



TEN Section Report on the "Smart Cities" Project



European Economic and Social Committee

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1. Introduction

1.1 Aim of the project

The “Smart Cities” project is a follow-up to the European Economic and Social Committee (EESC) own-initiative opinion on **Smart cities as a driver of a new European industrial policy**, adopted in July 2015¹.

In its opinion, the EESC discusses how smart cities can become drivers for new European industrial development. To achieve this, it is essential to converge on a development model that is more advanced and effective than those applied to date, where action has been extremely fragmented.

Within the framework of the project, a delegation of seven EESC members has carried out study visits to six EU cities that have started or implemented smart project initiatives. The study visits allowed the delegation to present the **EESC Smart Cities model** to local administrations and representatives of civil society and to conduct technical site visits to the Smart Cities initiatives.

The ultimate aim of the Smart Cities project is to compile a set of recommendations to be disseminated among the European Institutions and all relevant stakeholders across the European Union.

1.2 Methodology

The methodology used to select cities placed strong emphasis on wide-ranging economic, geographic, demographic criteria and the country’s governmental structure, which were crucial for demonstrating the differences between EU cities as far as possible. On this basis, six cities were selected.

Firstly, a distinction was made between **cities that are capitals of Member States** and those that are not. The justification for this is apparent, in that the particular status of being a State’s capital or not has different economic and investment implications.

The second selection criterion was their **geographical location**. The cities needed to represent different Member States spread as widely as possible across the European Union in terms of geographical location.

The third criterion was the **size of the city**. According to the European Parliament study **“Mapping Smart Cities in the EU”**², a city size has significant implications for the implementation of smart city initiatives. This research has taken into account only cities with over 100,000 inhabitants, whilst our project also included La Rochelle, whose population is below this level, to show that even smaller cities can have the potential to be “smart”, and should not be overlooked in terms of statistics.

Regarding the **economic criteria**, all the cities play a significant role in tourism or as transition hubs, due to a major airport or seaport, which is reflected in their economic data. Moreover, they also invest in the **R&D sector**. This is of crucial importance as it demonstrates that they are committed to investing capital in innovation and technology with a direct effect on the well-being and benefit of their citizens.

The selection of the cities was also based on **the country’s governmental structure** since this has an impact on the distribution of responsibilities and allocation of finance. For instance, some countries are strongly decentralised into autonomous communities, whereas others are unitary states in which the activities of the municipality activity are under the strict control of central government.

Finally, all the selected cities have **initiated and/or implemented smart projects**. These are mostly connected to the dissemination of ICT to different industrial sectors. Other areas include mobility, energy and the digital economy. The following chapters contain several comments on the involvement of citizens and civil society in the sphere of smart cities. This factor has played a crucial role, and was taken into account by Members during their visits.

¹ Smart cities as a driver of a new European industrial policy. References: TEN/568 EESC-2015-568. Own-initiative. Rapporteur: Ms Daniela Rondinelli (Workers - GR II / Italy). Plenary Session: 509 - 1 Jul 2015 - 2 Jul 2015. Official Journal of the European Union, C 383, 17 November 2015

² http://www.europarl.europa.eu/RegData/etudes/etudes/Join/2014/507480/IPOL-ITRE_ET%282014%29507480_EN.pdf

2. Smart Cities: background information

2.1 Defining a smart city

In the context of growing urbanisation, the EU and its Member States see cities as “**laboratories for a more dynamic, digital Europe**” in which to test out measures that can generate growth with employment and social development.

Such advanced cities, acting as innovation laboratories and rolled out on a large scale, would contribute to the industrial and socio-economic “renaissance” of the EU, setting in motion a genuine industrial, financial and social revolution.

The EESC therefore considers that smart cities can become drivers for development of a new **European industrial policy**. However, to achieve this, it is essential to converge towards a development model that can overcome the current fragmentation and promote a single vision for projects, going well beyond integrating ICTs, mobility and energy efficiency. There is a particular need to target initiatives that may take various forms at local level and that are underpinned by the pursuit of a simultaneous impact on GDP, growth, employment and productivity, and on people’s quality of life and physical and mental well-being.

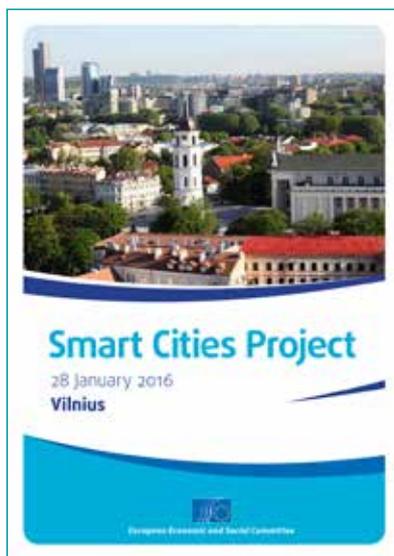
In particular, as expressed in the EESC opinion on Smart cities, the Committee is conscious that it is possible to apply a smart strategy to a city, island, subnational entity or industrial district by identifying a smart city development model that features the **coexistence and simultaneous integration of the following six enabling pillars**:

1. Projects related to energy efficiency
2. Dissemination of technology and connectivity platforms
3. New digital service ecosystems
4. Projects aimed at improving infrastructure and promoting urban redesign
5. Education and training related to acquisition and upgrading of necessary digital skills
6. Projects with economic and financial viability being co-funded through private and public financing

Finally, it is equally important to step up **the inclusion and role of civil society** and the social partners in the process of strategically designing smart cities, and in their implementation and subsequent monitoring, which is essential when it comes to **improving the quality of life** and work of individuals and businesses.

2.2 Vilnius

Description and country’s governmental structure



The administrative, cultural and economic centre of Lithuania is the capital Vilnius with a total population of 529 022 (in 2014). The city extends over 401 km². However, large areas of the city are not urbanised: buildings cover 20.2%, green areas 43.9% and water 2.1% of the total territory.

Vilnius brings together strong business and academic potential in high technology areas. It is home to major companies and key financial institutions but is also known as a centre for study and research. The city has six universities, with a student population of more than 60 000.

Vilnius is also rapidly attracting investment in its service industries, including IT, finance, and research and development. In 2016, Vilnius was awarded the third place (after Zurich and Edinburgh) among mid-sized European cities in the ranking of the European Cities of the Future, published by the fDi Intelligence division of the Financial Times which evaluates cities’ attractiveness for foreign direct investment.

As Lithuania is a unitary state, the municipality is not a subordinate state body, and municipal activity is permanently limited and under the strict control of central government.

Fields of excellence

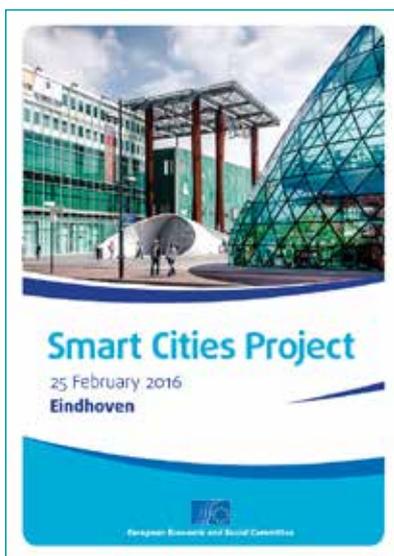
The smart specialisation strategy in Lithuania has identified country-wide fields of excellence, and some key skills in those fields are concentrated in Vilnius. The city is home to several global clusters of advanced industrial activities, including **laser physics, biotechnology** and other fields. Two technology clusters, "**Santara Valley**" (focused on biotechnology, molecular medicine and biopharmaceuticals) and "**Sunrise Valley**" (focused on attracting businesses engaged in knowledge-intensive activities) have been established in Vilnius to capitalise on the city's above-mentioned skills.

Forward-looking strategies

Vilnius is continuing to invest in and **develop its business parks to accelerate business start-ups**. The city is also committed to continuing its open-data policies. A centralised body that could share very specific solutions would definitely benefit the city. The knowledge that is needed includes either very specific **open-source technology platforms/technology solutions or specific knowledge pools** that would help speed up the preparation of strategic documents or choice of specific technology solutions, i.e. knowledge pools that would provide detailed pros and cons for specific solutions, so that the municipality would not need to invest in testing all possible courses of action.

