SMART CITIES STUDY 2017

INTERNATIONAL STUDY ON THE SITUATION AND DEVELOPMENT OF ICT, INNOVATION AND KNOWLEDGE IN CITIES

UCLG CGLU

UCLG Committee
Digital and
Knowledge-Based Cities

Bilbao

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The Committee of Digital and Knowledge-Based Cities of UCLG
Chaired by Juan Mari Aburto, Mayor of the City of Bilbao

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FOREWORD

I am pleased to present the second edition of the "Smart Cities Study", a study developed by the Committee of Digital and Knowledge-Based Cities of UCLG that aims to provide information in a didactic way on the different strategies and projects that cities around the world are putting in place, in order to move forward on the key aspects that make up a "smart city".

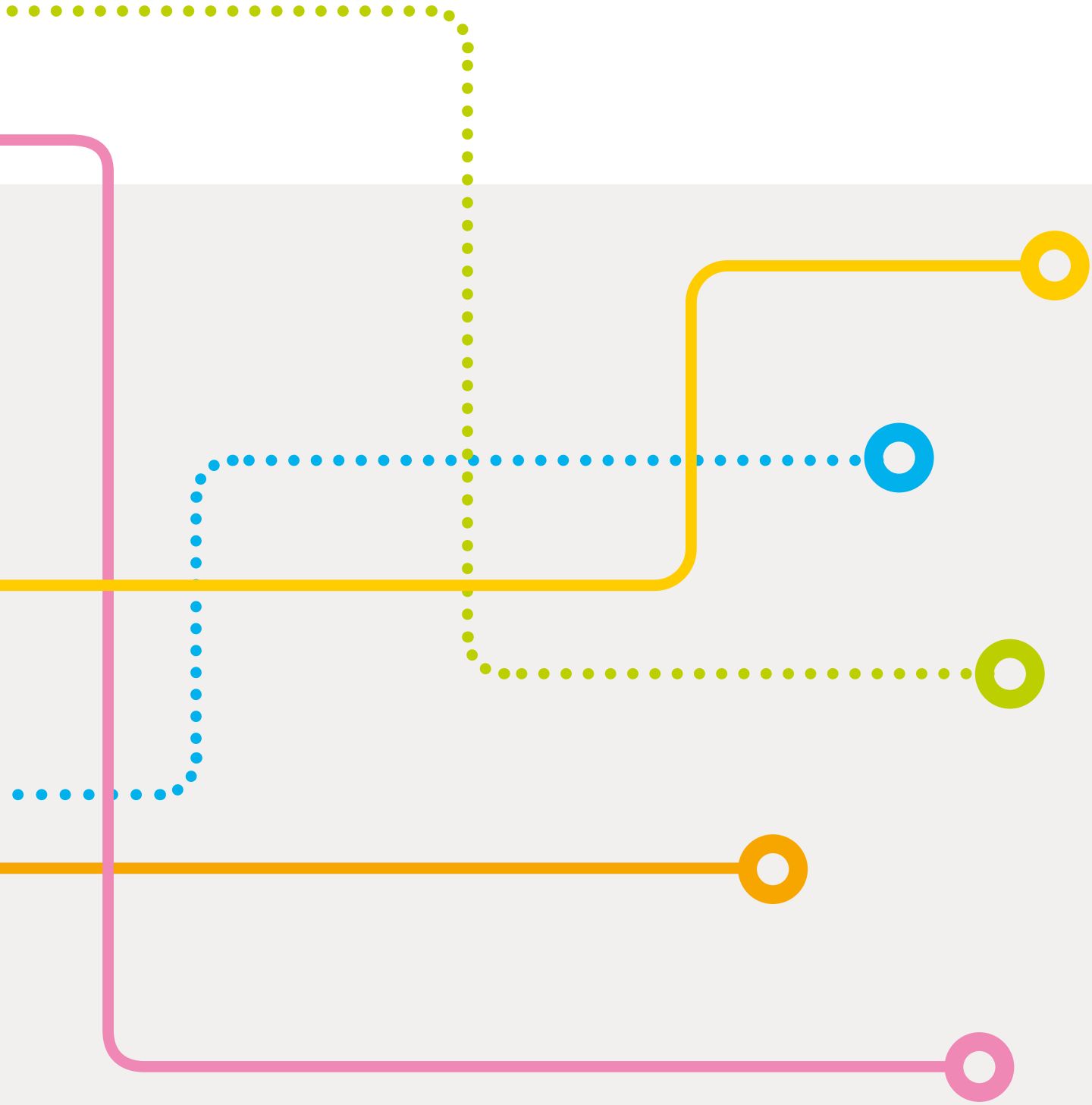
We are fully immersed in the Knowledge Society. We are increasingly hearing about smart factories, smart cities and smart specialisation strategies. The development of the "smart" concept is thus playing a central role in economic development strategies in our cities and regions.

Based on identifying good practices at the local level, this study analyses the key factors associated with smart cities in fields such as innovation, entrepreneurship, knowledge and talent, and the digital economy. As Chairman of the Committee of Digital and Knowledge-Based Cities of UCLG, I want to encourage cities and regions to join this movement to grow as smart cities by further promoting and opening ourselves up to innovation and knowledge.

In the same way, I believe this drive towards a smart city is fundamental, we cannot forget that a city can only be smart if it is able to integrate all the people who live there. Solidarity and inclusion policies must also be defining elements of a smart city, as we can only consolidate the long-term economic development of our territories from a basis of sustainable growth in environmental and social areas as well.

Juan Mari Aburto
Mayor of Bilbao
Chairman of the Committee of Digital and Knowledge-Based Cities of UCLG

Finally, I would like to reiterate the willingness of the cities that took part in the study, and of all the cities that form part of the Committee of Digital and Knowledge-Based Cities of UCLG, to share our knowledge and our experiences with other cities. Cooperation is, after all, an essential element of a smart city.



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1.1 SMART CITIES **IN UCLG**

A journey that began in 2005

Since 1990, the development of Internet and Communication Technologies (ICT) has favoured the more or less widespread generation of initiatives aimed at creating opportunities for communication and information sharing by local and regional communities.

Early experiences often arise spontaneously and circumstantially in the shape of citizen forums or within certain groups in order to address common issues, to the point that each circle or forum has different objectives. This phenomenon first appeared in the U.S. and then moved on to Europe and Asia.

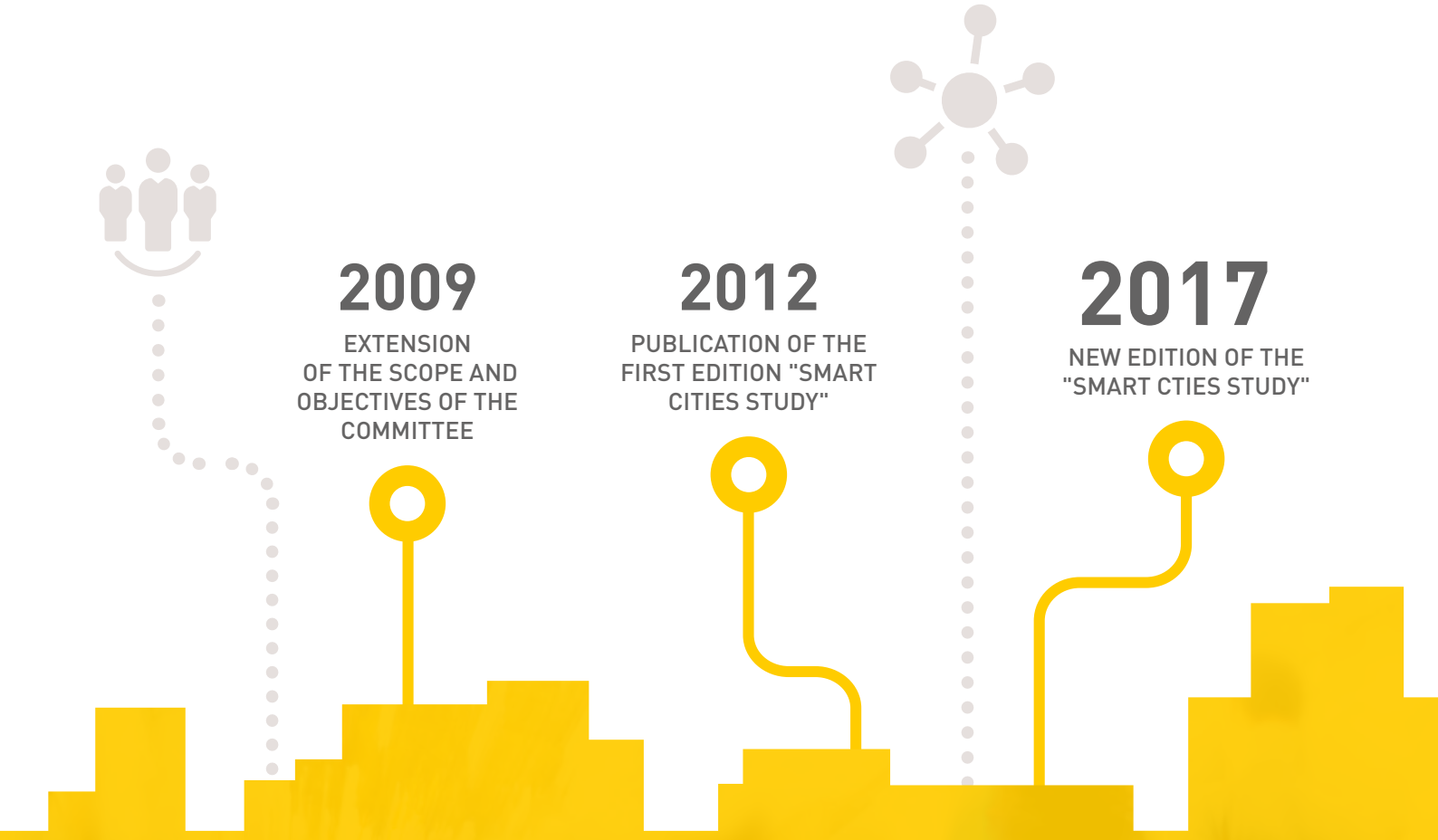
Local Authorities are aware that in recent decades the development of ICT, innovation and knowledge has increased, making them increasingly present in daily life, and basic components in the social and economic progress of their territories.

The world is becoming increasingly digital and no-one can remain unaffected by these changes. A change process of such enormous proportions and an uncertain climate regarding the resulting social model require Local Authorities, as the public authorities closest to the citizens, to provide an appropriate response.

The Committee of Digital and Knowledge-Based Cities of UCLG

Framed by the process of global reflections on the Information Society promoted by the UN, the **II World Summit of Local Authorities on the Information Society** was held in Bilbao in 2005, the specific results of which were a Declaration and an Action Plan, the **Digital Local Agenda**, where the Local Authorities committed to sharing their digital development with other cities and regions in order to forward the achievement of inclusive municipalities and cities and the use of ICT as tools for development.

To achieve these objectives - **to reduce the digital divide and implement Digital Local Agenda** as



means to improve the quality of life of citizens in decentralised governments - the **Committee of Digital and Knowledge-Based Cities of UCLG** was created that same year, chaired by the City of Bilbao.

Since then, the Committee has sought to promote the development of a shared vision and joint measures among local governments in favour of an inclusive Information Society that promotes the reduction of the digital divide.

In November 2009, in addition to continuing with the work the Committee had been undertaking to share digital development in solidarity with other cities and regions that are far from reaching this goal, it was deemed necessary to give the Committee a **broader scope, based on the local governments' pursuit of competitive excellence through knowledge management and innovation in cities**.

With this in mind, the members of the Committee and the UCLG World Council agreed to change the name of the "Committee on the Information Society" to the **"Committee of Digital and Knowledge-Based Cities"** to be more in line with the new objectives and in line with the work that the Committee was to carry out.

The Committee of Digital and Knowledge-Based Cities (CDKC) of UCLG aims to create an efficient network of cooperation made up of Local Authorities with a view to seizing any opportunities that new information and communication technologies (ICT), innovation and knowledge may offer, and to share those opportunities, assimilate them and adapt them to local needs to create new opportunities for all.

The aim is to achieve an **alliance between the various members of the Committee** to achieve a competitive economy driven by local authorities in which knowledge, innovation and new technologies (ICT) are created, transmitted, acquired and used to promote the economic and social development of the community.

www.uclg-digitalcities.org

1.1 SMART CITIES IN UCLG

THE COMMITTEE'S FIELDS OF WORK

1

DISSEMINATION OF THE LOCAL DIGITAL AGENDA MODEL

The momentum of which has been the Committee's main task over the last four years, and which continues to be an extremely useful tool to advance the goal of digital, competitive and collaborative cities in a structured and planned manner, while also advancing the Smart City Agenda.

2

IDENTIFICATION AND EMPOWERMENT OF THE FACTORS THAT MAKE THE MOST INNOVATIVE CITIES

Such as attracting and generating knowledge, improving education and learning throughout life, and support from local powers for economic sectors based on creativity and technological knowledge.

3

POSITIONING OF CITIES AS LEADERS IN THE TERRITORIAL INNOVATION PROCESSES

For their ability to articulate highly participatory and efficient networks.

4

CREATION OF AN EFFICIENT COOPERATIVE NETWORK

Consisting of UCLG member cities to tap into the creativity, innovation and knowledge with a view to sharing, assimilating and adapting to local needs and thus create new opportunities for all.

