Proyecto Fin de Grado

Grado en Ingeniería de Organización Industrial

Development of a Smart City Strategy

Autor: Pedro Wamba García

Tutor: Guillermo Montero

Dpto. de Organización Industrial y Gestión de Empresas

Escuela Técnica Superior de Ingeniería

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Autor:
Pedro Wamba García

Tutor:
Guillermo Montero Fernández-Vivancos
Profesor titular

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El tribunal nombrado para juzgar el Proyecto arriba indicado, compuesto por los siguientes miembros:

Presidente:

Vocales:

Secretario:

Acuerdan otorgarle la calificación de:

Sevilla, 2020

El Secretario del Tribunal

A mi familia

A mis maestros

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I would also like to thank my family and friends for all the support they have given me during the happiest stage of my life. Without them it would not have been possible to get here.

Pedro Wamba García

Sevilla, 2020

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1 PURPOSE OF THE PROJECT AND INTRODUCTION

Before starting to talk about a possible strategy to follow in the development of a Smart City, I would like to start writing this project by explaining what has led me to the realization of this particular work.

During my time as a student of the Degree in Management Engineering, I have had the opportunity to learn about many branches of knowledge in more than 40 different subjects divided in 4 years. In this way, one of the subjects that I have enjoyed studying the most has been Project Management, for that reason I thought that Guillermo Montero could be the ideal person to tutor me in this project.

From an early age, I have travelled around Europe and have had the chance to get to know many different cities and cultures. I feel lucky to have been able to see first-hand how a citizen of Bergamo works, how people move around in London or how a person from Munich spends his free time. Besides, although I don't like to identify myself with the recently used term ``Millennial´´, I consider myself a person more than familiar with the world of new technologies, I try to make use of them whenever they can make things easier for me. That is why when my tutor Guillermo Montero suggested the possibility of doing my ``Trabajo de Fin de Grado´´ about the concept of Smart City, I did not wait a moment to start working on it.

After some time of searching for possible cities on which to carry out my study, I realized that I had the solution in front of me. I chose to develop a strategy for a small city, not very technologically developed but with an enormous potential for improvement, Conil de la Frontera, where I am currently living.

The purpose of this project is, essentially, the development of a Smart City strategy for Conil de la Frontera, composed of a series of sub-projects, all of them based on information and communication technologies, from an initial diagnosis of the current situation of the city in Smart terms.

Due to the lack of a definition and globally recognized parameters or indicators, I have chosen to use the tool ``Herramienta de Gobernanza Ciudades Digitales´´, created by the Ministry of Industry, Energy and Tourism through the entity Red.es, for the development of this strategy and the initial diagnosis.

At the same time, a theoretical explanation of the Smart City concept, its development in recent years, its historical context and the different areas that make it up will also be given, so that anyone who reads the document without any prior knowledge of the subject will be able to understand this project. In addition, the Smart background in Conil de la Frontera will be presented, that is, the steps the city has already taken on its way to becoming a Smart City.

In summary, the project will begin with a theoretical part in which the main concepts will be explained, based on the ``Estudio y Guía Metodológica sobre Ciudades Inteligentes´´ developed by the Ministry of Industry, Energy and Tourism of the Government of Spain. Then, the problem to be solved will be presented, that is, the case of application of the theory previously developed for Conil de la Frontera. We will continue with the initial diagnosis, application and resolution for the city, as well as a comparison with a nearby and similar city. Finally, we will propose a series of measures to be implemented with which Conil will be able to follow its process of becoming a Smart City of reference, and we will present the conclusions of the study.

2 A BRIEF STORY ABOUT CITIES

Before Before we talk about Smart Cities as such, we must start by talking about the precedent of the concept, urban planning. This, according to the RAE [1], is the process of description, analysis and evaluation of the conditions of operation of the cities in order to generate design proposals that allow the regulation of the urban and environmental dynamics of the whole city. Today, almost any major city owes its design and functionality to generations and generations of urban planners, people who have worked to build the infrastructure necessary for these cities to accommodate those who are now their inhabitants.