2.3 Eindhoven

Description and country's governmental structure



The city of Eindhoven, which describes itself as a Technology, Design and Knowledge (TDK) city, has a population of 224 794. Main industries are high-tech systems, design, creative industry, automotive and food.

The Netherlands are divided into four layers: state, provinces, municipalities and regional water authorities. The state is responsible for matters of national importance. The provinces, municipalities, and regional water authorities are decentralised or joint authorities. A number of national rules, for example in the fields of benefits, environmental legislation, civil registry, are applied in the same manner across all Dutch municipalities. The communities are free to manage a number of other matters as they see fit.

Fields of excellence

Eindhoven is the **centre of technology** in the south of the Netherlands. One third of all the (mainly private) money invested in research and development in the Netherlands goes to Eindhoven and the surrounding area. The **Brainport foundation**, located in the South-East Brabant region, is a **partnership** between companies, knowledge institutions and authorities based in the local municipalities. The largest investments and the highest number of patent applications are made in Eindhoven, above all by ASML and Philips. Eindhoven is also the base of the **High Tech Campus Eindhoven**, where companies such as Philips and IBM are literally neighbours. The international competitive strength and innovation capacity of the industrial sector have a positive impact on employment and economic growth in the region.

Forward-looking strategies

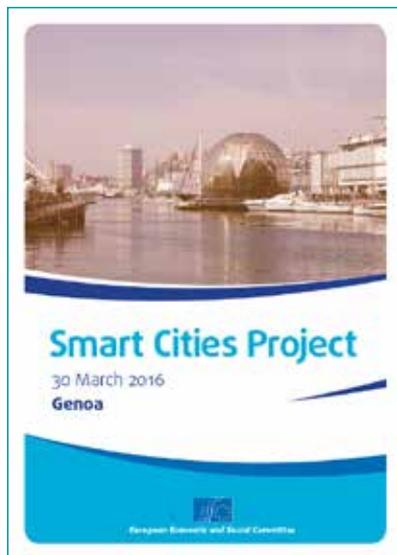
There is the need to have proper communication channels that allow effective knowledge management between all the stakeholders. This is one of the focuses that has various consequences for aspects such as the nature of strategy and dissemination of technology.

Becoming/being a smart city therefore depends much more on the question "why do we need smart specialisation?" than "what is or should be smart specialisation from a technology point of view?". The simple fact that the smart use of technology can **improve quality of life** does not mean that we will mainly need engineers to be able to achieve that quality leap. The first questions should be "what will the society of the future look like?" and "what values will be important?". A specific exploratory and

advisory authority would be a fantastic complement to the innovation challenges which progressive cities, such as Eindhoven, intend to keep addressing.

2.4 Genoa

Description and country's governmental structure



The Municipality of Genoa, the capital of the Liguria region, is made up of nine Administrative Units and has a population of 587 593 inhabitants.

Genoa has made a name for itself in the fields of research and technological development, thanks to the local area's network of businesses and scientific research institutions, with about 350 hi-tech companies in Genoa for roughly every 14 000 people employed.

The services sector currently employs roughly 80% of the existing local workforce in the Municipality of Genoa, while the industry sector employs only 14%. Tourism is the third leading sector thanks to a greater focus on promoting the city. The performance of the city's tourism sector has been encouraging; it is estimated that, by the end of 2015, Genoa will have welcomed more than 1.6 million tourists and that the number of stays will have increased by more than 14%.

The Italian Government has not yet established a specific structure for coordinating, establishing and systematising general Smart City strategies and the many policy areas associated with Smart City development. As far as a legislative framework is concerned, no significant legislative provisions or general frameworks have been established in the field. Only a few areas of activity, which in their broadest sense relate to the development of a conceptual outline for the Smart City, have been the subject of recent legislation.

Similar activities to those already seen at national level have been proposed in the Liguria region. The region has established a strategic **Digital Agenda programme** with regard to the specific issue at hand, with a view to developing services dedicated to individuals (digital health), tourism and SMEs.

Fields of excellence

The city of Genoa's fields of interest have achieved excellence in national and international businesses and start-ups operating in the innovation and emerging technology sector.

Genoa is home to **National Research facilities** in the field of technology, digitalisation and earth sciences (Italian Institute of Technology and National Research Council Institutes) and its university offers a wide choice of scientific pathways, with specialist engineering clusters situated throughout the region.

One of the Genoa Smart City project's key objectives is to **fully put into practice the concept of a 'laboratory city'** in which these entities can meet to pool individual expertise, and thus to encourage the development of a network of citizens through which to disseminate the expertise inherent in the key technological and scientific assets already established in the region.

The **Genoa Smart City Association** has launched EU and nationally-funded projects with the aim of creating a possible resilience model³ for the city, through which to test innovative solutions, including through exchanges with Italian cities affected by similar issues, and carry out research into possible solutions.

The Municipality of Genoa also makes use of the region's scientific and technological expertise in the field of energy efficiency; taking inspiration from its architectural heritage, it has launched activities designed to reduce energy waste and CO2 emissions through intelligent energy management (Smart Grid).

Continuing on the theme of **access to local expertise**, initiatives have been launched to develop infrastructure by installing more vehicle recharging points on the road, offer **incentives for electrical mobility** by raising awareness of the transition to electric vehicles, and foster research on and

develop the market for innovative mobility solutions with a view to improving the quality of living in an urban environment.

Forward-looking strategies

The association's successful participative model must be reinvented and developed into a **participative policy** and a **transversal SMART CITY model**.

The Genoa SC Association was founded in 2010, and since then has focused primarily on issues associated with energy. The experience accumulated over subsequent years has gradually revealed the need to switch the focus to the public. Over time, **public involvement** has taken on a central role in strategies developed by the Association, since it is the individuals themselves who are the end users of the city's services.

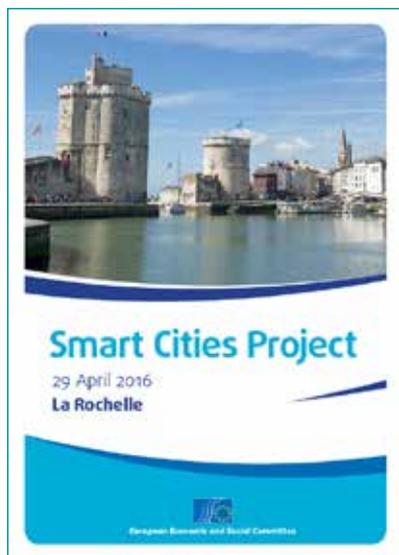
The Genoa Smart City associative model will develop from a concept into an organisation with legal personality, which will enable it to act as a partnership cluster in the many programme areas funded by the EU. In this context, the Association could fulfil a wide range of roles as part of international partnerships, owing to its associates' wide range of skills. The Association would become a sort of 'control room', acting as a manifold and guiding the development of projects launched by interested stakeholders.

The international dimension of Genoa and the Smart City Association will also be incentivised and developed, both with and between associates, with a view to exporting developed and tested best practices and thus attracting new investments.

To this end, the Municipality of Genoa is preparing a portfolio of successful practices and projects to use in raising awareness of its activities at European and extra-European level, while participating in international initiatives in which to showcase the city of Genoa.

2.5 La Rochelle

Description and country's governmental structure



With 162 781 inhabitants, the La Rochelle conurbation is ranked among the largest inter-municipal cooperation establishments in the Poitou-Charentes region. Among the 28 municipalities that make up the conurbation, La Rochelle is by far the largest with 74 880 inhabitants.

Its geographical location on the coast gives La Rochelle two major advantages that have contributed significantly to its development as a port town. Firstly, the port of Minimes, the largest French Atlantic coast marina, makes La Rochelle an excellent location for recreational sailing. Secondly, with La Pallice, La Rochelle possesses a deep-water harbour where seagoing ships and ocean liners can dock. With this harbour, unique on the French Atlantic coast and able to accommodate ships with load-carrying capacities of over 200 000 tonnes at any time of the day or night irrespective of tidal constraints, the town is very well placed to develop its port activities.

There are more than 66 000 jobs in the La Rochelle urban area, 90% of which are filled by its inhabitants. In this area, 15% of workers are employed in industry, which is lower than the regional (19%) and national (18%) averages. The naval, railway, food and automotive industries are the largest and together employ 25% of the workers in the area. There are around 1100 industrial establishments in the La Rochelle employment area (350 in the town itself) employing almost 11 000 people. The unemployment rate in La Rochelle is 11%.

