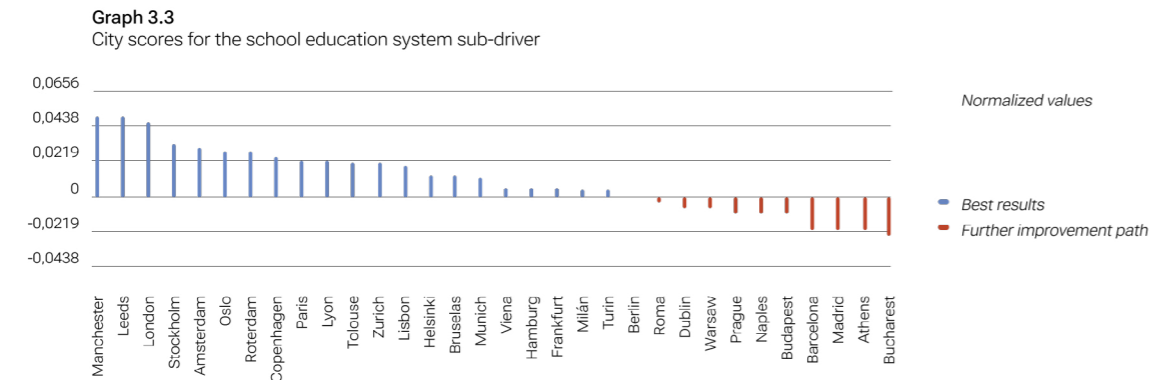
Graph 3.2
City scores by the postgraduate education system sub-driver



Graph 3
City scores for the Education and lifelong learning system driver



On the other hand, **school** education acts as a **talent retention factor**, and is the type of system that gets the best results in all of the cities. Figure 3.3 shows that 70% of the cities score positively and that, with the exception of the UK cities, **there is not a great difference between those that have scored positively**. These similarities are due to the fact that most of them have a very similar level of spending on education as a percentage of GDP: between 4 and 5%. Scandinavian cities, which invest more than 6% of their GDP in education, are the exception.



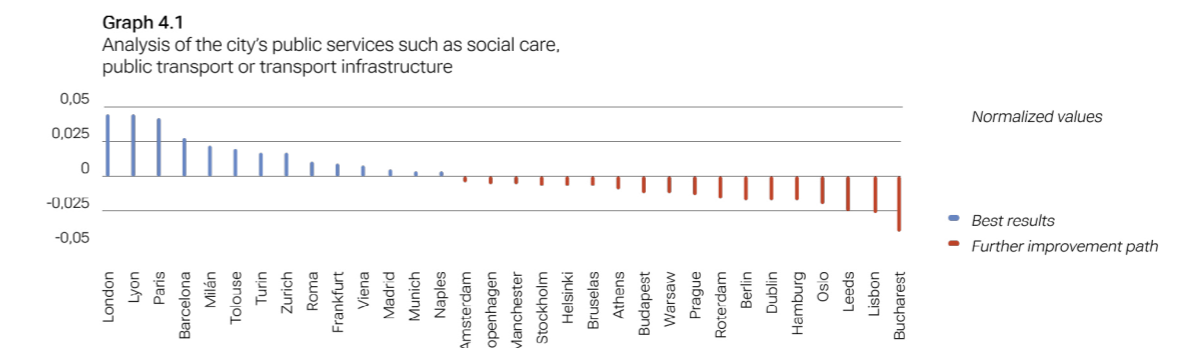
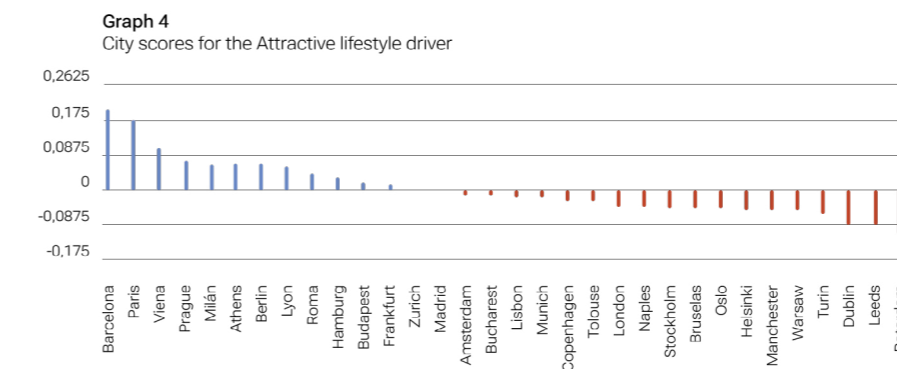
Finally, it should be stressed that many of the analysed cities have **plenty of room for manoeuvre to strengthen their education systems**. They could better attract and retain talent by increasing their spending on education and building a better reputation for their tertiary education system.

4. Estilo de vida atractivo

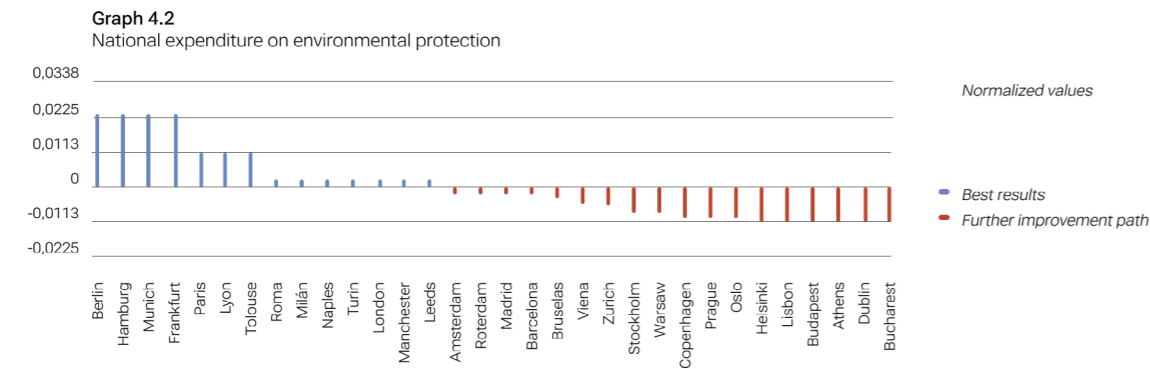
The attractive lifestyle domain aims to measure the **quality of life** of citizens and the **environmental surroundings** in which they interact. It also measures the **leisure options** and the quality and quantity of **public services** offered by the city.

This domain is structured into **four different types of categories**:

- **Public services:** includes aspects related to the efforts of public institutions to improve the lives of their fellow citizens within the framework of city services.
- **Health system:** aspects such as the number of doctors per inhabitant, the number of public hospitals and primary care centres are analysed.
- **Quality of life:** various indicators that affect the day-to-day life of the city, such as cultural offerings, water quality or safety (number of recorded murders, muggings, etc.).
- **Environmental impact:** includes aspects such as air quality, drinking water or environmental compliance in the city.



Sub-area	Indicator
Public services	Social care
	Transport infrastructure
	Public transport
	Air transport
Health system	Health personnel
	Public hospitals and primary care centres
Quality of life	Tourist population
	Environmental indicators
	Water quality
	Air quality
	Renewable energy consumption
Investment in environmental protection	Environmental compliance



It is particularly interesting to analyse the results in this area because of the breadth of the aspects covered, and also because they are all related to **non-financial variables**.

Cities with higher scores have **more attractive living ecosystems for attracting and retaining talent**. Gaining an advantage in this area allows these cities to enhance and **leverage the call effect** to improve their talent ecosystem, but also to ensure that the profiles that have been attracted to the city stay on a more permanent and lasting basis. A clear example of this is the leading city in this domain, **Barcelona**, a cosmopolitan city that has established itself as a **must-visit tourist attraction**. On the other hand, it is a leading city in terms of public services, and its transport and mobility systems also act as key factors in attracting talent. Barcelona is followed by cities of similar size and cultural characteristics such as Milan, Vienna and even Paris.

On the other hand, there are those cities that have not yet been able to create a living ecosystem attractive enough to compete with the aforementioned cities. English cities, which form powerful industrial and economic hubs, along with Dublin and Rotterdam, have **room for improvement** and major challenges in areas such as improving **air quality, investment in the environment and hospital care**. Finally, it should be noted that there are aspects that are not measured in this index, but which have a major impact, such as the climate or the culinary culture of these cities and/or regions.

5. Research, innovation and transfer to society

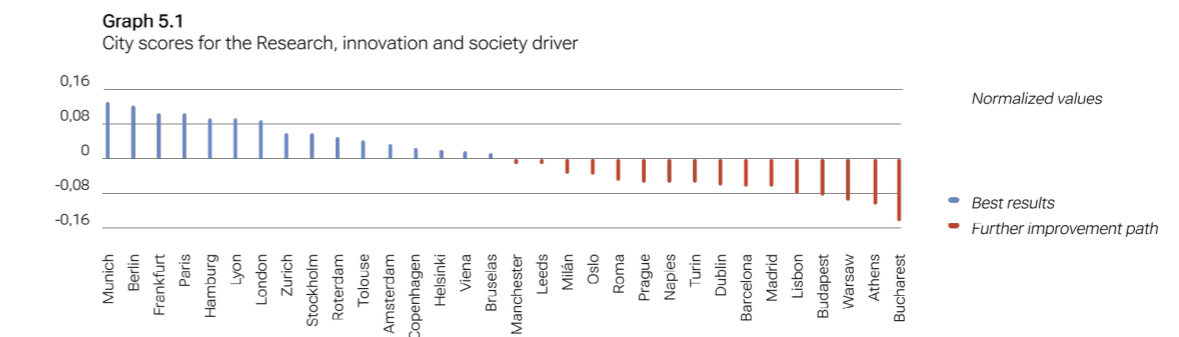
The domain of research, innovation and transfer to society aims to calculate the city's innovative fabric and its commitment to research. It measures three main fields:

Innovative talent: to find out the extent to which the city has a strong innovative ecosystem in terms of talent. Indicators such as numbers of active research personnel or the number of people dedicated to strategic sectors such as technology or high added value have been evaluated.

Investment in innovation: this measures the **investment** being made in innovation by the **city's public institutions**. In this sense, the index combines the total expenditure on all research, development and innovation that is carried out.

Impact and synergies between society and the innovative and scientific ecosystem: using indicators such as the number of patents registered, innovation production or technology transfer.