This branch of architecture has been present in our lives for a long time, exactly since Ancient Greece. The architect Hippodamus of Miletus is recognized as the first city planner, and the father of urban planning. His vision was based on the division of cities into areas for private, public and sacred use. Miletus is responsible for devising the city planning grid system. We can directly attribute to him the intersections and right angles between major boulevards in city centers.

However, we have to go back to the 17th century, when Maharaja Sawai Jai Singh II designed from scratch what would later become the new capital of India, Jaipur. The plan of this ancient king interested in architecture was the development of a new city based on ancient Vedic architectural principles and practices. The city was divided into nine blocks, two of which contained the state buildings and palaces, with the remaining seven allotted to the public.

Closer to our days, at the beginning of the 19th century, we can observe a small revolution of urbanism, belonging to which are the works of Pierre Charles L'Efant and his adapted grid system of Wawhington DC, Sir Ebenezer Howard and his Garden City practices in London, or Le Corbusier, responsible for the design of Chandigarh and his ``City Beautiful´´, project that later would influence urban residential design and city planning all over the world. [2]

From these pioneers we can admire their vision, how they anticipated the events of their time, or we can even learn from them how to design cities for today and for the future. However, there is one aspect that they could not foresee, which was the emergence of new technologies, specifically, information and communication technologies. It is this aspect that differentiates today's city planners from those of yesterday, the use of these technologies for the development of sustainable communities.

The first step on this path was taken by the city of Los Angeles in 1974, with the creation of the first urban big data project: ``A Cluster Analysis of Los Angeles'' report. Twenty years later, the term Smart City was used for the first time in Amsterdam, in its digital city project ``De Digital Stad'' to promote Internet usage. In 2005, the American company Cisco put up $25m over five years for research into smart cities. These were the first steps on a path that it follows today, and that presumably will continue for many more years, as for example with the Smart City Expo World Congress in Barcelona, an event that every year brings together tens of thousands of visitors from all over the world. However, one question arises: What is actually a Smart City?

3 WHAT IS A SMART CITY?

The promise of jobs and prosperity, among other factors, pulls people to cities. Half of the global population already lives in cities, and by 2050 two-thirds of the world's people are expected to live in urban areas.

Therefore, today's cities face a greater number of challenges - or at least are more sensitive to them - than those that existed a few years ago: new problems complicate the management of cities, making them even more complex. Poor air quality, insufficient water availability, overcrowded areas, financial sustainability, are some of the big problems caused by the increasing population density and demands of urban environments.

Fortunately, technology has undergone an exponential change in recent years and can be a great ally in responding to the challenges of the city. In this scenario, technology should be the driving force behind change in resource management, making a more efficient use of resources to meet the demand of larger populations with limited resources. This is where the smart city concept comes in.

To date, there has not been developed a unique definition of Smart City, as different agencies and governments have their own views on the concept, and other entities are still debating the content of the term. This is, for example, what the ITU (International Telecommunication Union, understand by Smart City:

``*An intelligent and sustainable city is an innovative city that uses information and communication technologies (ICT) and other tools to improve the quality of operations, urban services and competitiveness, ensuring that it meets the needs of present and future generations with respect to economic, social, environmental and cultural aspects´´*. [3]

McKinsey & Company, however, has a more pragmatic view of it:

`` *Smart cities add digital intelligence to existing urban systems, making it possible to do more with less. Connected applications put real-time, transparent information into the hands of users to help them make better choices… Becoming a smart city is not a goal but a means to an end´´* [4]

In other aspect, here we find what the respective public bodies understand as a Smart City:

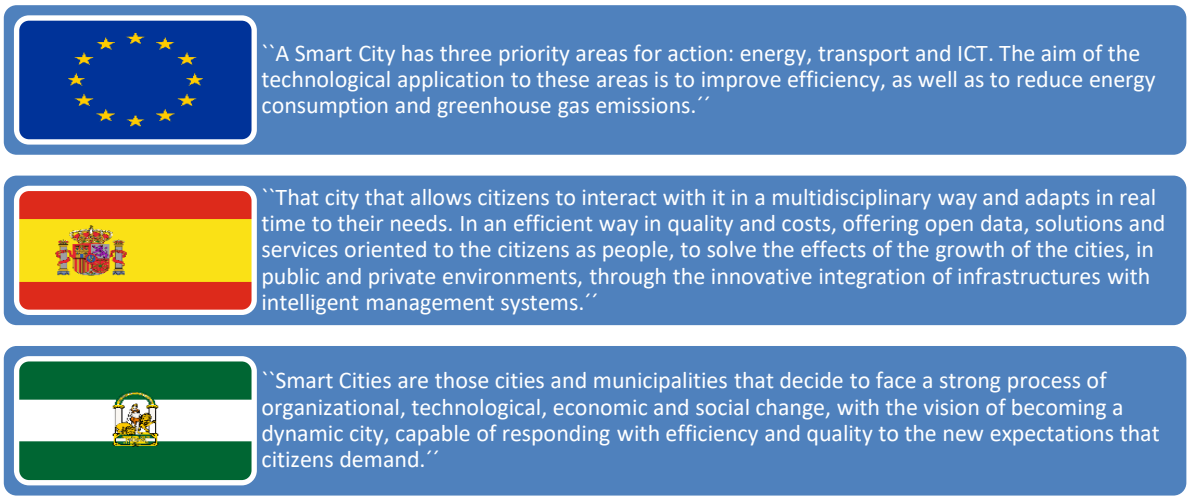

Figure 1: Smart City Definitions according to differents public bodies. [5] [6] [7]

What is clear is that, despite the small differences and points of view that exist, the common point between all of them is the use of ICTs as the key factor.

3.1 Focus Areas

Once the concept of Smart City has been clarified, the following functional areas should be established in which cities should advance with the objective of becoming Smarter. In order to define these areas, reports, work and perspectives from various public entities and bodies, local administrations, private entities, etc. involved in the development of Smart Cities have been taken into account, as set out in Spanish Ley 27/2013 of December 27th. [8]

The main challenge in turning traditional cities into Smart Cities is based on getting the main sector systems to integrate with each other, achieving unified forms of management. To achieve this challenge, and to facilitate a better understanding of the smart city concept, it has been broken down into different focus areas, which are the following ones:

3.1.1 Smart Economy

The smart economy brings together elements related to the development of employability and economic and financial growth. In addition, it aims to increase the productivity of these processes through efficiency and the creation of new innovative business models. The interconnection of goods, services and knowledge among the citizens of a Smart City, and of Smart Cities among themselves, is another of its objectives. It has the following main characteristics:

- Efficiency: An efficient and productive city manages to optimize its resources to the maximum in order to achieve greater objectives, or uses the least number of resources to satisfy the needs of its citizens.
- Innovation: Orients its policies and strategies to promote entrepreneurship to improve human capital and the economy of the city.
- Sustainability: Is able to satisfy current needs without compromising future resources and possibilities.
- New business models: It promotes local competitiveness through the digital economy, with the aim of increasing the intelligence of its business network and attracting investment, external wealth and human capital.

3.1.2 Smart Governance

Effectively combining the interests of citizens, social organizations, businesses and administrations is one of the objectives of intelligent government. Information and communication technologies are the main tool available to achieve this ambitious goal, as they allow interoperability between actors to share information with third parties, both nationally and internationally. Intelligent government is also responsible for ensuring a fair, equitable, transparent and properly protected information environment. The mechanisms to guarantee a fair, equitable and transparent government are the following:

- Good Government: It is the government that gets citizens, companies and administrations to work together to generate value and increase competitiveness in the city.
- Transparency: Is the coherent use of the necessary means and resources that guarantee public access to information, its reuse and the participation of citizens.
- Electronic Government: Is the global management of services with ICT as the main tool, allowing to identify synergies, optimize resources and offer better services to citizens.
- Information protection: A safe city must preserve the fundamental right of citizens to the protection of confidential information of the people who live there.