Over 3 million tourists, 25% of whom are foreigners, visit the town each year, which makes La Rochelle the third most visited city in France.

Fields of excellence

La Rochelle has developed a cluster of smart activities identified around six main policy areas: smart governance, smart economy, smart mobility, smart environment, smart people and smart living.

³ For further information, please see the HARMONISE project, chapter 3.2.2

Smart and sustainable cities are shaped by and constantly adapt to the various characteristics of their citizens. La Rochelle's digital strategy is founded on **constant innovation** developed in partnership with its inhabitants.

Between now and 2030, service users must succeed in **appropriating digital tools** while becoming involved in the urban space and participating in town management. For its part, by promoting the diversity of its inhabitants, the town will benefit from the added value of their contributions to offer an improved shared living experience. To bring this about, the town has adopted a **cross-functional and participative approach in connection with all its stakeholders** (universities, conurbation authority, civil society, economic stakeholders etc.).

Forward-looking strategies

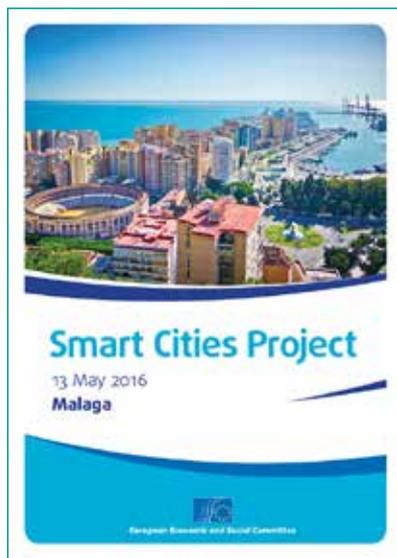
Local and regional authorities all try to gather information and benefit from **feedback** to determine the best practices to adopt in their areas.

Some cities in France have created a digital task force to forward an implementation strategy for all local authority departments, consistent with the particular characteristics of the local authority and the priorities of the elected representatives. This **digital task force** is responsible for providing guidance for both the decision-makers and the users, from the perspective of interactivity and interoperability.

Setting up a digital technologies task force is an opportunity for institutions to start to reflect on the digital policy to pursue within their local authority, according to its particular needs, and to put an overall digital strategy in place both externally and internally.

2.6 Malaga

Description and country's governmental structure



Malaga, the capital of the Costa del Sol, is situated in southern Europe on the Mediterranean coast, and is the sixth largest city in Spain in terms of the number of inhabitants (572 947 in 2015). In the most recent Eurobarometer survey conducted by the European Commission (January 2016), Malaga ranks among the top 10 European cities for quality of life.

Thanks to the Malaga 2020 Strategy, which adapts urban strategy to the Europe 2020 Strategy, Malaga is moving towards modernity and urban resilience, with four key areas in which to foster smart specialisations and competition in the region: new technologies, tourism, culture and the environment.

Finally, Malaga is home to a first-class port which has undergone a wide-ranging transformation, including the construction of new and modern infrastructure, such as a breakwater which provides moorings for the largest cruise ships in the world, and a new multipurpose quay for container traffic.

As regards the governmental structure, the Municipalities in Spain exercise their responsibilities at all times and in line with national and Autonomous Community legislation with regard to different policy areas, encompassing, inter alia, urban development, road infrastructure and other facilities owned by the Municipality and promoting public involvement in the efficient and sustainable use of information and communication technologies in the local area.

Fields of excellence and forward-looking strategies

Malaga's strategy is being developed in three areas of smart specialisation, namely a) mobility, logistics and transport; b) supply of ICT and the digital economy; c) as a tourist, cultural and leisure destination.

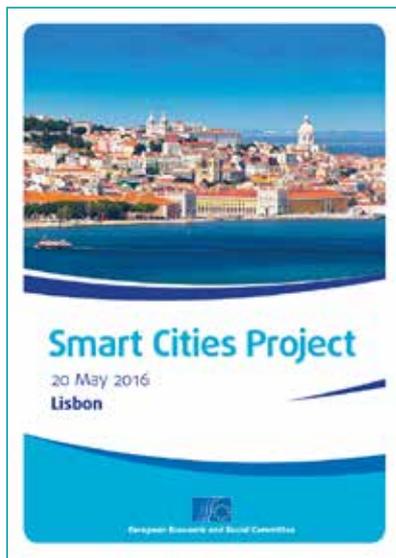
In particular, Malaga's position as a leader in the field of new technologies, knowledge and innovation is widely acknowledged. By 2015, it had consolidated its position through multiple awards and distinctions: it was awarded the **'City of Science and Innovation'** prize by the Ministry of Science and Innovation in 2011 and came **top in the national 'Smart City' ranking**, in 2015. In addition, Malaga has constructed the necessary social and entrepreneurial foundations for promoting its image and commitment to production, through multinational projects such as

the **'Malaga Valley' Club**, which is a mandatory annual meeting in Malaga for the main actors from international companies in the digital economy sector.

Malaga City Council intends to draw up an innovation plan which brings together strategies and sectoral activities in a coherent manner. The current structure of the City Council includes a department for the development of the city's smart specialisations.

2.7 Lisbon

Description and country's governmental structure



Lisbon, the capital of Portugal, is a metropolitan area with a population of 2.8 million inhabitants, and it is home to the country's economic decision-making centres. Lisbon represents about 37% of national GDP and employs about 1.43 million people (30% of the country's labour force), with an apparent labour productivity rate 1.3 times that of the country as a whole. The Lisbon region spends 2.3% of GDP on R&D, a significant ratio compared to the European average. The Lisbon region also boasts more than 50% of the country's total R&D expenditure.

Portugal is a unitary State composed of parishes (freguesias), municipalities (municípios) and two autonomous regions in the islands of Azores and Madeira. It respects the principles of the autonomy of local authorities and democratic decentralization of the administration.

Fields of excellence

The Lisbon region boasts a high concentration of companies involved in high-level technology and research, with approximately 333 000 companies headquartered in the region. The Lisbon region also has a higher percentage of workers employed in foreign companies and high-tech compared to the national average. Lisbon has maintained a good level of foreign investment, with several multinational countries choosing to locate there or to expand their activities in the region. It has asserted itself as an attractive area for shared service centres and has great potential for nearshoring services. The relevant sectors include information technology, software and internet, as well as the health and well-being sector.

Forward-looking strategies

It is considered important to **raise awareness** and **empower stakeholders** in project management practice. At the same time, using a maturity model would add more value because it allows an organisation to evaluate its methods and processes according to the best management practices and a set of external parameters.

The organizations will therefore benefit from the knowledge they will receive from citizens' involvement, and also from the results of the comparison between them and other entities. The next important task is to perform a realistic self-assessment and have a consistent measurement of impacts with a specific mechanism for the verification of results.

3. Areas of smart specialisation

This chapter will focus on what we have considered the most interesting of the cities' projects identified by five main areas of smart specialisation.

The smart specialisation strategy aims to draft a plan in order to achieve systemic changes that are based on the essential goals related to the city's agenda and also to the needs of its citizens. Therefore, it is crucial to co-create this strategy with input from the public, which is why we refer to it as the bottom-up strategy.

3.1 Smart Economy

Broadly speaking, the smart economy is the field in which the smart agenda overlaps with the economy, in the sense that the dissemination of technology has a clear economic purpose. More concretely, it entails projects, such as innovation of manufacturing facilities through ICT technology and the creation of new products as a result of applied technology.

3.1.1 Vilnius

The smart specialisation strategy has identified several fields of excellence in Lithuania, with two technology clusters in Vilnius demonstrating key skills in innovative activities, such as laser physics, and biotechnology. "**Santara Valley**" focuses on biotechnology, molecular medicine and biopharmaceuticals and "**Sunrise Valley**" focuses on attracting businesses engaged in knowledge-intensive activities.

3.1.2 Eindhoven

"**Brainport**" is a partnership between companies, knowledge institutions and authorities based in the municipalities of South-East Brabant. The largest investments and the highest number of patent applications are made in Eindhoven, above all by ASML and Philips. Eindhoven is the location for the High Tech Campus Eindhoven, where companies such as Philips and IBM have buildings in close proximity. The international competitive strength and innovation capacity of the technology industry have a positive impact on employment and economic growth in the region.

3.1.3 Malaga

One of the economic advantages of the city is its highly-skilled human resources especially with regard to ICT and the digital economy. The University of Malaga offers various undergraduate and postgraduate courses in this field. Malaga provides ICT for specific purposes to increase its competitiveness in traditional sectors.