THE COMMITTEE'S THEMATIC AREAS

KNOWLEDGE

HUMAN CAPITAL

INFRASTRUCTURE

LIFELONG TRAINING

EDUCATION

ICTs

E-DEMOCRACY

CULTURE AND IDENTITY

EDUCATION AND TRAINING

ACCESSIBILITY AND E-INCLUSION

SECURITY AND TRUST

E-HEALTH

E-ADMINISTRATION

E-BUSINESS

INFRASTRUCTURE

INNOVATION

R&D AND INNOVATION

CREATIVITY

TALENT RETENTION/ ATTRACTION

INTERNATIONALISATION

ENTREPRENEURSHIP

TECHNOLOGICAL INFRASTRUCTURES

1.2 SMART CITIES **CONCEPT**

Smart and innovative city

Traditionally, a smart city has been defined as a **"city that uses information and communications technology to make its critical infrastructure, its components and public services more interactive and efficient, making citizens more aware of them"**.

In a broader definition, a city can be considered as "smart" when its investment in human and social capital and in communications infrastructure actively promote sustainable economic development and a high quality of life, including the wise management of resources implemented through a participatory government.

An evolving concept

According to the **EIP-SC European Innovation Partnership on Smart Cities and Communities**, Smart Cities and Communities can be defined as follows:

> **Smart Cities must be considered as systems of people who interact and use flows of energy, materials, services and financing to catalyse sustainable economic development, resilience, and a high quality of life; these flows and interactions are "smart" through the strategic use of ICT infrastructure and services within a transparent urban planning and management process that responds to the social and economic needs of the society".**

1.3 SMART CITIES **FACTORS**

In preparing this study, the Smart City model has been used, which identifies the **presence and convergence of three main fields:**

FIELDS OF A SMART CITY

INNOVATION, ENTREPRE-NEURSHIP AND THE GENERATION OF ECONOMIC ACTIVITY

- SMART SPECIALISATION
- PROMOTION AND SUPPORT OF ENTREPRENEURSHIP
- PROMOTION OF R&D AND INNOVATION
- CLUSTERING. COLLABORATION WITH THE LOCAL BUSINESS FABRIC
- ATTRACTING INVESTMENTS
- POSITIONING OF THE TERRITORY

KNOWLEDGE AND TALENT

- QUALITY BASIC EDUCATION
- QUALITY UNIVERSITY
- LIFELONG LEARNING
- ATTRACTING TALENT
- RETENTION AND RETURN OF TALENT

DIGITAL SOCIETY AND ECONOMY

- DIGITAL CITIZENSHIP
- ADMINISTRATION 4.0.
- DEVELOPMENT OF T HE DIGITAL ECONOMY
- DIGITAL INFRASTRUCTURE

> **A city can be defined as smart when it displays positive performance in these three fields, and when it has been built based on a "smart" combination of elements (communications, infrastructure, economic development) and on purposeful and independent citizen activities (participation, education) that make sound management of the available resources through open governance.**

1.3 SMART CITIES **FACTORS**

4 MAIN SOURCES OF VALUE

1 IT IS SUSTAINABLE

Using digital technology to reduce costs and optimise resources, in a way that its current administration does not compromise the use of these by future generations.

2 IT IS INCLUSIVE AND TRANSPARENT

It has direct channels of communication with the public, operates with open information and allows the budgets invested in to be monitored.

3 IT GENERATES WEALTH

Offering suitable infrastructure to generate high quality employment, innovation, competitiveness and business growth.

4 IT IS MADE FOR THE CITIZENS

Using technology that improves the quality of people's lives, giving quick access to more efficient public services.

SYNTHESIS OF KEY CHARACTERISTICS

IT GENERATES INTEGRATION, WHICH IN TURN PROVIDES THE PUBLIC ADMINISTRATION WITH THE NECESSARY INFORMATION IN A TRANSPARENT WAY

IT OPTIMISES THE ALLOCATION OF RESOURCES

IT GENERATES PROCEDURES TO INCREASE THE EFFICIENCY OF THE GOVERNMENT

IT ALLOWS GREATER PARTICIPATION OF THE CIVIL SOCIETY IN THE ADMINISTRATION

THERE IS A HIGH DEGREE OF SATISFACTION AMONG ITS CITIZENS

IT PRODUCES PERFORMANCE INDICATORS THAT ARE USEFUL TO MEASURE, COMPARE AND IMPROVE PUBLIC POLICIES

Actors in the value chain of a Smart City

A more detailed approach to the implications of a "Smart City" allows the various **actors in the value chain** that coexist in a "Smart City" to be observed, as well as the **ecosystem** that forms around the **citizens, who are ultimately the ones that require quality services with greater transparency**, and the citizens are those who are truly active in contributing to the city. For this reason, the following actors surround the citizens, providing value and playing a role in the "Smart City":

ECOSYSTEM OF ACTORS IN THE VALUE CHAIN OF A SMART CITY

PUBLIC SERVICES
Provide services more efficiently, measuring their performance.

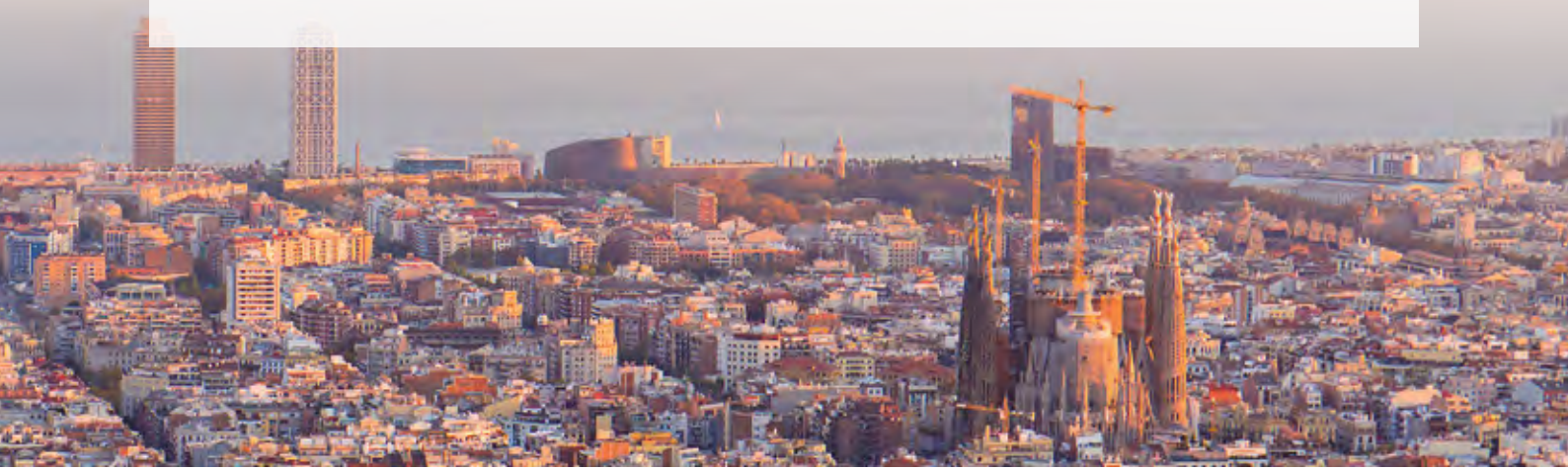
TECHNOLOGY COMPANIES
Offer interoperable, reliable and secure technological solutions.

GOVERNMENTS AND INSTITUTIONS
Provide momentum and a favourable framework.

CITY COUNCILS
Lead the project of transforming into a smart city.

UNIVERSITY
Support the development of solutions and test pilot models.

ENTREPRENEUR COMPANIES AND INDIVIDUALS
Take risk and demand a creative, dynamic and innovative environment.



2.
SMART CITIES
STUDY 2017


ПРОКАТ

2.1 NEW APPROACH

In 2012 the Committee of Digital and Knowledge-Based Cities of UCLG carried out an **International study on the situation of ICT, Innovation and Knowledge in cities ("Smart Cities Study")**. As a continuation of this work, the aim of this study is to focus its approach on the current situation and on the opportunities that ICT provide, as well as on the support for innovation and knowledge advancement to develop cities and transform them into "Smart Cities".

The study takes a **global and cross-cutting approach** from the different levers in which the potential for a city to grow and transform lie. For this purpose, 3 large fields that would characterise a Smart City have been defined, which include the following:

3 LARGE FIELDS THAT WOULD CHARACTERISE A SMART CITY

INNOVATION, ENTREPRE-NEURSHIP AND THE GENERATION OF ECONOMIC ACTIVITY

- SMART SPECIALISATION
- PROMOTION AND SUPPORT OF ENTREPRENEURSHIP
- PROMOTION OF R&D AND INNOVATION
- CLUSTERING. COLLABORATION WITH THE LOCAL BUSINESS FABRIC
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DIGITAL SOCIETY AND ECONOMY

- DIGITAL CITIZENSHIP
- ADMINISTRATION 4.0.
- DEVELOPMENT OF THE DIGITAL ECONOMY
- DIGITAL INFRASTRUCTURE

2.2 OBJECTIVES OF THE **STUDY**

MAIN OBJECTIVE

To analyse the current situation and the opportunities that information technologies provide, as well as the opportunities to support innovation and knowledge advancement to develop cities and transform them into "Smart Cities".

SPECIFIC OBJECTIVES

To characterise the current situation and the opportunities of these fields at the local level.

To identify the key elements that may either slow the development of these fields at the local level, or may facilitate their growth.

To identify successful case studies (good practices) that can serve as a reference for other cities to advance the "smart city" concept.

2.3 METHODOLOGY

In 2005, during the II World Summit of Cities and Local Authorities on the Information Society held in Bilbao, the Local Authorities present pledged to work towards achieving full access to the Information Society in their cities and regions by implementing Digital Local Agenda, a local electronic strategy to develop the Information Society in a given region. This work continued in 2012 with a new updated edition of the Study.

Now, after more than 5 years since the second edition of the study was released, **the time has come for a new balance to be presented**.

The study does NOT seek to rank cities.

The study aims to provide a reference document for UCLG members and other cities and regions, demonstrating the trends of Smart Cities.

It also seeks to identify good experiences that will lead to the subsequent exchange of knowledge between cities.

To understand the current situation of the cities, a series of questions were developed around the main fields that characterise Smart Cities, and a data collection form was designed.

The form was made available to members in electronic format and could be accessed and downloaded from the Committee's website in digital format.

The following distribution channels were used to notify members of the existence of this study, and to encourage them to participate by filling out the data collection form:

DISTRIBUTION CHANNELS

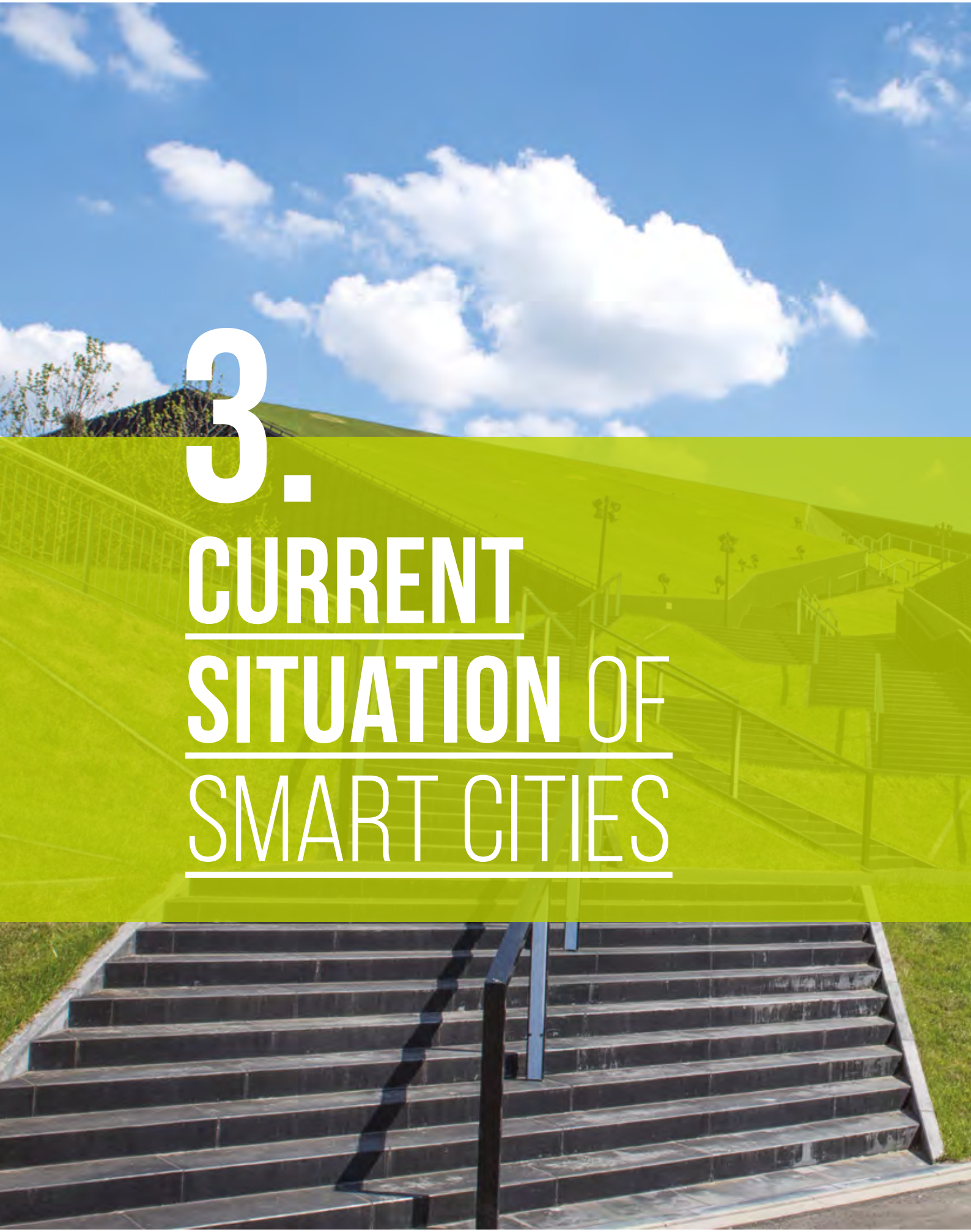
1. **Informative circulars were sent to all Committee members**
2. **An information section was created on the Committee's website**
3. **News were published on the Committee's website**
4. **Dissemination among members through letters sent by UCLG and its regional sections**

2.4 CITIES PARTICIPATING

20 cities around the world contributed to this study by submitting the data collection form with the required data on their city. Particular mention should be made to the participation of cities from Europe.