3.1.3 Smart Environment

This is one of the areas in which the effectiveness of smart cities has been most quickly highlighted. The attributes related to the natural environment and the physical structures of energy and water are some of the duties that smart sustainability has to deal with. A sustainable environment must include mechanisms to ensure the harmonious development of infrastructure, oriented towards meeting the needs of citizens, but guaranteeing the preservation of the environment for future generations. These two are the most important:

- Efficient infrastructures: These infrastructures include the elements necessary to satisfy the basic needs of the citizens, such as the water cycle, energy or housing.
- Environmental sustainability: A sustainable city is able to obtain the necessary resources within its environment and maintain adequate environmental quality levels without compromising future capabilities.

3.1.4 Smart Mobility

The attributes related to transport and logistics fall within this area, which embraces efficient and sustainable integrated and interconnected public transport systems. Intelligent mobility is the safe, effective and sustainable management of systems to facilitate citizens' access to, use and enjoyment of urban space. Green transport also comes under this area, as intelligent mobility prioritises access to accessible transport options, to save citizens' time, reduce costs and lower pollutant emissions. Its main structures are:

- Various Smart Infrastructures: They include the necessary elements for the safe, efficient and accessible provision of mobility services, such as buses, vehicles, trains, pedestrians, etc.
- Smart transport and traffic: It is the efficient management of resources to minimize the travel times of users and provide better services and information in real time to citizens.
- Connectivity: ICTs should act in the city as a platform for capturing, handling and managing information globally, with the aim of defining policies that improve the quality of life of society.

3.1.5 Smart People

This area is related to the increase and improvement of the city's human capital, which can be identified in the areas responsible for citizen participation, with special emphasis on the unemployed. It also takes into account the digitalization of contents of citizen interest, as well as the transparency and interaction with citizens. Its main structures are:

- Smart Education: It is the empowerment of the competences and skills of citizens to increase the human capital of the city, in matters such as ICT or online training.
- Social inclusion: Its mission is to guarantee citizens access to social, cultural and economic resources, regardless of their abilities.
- Citizen participation: It seeks to achieve participation in public affairs and in decision making that affects them directly or indirectly.

3.1.6 Smart Living

Finally, this area brings together everything related to the quality of life of citizens, and their lifestyle in physical, material (health, safety ...) and social (culture, family ...), to promote innovation, education, social cohesion and citizen collaboration. Smart Living is measured as citizens perceive their own quality of life. A Smart City is characterized by the fact that it is a desirable city in which to live and work, and that it promotes initiatives that affect the well-being of its citizens. There are two types of well-being:

- Environmental: It is the set of resources that the Smart City makes available to citizens to improve their living conditions.
- Social: It is the set of resources that the Smart City makes available to citizens to improve their satisfaction as individuals.

The report of the European Parliament's Directorate-General for Internal Policies ``Mapping Smart Cities in the EU´´ [5] considers that a city is Smart if it has at least one initiative that addresses one or more of the above areas.

These areas described above are common to most governments in Europe, and are also recognized in most parts of the world. However the services, levels or sub-areas belonging to these areas differ in most countries. In this project, we are going to use the definitions given in the ``Plan Nacional de Ciudades Inteligentes´´ [9], elaborated by several expert entities in the field, among which we must highlight the Secretaría de Estado de Telecomunicaciones y para la Sociedad de la Información" (SETSI), the ``Instituto para la Diversificación y Ahorro de la Energía´´ (IDAE) and the ``Escuela de Organización Industrial´´ (EOI).

All the perspectives belonging to these entities have been contrasted with the Spanish Law 27/2013 of December 27th [8], in which the relevant aspects affecting the competence regime of the municipalities are considered, and have served as a basis for the identification of all the units that integrate a Smart City.