Research and innovation are parameters that are very different from the other domains and their results are very different from the trends followed by the overall index. The results show that cities that have committed to a quality **innovation ecosystem** have an important **competitive advantage** when it comes to attracting crucial research talent. Clear examples are the German powerhouses such as **Munich, Berlin, Frankfurt and Hamburg, all of which lead the domain, only being accompanied by Paris**. These German cities particularly excel in **innovation spending, grants allocated to research staff and the number of patents registered**, and thus leave their mark in each of the aforementioned categories. It should be mentioned that these results should not come as a surprise, as Germany has positioned itself as a benchmark country in terms of research and attracting innovative talent.



Sub-area	Indicator
Investment in R&D	R&D&I expenditure Research
Research staff	Research grants
Innovation production	Registered patents Innovation production

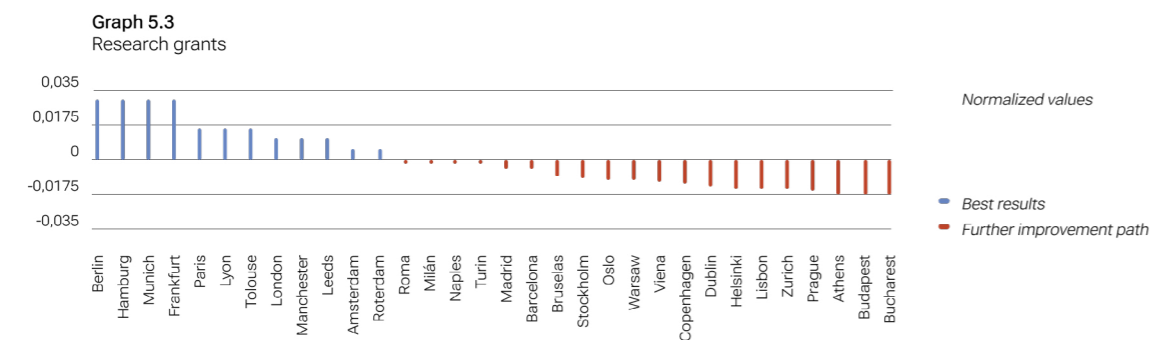
On the other hand, some cities show clear **room for improvement in terms of attracting research talent**. This type of talent is often the most neglected and one that **costs the most to invest** in, as shown in Figures 5.2 and 5.3. In this regard, cities such as Lisbon, Turin, Warsaw, Athens and Budapest have a lot of room for improvement. In fact, it highlights just how little economic effort they are making in comparison to the other cities in the index, along with low **levels of production of innovative products and services that can generate a significant impact on the market and/or society**, which is a differential aspect for the domain in question.

Table 5.2
Domestic R&D expenditure by country (% GDP). Year 2020.

EU (27 countries) 2,23
EU (28 countries) 2,15

Sweden	3,39	Czech Republic	1,93
Germany	3,17	United Kingdom	1,76
Belgium	3,17	Hungary	1,48
Switzerland	3,15	Italy	1,47
Austria	3,13	Portugal	1,4
Denmark	2,93	Poland	1,32
Finland	2,80	Greece	1,27
France	2,19	Spain	1,25
Netherlands	2,18	Ireland	1,21
Norway	2,15	Romania	0,48

Source: Eurostat



6. Diverse society

The diverse society domain measures those aspects related to the making of a **culturally and socially rich society** that works to build an **ecosystem** of acceptance and normality among all strata and ways of thinking, **enhancing and embracing diversity**.

Two aspects are analysed in this domain:

The immigrant population ratio in the city: this is a key aspect when it comes to attracting and retaining talent among the younger generations. The percentage of the adult immigrant population in relation to the entire adult population of the city is measured.

Gender equality and gender gap: this measures the gender pay gap or the gender development index of cities.

This takes into account aspects that lead a **city to be considered more attractive according to the non-economic variables** presented above and which, as noted above, are increasingly valued by society.

The analysis of the results in this area shows how capital cities, whose policies have **promoted inclusion and acceptance of diversity** and the migrant population, receive higher marks and are therefore **better positioned to retain talent, and above all to attract it, mostly from abroad**. The best example of this is **Dublin**, a city that has greatly enhanced its attraction to diversity, and now has one of the highest percentages of migrant populations of any city in the index. In addition, the Irish capital has positioned itself as one of the **leading cities for attracting migrants for highly skilled jobs..**

Behind this city, **northern European countries** are setting the trend in this area. Therefore, it is followed by cities such as Oslo, Stockholm and Copenhagen. All of them are **perceived as pioneers and examples of social rights**. Their attraction is not only based on more financial aspects, such as good public services and high salaries, but also on characteristics such as the **reduction of the wage gap** and **greater equity**, meaning that they are considered as centres of diversity and social acceptance.

On the other hand, there are cities that have recently engaged in restrictive policies, where the welfare and stability of their national population is prioritised over more global problems. These cities, including Budapest, Prague and Hamburg, have room for improvement in attracting foreign talent. It should be noted that despite not being one of the domains with the greatest weight and, therefore, not having a direct relationship with the top positions in the index, there is increased correlation between the negative results of the index and the countries in lower positions in the global ranking. Thus, these are examples of cities that, despite having some competitive advantages in some areas such as **economics and public policy**, have currently prioritised retaining local talent over attracting foreign talent.



subámbito	Indicador
International population	Adult migrant population
Gender	Gender Development Index Wage gap Proportion of women in managerial positions

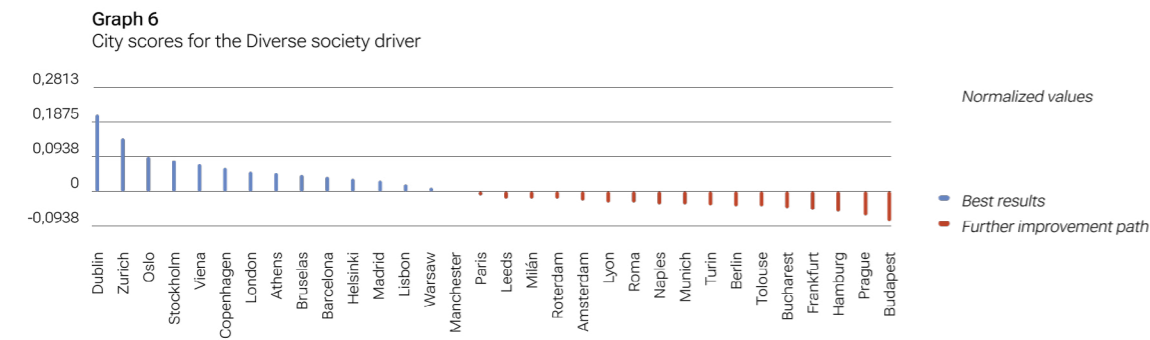


Tabla 6.1
Gender development index

Leeds	0,911	Amsterdam	0,922	Barcelona	0,889
Oslo	0,944	Rotterdam	0,922	Warsaw	0,879
Dublin	0,938	Brussels	0,913	Rome	0,875
Stockholm	0,934	London	0,911	Milan	0,875
Zurich	0,932	Manchester	0,911	Naples	0,875
Berlin	0,931	Vienna	0,904	Turin	0,875
Hamburg	0,931	Prague	0,891	Athens	0,864
Munich	0,931	Paris	0,891	Lisbon	0,852
Frankfurt	0,931	Lyon	0,891	Budapest	0,839
Copenhagen	0,928	Toulouse	0,891	Bucharest	0,818
Helsinki	0,927	Madrid	0,889		

Source:
United Nations Development Programme (UNDP)

7. Digital society

The digital society domain aims to observe and measure the extent to which the residents of cities, be it the **citizens** themselves or their **institutions and businesses**, have **engaged with** and embraced the **digital revolution** and new global technological trends. Two key aspects are analysed:

Digital reception and adoption: addressing aspects related to adoption of technology by individuals, internet accessibility, digital skills in society and the use of teleworking, among others.

Government digitalisation: this considers the digital evolution of the city and how it enables **digital interaction** with government, its intensive use by society and the most recent data from the **digital intensity index**.