DISTRIBUTION ACCORDING TO POPULATION AND GEOGRAPHICAL REGION

POPULATION	EUROPE	AMERICA	AFRICA	ASIA
< 50,000		Tequila		South Tarawa
50,001 → 100,000	Lappeenranta		La Marsa	
100,000 → 1,000,000	Bilbao, Brno, Bordeaux, Katowice, Liège, Porto, Ostrava	San Miguel de Ibarra		Seongnam
> 1,000,000	Barcelona, Moscow	Medellin, Quito Rio de Janeiro, Sao Paulo		Kathmandu



3. CURRENT SITUATION OF SMART CITIES

3.1 INNOVATION, ENTREPRENEURSHIP AND THE GENERATION OF **ECONOMIC ACTIVITY**

This field covers the commitment of the cities to smart economic development, both in the existing activities and in the incorporation of future approaches (developments of new sectors), as well as the position of the cities and the adjacent territories, and the development of collaborative activities among the local economic sector.

Smart specialisation

Smart specialisation strategies consist in identifying assets and characteristics unique to each territory, stressing the competitive advantages and bringing together participants and resources focussed around a vision towards a future of excellence, all of which are related to the concept of an "innovative environment". This specialisation is particularly relevant in the context of the current economic globalisation.

In this sense the coordination between the different levels of Government (national, regional and local) is a key factor for these Strategies, to ensure that the set of applied policies is aligned.

This Strategy, that may or may not be formalised, can be a process of entrepreneurial self-discovery for each territory.

3 CRITERIA OF SMART SPECIALISATION

PRIORITIZES SPECIALIZATION

Technologies or sectors are consciously prioritised.

BASED ON CONNECTING ACTORS

Taking advantage of the diversity, connecting actors and different sectors and clusters.

THE ENVIRONMENT IS TAKEN INTO ACCOUNT

Seeking competitive advantages in specialised and specific sectors, in coordination with other regions.

Some shared trends were identified from among the specialisation areas:

- Public promotion of the smart concepts through innovative public procurement, Smart Government, promoting technology transfer, etc.
- Commitment to strengthening the intelligence of public services (Smart Government, smart safety, transparency).
- Identification and focus on the cities' traditional sectors. For example, Porto and its commitment to the wine sector, Rio de Janeiro and its commitment to tourism, and Bilbao with industry 4.0 manufacturing, and the focus on certain sectors around which clusters with high technological components can be developed:
  - **Knowledge intensive business services.**
  - **ICT sectors.**
  - **Aeronautics.**
  - **Mobility and logistics.**
  - **Environment and sustainable development.**
  - **Bio sector (medicine, pharmaceutics).**

75%

of the cities participating in the study 15 out of 20 have a local smart specialisation strategy

60%

of the cities participating in the study have formalised the strategy

INNOVATION AND SMART SPECIALIZATION STRATEGY OF THE CITY OF BILBAO (iBILBAO 2020)

(Bilbao)

In 2014, Bilbao defined its "**Innovation and Smart Specialization Strategy of the City of Bilbao (iBilbao 2020)"**. The formulation of this Strategy implies the following advantages for Bilbao:

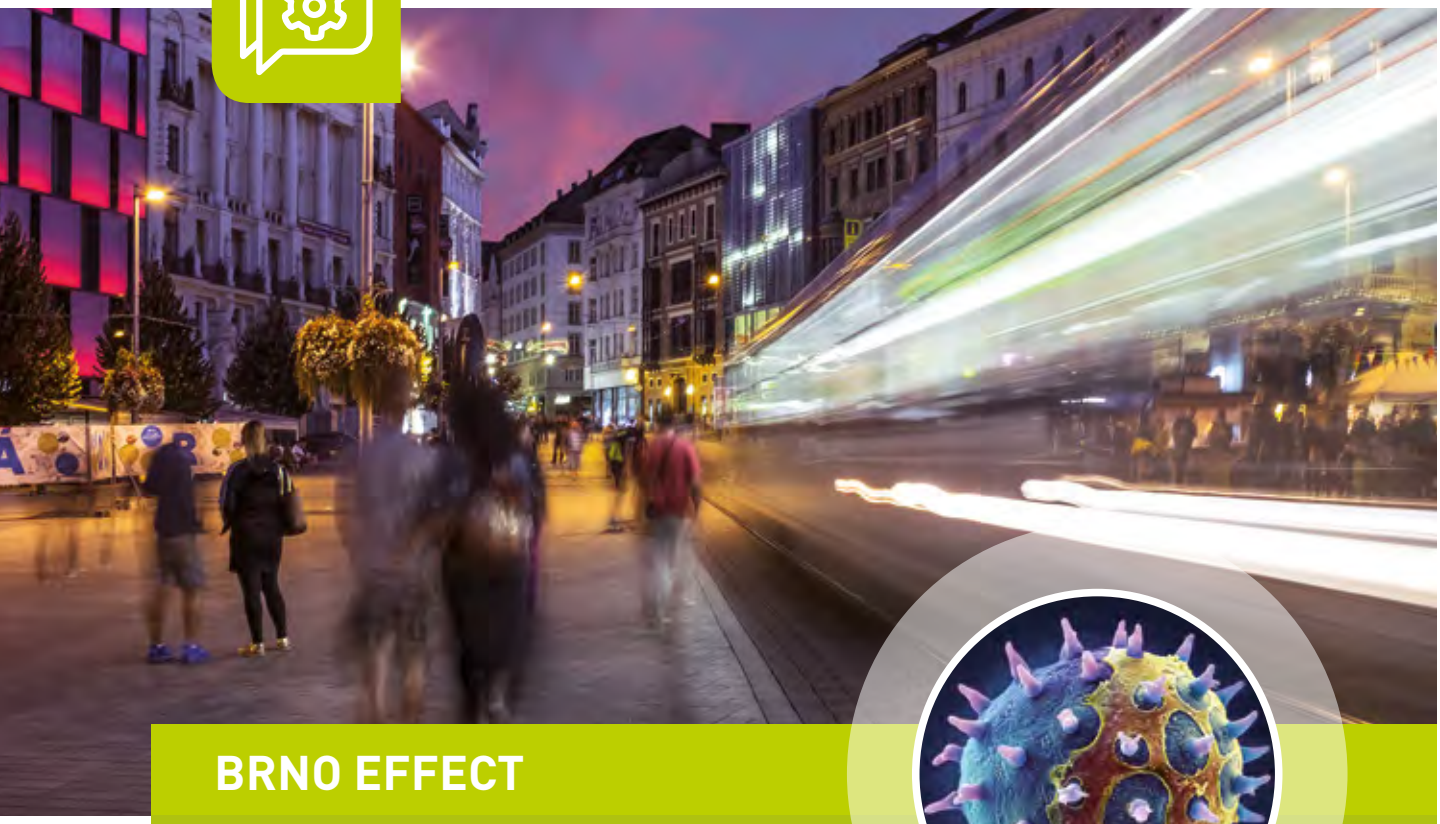
- It turns the integral vision of the city's economic future into an operational framework.
- It provides a development base for the **"Living Lab"** concept to support the development of the city strategic sectors.
- It generates visibility for entrepreneurs and investors in priority sectors.
- It explains the city imperative need to focus on developing sectors of the future.
- It should serve as an instrument for directing and coordinating the active policies of the Administrations responsible for the city economic development.
- It generates a framework to enable cooperation with the territory and with other cities that may be complementary.
- It focuses on innovation and competitiveness as necessary instruments to improve the economy and employment of Bilbao.
- It involves and aligns companies and innovation agents within a work framework.
- It establishes a monitoring and evaluation dynamics of the success of the strategic measures defined.

The sectors defined as priorities in Bilbao are:

- Knowledge-intensive Business Services (KIBS).
- Cultural & Creative industries.
- Digital Economy.

The strategic deployment of the iBilbao 2020 Strategy contemplates the definition of the following 7 strategic action axes:

- **Axis 1:** Bilbao, an entrepreneurial city.
- **Axis 2:** Internationalization.
- **Axis 3:** Business cooperation / clustering.
- **Axis 4:** Business innovation, development and technology transfer.
- **Axis 5:** Bilbao, city of talent.
- **Axis 6:** Financing.
- **Axis 7:** Positioning of "Bilbao, Innovative city".



BRNO EFFECT

(Brno, Czech Republic)

Brno is a very active city in the field of innovation. The "Brno Effect", more specifically called the "JIC effect", is currently very visible in the Czech Republic and in central and eastern Europe.

The key factors of Brno's success in the field of smart specialisation are leadership, stability and the commitment of all the parties concerned to allow and encourage the region's growth. They have a long term plan to do this, the Regional Innovation Strategy of South Moravia, which is defined and based on the principles of smart specialisation. Since 2001, the RIS SMR has brought together people from the scientific world (university and research centres), technology companies, local government leaders and citizens in general. Brno was one of the first cities to adopt the European Union's "SME Instrument" initiative.

The city's approach is based on the close collaboration between the academic world and the business world in the smart specialisation sectors. A specific example of innovative collaboration between the actors involved and the city of Brno are the "Days of Electron Microscopy". Brno is a global leader in electron microscopy and is home to numerous companies and scientific institutes in this field. More than 30% of the world's electron microscopes are produced in this city.

The aim of this event, coordinated by the Brno City Council in collaboration with other partners which took place from the 15th to the 21st of May 2017, was to present the field of electron microscopy. The programme included lectures, visits to laboratories, academic institutions and local companies that produce electron microscopes, film screenings at the observatory, exhibitions and special family activities. Entrance to the majority of the activities was free or charged at a nominal fee.

Promotion and support of entrepreneurship

Programmes to support entrepreneurship are public initiatives that foster the development of new smart projects that may favour certain sectors and groups of entrepreneurs (young people, women, emerging sectors), an essential part in setting up a comprehensive Smart City ecosystem.

Most cities have their own programmes to support business ideas and start-ups, and, in general, to promote and support entrepreneurship and a culture of innovation. In this sense, initiatives such as the "Global Entrepreneurship Week", the "Innovation Week", "Start-up Weekend", etc. have been organised. In addition, other cities frame their business support programmes within programmes on a state level; this is the case of Moscow, that develops the "Moscow - Business and Innovation City 2012-2018" sub-programme within the "Economic Development and Investment Attractiveness of Moscow 2012-2018" state programme, as well as the cases of the Lappeenranta-Imatra (Finland) and La Marsa (Tunisia) development programmes which are developed by their respective state governments.

There are also supporting programmes and actions for the creation of companies **aimed at certain collectives**, primarily to **women entrepreneurs, among which a large number of examples can be found:** "Women Tech Award in Sampa" and the Google partnership with the "Enterprising Women Network" (São Paulo), a project with Facebook for the entrepreneurial endeavours of women entrepreneurs (Tequila), the "Business Women Trophy" (Liège), "Ideas with a Future", "Mature Ideas", "The School for Women Entrepreneurs" (Barcelona Activa) or the "Business Women Trophy" and "Wallonia Grand Prix for Entrepreneurship" (Liège).

An emerging trend is to convert the cities into **innovation hubs** (e.g. Scale-up Porto - a strategy that aims to transform Porto into an international hub for scale-ups or post start-ups, São Paulo Tech Week and São Paulo Digital Centre "SP City Center" as a hub of innovation for technology).

To do so, **specific internationalisation programmes** have been developed, the aim of which is to connect start-ups with investors, accelerators and global markets, as well as **programmes to attract investment**, such as "Invest Porto" (to attract investment for Porto in the tourism, ICT and real estate sectors).

In terms of the types of existing programmes, sometimes these involve general programmes and on other occasions they are programmes focused on specific segments.

85%

of the cities participating in the study 17 out of 20 have programmes supporting entrepreneurship

55%

of the cities have incubation spaces

RUTA N CAPITAL

FINANCING FOR INNOVATION BASED ON SCIENCE AND TECHNOLOGY

(Medellin, Colombia)

The aim is to encourage innovation based on science and technology, which facilitates the creation and consolidation of highly differentiated businesses, through specialised support for product development, the implementation of marketing strategies and business models, and financial readiness to gain access to investment through intelligent capital. These actions are complemented by providing economic resources in the concept of risk sharing flexible finance.

This model is the result of the evolution of initiatives developed over the past five years, which have made it possible to structure the project evaluation and qualification system "Scoring N", and to monitor and control the implementation of activities, as well as providing support to existing needs or requirements to expedite the process for launching and commercialising new products. In addition, the system includes the new business payment plan and an indicator system to measure the impact generated by each project.

Its success is based on the development of financial tools to facilitate entrepreneurship through access to capital and to promote the generation of capacities in order to provide specialised support with the aim of reducing the main barriers to forming new businesses, making effective connections with the market, product development, and access to venture capital possible while protecting intellectual property.

www.rutanmedellin.org

The cities offer **different types of incentives for entrepreneurship**, not only incentives of an economic nature. Thus, some cities offer training in the form of tutorials, welcome events, entrepreneur workshops, connections with business angels and business consulting and coaching.

Economic incentives are primarily done by financing projects through seed capital or through national and regional grants, and State funds, or funds from international or multilateral entities, but investment funds have also been identified to help entrepreneurs ("Meusinvest" in Liège).