In the following definitions, the perspective and needs of citizens and companies have been taken as a reference, given that these are the main users of a city and its services. Thus, taking into account the work of the previously mentioned entities, this Smart City Model has been drawn up, composed of key áreas and sub areas.

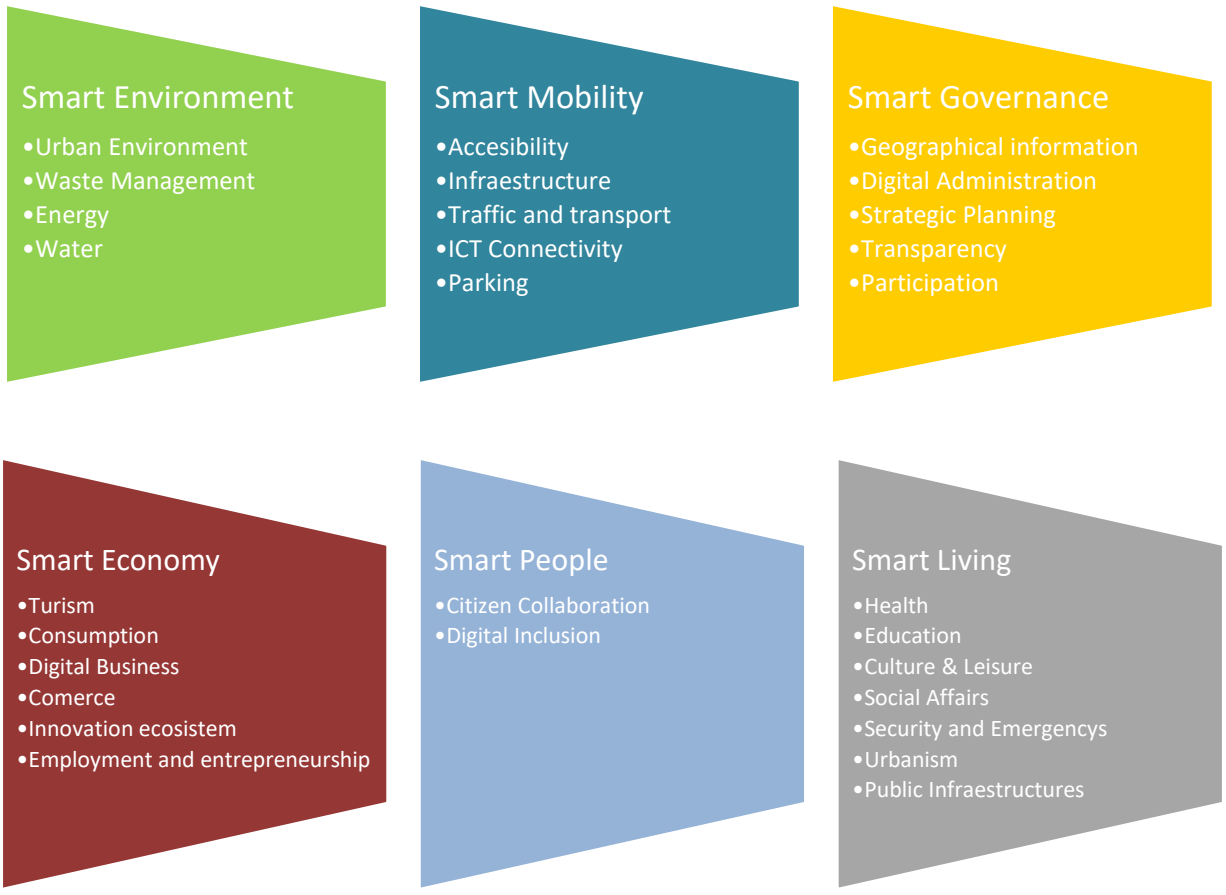

Figure 2: Focus Areas and Sub-Areas of a Smart City

3.2 Smart Services

Once the six areas that conform a Smart City have been defined, as well as the sub-areas included in each of them, we will continue to develop the concept of Smart City by defining the main services on which the smartization process should advance.