The **Andalusia Technology Park** (PTA), which was inaugurated in 1992, focuses on information technology, telecommunications, and research and development, and currently has over six hundred businesses operating from it, employing over 16 700 people and boosting local businesses, innovation and employment. The businesses in the PTA generated a turnover of EUR 1.6 billion over the last financial year.

With regard to **Acceleration and Incubation Projects**, four business acceleration projects have been launched following an agreement between Malaga City Council and the EOI Business School and receive 80% their of funding from EU schemes and 20 % from local government. The combined injection of capital of EUR 1 million and launching 150 new businesses aims to create an 'innovation eco-system'.

The Municipal Incubation Network (RMI) was created by Malaga City Council to encourage the creation and development of startup companies, to provide support for entrepreneurs and freelancers, and to create new jobs. It comprises 10 facilities located in each of the city districts which have collectively helped a total of 345 businesses. The survival rate of startups which utilised the services of the RMI

after one year is 93 %, (7.4% higher than the Andalusian average for the 2010 - 2013 period).

The **Urban Lab and SmartCity Demonstration Centre**, which was launched in 2014, is an area on the seafront for entrepreneurs and SMEs to test, certify and pilot Smart City products, services and technologies.

3.1.4 Lisbon

The city of Lisbon has many notable programmes and projects to support investors and entrepreneurs such as the **Fab Lab Lisbon**, a digital modelling and fabrication laboratory, which helps entrepreneurs in testing designs and building prototypes, facilitating innovation and startups.

In 2011 Lisbon City Council, in conjunction with the Portuguese government agency IAPMAI, implemented a business incubator, **Startup Lisboa**, to promote entrepreneurship initiatives, job creation and stimulate innovation. The **Lisbon Incubators Network** was launched in 2013 and currently consists of 11 incubators. It operates in partnership with the city council, academia and the private sector and has contributed to more than 200 start-ups and about 900 jobs.

3.1.5 La Rochelle

The roll-out of very high speed broadband throughout the conurbation with the objective of covering twenty-eight municipalities by 2020 is now starting to be introduced through fibre optic networks and represents an important growth driver.

“Open data”, a scheme which makes non-identifiable data freely available for all commercial or non-commercial types of usage, without technical, legal or financial restrictions, is also viewed as an important economic driver acting as an economic magnet, helping startups to offer new value-added services. A wide range of data will be available such as socioeconomic indicators, public transport, shops and educational institutions.

The economic development of the local ITC sector has been supported over the last ten years by the conurbation authority through **‘Créatio ImagéTIC’**, which represents 140 companies in the conurbation, employing 750 people and with a turnover of EUR 115 million.

During the same period, the **Sunny Side of the Doc** and the **Web TV Festival** were launched in La Rochelle, contributing to the rapid growth of the new ‘transmedia’ professions with the support of local authorities. SPN, a network representing digital companies in the Poitou-Charentes region, has also supported employment, innovation and equity financing over the same period.

The La Rochelle conurbation authority has made a decision to nurture transmedia projects in the area and has provided grants for the not-for-profits **“Images du Réel”** and **“Médias & Numérique”**. The latter is a collaboration involving eight IT and audiovisual companies and the University of La Rochelle to promote transmedia development by creating a positive ecosystem in the conurbation sharing resources and developing new concepts to increase the participants’ competitiveness. In partnership with Médias & Numérique, the La Rochelle conurbation authority has also set up a scheme to finance ‘transmedia pilot’ projects called **‘MOOVIN’** to promote the development of innovative digital projects in the area. The planned initiatives include helping companies set up and design transmedia projects, introducing companies to national level clients interested in purchasing transmedia products and mobilising experts in the field.

The La Rochelle conurbation authority has also set up the **PULPE** accelerator to encourage and financially support the emergence and the implementation of innovative projects in the region. This enables local companies to carry out their innovative technological projects while contributing to the professional integration of young graduates.

3.2 Smart Environment

Smart environment incorporates projects that have been categorised in different publications as smart living projects due to their similarity and interconnectedness. This area includes projects related to, for example, energy efficiency, renewable energy, sustainable housing, urban management, projects aimed at enhancing of social cohesion, quality of living conditions, street lighting and waste management.

3.2.1 Eindhoven

“**Vision and Roadmap Urban Lighting Eindhoven 2030**” (Light Roadmap), marks the official start of a new approach to and new management of the city’s public lighting, starting with a new and innovative way of tendering. It is a new project, developed in close cooperation with the Intelligent Lighting Institute of the Eindhoven University of Technology, for managing the city’s public lighting. The project has been commissioned by the City of Eindhoven and has started an innovative way of tendering. A consortium (lead by Philips Lighting and Heijmans) working in conjunction with the city council is to upgrade the existing public lighting to a completely smart grid, paving the way for the development and provision of a number of new services that will have a positive impact on the quality of life while reducing CO2 emissions and cutting annual operating costs.

In the run-up to the Light Roadmap, a number of innovative projects were either completed or begun, starting with the implementation of the vision “**Creating a Public Lighting Experience**” (CAPLE, 2008) in the Strijp-S neighbourhood in Eindhoven through the **Light-S programme**, was awarded the **iF Award** in 2010. The outputs include an interactive pedestrian crossing, based on LED lighting in the pavement (2009), the CAPLE-based implementation plan Light-S, which includes the research “If Light Can Fly”, on the possibilities in the field of lighting using drones, and the computer-controlled lighting plan for the Torenallee, which was awarded the international Auroralia Award in 2014 for being the world’s most ambitious sustainable innovation in lighting.



Stratumseind 2.0, © Tinus Kanters

Stratumseind 2.0, a project establishing a living lab in Stratumseind street, helps improve the area both economically and socially. Using the living lab methodology, data are collected more effectively and the strategy is tailored more accurately: interactive lighting is used to cut down on violent behaviour and vandalism. The data acquired are processed in line with safety measures which ensure compliance with privacy requirements.

Triangulum is one of the three European Smart Cities and Communities Lighthouse Projects, that serves as a testing ground for innovative projects related to smart environment (sustainable mobility, energy, ICT, etc.) that could be replicated in the future for other cities. In Eindhoven, the aim of Triangulum is to transform two districts into sustainable living environments. A number of initiatives will be deployed as part of this project, such as a clean-up of polluted land combined with sustainable energy measures and a biomass power station, ICT-enabled access to a car sharing scheme and smart parking, and more efficient ICT-enabled calculation of energy savings in the district.

3.2.2 Genoa

Genoa has several sustainable energy projects in place to reduce emissions and optimise energy consumption. “**Transform**” is an intelligent planning project to improve energy efficiency and quality of life, with the development of an IT tool to be expanded throughout the region. “**R2cities**” focuses on the development of an efficient energy system for residential buildings.

On the university campus the “Celsius” project plans to utilise waste energy effectively and efficiently to recover energy losses. This is to be done by identifying primary and secondary energy flows within the city and then boosting energy efficiency through the smart integration of highly efficient heating and cooling systems. Another project launched by the University of Genoa, which promotes

joint ventures with universities, industrial enterprises and distribution network operators, is “**ENERGIA 2020**” aiming to optimise thermal and electrical energy consumption and reduce CO2 emissions, annual operating costs and primary energy consumption on campus.



Energia 2020

“**HARMONISE**”, English acronym for “Holistic Approach to Resilience and Systematic Actions to Make Large Scale Built Infrastructure Secure”, is an EU project using case study analysis and scenario modelling on five European cities including Genoa which aims to improve the design and planning of urban areas focusing on large-scale buildings and complexes, in order to increase their security and resilience to new threats.

The “**ANYWHERE**” project aims to develop a pan-European, multi-risk platform to help regional and

local authorities deal more effectively with emergencies due to extreme weather conditions.

The “**iRAIN**” project promotes a new rain monitoring system for urban areas, providing real-time meteorological information from low-cost sensors and technologies which may be mounted on public transport or positioned in fixed locations.

3.2.3 Malaga

The **Malaga SmartCity project**, in the Playa de la Misericordia area of Malaga, was launched by Endesa in 2008. It had a budget of EUR 31 million with financial support from the Centre for the Development of Industrial Technology (CDTI) and on completion in 2013 the project made an energy saving of 25 % in the area, with an annual reduction in CO2 emissions of 20% (more than 4 500 tonnes p.a.). Through the widespread installation of photovoltaic panels, small wind turbines for micro-generation and rechargeable batteries for energy storage, the project directly involved the end-users in the energy management (11 000 domestic customers and 1 200 industrial and service customers), thus including the public for the first time in Smart solutions for energy efficiency and renewable energy.