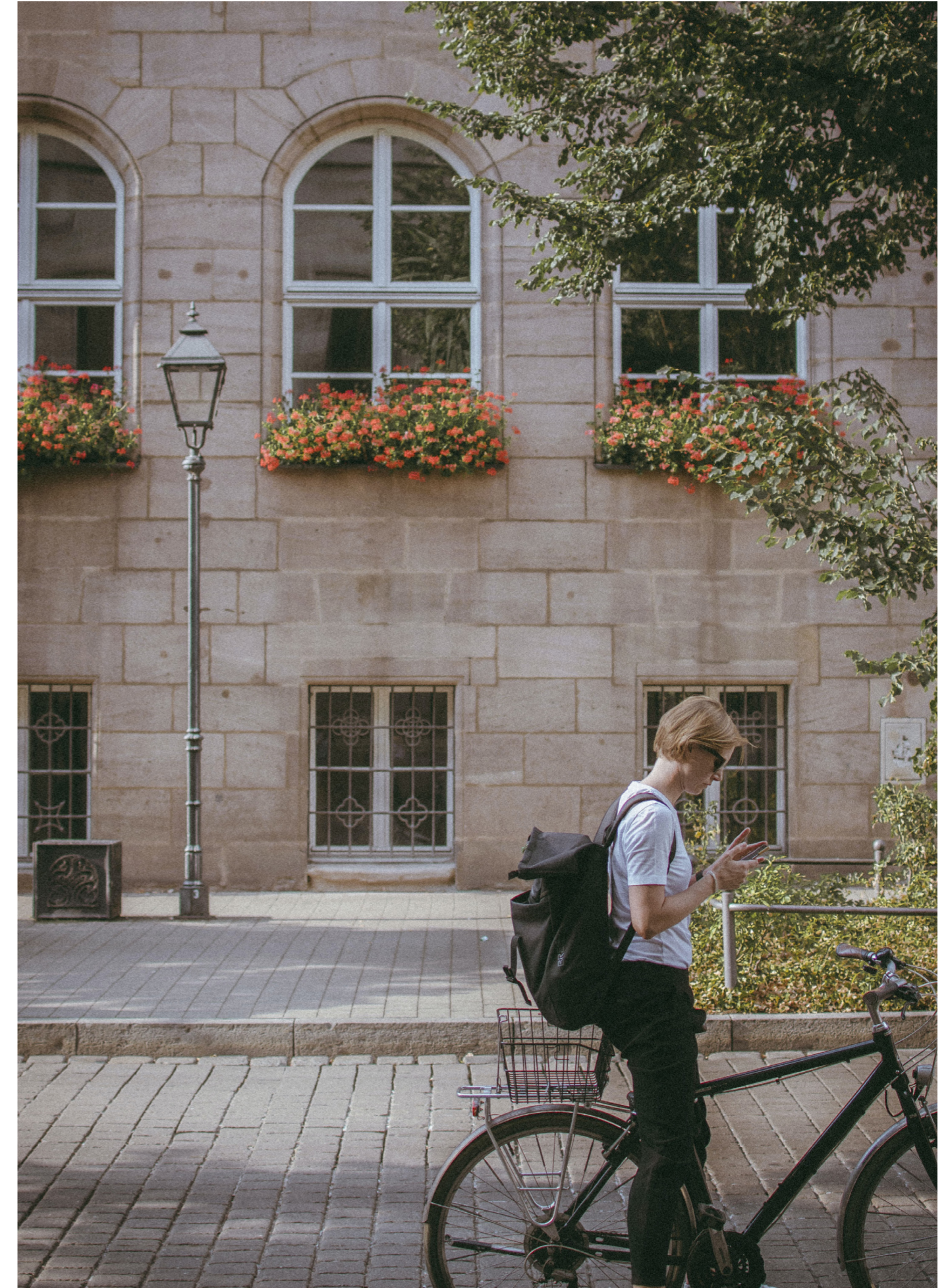
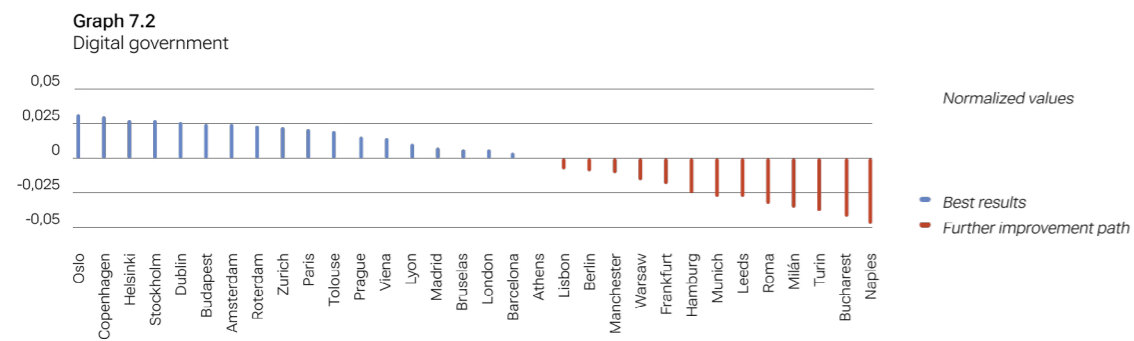
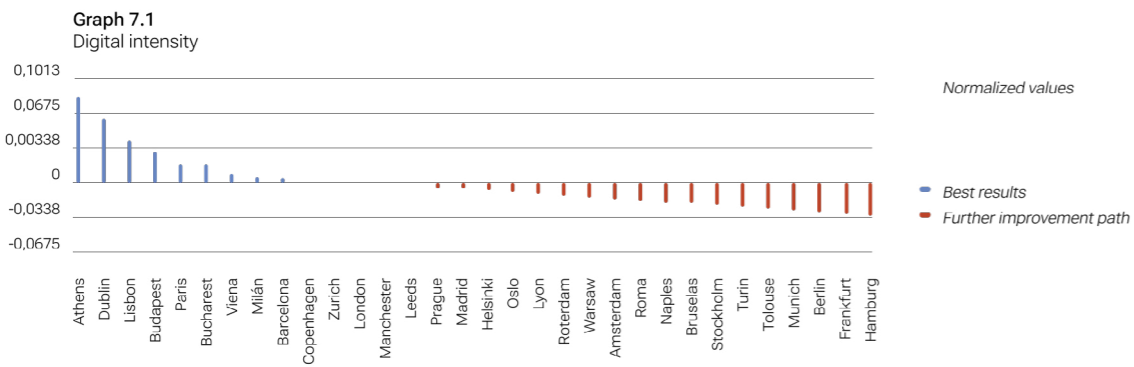
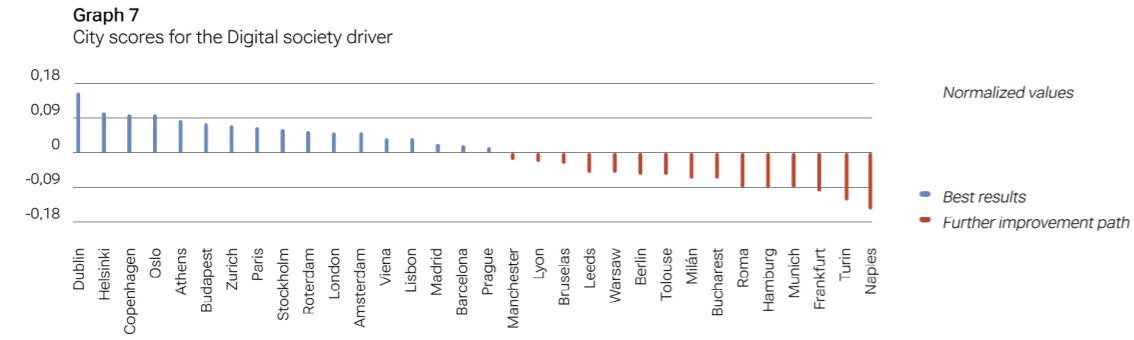
The analysis of the results in this domain shows the cities with the fullest digital development. These cities have opted for a holistic transformation, on the understanding that society and government have to be pioneers in this transformation if they are to be leaders in this sector.

Therefore, the cities that are leaders in this domain have made a **political and social commitment to digitalisation** by investing in new technologies, facilitating access to them for the entire population and being an example of the digital relationship between governments and the outside world.

Among the top positions are **Dublin, Helsinki, Copenhagen and Oslo**. This position in the ranking is due to the fact that for years these cities and their respective countries have been working hard to **strengthen their digital ecosystems**. Similarly, it is also worth noting the role of **Athens**, which is exceptionally close behind in this domain due to its commitment to the **digital transformation by the country's various industrial sectors**.

On the other hand, the analysis of the domain also shows those cities that have a long way to go to reach societies that have a **more average rating for global digitalisation**. The clearest example is the case of Naples, the last city in the domain, which stands out because it has substantial room for improvement in major indicators such as digital intensity, but also in minor ones such as internet accessibility and internet usage, showing that its citizens still have a major challenge ahead of them in this regard.

subámbito	Indicador
Technological adoption by individuals	Internet accessibility
	Internet use
	Digital skills of society
	Workers in technology and innovation sectors
	Trabajadores en sectores tecnológicos i de innovación
Digital government and businesses	Digital government
	Digital intensity



A two-speed Europe in talent attraction and retention

The overall results of the City Talent Index highlight a **rift between Northern Europe, and Eastern and Southern Europe**, separating the most advanced cities from those lagging behind in their ability to attract and retain talent. Map 8.1 shows that the ten cities with the highest capacity to attract and retain talent are Northern European cities, while the bottom positions are occupied by Eastern European or Mediterranean cities.

This gap is mainly explained by the fact that Northern European cities lead the continent in economic aspects and consequently by the **correlation** that exists between the **determining economic factors** of geographic mobility and the **capacity to attract and retain talent**. In this regard, Northern European cities are the best performers in terms of the quality of employment opportunities or the level of economic and tax conditions, showing that **financial motivations continue to prevail as the determining factors most valued by talent for their geographic mobility**.

This is true to such an extent that a **relationship is also observed between talent attraction and retention indicators and the per capita income of cities**, a common indicator of development. Figure 8.2 shows the correlation between the two variables in terms of their position in the ranking. Most of the cities are aligned around the diagonal, showing that their income and ability to attract and retain talent are fairly similar.

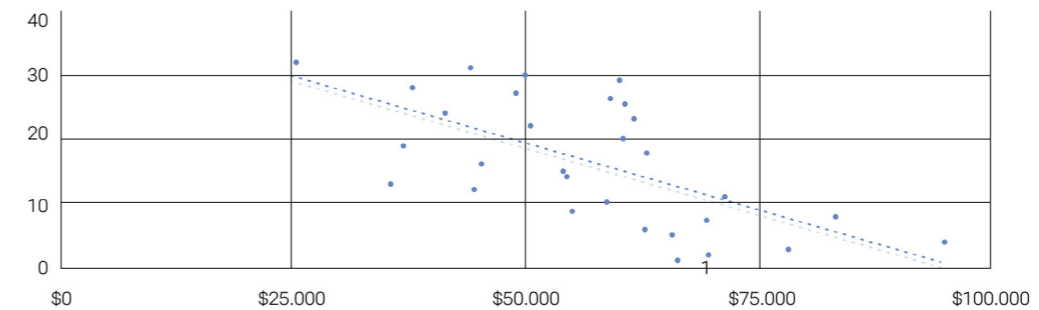
This difference between Northern European countries and the countries of the latest EU enlargement and the Mediterranean highlights the existence of a **two-speed Europe**. This idea was taken up in the White Paper on the future of Europe, presented in 2017. It argued for a hard core of countries acting as a driving force, with others trailing behind at a different speed, rather than all EU member states moving forward at the same time as a group. In other words, if a limited number of countries agree to cede more sovereignty on a particular point or to deepen integration in a certain area, it is not mandatory for all 28 to do so. In this sense, **the two economic speeds in Europe are also reflected in the ability to promote effective policies to attract and retain talent**.

Finally, and in line with the above, it should be noted that the good positioning of cities in the City Talent Index is highly influenced by their ability to stand out in a specific domain. I.e., **those cities that notably stand out and are well above the average in some domains are the ones that hold the best positions in the ranking**.

The most notable examples are London and Dublin, whose results set them apart in the domains of business excellence, making them the cities with the greatest capacity for attracting and retaining talent. Similarly, Barcelona's strong leadership in terms of attractive lifestyle, with a lead of more than 20% ahead of the next city, allows it to position itself as the leading city in southern Europe, despite not being one of the most attractive cities in terms of business, research and/or education.