Other types of incentives are the **collaboration agreements** for example, through which facilities are made available to enterprising individuals (e.g. Lappeenranta, VaiTec São Paulo), agreements are made with the best universities in Jalisco to develop social projects that support micro-enterprises developing competitiveness in the tourism sector (Tequila), and **tax exemptions** (such as real estate exemptions and tax exemptions for buildings dated prior to 1945 in Katowice).

Other actions such as information and promotion have also been identified. Examples of this type are: information for investors (e.g.. Investors Assistance Department in Katowice); specific tools for young people: Social network for young entrepreneurs and young entrepreneurs' card (Katowice); PAEPCE - programme for Generating Employment for Unemployed Workers: incentives for the unemployed; micro-investment; Invest+; Invest Jovem measures; Technical Support (Porto) and international travel designed to create growth opportunities for start-ups in initial stages through the Bordeaux Metropole in connection with the Chamber of Commerce.

With regard to **incubation spaces**, a large portion of the cities have acceleration and/or coworking spaces, such as Bilbao, Brno, Bordeaux, Moscow, Porto, Rio de Janeiro, Liège, Katowice, São Paulo, Medellin and Barcelona.

Usually these are incubation spaces and/or innovation funds which specialise in specific sectors, often located within the city's leading universities and R&D&i centres, in partnerships between the public and private sectors. Specifically, the following examples can be noted:

EXAMPLES OF SOME INCUBATION SPACES

Digital Economy
Auzo Factory Irazabal (Bilbao)

Leisure, culture and social innovation
Auzo Factory La Cantera (Bilbao)

Arts and crafts
Brno Industry, Hobby Lab and Fab Lab (Brno)

MStartup BCN, international incubator
(Barcelona)

With regard to the financing instruments used by the cities, 3 main different types can be identified, depending on the origin of the funds (state, regional or supranational) or the origin of the actors involved (public or private):

3 TYPES OF FINANCING INSTRUMENTS

1

STATE FINANCING

A clear example is the **Tunisian National Solidarity Bank (BTS)**, which supports entrepreneurship.

2

FINANCING FROM SUPRANATIONAL ORGANISATIONS

Examples are Brno's **JIC SME Instrument**, a programme for innovative companies with headquarters or a brand in Brno which receives support from the European SME Instrument (Horizon 2020) "Seal of Excellence" and **Tequila's Search for international cooperation with the Multilateral Investment Fund from the Inter-American Development Bank** and co-financing of projects by the University, the private sector and the City Council of Tequila in cash and in kind.

3

INTEGRATED FINANCING OFFER BY PRIVATE AND PUBLIC ACTORS

An example would be that of **Bordeaux Metropole**, a directed offer for the different development stages (seed capital, initial development, acceleration), with business angels, banks and venture capitalists that play a main role within this framework. Another example would be **Desafios Porto,** a challenge contest created by the City Council of Porto and private sector enterprises such as NOS, CEiiA and Ernst & Young. In Medellín, **Ruta N Capital offers a line of flexible financing with risk sharing**, aiming to consolidate a sustainable model that generates return and profitability with a probability of 93% compliance in a financing cycle of less than 7 years. In the case of Bilbao, of particular mention is the **Bilbao Crecer+: an ORKESTRA (Basque Institute of Competitiveness) initiative** funded by the Spanish Ministry of Industry, Energy and Tourism. Its aim is to generate an entrepreneurial ecosystem that supports both start-ups in their search for financing, and investors or business angels interested in investing and supporting entrepreneurial projects with high growth potential. It brings together individual and corporate investors, family offices and local investors interested in investing in both local projects and projects from other Autonomous Communities in Spain.

VENTURELAB

(Liège, Belgium)

The University of Liège created VentureLab, the first business incubator established in French-speaking Belgium dedicated to entrepreneurship among the student and young graduate populations. Its objective is to select and offer coaching services to business projects designed by students during their studies and/or immediately after graduation, regardless of the sector in question. It provides a space for co-working, tutoring and personalised follow-ups carried out by 3 coaches with entrepreneurial experience, as well as training modules, conferences, seminars, and networking. In addition, VentureLab launches a collective financing campaign (crowdfunding) through the platform Crowd'In, created by graduates of the HEC-ULg Entrepreneurs programme.

The key factors for its success are:

- It is supported by almost 20 partners (including, among others, the InBev-Baillet Latour foundation, BNP Paribas Fortis, Herstal Group and Rossel and RTL Belgium groups).
- The HEC-Ulg project led by Professor Bernard Surlemont, co-founder of several initiatives related to entrepreneurship (LIBRE, SEED, ID- campus, HEC-Ulg entrepreneurship master, etc.).
- VentureLab is one of the priorities of Wallonia's Strategic Plan which advocates for strengthening activities that promote the transition to entrepreneurial action among higher education.

The main quantitative results obtained since the initiative was put in place are the following:

220 young people were supported during the development of their project

30 ongoing projects

+50 jobs created in different sectors such as fashion, information technology, services, etc.

1.7 million euros has been mobilised through the 27 companies created

www.venturelab.be

SERVICE TO ASSIST AND SUPPORT ENTREPRENEURSHIP

(Quito, Ecuador)

The objective of this service is to select and develop citizen business initiatives. It primarily provides coworking, lab testing and incubation services, depending on the stage in which the selected project is.

- **Coworking**: It is a public-private collaborative space (with participation from IBM, Microsoft, and Netlife, among others) for projects in the creation and consolidation stages.
- **Testing Lab**: Alliances with commercial centres of the city which provide spaces where products of projects that already have prototypes can be tested for free, or where first sales can be generated.
- **Incubation**: Custom advice is provided during 6 months to shorten the learning curve and mitigate the risk of products that already have a market presence and are ready to be developed in an expedited manner.

During 2016, the results of each of the services were the following:

Coworking

47	lectures and events held in the space
2,479	participants at these events
23	enterprises permanently use the space

Testing Lab

5	calls for proposals made in various lines of business
329	registered enterprises
121	projects selected

Incubation

28	projects selected to take part
58	external mentors associated with the projects

LOCAL ECONOMIC DEVELOPMENT CENTRE

(San Miguel de Ibarra, Ecuador)

The Centre seeks to invigorate the economy at the canton level (subdivision below province level), strengthening entrepreneurship in all its phases. To this end, the main actions undertaken have been to develop and implement various pre-incubation, incubation and acceleration programmes with enterprises in the canton.

The key factors for success are the motivation, knowledge, commitment and loyalty of the participating parties.

The results obtained are as follows:

130	enterprises with innovative products
300	people with business ideas
100	businesses started up
1,000	people trained
6,000	people are beneficiaries of the productive projects

MOBILAB

COWORKING SPACE FOR INNOVATION IN MOBILITY

(São Paulo, Brazil)

MobiLab, created by the City Council of São Paulo, is a coworking space to introduce innovation that aims to improve mobility. Its purpose is to promote the transparency and use of raw public data on public transport and traffic.

It changes the relationship between the government and technology, moving from passive consumption and introducing creativity, customisation, and agility of the emerging companies of the public sector. In addition, it promotes projects to create public policies based on evidence, data analysis and using new methodologies developed in collaboration with research institutes and universities.

Since it was created in October 2015, MobiLab has launched two major initiatives:

- **A public bid** to identify the main problems the municipal transport authority faces, in close collaboration with the Municipal Secretary of Transport, the municipal transport company (SP Trans) and the traffic engineering company (CET). A bid was called for projects where newly created companies could present solutions to the existing challenges and the 4 best projects were contracted through a specific public procurement modality. One of the four projects supported by the initiative has had a significant impact on the traffic management, replacing the operating companies' paper-based fine recording systems with a system operated by smart phones. With this it was possible to reduce the workforce and reduce errors by 10%.
- **Coaching and residence:** 12 start-ups that were working on and developing solutions in the mobility sector were selected to take part in a residency programme, which includes coaching and mentoring activities, access to working spaces and events, and the possibility to develop prototypes for the City Council.

There are other partners participating in the initiative within the municipal government, making special mention to the Secretariat of Innovation and Technology and the Bloomberg Initiative for Global Road Safety, with São Paulo being one of the 10 participating cities around the world, and MobiLab is its focal point, as well as other partners such as ITDP, WRI, the World Bank and the Citi Foundation, among others.

The main success of MobiLab has been to incorporate start-ups by managing innovation and creativity at low cost, and by developing a new formula for public procurement.

www.mobilab.prefeitura.sp.gov.br

Promotion of R&D and innovation

The innovation capacity of urban innovation systems depends on the interactions and connections between the actors involved. A distinction can be made between different types of networks, from formal and business-oriented networks (supply chains, strategic alliances) to more informal networks aimed at people. In a powerful urban innovation system, the city is the high-intensity focal point for creating networks. Networks can produce concrete innovative partnerships and new entrepreneurship.

Some examples of networks at the local level are:

- **Local networks:**
  They offer formal and informal collaboration between companies and also between companies and public research institutions. The company-company collaborations occur on both formal and informal levels. Informal networks are also important to identify business opportunities and develop ideas.

- **University-company networks:**
  They are mainly focused on cooperation and the use of university innovation, technological and scientific excellence, with a high level of interaction with science and technology parks. New urban parks also value the opportunities to interact with technology producers and potential users in the cities, understood as "living labs".

- **Public-private networks:**
  These encourage business commitments with government and university programmes. For example, innovative cities show they have strong networks between public sector actors, and between the public sector and the business sector.

The fundamental characteristics of urban R&D and innovation systems are:

- **Connectivity and Accessibility**
- **Availability of qualified staff**
- **"Soft" characteristics such as quality of life**

70%

of the cities have science-technology parks in their metropolitan area

55%

of the cities have specialised parks

PORTO INNOVATION HUB

(Porto, Portugal)

The aim is to demonstrate the potential of innovation in transforming a city. This space located in the heart of the city of Porto showcases the work of the local innovation ecosystem, acting as a bridge between the people and the ecosystem.

Several activities have been carried out since this space was opened in December 2016, such as workshops/labs, exhibitions, and daily innovation conversations and meetings.

Its success is mainly based on the location of the space (in the centre of the city), on its accessibility (open and free for everyone), on its wide range of daily activities, and on its condition to act as a bridge between citizens, businesses and the municipality.

The main results obtained are as follows:

- **Workshops that present local business projects to the public.**
- **Promotion of innovation as a driver of local development.**
- **Networks of events and lectures that promote the cohesion of local development.**

www.portoinnovationhub.pt

Clustering. Collaboration with the local business fabric

Innovative cities have risen as authentic "hubs of talent flows" and trade relations in a globalised world. This is demonstrated by the fact that urban concentrations have accelerated over the last decade.

To do this, it is essential that policies and mechanisms are set out for collaboration between the public and private sectors, and between the private sector itself, in such a way that models of "competitiveness" are promoted which enhance the existence of high-intensity of local knowledge networks in innovative sectors to compete on a global level.

Formalised urban clusters maintain a close relationship with the industrial and entrepreneurial traditions of the cities in question. The following can be highlighted, among many others: Aerospace, Aeronautics, Audiovisual, Automotive, Biomedicine and Biotechnology, Digital, Design and Fashion, Energy, Machinery, Environment, Nutrition, Health, ICT, Tourism, etc.

The **coordination between the city and the private sector** is done through supporting **joint projects with local financing** (Bilbao - SPRI) and/or with **European financing** (Horizon 2020). It also promotes supporting infrastructure, organising events with an international vocation and encouraging sectors by undertaking collaborative projects with an experimental approach within the territory's ecosystem and areas of excellence.

The subsidies and benefits for residents of technology parks or industrial complexes are some of the specific measures taken to give rise to this collaboration.

65%

of the cities have formalised clusters

75%

of them have ways to collaborate with the companies

MAIN URBAN CLUSTERS

Aerospace	Aeronautics	Audiovisual
Automotive	Biomedicine	Biotechnology
Digital	Design and Fashion	Energy
Machinery	Environment	Nutrition
Health	ICT	Tourism

NETWORK OF COMPANIES
"GREEN ENERGY SHOWROOM"
(Lappeenranta, Finland)

The **Green Energy Showroom (GES)** is an active network of companies in the energy and environment sectors, the objective of which is to generate business through sustainable solutions.

The network was established by local companies in these sectors, the city of Lappeenranta, acting as the coordinator, and the Technology University (LUT). The companies obtain information about the projects and the national and international networks through the members of the network operating in the public sector. By belonging to the network companies have opportunities to get involved in projects and to search for new partners. The members of the GES network also contribute to achieving Lappeenranta's "green" objectives specified in their strategy, and these objectives can be promoted through investment and through the city's procurement and priorities service depending on the business potential.

The key factors for its success are the following:

- **The network has shared values and a common strategy.**
- **It provides the infrastructure to test and demonstrate environmental and energy solutions.**

Results obtained:

- **Creation of an attractive brand.**
- **The active collaboration between the companies has brought new clients to members from inside and outside the network. The companies have also found new markets for their products and services through the collaborative network.**

www.greenenergyshowroom.fi

DESAFIOS PORTO

(Porto, Portugal)

Desafios Porto is a challenge contest created by the City Council of Porto in collaboration with private sector companies such as NOS, CEiiA and Ernst & Young, the objective of which is to promote the cohesion of a local innovation ecosystem by creating solid public-private-citizen partnerships (PPP). The aim is to identify the issues concerning citizens and to invite private companies to create specific solutions to address these problems, the Municipal Administration taking on the role of mediator between the citizens and the private sector.

The contest involves a first phase in which citizens and visitors of Porto submit ideas and challenges on-line that they would like to address and resolve through applications and innovation; this is followed by a second phase in which the local innovation ecosystem is invited to submit proposals on products and services based on technology and innovation that present solutions to the problems raised. A jury evaluates the proposals and selects the best solution in each of the thematic areas (Energy, Health, Well-being, Mobility and Environment, and the Digital City). The awards include mentoring and funding to implement and scale the solutions.