SmartCity Malaga, © Malaga City Council

The **Elih-Med** (Energy Efficiency in Low Income Housing in the Mediterranean) project co-financed by the ERDF focuses on energy efficiency in low-income housing to identify and test the viability of cost-efficient technical solutions, and was awarded a **Eurocities prize** in 2014. The pilot project in Malaga, which was carried out in a social housing building inhabited by 140 low-income families, sought to involve residents by providing workshops which focused on the maintenance of energy-efficient facilities with a view to possible careers. Malaga City Council is currently reusing this method in other social housing projects.

Since the municipal photovoltaic units are mostly situated in public schools in the city centre, they not only generate energy, but also serve to educate children about sustainable energy. The 41 photovoltaic units installed produced 535 kWp in nominal power. The total electricity generated by these plants and by the cogeneration system at the Waste Water Treatment Plant sludge drying facility, combined with the biogas generated through organic fraction at the Los Ruices Environmental Centre, exceeded 75 000 MWh in 2013. Electricity consumption at municipal buildings and facilities amounts to just over 164 000 MWh per year.

‘**Walking to school**’ is an initiative supported by Malaga City Council and financed by European funds under the **Civitas programme**. The model is an example of good practice for any educational institution which encourages sustainable mobility and child independence as well as healthy habits for their future. The two forms of the model are “**Pedibús**” in which children walk to school, and

“**Bicibús/Bicitren**”, where they cycle. The project relies on the involvement of local people, businesses and other public and private entities along the children’s route to school and helps to improve safety on these routes while fostering community spirit.

The project was launched in 2013, when ‘Walking to School’ was put forward as an educational and environmental awareness-raising project on sustainable mobility aimed at primary education establishments in the city of Malaga, co-financed under the European ‘FP7 CIVITAS Plus II 2MOVE2’ project and coordinated by the Malaga Urban Environment Observatory.

Malaga has also implemented a **Smart Irrigation pilot project** which monitors, controls and manages the irrigation system according to the weather and humidity in the area. The remote irrigation management system saves over 28 500m³ of water annually, accounting for a reduction of 30 %.

3.2.4 Lisbon

BIP/ZIP Collaborative Strategy for Lisbon Local Development is an instrument to reinforce local development policies. These initiatives aim to bridge the gap between local communities and the city management fostering cooperation and mutual participation to promote a sense of community working towards a better functioning city. There are many diverse types of initiative including all areas of the city, from the so-called social housing-districts to neighbourhoods in the historic centre. The approved projects range from the construction of an amphitheatre to creating a street-food business to training young people in various trades. The project was developed and executed through the CLLD (Community-Led Local Development) methodology. This is a specific approach that enables local communities (also partnerships of public and private entities) to develop bottom-up strategies, while enhancing the community’s cohesion.

As part of the **Sharing Cities, Lighthouse project** was designed to test a new approach to creating smart cities. Among its aims are promoting international cooperation between industry and the cities, urban regeneration through better energy performance, the implementation of smart city solutions, the development of innovative business models to create new businesses and jobs. The Sharing Cities project favours citizen involvement, participation and mutual cooperation at local level, strengthening relationships between citizens and cities.

3.2.5 La Rochelle

The **Atlantech park**, a low-carbon emissions business park near La Rochelle, is designed to stimulate the development of technological activities and services in the fields of energy eco-efficiency in



Atlantech © Julien Chauvet - Mairie de La Rochelle

urban areas, soft mobility, sustainable development and eco-construction. The Atlantech park project was initiated by La Rochelle conurbation authority and has succeeded in bringing together the main stakeholders in the sustainable urban regeneration sector. The project promotes the re-use of materials, the circular economy, and the use of bio-sourced materials; prioritises the use of constructions that consume as little energy as possible, while favouring renewables and smart distribution systems; promotes soft mobility. The park hosts the Tipee technological trials platform which is a test laboratory, training centre, and a business incubator.

The La Rochelle conurbation committee supports the **BIOTOP industrial ecology project** which focuses on a collaborative ecological approach to waste management in industrial zones. The BIOTOP eco-network has brought together more than 120 companies, working on collective industrial ecology, as well as contributing to the innovation and creation of new products such as the “Melting Pot”, the first 100% recycled plant roofing material. This project is now developing from industrial ecology towards the circular economy, including CSR issues and waste collection and re-use through a resource centre.

3.3 Smart Governance

Projects related to smart governance aim to increase the transparency of the decision-making process and achieve greater citizen inclusion. These are mostly e-platforms initiatives that open up a more efficient communication channel, connecting citizens directly to the public administration, and also the open-data projects that provide the necessary information which can be utilised in a number of different ways, such as supporting the growth of businesses or increasing the level of participation and the public's involvement.

3.3.1 Vilnius

Vilnius city government has introduced **e-participation platforms** to involve citizens in the city's decision-making processes. The platforms allow citizens to express their opinions and make suggestions by interacting with members of the City Council, participating in polls, preparing e-petitions and even voting on topics that are on the Council's agenda.

Open-data policies in Vilnius city are a best-practice example of how good results can be achieved with minimum resources. City financial accounts, GIS (geographic information system) data, municipal real estate ownership, public procurement contracts, an open list of reductions in rent for municipal property, and other relevant information are fully accessible to the public. Implementing the **Open Vilnius** project in a short time frame with limited financial and human resources helped both to identify problems efficiently, enabling prioritisation as the project continues, and to make information available to the public as quickly as possible.

The "**Code4Vilnius**" initiative was launched in 2015 to involve anyone willing to contribute to Smart Vilnius initiatives. It aims to encourage IT developers to create products that involve citizens, encouraging them to participate in municipal decision-making and services. The applications are to include services such as tools for providing feedback and gathering opinions on certain decisions in the city council, and SMS voting on the quality of municipal services.

3.3.2 Eindhoven

The city has adopted "**design-thinking**" as a powerful methodology for making policy and municipal action more effective in a number of areas. The key is basing policies and decisions on the needs of the "end user", i.e. citizen. The city has appointed a strategic design consultant with a strong background in social design to oversee and develop projects and build a strong methodology.

3.3.3 Genoa

The **iCity** project aims to develop an open data platform for services and applications. The CloudT project is designed for the management of information activities through services directly available in the Cloud. The **CloudT platform** not only reduces costs, but improves the quality of IT services by dispensing with the need for any modified hardware and software.

The "**STRATEGIC**" project, whose aim is to create an ICT platform for the development and implementation of interoperable information technology making it more effective for individuals, organisations and businesses, with a view to promoting 'smart governance'.

3.3.4 Malaga

Through the **Open Data project**, the Malaga City Council allows access to its 630 data sets either on its open data portal, or on the national portal <http://datos.gob.es/>. These data have already been harnessed by a number of entrepreneurs and businesses to develop applications of various types.

One of the seven **Fiware** hubs in Spain is located at the Malaga City Council headquarters. Fiware is a platform for developing Future Internet applications promoted by the EU. Malaga has contributed

more data sets to the platform than any other Spanish city (a total of 513 as of 11 February 2016). This platform provides businesses, universities and developers with the tools they need to develop apps.

In Malaga, a number of applications have been developed through this platform, including the **CitySense project** and the **Smart Data Malaga project**. The latter was used by Urban-M and the postal service to jointly design a device to be installed in mail delivery carts to collect environmental data at a much lower cost than traditional data points.

'**Crowdworking**' is a space jointly created by Telefónica and various regional governing bodies throughout Spain, to be a hub for the promotion of knowledge and innovation in which to develop projects and incubate startups. In these hubs, the entrepreneurs receive the training and mentoring they require to create their digital business, with help from eco-system experts.

3.3.5 La Rochelle

La Rochelle conurbation authority has implemented numerous projects to increase Smart governance including:

- The **Open Data project** to facilitate innovation and transparency of public initiatives.
- The creation of **payment for parking by smartphone** ('pay by phone').
- The introduction of **internal electronic procedures** at the town hall (electronic signatures, electronic document management etc.).
- The inclusion of **sustainable development** as part of public policy and the creation of green governance (obtaining European Cit'ergie certification).
- **Free public Wi-Fi** - the town is setting up 2 to 3 new sites each year.
- **IT in schools** (computers in classrooms, interactive digital blackboards, tablets, introduction to programming etc.) to help educate students in ICTs and with ICTs.
- Setting up an **extranet online** so that hoteliers and hosts can pay the tourist tax remotely.