Relationship between per capita income and positioning in the ability to attract and retain talent



Cities	CDP per capita
London	66470,14
Paris	69743,83
Zurich	78376,03
Dublin	94997,31
Oslo	65600,11
Copenhagen	62897,72
Stockholm	69403,85
Munich	83192,71
Vienna	55109,25
Helsinki	58697,09
Amsterdam	71490,57
Barcelona	44562,19
Manchester	35500,25
Rotterdam	54648,52
Lyon	54287,91
Berlin	45245,31
Frankfurt	53929,09
Prague	62947,42
Leeds	37071,82
Hamburg	60519,70
Budapest	46200,53
Madrid	50469,20
Milan	61577,50
Lisbon	41508,59
Brussels	60728,85
Warsaw	59172,47
Toulouse	49341,11
Athens	37837,55
Bucharest	60204,82
Rome	49938,23
Turin	44091,46
Naples	25508,02

Results by profile

As mentioned above, the indicators for this index have been created using the approach and definition of talent developed by the Organisation for Economic Cooperation and Development (OECD), which proposes that **the attractiveness of certain countries or cities is based on a set of variables with a certain weight or importance, depending on the profile of the person they want to attract.**

Consequently, countries will prioritise their talent attraction policies and measures according to the profile they want to attract. For example, a university student will value and prioritise issues around the university system or the city's lifestyle. On the other hand, an entrepreneur will look at issues related to the economic system, such as taxation or the political stability of the region.

This index is adapted based on the different **desires and priorities** for each type of **talent profile**, thus determining the positions of cities according to their capacity to attract that profile. Hence, the positions of some cities rise due to their high capacities and good positioning in aspects prioritised and/or desired by the individual with this profile, while at the same time the opposite behaviour can also be observed in those cities that move down the rankings, as they do not stand out in aspects that are most valued by the individual. The index is therefore adapted according to the following profiles:

Profile 1: Entrepreneurs

This profile includes all those individuals who want to set up new businesses, so those cities that guarantee **business excellence**, as well as a higher level of **digitalisation** are the most attractive for this group, which also, as a second priority, values an **attractive lifestyle**.

In this sense, those aspects that directly affect workers and that will shape their perception of and attraction to the territory are important. For this reason, it is essential that the city nurtures a thriving business fabric and facilitates the setting up of companies and the organisation of relevant trade fairs. Similarly, all those policies or measures that **facilitate the development of an entrepreneurial ecosystem**, thus attracting young companies and foreign talent, will be more highly valued by entrepreneurs.

London and Paris are two very clear examples of how to attract this type of talent, due to the fact that they are two cities that prominently stand out in the field of business excellence. They have positioned themselves as leaders with a differential of practically 10-20% compared to the rest of the cities.

In addition, **Budapest** is a good example of a city that has risen four positions as a result of specifically placing value on aspects related to the domain of business excellence. This is because these are the only aspects in which the city is in the top 10, which is why it has an edge when it comes to attracting entrepreneurial talent, as it stands out in the two points most highly valued by this profile.

Profile 2: Researchers

The research community is another example of the talent that a city may be interested in attracting and retaining, and the value of doing so was shown by the recent COVID-19 health crisis. In this case, all those aspects related to **research, innovation** and a **society** eager for **constant discovery**, are in the spotlight for this profile. Thus, the city's ability to make its mark on the **innovation** map and attract investment, talent, **recognition** and benefits for citizens will be key to **attracting researchers**. In addition, they also value and expect it to be an attractive city in terms of lifestyle, and that there is a high-quality education system at all levels because of its link to the R&D&I domain.

Although the top 3 for this profile remains with the cities of London, Paris and Zurich, special emphasis should be placed on **Stockholm and Copenhagen**, which have moved up two and one positions respectively, thus making up the top 5 of the index for this particular group. In this regard, and by way of example, the Stockholm region in Sweden and the Copenhagen region in Denmark are considered two of the most innovative zones of the European Union, according to the European Commission's 2019 Regional Innovation Scoreboard. Consequently, it is for this reason, among others, that they have an advantage over the rest of the assessed cities in attracting this particular group.

In contrast, **Dublin**, despite being a city that is well positioned in attracting and retaining talent, is at the bottom of the league in terms of attracting and retaining research talent. Ireland's capital city scores well on aspects related to the business environment and its economy, but does not perform well on indicators such as the city's investment in R&D&I, the number of patents filed and ease of obtaining patents, among others.

Profile 3: Digital professionals

To attract the talent of digital professionals who are up to date with the latest technological trends, it is important to make the **city as digital** as possible by ensuring Internet accessibility and connectivity for all, **incorporating technology into all of an individual's daily activities** and making advanced digital government easily available. In addition, these professionals also look for and highly value cities with both an **attractive lifestyle** and the guarantee of a thriving business fabric.

The clearest examples are **Dublin** and **Helsinki**, which have moved up four and three positions respectively compared to their position in the overall index, ranking first in the case of Dublin and eighth in the case of Helsinki. In this way, they are two cities that stand out for their ability to use the opportunities provided by technology to push boundaries and deliver on them. In fact, both cities are capitals of countries considered benchmarks in the "Digital Economy and Society Index" (DESI) ranking, ranking in both cases in the top 5 of the most economically and socially digitalised countries.

Profile 4: Undergraduate and postgraduate students

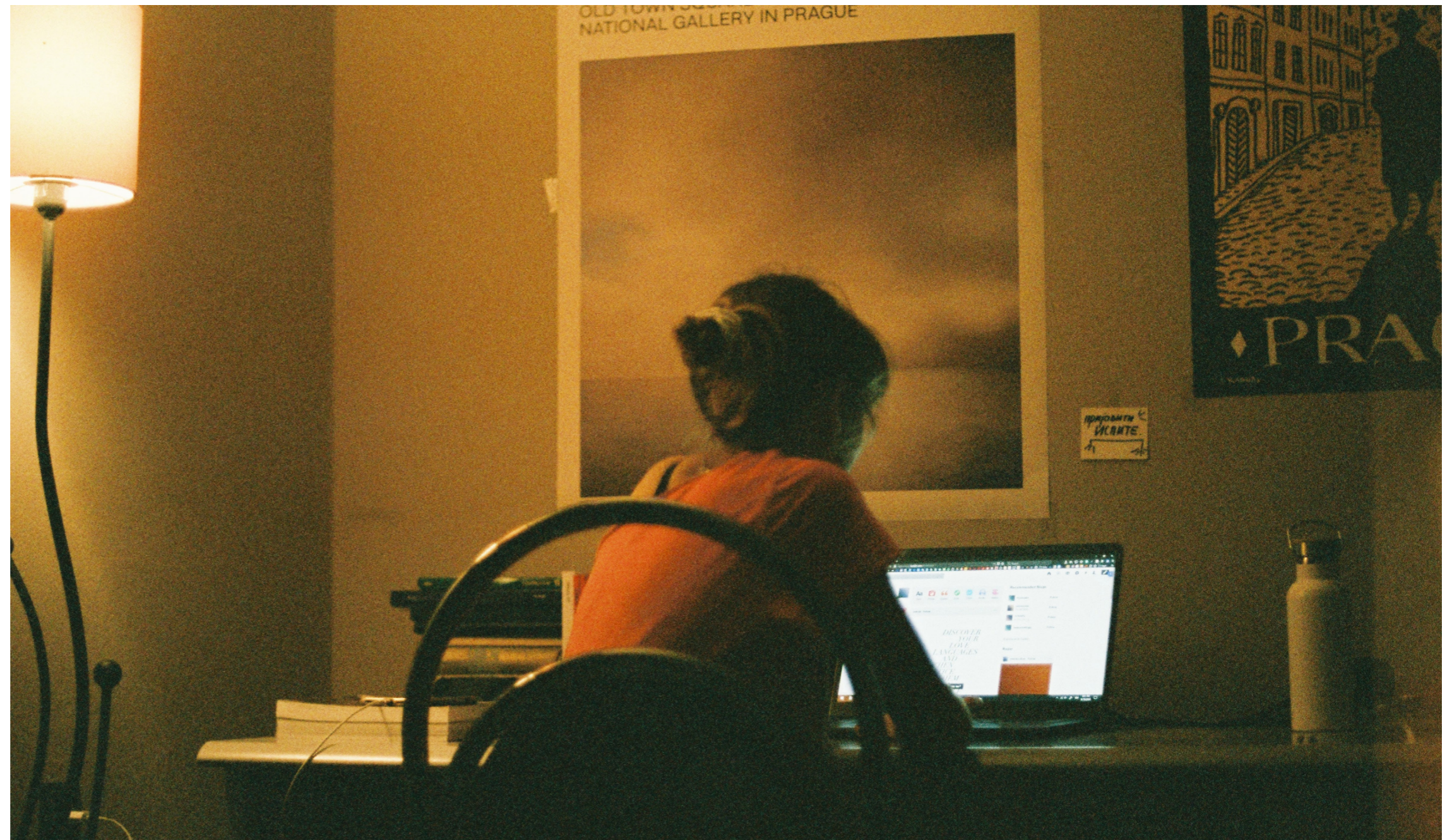
In this case, when a city seeks to attract and retain university talent, its focus is on promoting a good **education system** with the possibility of lifelong learning, and guaranteeing an **attractive and high quality lifestyle**, as these are the main desires of a university student when choosing the city where he or she wants to settle to study.

Hence, university students are interested in analysing the **educational opportunities** that a city can offer them. The quality of the education system and its practical and skills orientation facilitate a **higher level of future employability, as well as better pay**, which are key factors. Similarly, **lifestyle** is also a determining factor in the choice of city, so quality of life and the environment, as well as easy access to leisure and public services, will be paramount in attracting and retaining this profile.

London and Zurich are the **two cities best positioned** to attract and engage university students and/or professionals in the process of training. London has the most reputable university system on the continent and the second best business school in the world (London Business School). Zurich, although it does not stand out in terms of attractive lifestyle compared to other cities, is a city that ranks well in terms of good positioning in education and has a great capacity to attract investment in training, which consequently contributes to the good development of the professional careers of its citizens.