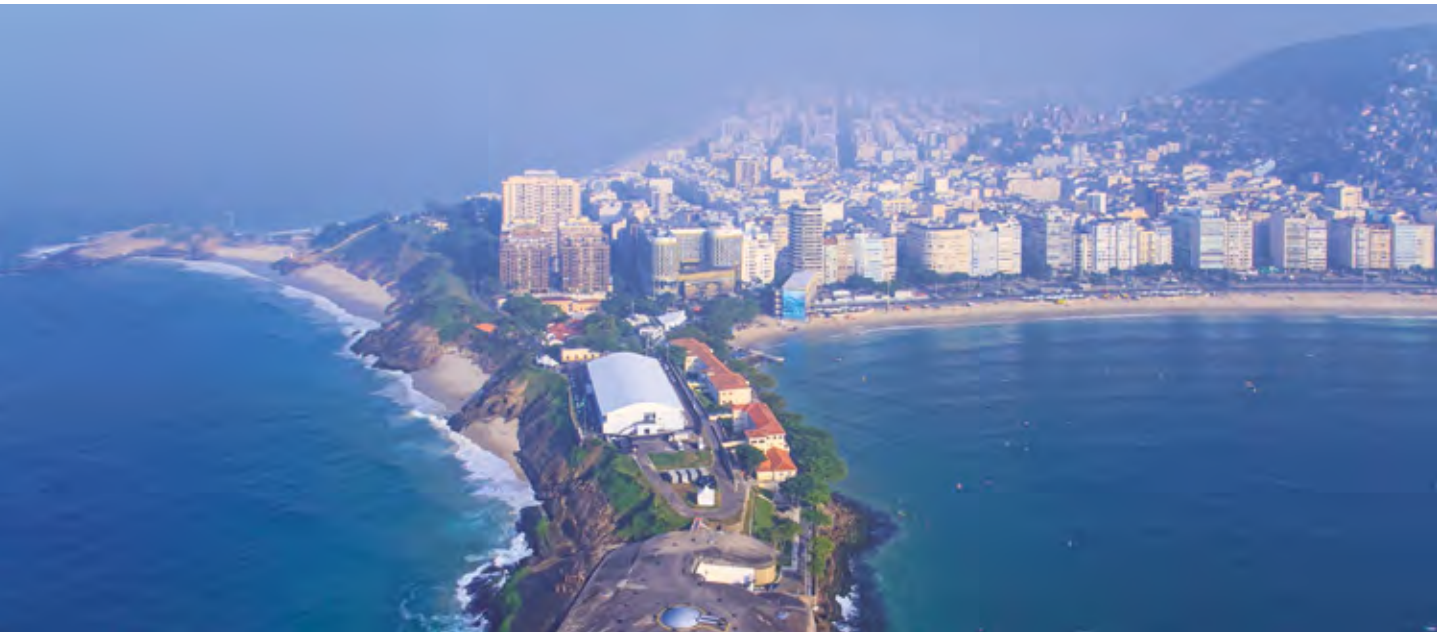
The success of this initiative is mainly due to the following factors:

- **High rate of participation of both parties, citizens and companies.**
- **Broad scope of challenges submitted and solutions proposed.**
- **The growth of the local innovation system is dynamic.**

The main results obtained are:

- **Day-to-day issues of the city of Porto are identified that citizens find relevant.**
- **4 projects have been implemented that aim to address key issues highlighted by the public.**

www.desafiosporto.pt



Attracting investments

In the current globalised context, large and medium sized urban areas are true generators of wealth on a national level; this favours private investment being the driver behind the growth of these areas.

In this way, investment decisions on the corporate level have evolved from a state level to an urban level (competencies between urban areas compared with between countries).

From the point of view of the private sector, some critical factors considered are:

- **Size**
- **Demographics**
- **Logistics**
- **Political leadership and incentives**
- **Existence of human capital**
- **Capabilities of the supply chain and logistics network**
- **Social stability**

From the point of view of cities, critical factors must be identified that give it a competitive advantage with regards to other cities in terms of attracting investments; a strategic proposal to attract investment should then be developed around these critical factors.

THE MAIN FACTORS IDENTIFIED BY CITIES FOR ATTRACTING INVESTMENTS ARE THE FOLLOWING:

58%
The existence of qualified human capital

47%
The concentration of innovative centres and actors

27%
Geographic position

Positioning of the territory

Various experts have identified that one of the traits that city leaders have which allows them to differentiate themselves from the rest is their image, together with their brand and brand image. City-brands are references of the city's identity, and they **have become strategic assets** that are integrated into relational, cultural, social and economic development values. Managing these brands must be done in a holistic manner in order to promote **international competitiveness**.

The city the brands refer to should serve as an identification device, allowing certain values and symbols to be attributed to the city. Therefore, the brand should act as a **differentiating element** that makes the city unique, as would be the case with any well known brand. In this sense the concept of a "Smart City" is a critical element in developing a global strategy of the international positioning of a city.

The value and image of a city's positioning, therefore, is to be understood in a digital sense. The city is not just a physical reality. It is also an ever-present site where the cities stand out as communication hubs that interact between themselves and are able to generate new areas, beyond the confines of the physical space or the borders, connecting and coordinating with other hubs or networks on the national or supranational dimensions.

100%

of the cities participating in the study note that they have positioning strategies

The most common strategies are those aimed at enhancing the attractiveness of the city to tourists as the social and economical driver for tourism

Among the fields identified by the cities to develop positioning strategies, the following should be highlighted:

Tourism

Bilbao, Barcelona, Bordeaux, La Marsa, Porto, Tequila, Rio de Janiero, South Tarawa, Kathmandu, San Miguel de Ibarra, Lappeenranta, Ostrava

Culture, art and design

Architectural/cultural heritage

Innovation - Sustainability - High quality of life

Global competitive knowledge, economic attractiveness, competitive prices

TEQUILA SMART MAGICAL TOWN

JOSÉ CUERVO FOUNDATION

(Tequila, Mexico)

The objective is to incorporate projects related with developing tourism in the town of Tequila in an organised and planned way, providing them with tools so the citizens can become the main actors in this development.

Multidisciplinary work groups have been formed with students and academics thanks to the collaboration with ITESO and the University of Guadalajara, through the Los Valles University Centre, the Higher Technological Institute of Tequila and the Monterrey Institute of Technology and Higher Education; these work groups have assisted in data collection, data processing, needs analysis, and formulating the proposals and projects, with the aim of raising awareness among the population about the heritage value of their traditions. Likewise, they contribute to generating confidence in micro-enterprises and entrepreneurs in order to establish, accelerate and consolidate business models aligned with alternative tourist routes, recognising this as an opportunity for the sector to create new jobs and improve economic well-being.

The basis of the José Cuervo Foundation is that "the development of tourism in Mexico should, among its other objectives, aim to integrate rural communities and small towns of Tequila in order to improve the quality of life of the residents, its economy, education and health". This is the starting point for setting up a strategic alliance with ITESO through its PAPS (Professional Application Projects), so that students assist it carrying out social projects of local and community tourism, incorporating these projects into the population of Tequila.

The key factors for its success are the following:

- **Market orientation and alignment with the municipality's sectoral strategy.**
- **Generation of knowledge.**
- **Management training.**
- **Associations and use of technology.**
- **Development and use of human capital.**

3.2 KNOWLEDGE AND **TALENT**

The development of Smart Cities gives rise to a shared interest between the public and private sector, based on the fact that the digital transformation of public administrations and the cities as a whole will serve to develop an economy focused on Smart Cities, with specialised companies that are able to provide services to the cities to make them more intelligent, improve the quality of life and promote the creation of new jobs. To go down this road, profound changes must be made in the way the organisations work and are managed, which in turn requires different skills and profiles that provide, maximise and optimise resources

Quality level of training

Training is an essential element for the development of Smart Cities, the generation of a critical mass endowed with the required resources being the key. In addition, professional profiles should be developed within the Smart Cities (Smart People) based on the knowledge economy, with an intensive use of technologies and research for science and industry sectors. Hence addressing the more traditional sectors such as local business is also necessary.

On the basic educational level, a commitment should be made to technology and to promoting the interconnections between centres and the society by developing a model of innovative education focussed on the capabilities required for the future.

20%

of the cities have dual advanced vocational training models

30%

of the population between the ages of 25 and 30 years from the cities participating in the study have university studies, compared to the entire population within this age group

A Smart City should opt for scientific education based on producing knowledge which is closer to the reality of society, with more freedom to act and greater use of advanced technologies and methodologies in basic education. The existence of "big data" in urban environments should encourage projects such as the development of virtual reconstructions, educational mappings, simulations, interactive virtual tours of the city from the classroom... The development of the IoT and the monitoring of the Smart City and its evolution should generate data that is accessible to students so they can develop projects, innovations and/or reflections on their environment, so that the learning in turn has a real impact.

In this sense, a key element for the successful deployment of a Smart City is having critical masses with advanced training profiles (dual vocational training models, university graduates). Another is the interconnection between all the actors that create knowledge in the cities (schools, professional training centres, universities, libraries, technology centres, continuing education institutions).

From the cities participating in the study, mention should be made to the models of **dual work-study training models at both the academic and vocational training levels:**

Bilbao and Liège

Offer dual work-study vocational training with 8-15 hours per week of general technical and practical training in the classroom and 3-4 days as an intern in an employer company with a legal, paid contract. In the case of Bilbao, 44 vocational training specialities are offered.

Katowice

Has municipal vocational schools in cooperation with enterprising individuals by organising internships in local companies. The students have 3 to 5 days of internship at the company and the company is responsible for ensuring that students receive the quantity and quality of training referred to in the previously agreed conditions. In 2016 a total of 95 students took part in this dual training system.

Bordeaux

Vocational training is developed through internships in different formats, for example, with work-study contracts, apprenticeship contracts, CIFRE thesis, etc.

Bilbao and Tequila

Agreements have been signed that set out the collaboration between private companies and the University. For Bilbao this includes agreements with the company SENER and the MONDRAGON UNIBERTSITATEA, and for Tequila this includes the agreement between the Technological Institute of Tequila and private companies in which the students develop a project at the companies before graduating.

Brno

The JIC Talent programme in Brno places students in vacancies at the companies working with the South Moravia Region Innovation Centre.

Medellín

The National Apprenticeship Service, inspired by the German dual model, aims to provide technical training for the human resources and link this with the labour market through 16 training centres in Antioquia, where economic training is related to different sectors such as agricultural business, manufacturing, textiles, design, fashion and clothing, health, trade, services, infrastructure, mining and tourism.

Barcelona

Has University-Company programmes on a regional level with the participation of the City Council; it develops dual vocational training and some industrial doctorates by opting for work-study models (with training at the educational centre and internships in the company).

ME & MYCITY

(Lappeenranta, Finland)

Me & MyCity is a Finnish educational innovation that has received international recognition. It began in 2009. Me & MyCity is a learning concept aimed at students in the sixth and ninth grade, covering society, working life and entrepreneurship.

The learning environment of Me & MyCity for sixth grade students is a miniature city where students work in a profession and act as consumers and citizens as part of a society. The learning concept includes teacher training, learning materials for ten lessons and a one-day visit to the learning environment of Me & MyCity.

Me & MyCity for ninth-grade students is a learning concept that covers business and the global economy. It involves history lessons, social studies, and vocational guidance. The concept culminates with a learning game at Me & MyCity. Operations between global companies and a bank are simulated. The companies are involved in the lessons, the game and the learning environment. The students play the role of company executives, taking part in tasks for the different areas of responsibility.

The teams compete against one another and the winning team is the one that earns the highest operating profit and the best reputation. Close interaction and a good strategy are required to win.

INCENTIVES FOR TALENTED STUDENTS

(Katowice, Poland)

Talented children and young adults work in 3 institutions in Poland where they can develop their talent and interests, taking part in a range of leisure activities.

- **Professor A. Kamiñski Youth Palace:** workshops are organised for both preschool and school individuals and groups, to help develop hobbies and interests. They cover multitude topics, such as reading, the media, civic education, history, knowledge of the society and geography, choreography, music, theatre and acting, drawing, painting and visual arts, sculpture, ceramics, crafts, cooperation with the local community, ecology and biology, chemistry and physics, mathematics and ICT, language, modelling and sports (judo, fencing, gymnastics, swimming, sailing, skiing, and shooting).

- **MDK Youth Club:** offers a wide range of educational services for particularly gifted young residents of the city. They are shown the possibilities of development, and given motivation and support to achieve their goals. The MDK faculty has developed and put into practice their own programmes and the high quality of their work was recognised by the Ministry of National Education and the Centre received the Talent Mine award.

- **Inter-School Sports Centre (MOS):** organises classes and workshops for individuals and groups of children and youths, aiming for them to try out various sports, either for recreational purposes or for competition. It include disciplines such as swimming, posture correction, basketball and athletics. While the students of the centre have had success in sports tournaments in Poland and internationally, they also continue with their sporting career once the MOS classes are over, moving on to the national Polish teams.

Katowice also has various **awards and scholarships for students with special results (best students and best graduates)**.

Finally, mention should be made to the initiative developed by the city in 2016: the **Silesia - Katowice Science Festival 2016**, where young scientists presented their scientific achievements and organised a variety of activities such as conferences, a talent contest and a specific programme developed for the children.

Quality university

35%
of Barcelona's international students are undertaking post-graduate courses in the science faculties

20-25%
in Liège, Lappeenranta, Moscow, Brno and Bordeaux

13%-10%
of international students in Porto and Bilbao respectively

To date the university systems are responding to the needs arising from the new paradigm with some delay, as they have not adapted their offer to the needs of the most demanding or emerging profiles (some profiles derived from Smart Cities that are already emerging are experts in Big Data, IoT, smart service managers, and R&D project managers).