Smart governance projects which La Rochelle conurbation authority is currently implementing include:

- A **citizen's portal** to develop high-performance, simple and accessible public services. The La Rochelle single account project will provide single access to all remote services and online procedures (pertaining to children, living environment, civil status, urban projects etc.), providing easy access and multi-channel points of entry for users as well as allowing the grouping and monitoring of user complaints.
- Updating of **participatory internet and intranet sites**, as well as the development of mobile applications in order to improve communication and citizen consultation.
- The **digital transformation** of town hall services and the pooling of resources between municipalities to improve the efficiency of public initiatives.

Future Smart governance projects include:

- The **detection of free parking spaces** on roads. No sensors will be used, but data from parking meters will be released in real time. There will therefore be no environmental impact, and costs will be lower than would be the case with an equivalent service.
- The location of cycle paths, bicycle racks, shared vehicle stations, real-time traffic reports, data about accidents.
- The development and support of **innovative digital services** (crowdsourcing, Fab Labs, etc.)

3.4 Smart Mobility

Smart mobility strives for the interconnection between transport and logistics, as a result of using ICT technology. This area covers projects related to, for instance, electric mobility, mobile apps for public transportation, or projects related to data-gathering from citizens about the quality of transport and air quality.

3.4.1 Vilnius

A number of projects have been implemented to improve transport management in the City of Vilnius:

- a **traffic monitoring and regulation system**;
- a **single travel card** for public transport, together with dozens of new vehicles and express buses to make journeys faster and more comfortable;
- a **bike-sharing scheme** launched to increase ways of getting around the city
- the **Smart Vilnius** mobile app, which includes mobile ticketing (for the purchase of public transport tickets, planning journeys and live timetables). The mobile parking app can be used to pay city parking fees online.



Bike-sharing scheme in Vilnius, © Saulius Žiūra

3.4.2 Genoa

Genoa City Council has implemented several projects to improve transportation in the city.

The “**Ele.c.tra**” project tests an innovative model for the development of sustainable electrical mobility with low CO2 emission technologies and a low environmental impact in urban areas where motorised traffic is particularly prevalent.

The “**MOVE US**” project develops ICT mobility solutions which, utilising an analytical cloud-based management platform, promotes user services to encourage sustainable mobility, ‘smart mobility’ applications for both private electronic devices and mobility control centres, and applications for evaluating the energy efficiency of mobility.

“**I Locate**” is a pilot project to develop a geo-localisation network of users and security agents and to produce high-technology services for tablets and smartphones, to be used both for ‘navigating’ around the building and in the event of an emergency.

3.4.3 Malaga

The **Zem2All** (Zero Emissions Mobility to All) is a large electric mobility project with a budget of EUR 60 million (75% from Japan and 25% from Spain) which was launched in 2012 as part of the Japan-Spain Innovation Programme (JSIP) by NEDO (New Energies and Industrial Technologies Development Organisation of the Japanese government) and the CDTI. The project, which was completed in 2015, was implemented both by Spanish businesses (Endesa (lead company, Telefónica and Ayesa) and Japanese businesses (Mitsubishi Corporation, Mitsubishi Heavy Industries, and Hitachi).

The project investigated the impact of electric vehicles, vehicle recharging and related services in a ‘smart city’. The project used 200 rented electric vehicles (160 Mitsubishi i-Miev and 40 Nissan Leaf) and the Malaga City Council also used 45 of the vehicles for its municipal fleet. Feedback information from the users and from the vehicles themselves was sent to the electric mobility Information and Monitoring Centre



Charging stations in Malaga, © Malaga City Council

to manage the recharging, parking and power distribution systems. Nine quick charging points were made available in the area as well as the standard Endesa charging points at the normal parking locations, all of which also relayed information to the Information and Monitoring Centre. A series of provisions was included in municipal legislation to promote electric mobility (lower car tax, free parking in blue zones, and reduced rates in municipal car parks).

The **Victoria project**, funded under the 2013 Andalusia Interconnectivity ERDF Technology Fund, introduced the first dynamic induction-charged electric bus in Spain to increase the autonomy of

electric buses without altering operating times. Such technology enables electric vehicles to be recharged wirelessly while in motion, allowing buses to be recharged in any one of four ways (standard conductivity, rapid conductivity, static induction and dynamic induction).

In addition to a considerable intermodal transport network, the city is fully committed to more sustainable and energy-efficient alternatives such as electric mobility and bicycles. Malaga City Council currently has a 33 km network of urban cycle paths which it plans to extend by 69 km in the coming years.

Malaga has drawn up a **Sustainable Energy Action Plan** (SEAP) and all its transport activities are designed to reduce CO₂ emissions in accordance with the 2020 Europe Strategy. In 2015, the City Council Plenary unanimously voted in favour of joining the new European Covenant of Mayors for Energy and Climate initiative.

3.4.4 La Rochelle

La Rochelle has a long tradition of innovation that began in the 1970s with the introduction of pedestrian precincts in the town centre. The first city bicycles appeared in 1976, **electric car-sharing** was introduced in 1999, and in 2003 the park-and-ride scheme was launched.

Important innovations include **transport pass cards** with a chip that can be recharged on the internet, enabling inter-operability between methods of transport, a real-time information service for travellers via SMS and the QR code system (indicating times of next buses and information about delays), information panels at bus stations and at bus shelters, and TFT screens in buses.

The transport authority known as **Yélo** includes buses, car sharing, bicycle sharing, park-and-ride, ferries and sea buses. La Rochelle offers various forms of Smart transport including

- **“Yélobobile”** cars have 13 stations in La Rochelle. These are self-service cars with no obligation to return the car to the original pick-up station.
- **“Park-and-ride”** has 500 users per day (annual average), 3 additional park-and-rides to be set up.
- **“The Sea Bus”**, featuring solar panels (26 m²) supplying 20% of energy with mains charging at night (Ni-Cd batteries), had 123 000 travellers in 2015.
- **“The Ferry”**, 232 500 passengers in 2015, first solar-powered electric boat in France (1998).
- **“Yélo la Nuit”** is a service that is constantly improving, responding to real needs, and currently has 130 Yélo taxi ranks/landing stops identified with a ‘T’ logo.

In 2006, **“ELCIDIS”** (Electric City Distribution system) was included as part of the ‘New mobility services using electric vehicles’ and the public service delegation contract was signed with Proxiway.

ELCIDIS has a strategic central platform located near to the town centre enabling final-mile delivery. Electric vehicles are favoured due to a municipal order restricting access to the town centre between 6 a.m. and 7.30 p.m. The service offers grouping/ungrouping, delivery to individuals, rental of storage areas, 2 electric models (3.5 t), 3 utility vehicles, one of which is refrigerated. There is ongoing consultation on the overall strategy for delivering goods into town / final-mile.

The **CityMobil2 Experiment (City Mobile 1: 2006-2011; City Mobile 2: 2014-2015)**, part of a European project together with local partnerships, is a public transport system of 6 driverless, electric vehicles for urban transport. Although the vehicles are driverless, there is an operator on board for safety and to provide information. With 15 000 passengers and 0 accidents, this project represents an important step forward in the legalisation of driverless public transport vehicles.



The town of La Rochelle has jurisdiction over parking in public spaces and, since the conurbation authority is both a stakeholder and an innovation driver, it introduced parking payment by means of telephone and internet using the **PayByPhone application** in 2015.

3.5 Smart People

In the area of smart people, the projects entail some learning processes for citizens to acquire the necessary skills and knowledge for the mastering ICT technology. This field is crucial as, without its support, other areas of smart specialisation would be disadvantaged. Initiatives can also empower people to customise and, more generally, work with data in order to make informed decisions on their lifestyle. They also enable people to make use of the opportunities to design products and services.

3.5.1 Genoa

The "**Rapid Deployment for Intelligent Cities and Living**" (RADICAL) project aims to create a Cloud-based platform fed by information generated by sensors in the city's infrastructure, individuals' own devices, and individuals using social networks. Genoa has produced two systems: an intelligent system for managing the journey of products from countryside to city while reducing CO2 emissions and a portal for raising public environmental awareness have been launched on this platform. The latter aims to empower citizens who want to have a more eco-sustainable lifestyle with the necessary tools to do so, providing them with an opportunity to exchange good practices and make suggestions, as well as encouraging crowd based innovation. Every city participating in the project uses the RADICAL platform to upload the services it has chosen to develop, making them available and accessible to all other interested cities.