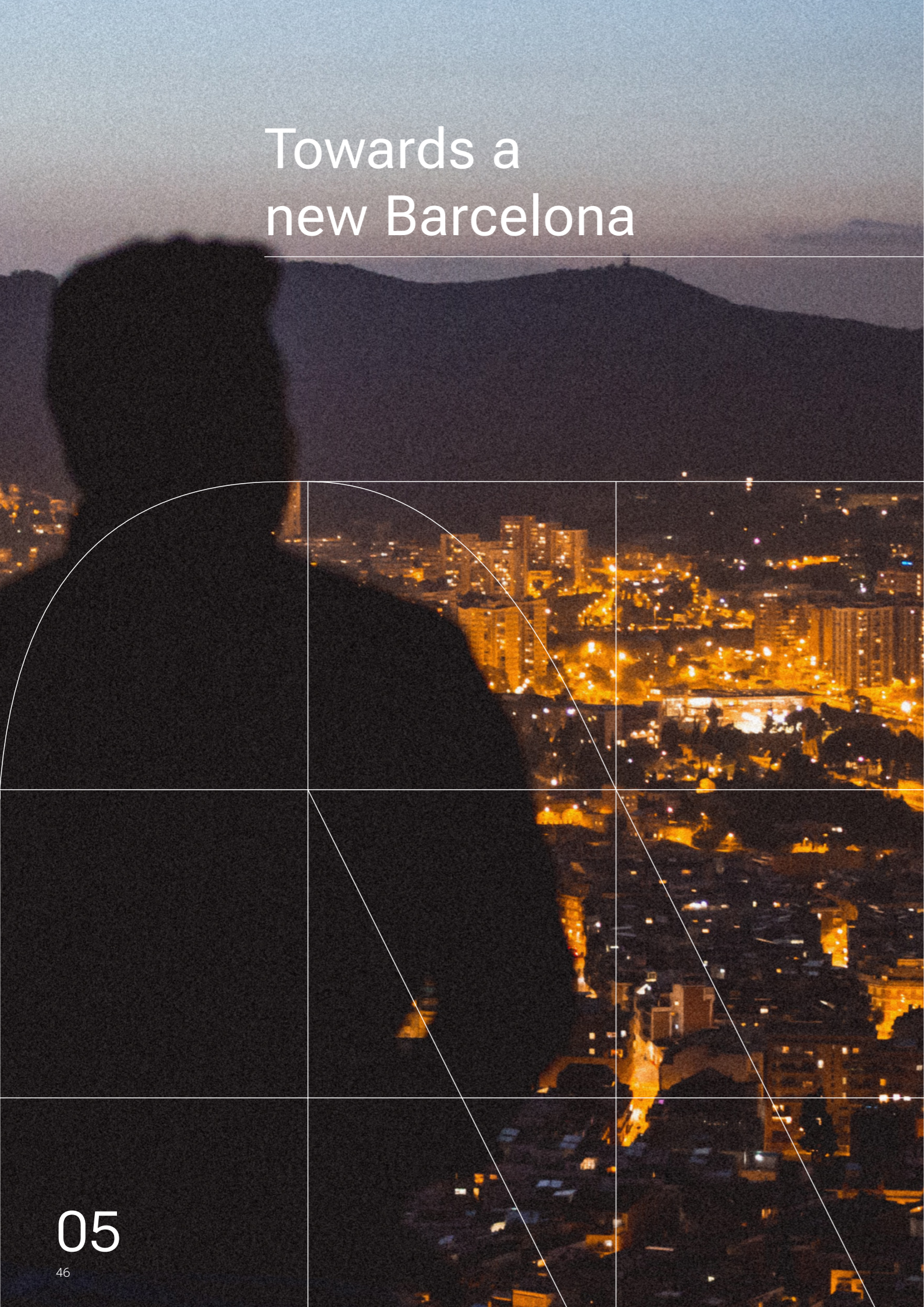
In addition, two of the cities that stand out for their great capacity to attract university talent, and consequently have a **higher position for this profile when compared to the overall result of the index, are Barcelona and Madrid**. Despite not having leading education systems (12th and 11th position, respectively), the differentiating factor is the lifestyle they offer, with a wide range of universally accessible public services and the city's environmental conditions contributing to a high quality of life. Barcelona is the leading city in the index in terms of offering an attractive lifestyle. In fact, it ranks as the eighth most attractive city in the world to live in, according to "The World's Best Cities 2021".

At the other end of the scale is Munich, which has moved down in the index for the university community, ranking 15th in the analysis of the education system and 18th in terms of lifestyle attractiveness.



Towards a new Barcelona

TOWARDS A NEW BARCELONA



Barcelona, the leading
city in southern Europe

Barcelona in business excellence and public policy

Barcelona is not as highly ranked in the parameters relating to the economy, business and public policy. Specifically, it has fallen back five positions in the **domain of business excellence**, where it is among the cities with the lowest score in the ranking in terms of the labour market, mainly due to structural problems with unemployment. It is also affected by declining business productivity. Despite this, if we go deeper into the analysis, Barcelona is valued as a city with an attractive entrepreneurial ecosystem, with a very good position for the creation and stabilisation of start-ups in the city.

On the other hand, in the **domain of economics and public policy**, a loss of confidence is identified in govern ability, associated with the political instability of the city's environment, as reflected in the negative trend in the indicator of political stability and absence of violence.

	Index Position
Business excellence	23
Labour market	29
Unemployment rate	30
Youth unemployment rate	31
Employee remuneration	6
Vulnerability of workers	7
Labour market	26
Business productivity	25
Business demographics	7
Talented migrant population	26
Entrepreneurial environment	11
No. of start-ups	8
No. of start-ups with t+3 years	5
Tax burden on companies	15

	Index Position
Economics and public policy	23
Governability	23
Political stability and absence of violence	27
Rule of law	23
Government Effectiveness	23
Legislative quality	24
Economics and regulation	25
Tax burden x country (over GDP)	10
Average cost of living	27
Foreign direct investment inflows	8

Barcelona in education systems and research and innovation

Barcelona's position in the field of education and life-long learning has stabilised, thanks to the **international recognition of the city's business schools**, which are among the best in the world. **IESE** is in the **top 3 in Europe** according to the Financial Times annual ranking of business schools - and **ESADE** is in the **top 10 in Europe**. These good results contrast with the decline of some indicators in the sub-domains of the education system, the university system and the vocational training system, such as the reduction in public investment or the decline in the reputation of some universities in the territory.

In terms of **research and innovation**, Barcelona has considerably **reduced its public spending on R&D** and innovation and research grants, despite the increase in research personnel that has been seen in recent years.

	Index Position
Education system and lifelong learning	12
Education system	29
Public expenditure on education	28
Quality of the education system	31
Student/teacher ratio	13
Labour force with pre-university studies	8
University education system	26
Public expenditure on university education	21
University population	19
University ranking	13
Postgraduate education system	2
Business school ranking	2
Vocational Training System	19
Labour force with VT qualifications	6
Training for employees	24

	Index Position
Research, innovation and transfer to society	26
R+D Investment	29
Public R&D expenditure	29
Research talent	14
Research personnel	12
Research grants	17
Innovation production	16
Registered patents	16
Innovation production	26

Barcelona in attractive lifestyle

Barcelona leads in the **domain of attractive lifestyle** thanks to its wide range of public services for citizens, such as mobility and transportation and sanitation. In addition, the city is seen as a **must-visit tourist attraction**, which generates a pull **effect to attract talent**.

It also stands out in key aspects such as **transport infrastructure** that facilitate connections and freight traffic and, consequently, favour the attraction of business projects. In this sense, in addition to the road and rail networks, there are the maritime waterways and the presence of the Port of Barcelona.

Conversely, there is room for **improvement in the city's environmental indicators**, mainly in relation to environmental protection and performance, where Barcelona is below the middle of the ranking.

	Index Position
Attractive lifestyle	1
Public services	4
Social care	25
Transport infrastructure	1
Public transport	20
Air transport	8
Health system	13
Health personnel	19
Public hospitals and primary care centres	16
Sanitation	1
Tourism	1
Tourism population	1
Environmental indicators	19

Barcelona in diverse society and digital society

Barcelona stands out as a **diverse and egalitarian city** thanks to its good performance on **gender indicators** compared to other cities in Europe, such as a low pay gap or a good proportion of women in managerial positions¹

Similarly, Barcelona is positioned as a **digital city**, standing out in aspects such as the number of households with Internet access and the **level of digital intensity of the private sector**, but it still has plenty of room for improvement in the domain of digital administration and the digital skills of its citizens.

	Index Position
Diverse society	10
Social inclusion	9
Adult migrant population	9
Gender	11
Gender development index	22
Wage gap	9
Proportion of women in managerial positions	13

	Index Position
Digital society	16
Technological adoption by individuals	14
Internet accessibility	9
Internet use	11
Digital skills of society	14
Workers in technology and innovation sectors	20
Digital government and business	18
Digital government	18
Digital intensity	9



Recommendations for improving Barcelona's talent attraction and retention

We have included the views of leading personalities from the city in the different areas analysed in this study to supplement the results obtained for Barcelona from a qualitative perspective.

Specifically, several panels of prominent people in the city from different sectors and disciplines (educational, real estate, scientific, institutional, etc.) were organised to allow them to share their views on Barcelona's talent positioning, as well as to define recommendations and courses of action to be taken in the future by the city of Barcelona.

1. The analysed sources calculate gender indicators at a state level.

The recommendations made by the focus groups are presented below:

1. Improving the city's business fabric by promoting and attracting large business and technology initiatives and projects (hubs) and consolidating the start-up law

- Encourage the collaboration of the triple helix (business, government and university) to **welcome major projects in the territory**, and ensure that they provide better job opportunities, a dynamic business ecosystem and transfer infrastructure, knowledge, etc. to the city. Some examples of these macro-projects could be the Mobile World Congress (MWC) or the great America's Cup initiative.
- **Attract the implementation of technology and innovation hubs of large corporations¹**, thus promoting the mobility of international talent. In the last five years, more than 20 technology hubs have been established in the city (Ocado, Nestlé, BSC, Schneider, Cisco, etc.), creating more than 6,000 direct jobs.
- **Capture vertically integrated projects with a value chain.** Many of Barcelona's companies work in secondary support tasks for foreign conglomerates, and are involved in only one or two stages of the value chain. Therefore, it is necessary to have companies that seek vertical integration in the same geographical area to capture the entire product value chain; and to have a critical mass of this type of companies so that their suppliers are close by to avoid dispersion throughout the territory.

- **Identify and publicise successful cases of entrepreneurship** that help to consolidate Barcelona as an attractive city for international talent.
- **Collaborate in the implementation of the new state law on start-ups** from the city of Barcelona, by creating public bodies or offices that provide support with the paperwork for the different processes associated with the law. For example, the Barcelona International Welcome Desk for processing residency applications, or the Barcelona Centre Universitari (BCU) as an employment portal for research staff.
- **Enhancing university-business collaboration.** Universities have to create talent and companies have to develop it. Businesses and universities must communicate with each other to ensure that talent is not only created, but also trained on an ongoing basis.