To ensure the greatest fit between the universities and the development of the "Smart Cities", the universities' main specialisation areas should be in harmony with the prioritised areas on the city level, in order to strengthen the consistency of the city's position.

Some of the educational areas of the most prestigious universities identified by cities are the following:

- Engineering
- Medicine and Health Sciences (Dentistry, Nursing)
- Economics and Business Sciences
- Law
- Technology

OPEN ACCESS TO L'UNIVERSITÉ DE LIÈGE

(Liège, Belgium)

Liège aims to disseminate scientific information, without economic or any other type of barriers to make knowledge diffusion and development possible.

The University of Liège has, for several years already, carried out an active policy in matters of support for open access to information and fully subscribes to the principles of Open Access. With this commitment and the implementation of an institutional repository policy, the University of Liège has positioned itself as an important actor in Open Access, both at the national and international level. It is currently developing a new initiative to establish the foundations of a European movement in favour of unrestricted access, an initiative that will create EurOpenScholar in participation with a number of European universities.

In this context, the Network of Libraries has developed a number of initiatives in terms of Open Access including ORBi (Open Repository and Bibliography), PoPuPS (Publication Portal of Scientific Periodicals of the University of Liège), and the directory of electronic master theses.

The key factors for its success are the following:

- **International partnerships have been established.**
- **Ambitious institutional repository policy.**
- **It has taken an ethical and committed stance.**
- **Business oriented.**

The main results achieved by the initiative have materialised in the ORBi having more than 134,000 references to publications from University of Liège authors in 2016, 84,000 of which have a full text associated with the reference. In addition, there have been more than 2 million downloads of full texts worldwide, with an average of 50 downloads per document. This has strengthened the visibility of the University of Liège at the international level.

www.lib.ulg.ac.be/en/content/open-access-l-ulg

Lifelong learning

The needs arising from developing the knowledge economy reinforce the need for a stable framework of lifelong learning in the cities; this is particularly relevant for those segments of the population with the greatest needs (children, senior citizens, the most disadvantaged sectors), both to strengthen and ensure their employability and to ensure they can adapt to a smart environment and to the digital relations with Administrations and other agents in the urban ecosystem.

75%

of the cities have specific lifelong learning programmes

They are mainly directed at specific groups: Senior citizens, Civil servants, The unemployed, Women, etc.

The cities participating in the study are developing programmes that promote lifelong learning, focussed on the following main learning areas:

- **Technology and ICTS**
- **Literature and the Humanities**
- **Entrepreneurship and Corporate Social Responsibility**
- **Finance and banking**
- **Governance and administrative transparency**
- **Customer service**
- **Architecture and road construction**
- **Urban and participatory agriculture**
- **Digital citizenship**

The universities in many of the cities have **training programmes for adults in general, and for specific groups such as senior citizens**, and educational offer is based on general topics: humanities, digital citizenship, literature, technology, etc.

In this context, the main training centres in addition to the universities are:

Bilbao
Experience Classrooms aimed at senior citizens, in collaboration with the University of the Basque Country.

Brno
Tourist Information Centre, Technological University and the University of Mesaryk.

Porto
Agitar University of the Third Age.

Barcelona
25 adult training centres which offer 14,125 places in the following types of training: linguistics, basic training, access to educational cycles and digital skills.

Liège
162 establishments providing for adults with training from secondary or higher education levels in areas such as the Academy of Fine Arts, Business and Computer Science School, Angleur Social Promotion School, School of Arts and Crafts, Lifelong Learning Institute, Institute of Modern Languages, Institute of Technology, Institute of Craft Techniques, Institute of Public Works. Courses to make up French, Mathematics, Dutch and English are also offered to small groups.

Ostrava
VSD University of the Third Age, Ostrava Technical University and Ostrava University.

Medellín
The "Children's University" and extension courses for adults.

Some cities also carry out **training actions aimed at the most disadvantaged segments of the population**, such as in Quito and Medellín for example. Lifelong learning workshops are organised in Quito covering computer science, accounting, marketing and sales, urban and participatory agriculture, caring for small species, and entrepreneurship training workshops. In Medellin, scholarships are offered to students in strata 1, 2 and 3 who have completed high school so that they can continue studying in higher education.

The cities also direct their efforts to other groups such as **civil servants** (language courses, and social and interpersonal skills for people employed in Ostrava), **unemployed citizens and women on maternity leave** (free training and professional development in accounting, sales and customer service in Moscow).

THE "ATENEU DE FABRICACIÓ" PROJECT

(Barcelona)

The "Ateneu de Fabricació" (manufacturing labs) are free public spaces set up by the Barcelona City Council where people can learn and experience the world of digital manufacturing. The objectives are to introduce citizens to the technology, science and design of digital manufacturing and its applications, particularly for children and young adults; to promote activities and projects to improve society by using new open and on-line learning and organisational models; to train people in the use digital manufacturing technology (machines and software); to support entrepreneurial projects with the aim of creating companies, cooperatives and other initiatives that generate employment; to make resources available, searching for synergies and creating connections between companies, institutions, communities and people.

They have machinery and qualified staff to provide training, support projects and host activities based on the social and solidarity economy. The model focuses on use rather than ownership, because sharing is a business model, a model of a city and a way of living. The "Ateneu de Fabricació" work on the basis of the non-economic return provided by any person who uses the Ateneu's resources, by exchanging goods for goods, without money being involved.

www.ateneusdefabricacio.barcelona.cat

Attracting talent

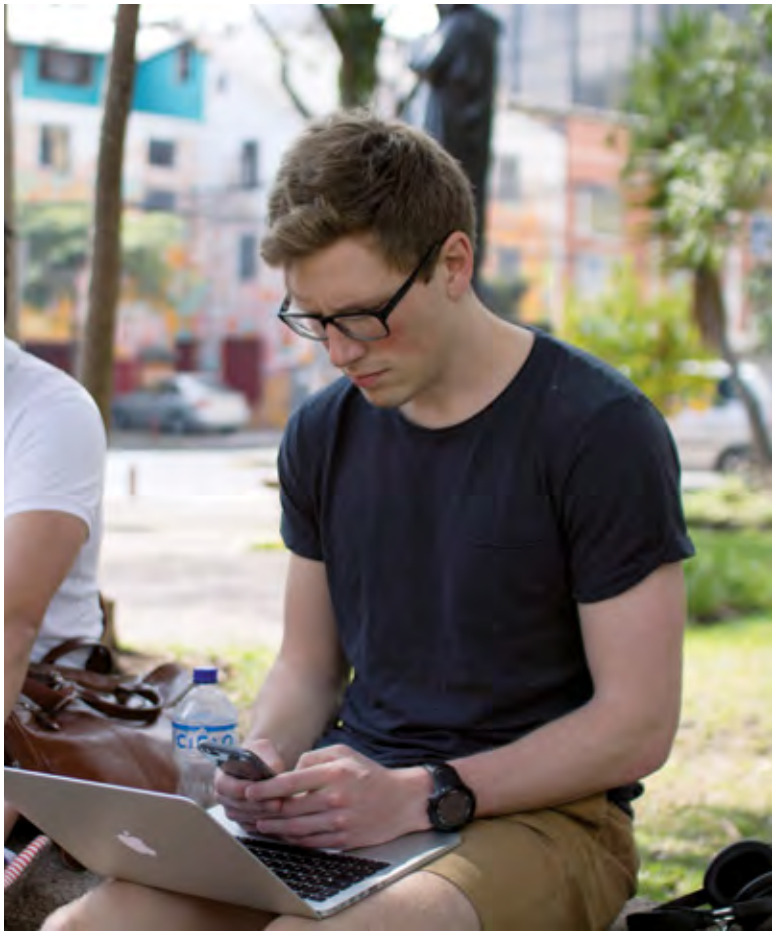
UA Smart City that aspires to build urban models that respond to the great challenges of current economic, cultural and social transformation in a sustainable way must establish and implement strategies to attract talent that complements and reinforces the existing talent in the city itself.

The cities that aspire to become references in terms of innovation and entrepreneurship need to have powerful and consistent strategies to attract talent that are particularly linked to the knowledge economy (smart government, smart economy, smart mobility, smart safety, etc.).

Talent attraction requires coordination by all the agents that make up the Quadruple Helix (private sector, civil society, government and academia). In this sense, some strategies to capture post-graduate students are framed by agreements with administrations and private companies to provide secure working opportunities.

Among the **programmes** mentioned in the **talent attraction** study, there are some targeted at specific sectors such as advanced materials, surfaces and nanotechnology, ICT, Medtech, medical devices and life sciences, energy efficiency, electronics, optics, robotics and automation, automotive components and advanced manufacturing (Moscow).

Some cities also have **scholarship programmes** to support the talent. Katowice has "Prymus" **scholarships** aimed at outstanding students; in 2016, 265 students from public and private schools were granted this scholarship in support of their achievements in science. Ostrava has an educational and talent management support programme in the fields of technical and natural sciences which has grants to popularise, develop and practically use these sciences.



55%

of the cities have programmes to attract talent

The priority talent niche groups are young female researchers and post-graduate students, particularly in technological fields

In Bilbao the **Bizkaia talent initiative** the drive for establishing the necessary conditions to attract qualified talent in innovation and knowledge processes is materialised through the aid programme co-financed by the European Commission to facilitate the promotion, recruitment and connection of researchers in Bizkaia and Demola to improve the employability of young people in the city.

In Bordeaux, **"Job of the partner"**, comprises a set of facilitating actions to help newly arrived partners to find opportunities in the local employment market.

In Liège the **Venture Lab** has an incubator providing a work space for students and young graduates, offering support by experienced entrepreneurs as well as training, actions and events that are specially designed to help them to progress. More than 200,000 people study at the University of Liège, 4,600 of which are international students, which provides potential for further projects. In combination with its essential teaching vocation, the University of Liège has also put in place a systematic assessment of the work its research units carry out.

Other cities participating in the study also develop various initiatives to attract talent. Lappeenranta for example has a regional recruitment campaign for software specialists and Ostrava has the European In Focus project which is intended to produce an integrated action plan with the involvement of regional actors in talent attraction management areas.

On the other hand, cities like Barcelona have an enormous capacity for attracting talent, but in this case there is a problem linked to the existing labour market due to the working conditions offered to young people, which makes attracting researchers difficult.

IN FOCUS

(Ostrava, Czech Republic)

Ostrava has a new Strategic Development Plan for the period 2017-2023, where one of the activities is to support talented people by implementing special programmes that convert the city into a place where this talent can be nurtured.

This activity is carried out through the international project In Focus (URBACT), the aim of which is to produce an Integrated Action Plan (IAP) with the involvement of regional actors in talent attraction management areas. This plan will be finalised in April 2018. In addition, the Moravia-Silesia region in collaboration with the city of Ostrava is preparing a brand management strategy for the region, paying particular attention to talented people both inside and outside the region.

www.urbact.eu/In-Focus

São Paulo does not have a public strategy but the city has the best universities and research infrastructure in the country. Highly specialised services and multinational companies are concentrated in the city, leading to its particular attractiveness for Brazilian talent.

Ruta N in Medellin ensures that companies located in the innovation district are able to find the talent they need. It also allows savings of 90% on the selection process costs at regular market prices. It allows talent to be attracted from cities like Bogota, Barranquilla, Cartagena and Armenia.

Cities such as Bordeaux and Liège stand out for the attraction of international students

NEW SET OF POLICIES FOR ATTRACTING SKILLS AND COMMUNICATION BETWEEN TALENTED PEOPLE

(Bordeaux, France)

The aim is to keep skills up to date and to raise awareness of new trends through new approaches to innovation and communication between the city's human resources. The response to this challenge consists in applying a triple policy based on encouraging frequent contact and mobility between talented people, a set of classic "talent attract" actions and a collective effort to detect relevant trends for the future.

- **Mobility**
  Frequent contact between talented people greatly involves opening the University and the Campus Chartrons private schools based on the collaborative culture with the local ecosystem and public institutions policy. For example, the Department of Innovation and Digitalisation of Bordeaux Metropole takes on interns from local engineering and internet schools. Multiple pilot projects are developed jointly between Bordeaux Metropole or the city of Bordeaux and innovative local schools. The fluidity of talent mobility also has a lot to do with organising large-scale events (FrenchTech, Great Junction, Digital Week, etc.), with sessions explicitly dedicated to talent meetings and presentations of local companies to students.

- **Attracting talent**
  Within the framework of creating "Magnetic Bordeaux" as a trademark of the area, the project partners (public and private

institutions), carry out processes coherent with instilling the initial desire to settle in Bordeaux. High-level visits of delegations to international events are used to make the most of this action, as well as international events such as "Vinexpo" which often generates a personal or professional desire to settle in the city.

- **Mobility of ideas between talented people**
  A deliberate policy to learn together and to identify the skills needed in the future.

The success of Bordeaux in learning policies is based on the quality of a thriving ecosystem that connects prestigious universities (public and private), an active public administration and an innovative private sector in an area with many assets.

Some actions of particular mention are:

- **Modernisation of the University of Bordeaux**
  Thanks to their identity as an "initiative of excellence", which has enabled it to undertake a policy to renovate buildings and its governance with the aim of becoming a global centre of excellence, and to develop innovative governance projects and research.

- **Seamless mobility within the city and the rest of the world**
  The city has undergone massive urban regeneration, including a new transport system, new offices on offer and real estate, the flagship being the Euratlantique project that will benefit from the future high-speed train to Paris.

- **Environment favouring growth and communication**
  Areas to meet up, share ideas and projects have flourished: there are dozens of coworking spaces, incubators, and accelerators, as well as offices focused on innovation (such as the flagship "Cité Numérique" with 20,000 places, Darwin, Bordeaux Unitech, Héméra and "33 entrepreneurs"), with acceleration and start-up events, such as "La Grande Jonction".