The "**Very School**" project is dedicated to the development of a digital information system to improve the energy efficiency of school buildings.

The "**JCVG**" project uses the peer education method to teach secondary school pupils and informal groups of young people about positive masculinity, combating violence against women and tackling discrimination against the LGBT (Lesbian, Gay, Bisexual, Trans-sexual) population.

3.5.2 Malaga

The "**Incentivised Training Programme**" aims to help those with particular difficulty in accessing the labour market to gain professional qualifications in specialisations in demand. The programme's development follows the dual training model, combining theoretical training with on-the-job learning. This programme is entirely funded by Malaga City Council and relies on the help of local businesses to provide work experience opportunities for the students. As part of the Incentivised Training programme, a wide variety of courses is offered, including several which are relevant to sustainable development and Smart Cities such as:

- Urban and industrial waste management. (300 hours)
- Development of applications for the management of business content. (300 hours)
- Digital marketing in training. (280 hours)
- Installation of telecommunications systems in the telephone network. (140 hours)
- Technical water facilities. (250 hours)

The "**School Workshop Programme**" is a training and employment programme designed to bring young unemployed people under 25 into employment by means of qualifications and professional experience. The programme provides those who have not completed basic formal education with the opportunity to earn a secondary school qualification as an adult. Several School Workshop projects developed in recent years are particularly noteworthy, including:

- The '**Energy Efficiency**' School Workshop focusing on implementing energy-efficient measures and the installation of renewable energy equipment, and energy-efficient plumbing and electrical facilities.
- The '**Urban Spaces**' School Workshop about general maintenance of urban spaces in the socially deprived Palma-Palmilla district.
- The '**Hardware Services in ICT**' School Workshop to develop the skills required for the Auxiliary Operations professional certificate in installing and maintaining micro-computing systems, installing networks and maintaining municipal IT equipment.

“**Aula Mentor**” is an open and flexible online education project to enhance adults’ personal and professional skills, supported by the Ministry of Education, Culture and Sports through the Sub-Directorate General for life-long education.

The “**ONLINE Training Programme**” involves training courses for lifelong learning using Web 2.0 technologies within virtual learning environments and is based on tutoring and student monitoring. This programme, funded entirely by municipal resources, helps to bring professional knowledge up to date to improve employability, and attracts a large number of students thanks to the information and communication technology it uses as learning tools.

The “**Municipal Placement Agency**” is an intuitive, free online service approved by the Public Employment Service to help job-seekers find employment and to provide businesses with a tool to identify suitable candidates for vacant positions.

“**The Business Unit**” programme aims to incentivise the creation of businesses in Malaga and to help sustain them, and is based on the principle that sustainable development starts with the creation of productive and entrepreneurial cities. It offers a full information service for business creation as an initial point of contact for entrepreneurs, and focuses on resources available for entrepreneurial development, providing future entrepreneurs with advice for their startup projects.

Self-employment is encouraged through a personal advice service which is available throughout the business creation process. Access to alternative funding sources, such as mini-credit programmes is provided. The creation of businesses is promoted through support in recruitment by means of the Employment and Self-Employment programme which is financed entirely from the municipal budget.

Training is offered for local businesses and entrepreneurs at the Municipal Business School and business meetings are held in the city’s 11 districts to foster the development of synergies between businesses.

3.5.3 *La Rochelle*

Thymio robots are experimented in primary schools to encourage the participation of young people through play. Thymio robots are Swiss-made and work with drag and drop languages and text-based languages like Python. The robots use life situations and role play as ways of stimulating the pupils’ interest and raising issues. Choosing active educational methods develops capacities for creativity, nurturing initiative rather than simply the ability to understand and reformulate. Following the new school programmes from the Ministry of Education, with the help of specially adapted programming software pupils can code movements, leading to an understanding and the production of simple algorithms.

La Rochelle also promotes computer-based logic through experimentation in the form of extracurricular games helping children understand and perhaps sparking interest in the digital technology that surrounds them in their daily lives.

Three primary schools in the town of La Rochelle are to experiment with this introduction to logical thinking during extracurricular time through the use of the Thymio robot as an educational aid. In parallel, the robot will also be used in recreation centres during school holidays. This educational aid develops creativity and empowers children in the field of ICT.

Training for children’s group leaders is to be implemented through the **Class Code project** which is supported by INRIA (the French National Institute for Research in Computer and Control Sciences), and aims to train 300 000 group leaders through a series of online lessons and on-site training courses.

The “**Cyberlocal**” project, implemented by the conurbation authority, aims to encourage the familiarisation and use of ICT, to promote digital inclusion for the citizens of the conurbation and to reduce any inequality or social exclusion related to digital technologies. In 2010, the conurbation authority set up a free, accessible public access point (PAP) on the internet which makes several resources available to citizens and offers free online workshops,

4. Recommendations and conclusions

4.1 Challenges and recommendations

As described in the previous chapters, it should be pointed out that each city has its specific characteristics and fields of excellence. All the selected cities have already launched various projects and thus increased their overall “smartness”, whilst other projects are not yet fully implemented.

The ideal situation would have been to assess every project by evaluating all the relevant data before its initiation and after its implementation to determine whether the smart agenda delivers the outcomes that are assigned to it, with particular regard to Return on Invested Capital, and their impact on the quality of life and employment. This raises about a number of challenges related to data gathering, the creation of a harmonised methodology and keeping databases up-to-date. We would suggest that smart cities establish a system of key performance indicators to evaluate those outcomes, although we are conscious that it is not an easy task to fulfil in a short time-frame.

However, the overall impression is that, due to their smart potential, the six assessed cities **have the capacity to achieve the envisaged outcomes**, and most of their projects must have had a **positive impact on growth and employment**.

One of the key aims of the project was to develop a set of recommendations. The study identified several key challenges on which to focus and mistakes to be avoided. Taking the key challenges as a starting point, a series of recommendations has been identified to help cities to improve the success of their future or ongoing projects. The proposed recommendations are based on the site visits, the cities’ stakeholders contributions with the description of their best practices, as well as two EESC own initiative opinions⁴.

The following series of challenges and the subsequent recommendations have been gathered from five main policy areas.

4.1.1 Civil society’s involvement and quality of life

Challenge:

- Since technology cannot work alone, **lack of communication** with citizens results in **top-down approaches**. As a result, some projects and their strategies may end in failure.

Recommendations:

- Smart projects have to be developed with **input from civil society**, taking into account its culture and customs. In particular, in a number of the assessed projects, it is envisaged that any transformations, either small or large-scale, have to be carried out after consultation with those citizens who are directly impacted by the changes. This level of **public involvement** is welcomed by the Committee and should be regarded as a standard procedure for creating cities which are both intelligent and also human.
- Technology is not an end in itself. Broadly speaking, if technology is to succeed in meeting the needs of the area and its inhabitants, the majority of technical solutions required in a smart city must be considered with the involvement and participation of the different stakeholders.

4.1.2 Financing schemes and economic issues

Challenge I:

- **Limited budget** represents a barrier to marketing innovative smart city solutions and a greater level of **investment** is required at the early stages in particular.

Recommendations:

- Since funding for infrastructure from traditional sources falls far short of the investment needs, **combined public and private financing schemes** represent a significant development in the

4 A) The above-mentioned Smart cities as a driver of a new European industrial policy. References: TEN/568 EESC-2015-568. Own-initiative. Rapporteur: Mrs Daniela Rondinelli (Workers - GR II / Italy). Plenary Session: 509 - 1 Jul 2015 - 2 Jul 2015. Official Journal of the European Union, C 383, 17 November 2015.

B) Digital society: access, education, training, employment, tools for equality. References: TEN/548 Own-initiative. Rapporteur: Mrs Isabel Caño Aguilar (Workers - GR II / Spain). Plenary Session: 500 - 9 Jul 2014 - 10 Jul 2014. Official Journal of the European Union, C 451, 16 December 2014.

overall practice, not to mention the fact that public sector money could be used to reduce the commercial risk of innovative elements and then accelerate the flow of private sector finance.