2. Bring the region's regulatory and fiscal framework up to the level of other European regions

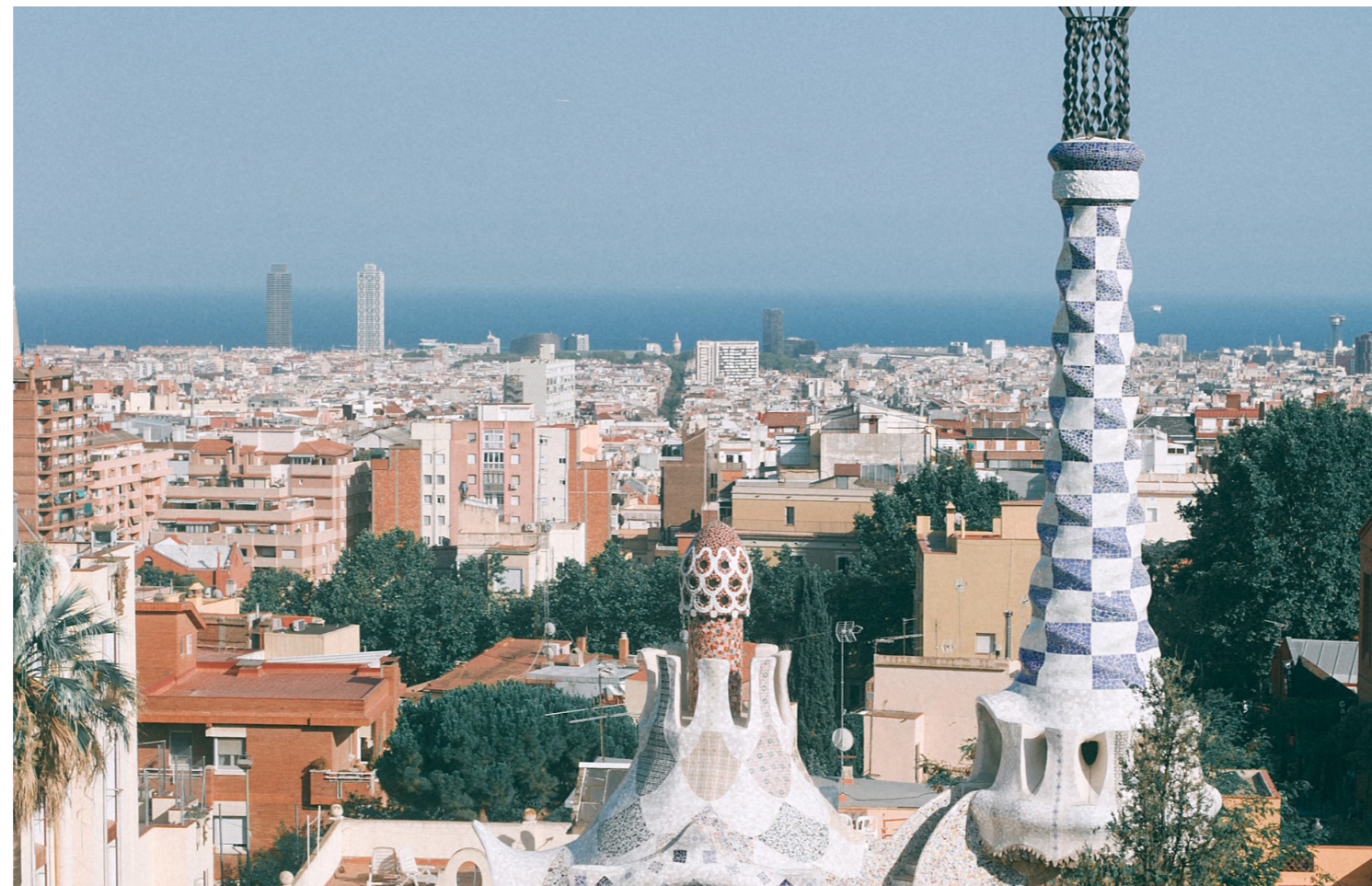
- **Seek mechanisms to reduce the tax burden on professionals and companies** for taxes that fall under local jurisdiction, in order to improve the city's position in attracting international talent
- **Homogenise the tax burden on companies** compared to other European cities in order to increase its competitiveness and attractiveness.
- **Simplify and adjust the legal framework for the establishment of new companies**, reducing red tape for local and foreign companies and professionals and speeding up the procedures associated with creating companies and hiring professionals.
- **Boost funding and investment in innovation.** The Catalan capital, like San Francisco, has the capacity, attractiveness and talent - but not the financial tools - to attract more *venture capital* companies and other economic agents. This potential is not currently be-

ing exploited and/or is leaking away to other Spanish and European cities. Thus, Barcelona accumulates knowledge, but does not receive financial consideration in return. Currently, the business culture feels safer investing in proven companies (*copycats*) and in very mature markets with little innovation (real estate, hospitality, etc.). In addition, as a rule, the business culture is averse to long-term investments.

- While in other cities it is private capital that is invested in pioneering and ground-breaking technologies, in Barcelona it is expected that this investment will always come from government bodies. For example, the three private incubators in Barcelona (Antai, Nucleo, Mutter) are not linked to universities or research.

3. Foster attractive telework policies to attract digital or research talent to settle in the city

- **Position Barcelona as a city with high purchasing power** in relation to the cost of living, where it is easier to enjoy access to certain goods and services (health, high quality education, good urban transport network, etc.).
- **To continue promoting the city of Barcelona and its surroundings** as a great city that combines ancient culture, exceptional gastronomy, a mild climate and a great potential for quality of life with a wealth of diverse leisure options.
- Ensure that all local, regional and state institutions work together to **draft laws that promote the attraction of digital nomads**, with improvements in terms of labour regulation, less restrictive taxation and easier access to social security for newcomers.
- **Continue to contribute** to initiatives such as the Catalan Institution for Research and Advanced Studies (ICREA) or the Barcelona University Centre, which help **researchers find housing**, join student associations and gain **access to a full range of culture** and leisure activities.



1. For more information see the report prepared by NTT DATA for the Mobile World Capital, ACCIO and Barcelona City Council "Tech Hubs Overview, Barcelona European Capital of Technology Hubs"

4. Internationalise the educational system of the city of Barcelona in order to attract a greater number of foreign students and professionals

- **Encourage the quantitative and qualitative improvement of cultural offerings in English** in the city, with the aim of improving the inclusion of foreigners, a growing group, according to Barcelona City Council sources.
- **Promote the creation of international networks and communities in different areas of the city's economy and culture.** For example, economic opportunity networks that form more partnerships with chambers of commerce, consulates and non-profit associations that bring together foreign professionals (e.g. the CodeWomen women's empowerment and support community), or for-profit associations such as Soho House, The Cover, Casa Juno, etc.
- **Support English language learning in the city's schools.** The aim would be for it to be an additional basic language and for the system to promote the use of the international curriculum, as is already the case in other European cities, such as Berlin. Education opportunities in English at the various higher education levels (high school, university, masters, etc.) should not be overlooked.

5. Transform Barcelona into a benchmark city for effective environmental policies in the long term, given that sustainability will be one of the main factors in the mobility of young talent

- **Promote environmental and sustainability policies that anticipate the external effects of climate change.** Become a proactive city with actions to combat the effects of rising average temperatures, such as creating multiple climate shelters spread evenly throughout the city, making it mandatory to paint roofs white, planting vegetation in as many spaces as possible, replacing asphalt with more sustainable materials, etc.
- **Continue with policies to improve air quality, electrify the vehicle fleet, reduce road traffic and subsidise public transport,** and sign a sustainable city pact that reflects the long-term vision of Barcelona beyond electoral cycles.
- **Promote and encourage the construction of sustainable buildings that adapt to the possible consequences of climate change:** green roofs, assistance for the installation of photovoltaic panels, reuse of every drop of water up to four times in public buildings and promotion of the same policy in domestic buildings, etc.



6. Give a boost to synergies in the field of innovation in different key sectors (health, transport, technology, digitalisation, etc.) to make Barcelona a centre of excellence in research and thus attract new talent in the domain of research

- **Improve communication and transfer channels between research and corporations** by promoting initiatives that **bring research closer to the labour market**, and by shifting the outlook of academic and research careers as the only natural pathway for professors or students on doctoral programmes. For example, **by proposing remuneration programmes for professors** who offer mentoring to SMEs or by **providing incentives for the integration** of doctoral students **into the productive labour market.**
- **Coordinate and centralise lobbying initiatives** that allow the different research centres to jointly highlight the importance of research for the development of society and **lobby for greater investment in this field**, both in terms of working conditions for research staff and in terms of funding (increased public investment, greater public-private investment or the exploration of other formulas such as patronage).
- Turn Barcelona City Council into a **catalyst for attracting investment** in research and **enhancing synergies between centres of excellence**, science parks and university hospitals, etc., that already exist in the city. In this sense, to continue promoting and fostering the creation of entities such as BIST (Barcelona Institute of Science and Technology) to bring together initiatives in the city that combine knowledge, talent and options to apply for large grants. For example, the Bonanova/Diagonal/Esplugues de Llobregat area has a concentration of high-level academic institutions and start-up incubators, but this knowledge corridor is not being used sufficiently to transfer knowledge and attract other research entities.

7. Promote digital administration to facilitate the reception and adaptation of the expatriate community in the territory.

- **Commit to a proactive and digital model** for the provision of public services, **by using and exploiting the data** that the government holds on each citizen.
- **Promote a 'one-single point'** that, in a single digital and physical location, provides a **personalised citizen assistance service, with connections between governments**, for the **reception and adaptation of the expatriate community.** This service would ensure that key formalities such as paying taxes, registering with the national health system, etc. are all handled easily and efficiently. For example, successful experiences in the cities of Tallinn, Helsinki, Vilnius, which have agencies that assist foreign talent arriving in the new country, could be replicated.
- **Step up regular campaigns to publicise and explain** the main formalities to be completed by the expatriate population upon arrival in Barcelona.
- **Digitalise the procedures linked to establishing the city's international talent**, placing special emphasis on improving and optimising the procedures associated with the issuance of the foreigner's identity number (NIE).



Talent attracts talent

As an additional conclusion to those presented above, the study finds that **Barcelona** is the city with the highest ranking in terms of attractive lifestyle. It is precisely this geographical and urban attraction that makes it an **ideal location for attracting and retaining talent**. However, this also entails **the creation and development of local talent**.

To this end, it is essential to focus on **education**. For example, to provide talent for today's knowledge society, it is necessary to **awaken children's interest** in the disciplines that fall under the acronym **STEAM** (*science, technology, engineering, art and maths*). Currently, technical careers in these fields are not in demand among secondary school students, especially girls. As a result, not enough talent is created at the university level and, subsequently, the relevant job openings are not generated to meet current needs, let alone future ones.