The main results are as follows:

- **The University is being recognised at the national and international level: 9 research centres have been labelled as "LABEX" (research centres of excellence).**

- **Bordeaux is now recognised in Paris as the most suitable destination for talent and innovative entrepreneurs: hundreds of entrepreneurs are joining the city, giving rise to a vibrant community of small and large businesses gathered in the Aquitaine digital cluster, promoting the "digital spring".**

- **Among the executives that would like to leave Paris for a different life (according to a survey of 3,689 people), 80% of them are considering it, and 56% put Bordeaux as their first choice for a destination.**

- **New talent, new practices: the high intensity interaction between the talented people and the provision of innovative ideas has a tangible effect on everyday life. According to the "Urban Collaboration Index", Bordeaux has been in first place for two consecutive years as the capital of France in terms of a Collaborative Economy.**

Retention and return of talent

Smart Cities need to acquire actions and programmes that stimulate, retain and return talent, as local authorities can have an impact on increasingly relevant elements when it comes to boosting talent and motivating local initiatives. To do so, they must design and implement ecosystems favourable to talented people that wish to stay in the city or return to it, in able to develop there personal and business projects there.

In this regard the designed system should allow for a balanced flow of talent in order to adapt to the globalised context.

25%

of the cities have programmes to retain talent and encourage it to return

Looking to the future, the retention and return of talent is identified as one of the great challenges of local governments to provide the cities with a differentiating factor that allows them to position themselves as centres of talent attraction (local talent, in this case).

There is a lower prevalence of this type of programme among the cities participating in the study, in comparison with talent attraction programmes. One example is in Moscow, where the Mayor's initiative consists in granting 1 million roubles to winning students of the International Olympiads (in chemistry, physics, information technologies, etc.) that stay in Moscow.

Medellin has developed initiatives such as "Es tiempo de volver" (it's time to come back) and the "Enlaza mundos" (connecting worlds) programme in which people from the lower strata can do master and PhD studies abroad. One of the conditions for the scholarship students is that they must return to the country and do some form of social service in their area of study in order to cancel out the debt.

3.3 DIGITAL SOCIETY AND ECONOMY

The development of a digitised society on all levels (citizenship, public administration, infrastructure, economy) is an essential feature of the Smart Cities to ensure it can respond to current and future challenges.

Digital citizenship

The digitisation of citizens is a key element in developing Smart Cities, since both economic processes and social processes like governance need active participation and direct interaction with the public, the new digital citizens being those that are leading the change of contemporary cities. In fact, digital citizens are already present in all urban communities, and they should form part of an active dialogue in the context of hyper-connected cities, benefiting the public on the whole.

To do so, the new generations must be encouraged to be genuinely digital native, and programmes should be designed for the population groups that are theoretically further away from the technological reality, avoiding digital divides from being formed.

Among the measures implemented in these areas, mention should be made to **specific training programmes for certain groups** such as training for senior citizens (digital literacy workshops aimed at the 3rd age in Bilbao, Moscow and Helsinki) and for the unemployed (Helsinki).

The cities have also launched **initiatives for access to new technologies in groups at risk of being excluded** (Bilbao, Liège), for **girls and women** (Brno), accessibility initiatives through **donations of computer equipment to be renewed** from citizens to disadvantaged groups (Moscow), as well as organising an international forum (Liège ICT Day) as a space for reflection on new technologies and what they contribute to human development (Liège).

Some cities such as San Miguel de Ibarra, go even further, by providing computer equipment to educational institutions **in urban and rural areas**, and by offering permanent ICT training in rural schools, and developing material on digital literacy for schools and priority groups as well as a digital literacy programme aimed at more remote schools by using a mobile classroom equipped with computers.

In other cases it involves serving groups with a specific problem, as in Katowice, where a fully **intelligent web browser** has been developed which allows the blind and people with impaired vision to find information about the city and its public services.

It should also be noted that the vast majority of the cities have **specialised training workshops** intended to incorporate ICT to the strategic sectors, as is the case of Bilbao. Initiatives aimed at civil servants in Bordeaux should also be highlighted, as well as Porto's internal training guide for municipal employees on international and local Smart City projects and the various actions launched from Barcelona Activa aimed at digital training/education (internal study on the digital divide, the Ateneu de Fabricació, inclusion programmes, etc.).

In addition, **citizen information, awareness raising and education programmes** have been put into place (La Marsa, Quito), and in Medellin a community has been formed to co-create solutions to the city's problems by developing community pilot projects, where the connections between citizens, the Government, the university and companies allow specific neighbourhood problems to be solved (Comuna Innova).

In this regard, aside from the traditional investments in smart infrastructure, one of the most widespread policies to form digital citizens is to provide free access to the internet in public centres and enable free public Wi-Fi networks in parks, squares and public spaces (Moscow, Quito, Katowice, São Paulo, etc.), to offer internet services to rural parishes and city parks (San Miguel de Ibarra), and to opt for a network of public internet access hot spots, printers and free courses on new technologies (practically carried out by all the cities).

70%

of the cities have programmes to help people left out of the digital world to enter it

50%

of them have digital vocation empowerment programmes for children and youths

"INFORMATION CITY" PROGRAMME

(Moscow, Russia)

This programme was launched in 2012 with the aim of improving the quality of citizens' lives through the widespread use of ICTs. Three priorities were established for it:

1. **To create high-quality ICT infrastructure**. A public-private collaboration has been used to implement programmes that improve 3G/4G coverage, broadband internet access in residential homes and the free Wi-Fi network in the city. This collaboration is done in a variety of formats: (a) The Municipal authorities contract business services including high contractual standards, which encourages the companies to develop their technical infrastructure and improve the quality of the services. For example, this is how the Moscow city government has provided a qualitative transition to the use of optical data networks in recent years. To date all the city's social institutions and more than 80% of the population have access to high speed broadband. b) The operators create their own services for citizens and the municipal government helps them by providing the necessary data and experience, making administrative procedures easier. For example, by expanding 3G/4G coverage, the installation procedure of mobile communication stations in urban buildings has been considerably simplified for operators. At the moment 99% of the city's area has 4G coverage and the level of penetration of mobile communications in Moscow is the second highest in the world.

2. **Ensure this infrastructure is available for all the citizens of Moscow, removing the digital divide** by implementing various projects: 1) Free Wi-Fi in the city (2nd city in the world with most urban public areas covered); 2) Free electronic equipment ("Good Deed" project); 3) Free access to the network and to electronic communications devices in libraries and urban centres that provide public services.

3. **Helping people to acquire the necessary skills to use this infrastructure** by providing free courses on basic IT and internet knowledge for senior citizens in various institutions, universities and schools. "New technologies school" for school children and teachers at 200 schools in Moscow.

The main result is achieving access to fast and stable internet (Moscow is the 4th city in the world in terms of internet traffic), at an affordable price (the cost of broadband is one of the lowest in the world) and with the opportunity to receive, if necessary, training on how to the use the internet and electronic devices.

CREATIVE TECHNOLOGIES

(Quito, Ecuador)

Its objective is to train teachers, children and youths to develop the Social Laboratory of Creative Technologies and logical-mathematical skills by using the Arduino and Scratch methodologies (free software and programming platforms, respectively, created by MIT).

The actions developed are the following:

- Knowledge and the use of programming and robotics is made democratic for children and young people from vulnerable sectors of the city.
- Stimulation of students from 12 years of age on the use of technology as a creative tool and a tool for technical vocations.
- Introduction to science and technology from an early age by creating games through the Scratch platform.

The key factors for its success are the following:

- Link between the public and private sectors and academia to implement the project.
- Teachers trained that are able to train others in the most vulnerable sectors.
- Children trained in Scratch.
- Children and young people trained in Arduino and 4A.

The main results obtained are:

- **Diversity of actors linked to its management:** From the public sector, the General Secretariat of Territorial Coordination and Citizen Participation and the Economic Promotion Agency ConQuito; from the private sector, the Telefónica Movistar Foundation, and from academia, the Army University (ESPE) and the Equinoctial University of Technology (UTE).
- **65 coaches have been trained** (university students) who are able to share their knowledge in vulnerable communities.
- **553 girls and boys between the ages of 8 and 12 have been trained in the Scratch methodology.**
- **138 girls and boys between the ages of 12 and 17 have been trained in the Arduino methodology.**

NAVES DO CONHECIMENTO

(Rio de Janeiro, Brazil)

The objective of the "knowledge vessels" initiative is to provide the lower-income communities and slums with state of the art technology.

The activities are carried out in the 9 new knowledge vessels established within or close to the most disadvantaged communities in the city. These vessels are equipped with free Wi-Fi, computer programming classes, games, English, photography and audiovisual training. They are mainly directed towards children and the facilities which can be accessed by anyone in the community can are open until 9 pm. A collaboration agreement has been signed with CISCO, which has sponsored the creation of technical laboratories and provides training in the vessels.

The main factors for its success are:

- Incentives to highly performing students, mostly for children.
- Free access to computers and classes. Free Wi-Fi around the vessel.
- Technical training and collaboration with municipal schools.

The main results obtained are:

- **Award winning games have been created and social start-ups have been developed by students that are 10 years of age.**
- **Technical education.**
- **Digital inclusion for senior citizens.**
- **The people taking part develop a sense of pride in belonging to their community.**

DIGITAL INCLUSION

(São Paulo, Brazil)

The Coordination of Connectivity and Digital Convergence was created through Law 15,764/2013 with the power to plan, coordinate, implement, and maintain the internet connectivity services provided by the municipality; to implement digital convergence initiatives for municipal services; to propose partnerships with universities, civil society organisations and the private sector to foster the creation and application of innovative technological solutions aimed at the digitalisation of municipal services and to manage the municipal digital inclusion policy, refocusing the actions to extend and qualify their scope.

Some of the main activities include the implementation and management of Tele-centres, Digital Squares and public Fab Labs. The Tele-centres are spaces that provide free public access to ICTs, such as computers connected to the internet for multiple uses, including assisted and unassisted navigation, courses and other activities to promote local development. The city council provides a free wireless signal through the Digital Squares in areas such as squares, parks and other public facilities, for which maintenance and support models have been formulated and implemented.

The Fab Labs are places of creativity, learning and innovation, accessible to anyone interested in creating, developing and building projects. This is done through collaborative processes, the exchange of knowledge and the use of digital manufacturing tools. The Fab Labs offer the population of São Paulo the opportunity to learn, design and manufacture different objects on different scales.

One of the key factors to its success is their location in strategic places of the city. The Tele-centres attend to the most vulnerable areas of the city and the Fab Labs offer courses, workshops and conferences, spreading the production of knowledge in the arts, technology, science and innovation, aiming to strengthen the "Do-It-Yourself" culture.

The main results obtained in 2016 are:

- **40 million accesses made at the Tele-centres.**
- **more than 70 million accesses in the Digital Squares.**
- **The Fab Lab served 44,000 people.**

Administration 4.0

The most relevant challenge a "Smart City" of the 21st century faces in government is transparency and the full digitalisation of its performance. A "Smart Government" is the main element that the cities have to develop a smart city, and one of its main functions is to develop policies that encourage the use of ICTs in the city to serve citizens and that encourage synergies between the different figures of society. ICT is not the objective, but the means by which the city can have the necessary elements to progressively improve their quality of life and ensure the cities work as an efficient and effective organism.

The main pillars of a Smart Government are:

- **Transparency and participation**
- **Government and electronic administration**
- **Open Data**

Among the cities participating in the study, the initiatives to be highlighted are those in favour of developing a "Smart Government" and the handling of mass data in the following areas: **Interoperability, information reuse, participation, open government, etc**.

One of the key areas is the **efficient management and development of interoperability**. Examples of this are the development of strategic information systems for water, waste, energy, mobility and public transport management. For example, Bilbao's balanced score card and intelligence system Big Bilbao and Lappeenranta's information management system created with an intelligent video surveillance monitoring and analysis system developed in cooperation with IBM, which helps detect potential risk situations and events that may involve risk.

There are currently 256 cameras installed in Katowice; Bilbao has an integrated system to manage taxes, fees and payments (Udaltax); Medellin has public service cards that integrate the municipalities belonging to the metropolitan areas, which can be used as a card for public transport, parking, leisure centres, libraries and at town halls, as well as a way of consolidating all the information for each citizen under a unique number, so that each citizen's public information and procedures can be available and on-line (360 Citizen).

Another relevant area is **availability and multi-channel access**. Municipal websites are conceived as multifunction, one-stop-shop, on-line platforms through which citizens can interact with the authorities, providing news, contact information, on-line public services, real time open data and open budgets.

There are also a number of experiences in the **re-use of information and open government,** such as the installation of sensors and open data (Future cities, Fiware node, Synchronicity) in Porto and various open government platforms.

Within the field of efficient management, the most common public services offered by the cities relate to municipal procedures (tax management, parking payment systems, etc)

60%

of the cities have embarked on big data programmes

CENTRALISED ON-LINE MANAGEMENT SYSTEM

(Moscow, Russia)

The objectives are to reduce staff costs and the costs of circulating Moscow Government documentation; to reduce public debt in housing, public services, traffic fines, etc., through timely notifications, and to improve the day-to-day experience of interactions between citizens and government services, simplifying the procedures and reducing lost time.

The centralised management and public service provision system covers all aspects of life in the city (public services, housing, health, education, security, etc.), giving 8.5 million residents access to the system (more than half of the population of Moscow) with more than 200 services available on-line and via mobile phone such as: school enrolment, medical appointments, payments of public services, meter readings, traffic fines, etc.