- Investment in smart cities should be supported by making more of the **synergies between existing European, national and regional public funds** and by harnessing the opportunities provided by the European Fund for Strategic Investments.
- **Replicability** and scalability of innovative solutions should be pursued by encouraging the emergence of technical standards for interoperability, exchange and open enabling solutions.

Challenge II.:

- **Rigid legislation** and/or a reluctance to adopt innovative financing models based on public-private partnerships may be considered as barriers to development.

Recommendation:

- It is essential to promote a smart cities common market, by means not least of a **harmonised regulatory framework** that includes an EU-level review of public-private partnership tools in order to make them more attractive for businesses and extend their operational remit to the services sector, which is central to the digital economy.

4.1.3 Bureaucracy and complex processes

Challenge I.:

- **Bureaucracy** and complex processes, on different levels, slow down projects and make several of them ineffective in terms of addressing the citizens' needs. The most common challenge is to avoid the **dispersion of strategies** (social, energy, tourism, etc.), and the struggle to define a common and coordinated framework for activities.
- Smart projects are nowadays mostly governed and carried out on a local and, in some cases, regional basis, sometimes **without proper strategic planning** that would allow for organisational management. Some local administrations face **internal barriers** because their current format tends towards traditional compartmentalisation in some areas. As a result, a less integrated and transversal approach towards developing future projects is followed.
- The ultimate goal of implementing smart cities projects is always and above all to **improve quality of life**. However, smart specialisation often goes hand-in-hand with **disruptive innovations**. This could be at an organisational, financial or even at a personal level between people. The time that it takes to achieve smart specialisation therefore depends mainly on the turnaround times of the (generally regular) decision-making processes involved.
- The **timing** of public and private activities is often out of phase: the city receives requests from multiple start-ups carrying out projects which would fit in perfectly with the political vision of the elected representatives, but which are postponed or abandoned because the implementation periods are too long, or there is a lack of scope for support.

Recommendations:

- There is a need to harmonise the decision-making processes of projects and avoid bureaucracy as far as possible. Dividing the focus among many projects should be avoided. Reducing the number of initiatives and a **better allocation and targeting of resources** is necessary for projects to be more efficient. There should be more comprehensive planning and a common vision of shared objectives.
- **Collaboration in a multi-sector approach** is key as a way for services/technicians in the different authorities, administrations, or institutions to work together (multidisciplinary work, skill transfers, sharing of platforms) in order to bring a new dimension to the projects being implemented.
- **Knowledge-sharing practices** are highly recommended for fostering cooperation and promoting learning processes between different cities that might have similar features.
- Due to the fragmented nature of the expertise and resources of both the European Commission (with smart cities policy spanning six directorates-general), and the Member States, where the division of powers and responsibilities between central, regional and local administrations is not always clear, the Commission should set up a **single European centre of expertise on smart**

city policy and resources, involving the directorates-general concerned, the Member States, the Committee of the Regions and the EESC.

- Every Member State should also set up **one-stop shops** to provide smart cities with access to technical and financial expertise. These would be open to local public and private stakeholders so as to nurture advocacy by consultative groups made up of **civil society organisations and the social partners** at national level and within individual cities, promote cross-cutting working methods, the informal sharing and transfer of skills and knowledge, enable project emulation and prevent the duplication of projects. Moreover, these one-stop shops would link up directly with the single European centre of expertise on smart city policy and resources.

Challenge II.:

- **Exchange of data** at all levels is recommended. However, the different data standards are a barrier.

Recommendation:

- Interoperability of data must be encouraged. **Data standards** are useful for creating, sharing, and integrating data from multiple resources.

4.1.4 Lack of skills, education and digital inclusion

Challenge I.:

- A **lack of highly-qualified professionals** in the public sector is a barrier to taking the right decisions on the choice of technologies.
- The EU has a high unemployment rate but at the same time - as the Commission has pointed out - it faces an immediate shortage of 900 000 skilled workers to **fill vacancies** in the ICT sector.

Recommendations:

- It is crucial to introduce plans to **provide training** and enable individuals, both in the public and also private sectors, to upgrade their skills to embrace innovation. Most of Member States have already implemented reforms of their national education systems in order to fulfil the requirements of the labour markets. Nevertheless, the continuous improvement in forecasting of future needs and shortfalls, as well as closer cooperation between educational establishments, government and employers, are key factors in addressing the existing mismatches.
- A drop in the number of ICT graduates, and the retirement of current ICT workers could jeopardise the ICT job growth potential. Therefore, there is a need to **strengthen education** in science, technology, engineering and mathematics and to improve the career image of these fields.
- Currently, only 30% of the 7 million or so people working in the ICT sector are women; **women are under-represented** at all levels, and above all in decision-making positions.
- A change in policy is made particularly necessary by the drop in the number of women ICT graduates: currently, only 29 in every 1 000 women hold a postgraduate degree in an ICT subject, and only four in every 1 000 will be employed directly in the sector.
- Greater female participation in the ICT sector could increase the euro area's GDP by EUR 9 billion.

Challenge II.:

- **Digital exclusion** is a key challenge linked to connectivity issues and skills, especially as far as the older generations or vulnerable citizens are concerned.

Recommendations:

- **Accessibility** is a human right. It should also be noted that in Articles 20, 21 and 26, the Charter of Fundamental Rights of the European Union, an integral part of the Lisbon Treaty, prohibits any form of discrimination on account of disability and recognises the right of persons with a disability to benefit from specific measures; for its part, the United Nations Convention on the Rights of Persons with Disabilities commits member states to adopting adequate measures to ensure access for people with disabilities, on an equal basis, to information and communications technologies, including the internet.
- Models for **Open Innovation** should be promoted. Care must be taken to avoid unjustified measures to protect intellectual property when these could restrict innovation processes in the digital economy.

4.1.5 EESC's smart city model

Challenge:

- On the basis of the study visits and the material we have received from cities' stakeholders, it can be argued that the selected cities have done their best to develop a **comprehensive approach**, although, in some cases, their focus is on the pillar more connected to their fields of excellence. However, it must be pointed out that, as already described, La Rochelle, most notably, has developed a cluster of smart activities identified in six main policy areas.

Recommendation:

- It is advisable to converge towards a development model that is more advanced and effective than those applied to date, which have been characterised by extremely fragmented action. Consequently, it is proposed that the above-mentioned (paragraph 2.1) six pillars should be considered as standard components of a strategic smart city project as these elements can maximize their positive impact.

4.2 Conclusions

Context

This report is the first of its kind to focus on EU cities, selected on the basis of wide-ranging economic, geographic, demographic criteria and the country's governmental structure.

Within the framework of the study, a delegation of seven EESC members has carried out study visits to six EU cities, in order to learn about their smart initiatives and then draw up a set of recommendations to be disseminated among the European Institutions and all relevant stakeholders across the European Union.

Why the smart cities projects are so important?

The continually accelerating population growth, both globally and at European level, determines that more and more people will end up living in cities and megacities. In particular, more than half of the world's population now lives in cities, and this figure is set to rise to 70% by 2050. This trend is creating quite a challenge for cities but, at the same time, the challenge can be seen as an opportunity that can transform them into drivers of innovation.

Promoting smart cities across Europe means **increasing the efficiency and accessibility of services; and reducing poverty, unemployment, social exclusion, pollution and environmental damage**. Moreover, making cities "smart" will impact on the day-to-day lives of individuals, workers and businesses through a series of changes, related, for instance to teleworking, e-democracy and greater transparency, and will allow more active participation in the decision-making process.

Forward-looking perspective

Turning to a forward-looking perspective, the main lessons learned from this study are the following:

- Cities will only progress towards a smart mindset if the process is based on an ongoing **dialogue with civil society**, which can be extremely helpful at all the different levels of the whole process. Consequently, the smart agenda, at the European, national and local institutions level, has to ensure that projects are always **contextually tailored to reflect the needs and well-being of the citizens**;
- Since the collaboration, dissemination and promotion of best practices and expertise is essential, there is a need to create a **culture of sharing innovation**: the EESC can play a role of facilitator of this important process in its institutional role of a bridge between Europe and organised civil society.
- **Cooperation** between the private and public sector, including research centres and Universities, is a powerful tool to match the objectives of covering investments needs and maximising the added value of best practices.

In conclusion, it can be argued that the study visits to the selected six EU cities and their reports proved even more conclusively that the main conclusions of the Committee's own initiative opinion on Smart cities as a driver of a new European industrial policy are still valid and crucial for the smart cities to reach their full potential.

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