On the other hand, it is also essential to work on **the development of lifelong training for professionals**. Companies, in partnership with local universities, provide better training for internal talent. And this better educated talent, in turn, can lead to higher-value projects that will attract new talent. **Businesses and universities** must therefore communicate with each other to **ensure that talent** is not only created, but also **trained** on an ongoing basis.

Initiatives such as ICREA (Catalan Institution for Research and Advanced Studies) and BIST (Barcelona Institute of Science and Technology) have been created in Barcelona to create synergies and put **Barcelona** at the **forefront of lifelong learning for professionals**. The city currently has more than 40 digital *bootcamp* training centres, with two of the best business schools in the world (IESE and ESADE) as well as various *second-tier* centres, which, thanks to the city's attractiveness, contribute to a lifelong learning culture.

In conclusion, in order to **further improve** the city's capacity and positioning to attract and retain talent, initiatives related to the **city's ability to generate talent and prevent talent** from opting for options overseas should not be overlooked. Highly talented societies with strong educational potential become centres of knowledge creation, and thus highly attractive ecosystems of highly qualified talent. **Talent attracts talent.**



Annex

ANNEX



Annex 1: High-level methodology and limitations

01. Introduction

In order to understand how the indicator is built, it is particularly important to provide a detailed explanation of the methodological process used to obtain both the individual scores in each of the sub-indices and the computation of the overall index.

As this was a calculation requiring a significant amount of data processing, the **CRISP-DM** (*Cross-Industry Standard Process for Data Mining*) methodology was used. This methodology consists of six different phases, although, given the specific characteristics of the process, in this case they have been reduced to only four: understanding and standardisation of the data; cross-referencing and processing the information; selection of the standardisation/classification criterion; and generation of the sub-indices and calculation of the global index for the different cities.

Each phase of the methodology is detailed below.

02. Understanding and standardisation of the data

The information needed to compile the index has been obtained from a range of information sources. The indicators extracted for each of the sources are specified below:

Eurostat: unemployment rate, youth unemployment rate, employee compensation, worker vulnerability, business demographics, attracting foreign talent, business start-ups, business start-ups older than three years, public expenditure on education, student/teacher ratio, pre-university education labour force, public expenditure on university education, university population, vocational education labour force, expenditure or social care, transport infrastructure, public transport air transport, health personnel, public hospitals and primary care centres, tourist population, investment in environmental protection, R&D&I expenditure, research personnel, research grants, adult migrant population, wage gap, internet accessibility, internet use, digital skills in society, workers in technology and innovation sectors, digital government and digital intensity.

OECD: business productivity, quality of the education system (PISA report) and registered patents.

World Bank: tax burden on business, political stability and absence of violence, rule of law, government effectiveness, legislative quality, foreign direct investment inflows and renewable energy consumption.

Expansion: tax burden on GDP.

Numbeo: average cost of living.

QS TopUniversities: university rankings.

Financial Times: business school rankings.

World Economic Forum: investment in employee training.

UNICEF: health and water quality.

IQ Air: air quality.

Yale: environmental compliance.

WIPO: production in innovation.

United Nations Development Programme: gender development index and women in managerial positions.

After extracting the information, an audit process was carried out in which the percentage of indicators that

do not provide information on any given city was calculated for each city. Similarly, the percentage of cities for which no information is available in the indicator was calculated for each indicator.

For indicators where the information was aggregated at a national level, proxies were used to disaggregate the information. This use of *proxies* has been divided into two parts: economic indicators and population indicators. For economic indicators, the value of the indicator was obtained by multiplying its value by the contribution of the NUTS2 GDP to the national GDP. Similarly, for population-based indicators, the value of the indicator was obtained by multiplying its value by the ratio between the population of the NUTS2 and the national population.

03. Information cross-referencing and processing

As previously mentioned, the information used to construct the different domains and sub-domains was obtained from public sources from international organisations such as the World Bank, the OECD, the International Monetary Fund and, above all, Eurostat.

Minimum cross-referencing level

The variety of sources of information makes it inevitable that different nomenclature will be used for the same city: the NUTS codes (*Nomenclature des unités territoriales statistiques*, in French), the literal name of the city in international language, the ISO-3 code associated with the country of each city or even the urban areas defined by Eurostat itself.

This range of different ways of identifying a single city made it necessary to first establish a table of equivalences, in which the NUTS3 code (smallest administrative level, which in the case of Spain is associated with the province) was the key field for cross-referencing, along with the city's international name.

Data availability assumptions

After defining the minimum level of cross-referencing between the different sources of information, there are two determining factors that are of particular relevance when constructing the different domains. On the one hand, the UK's exit from the European Union and, on

the other hand, the disparity in the publication of the different data tables.

A. Exit of the United Kingdom from the European Union

As a direct consequence of the implementation of the UK's exit from the European Union, its cities no longer appear in Eurostat's NUTS directories. Special mention should be made of the City of London itself, which was divided into several administrative areas without a defined NUTS3. Therefore, for the United Kingdom of Great Britain and Northern Ireland, it will be understood that the Eurostat domains will be available until such time as the country's exit from the European Union becomes effective, with no impact on the rest of the domains that come from other international organisations.

B. Disparity in the publication of official data

Another aspect where certain assumptions had to be made in order to ensure the quality of the analysis and a scope as close to reality as possible was the year in which the information was published and the frequency of availability. In the first stage of selecting the information, a time window was established between 2022 and 2016, so that structural and situational effects that cause distortion such as wars, crises resulting from COVID-19, etc. would be cushioned in the different areas, without going too far back in time when the global, and especially European, structure and situation would be very different from the current one.

On the other hand, depending on the availability of the data, efforts have been made to achieve maximum completeness for each of the indicators by using the most recent information possible, so that if data is available for 2022 it is used and, if not, previous years are examined until the first available year is found. If 2016 is reached and no information is available, the missing value is left out and replaced by the average of the values of that indicator.

Once the common framework for cross-referencing all the sources of information was defined and the criteria for selecting the information selected (in the case of no records for the year 2022), all the data sources were integrated using a script written in the Python language. The design of this programme took into account the previously defined structure of indicators and sub-indi-

cators, so a relative path indicated at the beginning of the script would be able to find all the sub-directories to load the information and proceed with the processing in order to produce a single consolidated table.

As a final step prior to the construction of the table, an audit and validation task was carried out with a double objective: to verify that all the defined assumptions were executed correctly, and that the level of misinformation in each of the indicators does not exceed a pre-established threshold. In this respect, out of the whole panel of indicators and sub-indicators defined at the initial stage of this analysis, a threshold of 60% was established for misinformation. That is, if 60% or more information is missing from a column, it is omitted from the final analysis, as the quality is not sufficiently adequate or representative.

Of all the indicators (50 indicators), the average misinformation (percentage of missing values) was 13.94%, with the least amount of misinformation being found in the unemployment rate for each city (among others) with 0% missing values, compared to the most misinformation, which was the air quality in each city, with 47.06% misinformation. When the level of misinformation is considered for each city, the average level of misinformation is 13.94%, with Madrid being the most complete city with all indicators reported, whereas Glasgow is missing 54% of the indicators. In the case of Barcelona, the level of misinformation is 2%.

Consequently, after approval of the audit and information quality analyses, the final table is at a sufficient level to proceed with the standardisation of the different indicators.

04. Selecting the standardisation / classification criterion

When it came to building the global indicator, and therefore the partial indicators, the high dispersion of the data and the difference in measurement scales were noted; therefore, it was necessary to proceed with tasks to standardise or classify the different pieces of raw data. For example, the percentage of the population with higher education is not comparable with a ranking of universities. The following criteria were used to cushion the dispersion effect between the data and the different scales of measurement:

1. If the variables were mainly numerical, statistical classification resembling a normal was used.
2. If the variables are rankings or synthetic indicators, the min-max scaler method of standardisation was used

4.1. Classification

The classification of a numerical variable to resemble a Normal distribution with mean zero and standard deviation one is calculated by the following formula:

$$x' = \frac{x - \bar{x}}{\sigma} \rightarrow N(0,1) \quad | \quad x' = \frac{x - \bar{x}}{\sigma} \rightarrow N(0,1)$$

where

$$x'$$

represents the value of the classified variable,

$$x$$

the value of the unclassified variable,

$$\bar{x}$$

the mean of the variable and

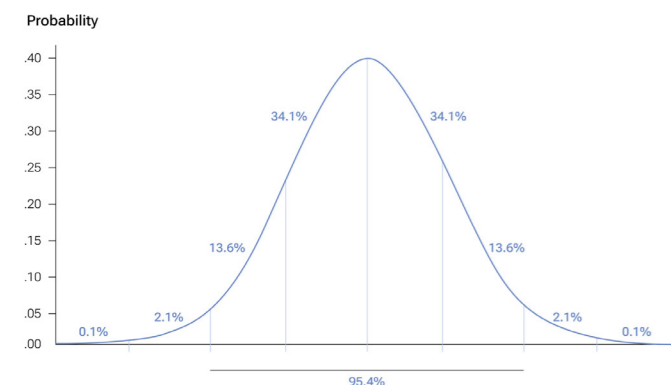
$$\sigma$$

the standard deviation.

After applying the classification, the cut-off point from which it can be considered as an outlier or not was established. The cut-off value was defined by calculating the probability that 95% of the data fall within an interval. By calculating this interval, the value of 1.95 was established, leaving a closed interval varying between [-1.95, 1.95].

4.2. Standardisation

The second method that was applied, only for those variables that are not numerical in origin, but are rankings or scales, was standardisation using the min-max scaler method. This method uses the following formula:



$$x' = \frac{x - \min(x)}{\max(x) - \min(x)} \rightarrow U(0,1) \quad | \quad x' = \frac{x - \min(x)}{\max(x) - \min(x)} \rightarrow U(0,1)$$

where

$$x'$$

represents the value of the standardised variable,

$$x$$

the value of the unstandardised variable,

$$\max(x)$$

the maximum of the variable and

$$\min(x)$$

the minimum.

As two different ways of processing the information coexist (classification and standardisation), it can be seen that the limits between the two distributions are not the same; in fact, while classification has a range of [-1.95, 1.95], standardisation using the *min-max scaler* only varies between [0,1], meaning that there is a range of 2.92 units that standardisation does not cover when compared to classification. To overcome this problem, the *min-max scaler* formula was slightly modified to cover the same range as classification.

$$x' = \frac{3.9(x - \min(x))}{\max(x) - \min(x)} - 1.95 \rightarrow U(-1.95, 1.95) \quad | \quad x' = \frac{3.9(x - \min(x))}{\max(x) - \min(x)} - 1.95 \rightarrow U(-1.95, 1.95)$$

This gives both methods an equal variation range, ensuring their comparability and respecting their interpretability.