The basic elements of the system are the urban services portal, the single mobile platform, the automated notification system and the multifunctional centres located in each district of the city. The city's services portal operates as a one-stop-shop, providing 150 key services. It handles 100 million applications and 2 million transactions per year. The single mobile platform is designed to meet the specific needs of different groups of the population, and it covers 10 urban applications, 20 SMS options and USSD services. It offers 450 dynamic data sets through an open API for independent developments and manages 250 million requests per year and 20 million SMS are sent to citizens on a monthly basis. In 2016, the omni-channel notification system was implemented, which provides the public with information based on the time and on their location, age, and personal history of interaction with municipal services. Depending on the citizens' reaction to the different types of notifications, the system automatically adjusts the content and the channels, changing between email, SMS and push messages.

The success of the system is based on centralising all the functions, the variety of communication channels, the notification on the possibilities available, and the development of easy-to-use instructions. The main results obtained are: 8.5 million people registered in the system; 100 million dollars of savings per year for the municipal budget and at least 3 hours of annual time savings for each inhabitant. Among the 80 million people who visit the multifunctional service centres on a daily basis, only 1% wait more than 15 minutes, the average waiting time being less than 3 minutes.

Development of the digital economy

A smart economy based on the digital sectors should aspire to become the main pillar of urban development in a smart community. This model is based on a series of interconnected actions to promote development, sustainability, and the attractiveness for new investments, and the development of new entrepreneurial projects. Some of the benefits of this commitment are the development of e-business and e-commerce, the increase in productivity, employment and innovation in ICT, and the generation of new services and products, and new business and entrepreneurial models and opportunities.

The cities participating in the study often have specific programmes that support digital entrepreneurship. Some examples are presented below:

65%

of the cities have programmes that support digital entrepreneurship

Brno

Support in the different phases of a project: business concept (Enter); product development and launch on the market (StarCube); product or customer development strategy (Master); new business impulses for already established companies (Platinn) and collaboration between creative companies and service providers (Creative vouchers).

Liège

Support for the digital business fabric (W.IN.G - Wallonia Innovation and Growth) through an investment fund specialising in financing start-ups. The programme also includes coaching, support by mentors, access to a network, a community and the possibility of privileged use of certain services provided by their partners.

Bilbao

The Auzo Factory Matiko is a centre specialised in digital economy projects. In addition, the Bizkaia Digital programme on the provincial level specifically supports the development of the sector.

São Paulo

The Vai Tec financial support programme through partnerships and aid directed to innovative activities that contribute to economic and social development and are relevant for the municipality, giving priority to ICT-related projects and young people with low income.

In addition, many cities have opted to create **innovation ecosystems to respond to various entrepreneurial needs in the digital field. To do this there are specific programmes such as:**

Moscow
Open innovation programme where government institutions specify the technologies they need or the problems they need to solve and they open a competition aimed at start-ups and scientists from which they can choose the best proposals to be developed into pilot projects.

Rio de Janeiro
"Porto Digital" programme to develop a suitable environment for the creation of innovative businesses, aiming to become a centre for ICTs, Industry 4.0 and the creative economy.

São Paulo
TechSampa programme to stimulate innovation and technology entrepreneurship, supporting the creation and development of start-ups, promoting competitiveness, sustainable product and technology development and consolidating an ecosystem of start-ups.

Medellin
The "Ruta N" framework has a centre for the development of digital business, responsible for training entrepreneurs and citizens in general in new technological trends. Incubation processes are carried out through expert mentors, generating connections to develop prototypes and gain validations, to facilitate access to company valuations, protect intellectual property and gain access to investment and markets, generating sustainable and scalable business models.

Likewise, the cities organise **events such as:**

Porto
"Start and Scale Week", an event promoting innovation and entrepreneurship, which includes workshops, conferences, mentoring and exhibitions of the work carried out by entrepreneurs, and "Hackathon", directed at the ICT community to develop solutions for the city based on open data. The 2016 edition took place in various cities of the world at the same time: Arrecife (Brazil), Utrecht (The Netherlands), Olinda (Brazil) and Santander (Spain).

Tequila
App contest with the universities.

Quito
Development of hackathons and innovation challenges to solve the city's or a private company's specific problems, in collaboration with academic institutions with the aim of increasing the scope of the university community in careers related to science, technology, engineering and mathematics.

Liège
Belfius KIKK Awards, which reward the most innovative digital start-ups.

Digital and smart infrastructures

The expansion of digital infrastructures, together with intelligent physical infrastructure by creating sustainable and innovative value chains can generate improvements in the quality of life and diversification of social and economic areas, generating a positive impact on the society as a whole.

The use of technologies such as fibre optics, Wi-Fi and sensors have converted cities into hyper-connected "alive" cities. Citizens leave a digital trace of information in everything they do, thanks to new technologies. In this sense, for the entire Smart City to be successful, it must have truly intelligent digital infrastructures that allow relevant data and information to be extracted in order to manage this volume of information and draw conclusions.

This will involve creating urban digital ecosystems where information is shared in such a way as to get a better understanding of the citizens and offer them a better value proposition, while respecting the legal frameworks.

The main projects that have been put into place related to creating and improving digital infrastructures in the cities are the following:

- Free public Wi-Fi and 3G networks (Bilbao, Bordeaux, La Marsa, Quito, Liège, Katowice, São Paulo, Medellín, Barcelona) and fibre optic and broadband networks connected to the Internet of Things (Bilbao, Bordeaux, La Marsa, San Miguel de Ibarra).
- Centralised video-surveillance system (Moscow, San Miguel de Ibarra), unified rescue service management system (Moscow) and intelligent transportation system (Katowice).

- Installation of radar systems, signalling, public vehicle location, and sensors to measure traffic, temperature and contamination levels (Brno, Porto)-
- Multifunctional platform for public access to information and support on training options, vocational guidance, employment, apprenticeships, telecommunications and all the information related to job searches and offers, especially those in the digital economy (City of Professions, Porto).
- Creation of open data portals (Bilbao, Brno, Tequila, Quito) and creation of an electronic communication platform (Brno).

85%

of the cities have specific projects to promote digital infrastructures

GEOGRAPHIC INFORMATION SYSTEM

(La Marsa, Tunisia)

The objective of the geographic information system is to collect and capture geographic data and attributes in relation to planning cities, roads and public lighting.

Actions were developed in the framework of the Geomatics Development Project in La Marsa, which included 3 phases:

1. **Data integration module for regulated urban planning:** management of demolition orders and the urban development plan, management of construction permits, calculation of indicators such as ratios, density, etc., history of premises, geocoding addresses, construction management, land, housing and information on its status, incorporation of administrative documents, etc.

2. **Data integration module for the road network:** management and monitoring of interventions to the road network, management of parking areas, road routing, pavements and roadways, trees, preparation of cross roads, displays of operator networks, incorporation of administrative documents and calculation of the cost of the interventions.

3. **Data integration module for public lighting:** fault management and optimisation of networks, controlling consumption, planning network extensions, establishing status by neighbourhood or geographic area and location of non-illuminated areas or poorly lit neighbourhoods.

The project has several features, including geocoding, topological verification, support for Arabic languages, itinerary calculations, calculation of the cost of the interventions, incorporation of documents (development plan, property titles, scanned drawing, etc.) and indicator calculation and monitoring.

The main result is having good visibility of the business actions and the common infrastructure available to the city.

QuitoTeConecta PROJECT

(Quito, Ecuador)

The flagship project "QuitoTeConecta" (Quito connects you) promotes public and private companies to take part in converting the metropolitan district of Quito into a smart, resilient, sustainable and innovative city.

To do this, in addition to signing participation agreements with private telecommunication companies, work has been done with the academic sector, specifically through the alliance with the National Polytechnic School (EPN) and the Pontifical Catholic University (PUCE), who have made existing Wi-Fi infrastructure on their campus available to the "QuitoTeConecta" project and all the citizens. At the same time, Wi-Fi hotspots in parks and squares can connect to the EPN and PUCE university services so that they can be used by the students. There is also a "QuitoTeConecta" Wi-Fi navigation room in the Visitor's Centre in the city's historic centre.

- **The key to the success of the project is that it is based on a collaborative economy model, which has allowed sustainability for the future and a greater interest of the people taking part to be connected.**

- **The main results obtained are: 1) there are currently 402 Wi-Fi hotspots in the Metropolitan District, strategically located in parks, squares, universities and public transport stops. 2) Also, in response to the emergency caused by the possible eruption of the Cotopaxi volcano, 30 hotspots were placed in the temporary shelters set up by the National Secretariat for Risk Management, which would be put into operation once an alert is received from the relevant authorities.**

www.quitoteconecta.gob.ec

4.
MAIN BARRIERS AND FACILITATING ELEMENTS

4.1 BARRIERS

The cities participating in the study have identified a number of elements for the development of Smart projects in their areas, some of which are individual ones, and most are common to the cities analysed, especially those with limited dimensions and capacities.

The coordination of mechanisms between the public and private sector, access to finance, and the need to develop strategies to attract and retain talent are common and high-impact elements surrounding the aspects of a Smart City. Among the barriers identified, the following stand out:

BARRIERS IDENTIFIED

1

INNOVATION, ENTREPRENEURSHIP AND THE GENERATION OF ECONOMIC ACTIVITY

- Low entrepreneurial spirit.
- Difficulties in accessing financing for entrepreneurial projects (particularly for the most appropriate financing mechanisms such as venture capital, seed capital, etc.)
- Insufficient connection between universities and the private sector.

2

KNOWLEDGE AND TALENT

- Little connection between the universities and public administrations.
- Difficulties in attracting talent from outside the city.

3

DIGITAL SOCIETY AND ECONOMY

- The complexity of the existing bureaucratic processes at the administrative level in each city.
- Lack of alignment between the different public actors.

4

OTHERS

- Lack of contact with other international experiences.
- Having an out of date legislative framework.

4.2 FACILITATING ELEMENTS

The cities have also identified facilitating elements that favour the development of Smart City projects on all levels (public and private). Specific mention should be made to those such as having specific public planning for entrepreneurship, support for entrepreneurs, and programmes and physical infrastructure to support entrepreneurial projects. Some specific areas that were identified are the following:

SPECIFIC FIELDS OF A SMART CITY

INNOVATION, ENTREPRENEURSHIP AND THE GENERATION OF ECONOMIC ACTIVITY

HAVING INFRASTRUCTURE TO DEVELOP ENTREPRENEURIAL PROJECTS

HAVING FLEXIBLE FINANCING MECHANISMS

SUPPORT FOR R&D AND IN PARTICULAR SUPPORT IN GENERATING PATENTS AND PROTOTYPES

MENTORING AND TECHNICAL SUPPORT FOR ENTREPRENEURS

KNOWLEDGE AND TALENT

DEVELOPMENT OF PARTNERSHIPS BETWEEN THE UNIVERSITIES, THE ADMINISTRATION AND THE PRIVATE SECTOR

DIGITAL SOCIETY AND ECONOMY

HAVING A PLANNING STRATEGY AIMED AT PROMOTING ENTREPRENEURSHIP ON DIFFERENT LEVELS

TRANSPARENCY AND AVAILABILITY OF OPEN DATA

ALIGNING THE DIFFERENT PUBLIC ADMINISTRATIONS AROUND COMMON AGENDAS TO SUPPORT ENTREPRENEURSHIP AND INNOVATION

5. CONCLUSIONS

In conclusion, the following characteristics have been identified based on the information provided by the cities participating in the study, both for the fields of study and for the key barriers and facilitating elements identified:

FIELDS OF THE SMART CITIES

1

INNOVATION, ENTREPRENEURSHIP AND THE GENERATION OF ECONOMIC ACTIVITY

- 75% of the participating cities have a smart specialisation strategy, 60% of which have been formalised.
- 85% of the cities have programmes to support entrepreneurship, and 55% have specific spaces to incubate emerging companies.
- 70% of the cities have science-technology parks in their metropolitan area.
- 75% of the cities have formalised collaborations between the city and local businesses.
- The cities identified the skilled human capital, the concentration of innovation centres and the geographic positioning of the cities as the main factors for attracting investments.
- All the cities have a positioning strategy (particularly those focused on promoting tourism).

2

KNOWLEDGE AND TALENT

- Despite identifying the significance of having skilled human capital, only 20% of the cities have combined models of advanced professional training.
- 75% of the participating cities have specific lifelong learning programmes (particularly focused on senior citizens, civil servants and the unemployed).
- 55% of the cities have programmes to attract talent, especially for young researchers and post-graduate students.
- The programmes to retain talent and have it return have been identified as a priority under development, so only 25% of the cities have this type of mechanisms.

3

DIGITAL SOCIETY AND ECONOMY

- 70% of the cities have programmes to help people left out of the digital world to enter it (50% have programmes geared towards children and youths).
- There are Big Data programmes in 60% of the cities.
- The digital support for entrepreneurship is present with 65% of the participating cities having specific support programmes.
- With regard to smart and digital infrastructures, the degree of deployment is high: 85% of the cities have specific projects to promote this physical infrastructure.

Looking towards the future, the following key barriers and facilitating elements have been identified:

FIELDS	MAIN BARRIERS	MAIN FACILITATING ELEMENTS
Innovation, entrepreneurship and the generation of economic activity	• Low entrepreneurial spirit. • Difficulties in accessing financing for entrepreneurial projects (venture capital, seed capital, etc.) • Insufficient connection between universities and the private sector.	• Having infrastructure to develop entrepreneurial projects. • Having flexible financing mechanisms. • Support for R&D and in particular support in generating patents and prototypes. • Mentoring and technical support for entrepreneurs.
Knowledge and talent	• Little connection between the universities and public administrations. • Difficulties in attracting talent from outside the city.	• Development of partnership between the universities, the administration and the private sector.
Digital society and economy	• The complexity of the existing bureaucratic processes at the administrative level in each city. • Lack of alignment between the different actors.	• Having a planning strategy aimed at promoting entrepreneurship on different levels. • Transparency and availability of open data. • Aligning the different public administrations around common support agendas.
Other factors identified	• Lack of contact with other international experiences. • Out of date legislative framework.	

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