05. Generation of the index and sub-indices

After standardising or classifying the information for the cities that make up the index, the partial weightings and the system for generating the city ranking were designed.

Sequentially, for each sub-domain, a choice was made as to whether standardisation or classification was more appropriate and the appropriate formula was applied as a result. Subsequently, the ranking was obtained by ordering the values from highest to lowest. For those indicators where a low value is preferable (e.g. worker vulnerability), the hierarchy was inverted, i.e. the classified/standardised value was multiplied by minus one.

By calculating each of the indicators individually, it is possible to analyse in isolation how a city ranks relative to the rest on just one of the indicators, or a comparison can be made in aggregate when calculating the sub-index at a more aggregated level.

This effect means that, for example, a city can be ranked third in one of the indicators and have lower rankings in the others and be in the mid range as an overall ranking. This will have a more or less powerful effect on the ranking of a city within a sub-domain or even within the entire index depending on the weights assigned to it. If the indicators in which a city has a lower nominal value have a lower weighting compared to the rest, it will be placed higher in the table; conversely, if the weights are higher in these indicators, it will be penalised.

Annex 2: City selection data

TOP 50 cities by population

Population (unit: number of persons)

	Population	Position
TR012: Istanbul	13285813	1
FR001: Paris	12924097	2
UK001: London	12320148	3
ES001: Madrid	6791667	4
DE001: Berlin	5259440	5
DE038: Ruhr	5117039	6
ES002: Barcelona	4985549	7
IT002: Milan	4944728	8
TR001: Ankara	4791626	9
IT001: Rome	4331571	10
EL001: Athens	3544204	11
IT003: Naples	3372586	12
UK008: Manchester	3356475	13
DE002: Hamburg	3296381	14
BE001: Brussels	3260987	15
PL001: Warsaw	3154440	16
UK002: West Midlands urban area	3106063	17
HU001: Budapest	2979468	18
PT001: Lisbon	2969024	19
AT001: Vienna	2967197	20
DE003: Munich	2882464	21
NL002: Amsterdam	2838598	22
TR013: Izmir	2798911	23
DE007: Stuttgart	2778315	24
DE005: Frankfurt am Main	2693488	25

	Population	Position
UK003: Leeds	2626685	26
PL010: Katowice	2505530	27
SE001: Stockholm	2308143	28
CZ001: Prague	2216056	29
RO001: Copaceni	2202465	30
FR003: Lyon	2113104	31
DE004: Cologne	1994029	32
IE001: Dublin	1935118	33
TR005: Bursa	1929478	34
DK001: Copenhagen	1919370	35
NL003: Rotterdam	1848449	36
UK004: Glasgow	1834180	37
IT004: Turin	1742605	38
ES003: Valencia	1733606	39
TR010: Gaziantep	1662576	40
BG001: Sofia	1553081	41
DE011: Dusseldorf	1550191	42
ES004: Seville	1545862	43
UK006: Liverpool	1537014	44
FR009: Lille	1518544	45
FI001: Helsinki	1490142	46
FR004: Toulouse	1423458	47
PL003: Cracow	1400321	48
NO001: Oslo	1380577	49
CH001: Zurich	1369041	50

TOP 50 cities by GDP

GDP (Million US Dollar unit)

	Population	Position
FR001: Paris	901376	1
UK001: London	818922	2
TR012: Istanbul	629648	3
ES001: Madrid	342770	4
IT002: Milan	304484	5
DE003: Munich	239800	6
DE001: Berlin	237965	7
ES002: Barcelona	222167	8
IT001: Rome	216311	9
DE038: Ruhr	207408	10
NL002: Amsterdam	202933	11
DE002: Hamburg	199496	12
BE001: Brussels	198036	13
DE007: Stuttgart	191656	14
DE005: Frankfurt am Main	187375	15
PL001: Warsaw	186656	16
IE001: Dublin	183831	17
TR001: Ankara	180189	18
SVK: Slovak Republic	177219	19
AT001: Vienna	163520	20
SE001: Stockholm	160194	21
CZ001: Prague	139495	22
HU001: Budapest	137653	23
UK008: Manchester	135940	24
EL001: Athens	134104	25

	Population	Position
RO001: Copaceni	132599	26
PT001: Lisbon	123240	27
DK001: Copenhagen	120724	28
DE004: Cologne	120461	29
FR003: Lyon	114716	30
UK002: West Midlands urban area	110266	31
DE011: Dusseldorf	109208	32
CH001: Zurich	107300	33
HRV: Croatia	106436	34
NL003: Rotterdam	101015	35
UK003: Leeds	97376	36
TR013: Izmir	95051	37
LTU: Lithuania	93074	38
NO001: Oslo	90566	39
FI001: Helsinki	87467	40
IT003: Naples	86028	41
PL010: Katowice	85221	42
DE014: Nuremberg	81117	43
IT004: Turin	76834	44
SVN: Slovenia	73672	45
DE083: Braunschweig-Salzgitter Wolfsburg	72356	46
UK004: Glasgow	70752	47
FR004: Toulouse	70235	48
DE013: Hanover	70174	49
DE084: Mannheim-Ludwigshafen	67125	50

Annex 3: Indicators analysed and sources of information

A Business excellence

A.1 Labour market

1.1	Unemployment rate	Unemployment rate	Eurostat
1.2	Youth unemployment rate	Youth unemployment rate	Eurostat
1.3	Employee remuneration	Average salary	Eurostat
1.4	Vulnerability of workers	% of employees on temporary contracts	Eurostat

A.2 Business fabric

2.1	Business productivity	Gross added value / no. of people in employment	OCDE
2.2	Business demographics	(No. of companies with over 10 employees * ((regional GDP) / national GDP)	Eurostat
2.3	Talented migrant population	% of foreign workers with higher education qualifications / total foreign workers	Eurostat

A.3 Entrepreneurial environment

3.1	No. of start-ups	No. of start-ups * regional GDP / national GDP	Eurostat
3.2	No. of start-ups with t +3 years	No. of start-ups created in year T that have reached t +3 / no. of companies created in year T	Eurostat
3.3	Tax burden on companies	Tax payable by companies	Tax Foundation

B Economics and public policies

B.1 Governability

1.1	Political stability and absence of violence	Political Stability and Absence of Violence Index	World Bank
1.2	Rule of law	Rule of Law Index	World Bank
1.3	Government effectiveness	Government Effectiveness Index	World Bank
1.4	Legislative quality	Regulatory Quality Index	World Bank

B.2 Economics and regulation

2.1	Tax burden over GDP	Total % of tax and social contributions as a ratio of GDP	Expansion
2.2	Average cost of living	Average expenditure in consumption per household and equivalent per adult	Numbeo
2.3	Foreign direct investment inflows	Average value of foreign direct investment inflows	World Bank

C Education system and lifelong learning

C.1 Education system

1.1	Public expenditure on education	Public expenditure on education as a % of GDP	Eurostat
1.2	Quality of the education system	Position under the PISA report	OCDE (Informe PISA)
1.3	Student/teacher ratio	Total number of teachers in the region / total number of students in the region	Eurostat

C.2 University education system

2.1	Public expenditure on university education	Total public expenditure on university education / country's GDP)	Eurostat
2.2	University population	Number of university students / regional population	Eurostat
2.3	University ranking	Weighting of the best 200 universities at regional level (the top-ranked institution in each country was added to the group if it was better than the top 200)	QS TopUniversities

C.3 Postgraduate education system

3.1	Business school ranking	Total no. of points indicating the importance of each business school in the Ranking	Financial Times ranking
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C.4 Vocational Training System

4.1	Labour force with VT qualifications	% of workers who have completed VT programmes	Eurostat
4.2	Training for employees	Investment by companies in employee training and development	Weforum

D Attractive lifestyle

E.1 Public services

1.1	Social care	Social care expenditure / GDP	Eurostat
1.2	Transport infrastructure	Road, railway and inland waterway networks	Eurostat
1.3	Public transport	Stock of public buses, coaches and trolleybuses / regional population (NUTS 2)	Eurostat
1.4	Air transport	No. of air travellers	Eurostat

E.2 Health system

2.1	Health personnel	No. of doctors for every 100,000 inhabitants	Eurostat
2.2	Public hospitals and primary care centres	No. of rooms in public hospitals and primary care centres in the region	Eurostat

E.3 Quality of life

3.1	Tourist population	Total no. of nights in tourist accommodation	Eurostat
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E.4 Environmental indicators

4.1	Water quality	Proportion of the population who use enhanced water supplies	UNICEF
4.2	Air quality	Air Quality Index	IQ Air
4.3	Renewable energy consumption	% of total consumption of final energy	World Bank
4.4	Investment in environmental protection	Environmental protection investments in the overall economy	Eurostat
4.5	Environmental compliance	Environmental Compliance Index	Yale

E Research, innovation and transfer to society

D.1 Investment in R&D

1.1	R&D&I expenditure	Total expenditure on R&D as a % of the region's GDP	Eurostat
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D.2 Research

2.1	Research staff	No. of research personnel / general workforce (regional)	Eurostat
2.2	Research grants	No. of European Research Grants (Starting Grants – StG)	Eurostat

D.3 Innovation production

3.1	Registered patents	Patent applications at the EPO for every million inhabitants	OCDE
3.2	Innovation production	Innovation Production Index	WIPO

F Diverse society

F.1 International population

1.1	Adult migrant population	Distribution of the population by large citizen group and occupancy status	Eurostat
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F.2 Gender

2.1	Gender Development Index	Gender Development Index	United Nations Development Programme (UNDP)
2.2	Wage gap	Gender Wage Gap Index	European Parliament / Eurostat
2.3	Proportion of women in managerial positions	Proportion of women in senior and middle management positions (%)	United Nations Development Programme (UNDP)

G Digital society

G.1 Technological adoption by individuals

1.1	Internet accessibility	Households with home internet access	Eurostat
1.2	Internet use	Frequency of internet use: once a week (including every day)	Eurostat
1.3	Digital skills of society	People's digital skill level	Eurostat
1.4	Workers in technology and innovation sectors	Employment in manufacturing industries involving high and medium-high technology and in knowledge-intensive service sectors	Eurostat

G.2 Digital government and businesses

2.1	Digital government	People who use the internet in their dealings with the government	Eurostat
2.2	Digital intensity	Digital Intensity Index	Eurostat

NTT DATA