These are the municipal services where there is generally a greater application of ICTs at present, or where it would be easier to apply ICTs to improve the quality and efficiency of these services.

Thus, three different typologies of services are defined for each of the six areas defined above:

- Services for the City
- Services of Attention and Relationship with the Citizen
- Support services for an Intelligent City

3.2.1 Services for the City

These services refer to those infrastructures or services whose main target is the city as a whole and its public spaces, or which focus on improving their management.

In the following excel it is shown the relationship of each of the services with its typology and the area to which they belong:

	Services for the City
Smart Environment	Maintenance of parks, gardens and beaches Risk Management Air Quality Noise Measuring Varied Cleaning Waste Management Management of the Clean Point Network Gas Consumption in Municipal Buildings Street Lighting Consumption Electricity consumption of municipal buildings Monitoring of energy consumption in private buildings Water Consumption and Quality Wastewater Plant Network Management
Smart Mobility	Traffic control Traffic control in pedestrian and restricted-access areas Municipal fleet management Passenger transport management Toll management Management of electric vehicles recharging points Public bicycle network management Management of limited parking areas Parking Management Traffic light and signal management Management of information panels Varied Accessibility Accessibility in private establishments Accessibility in urban means of transport Accessibility in public establishments
Smart Governance	
Smart Economy	
Smart People	
Smart Living	CCTV Monitoring and activity of troops and brigades Security and emergency control centres Electronic Emergency Information Services Urban Planning Electronic services for monitoring planning regulations compliance Management and maintenance of public infrastructure and urban equipment Conservation and rehabilitation of historical heritage Detection of incidents in urban infrastructure

Tabla 1: List of Services for the City [6]

3.2.2 Services of Attention and Relationship with the Citizen

These services are those that are centred in facilitating the interaction of the citizens and companies with the local administration and the municipal services.

	Support services for an Intelligent City
Smart Environment	
Smart Mobility	Public Wifi Areas Mobile coverage
Smart Governance	Municipal Strategic Plan and Intelligent City Plan Electronic Inventory of municipal assets Electronic Cartography
Smart Economy	Services to companies for the incorporation of ICT Services, resources and structures for innovation
Smart People	Advice and training in new technologies
Smart Living	

Tabla 2: List of Services of Attention and Relationship with the Citizen [6]

3.2.3 Support Services for an Intelligent City

They are assets, resources or services that enable or boost the development of an Intelligent City.

	Services of Attention and Relationship with the Citizen
Smart Environment	
Smart Mobility	
Smart Governance	Transparency portal Social Media Digital transformation spaces Electronic Site Online Formalities Corporate Website Sectorial Websites Information and citizen care apps
Smart Economy	Mobile Apps for tourists Other electronic services for tourists Mobile Apps for commerce Other electronic services for commerce Electronic services for employment orientation and entrepreneurship Electronic consumer information services
Smart People	Crowdfounding Crowdsourcing
Smart Living	Teleconsulting Services Telediagnostic Services Telecare Services Other electronic services for specific groups Electronic services for local educational offerings Electronic services for protected housing demanders Electronic services for the use of sports resources Electronic services for the use of cultural resources

Tabla 3: List of Support Services for an Intelligent City [6]

3.3 Indicators

Once all the areas and sub-areas have been identified, as well as the services that belong to them, it is time to talk about the Smart indicators. These indicators [6] define a framework for evaluating the degree of Smart development of these services. Their main functions are as follows:

- To define a simple model that allows, in a practical way, the evaluation of the degree of development of an Smart service.
- To have a simple tool for municipalities to make an assessment of the state of their services in relation to the objective of making them Smart.

In order to define a model of indicators to evaluate the degree of Smart development of a specific service, we have started from the definition of Smart City proposed by the ``Comité Técnico de Normalización 178´´ [10], which specifies:

``Smart City is the holistic vision of a city that applies ICT to improve the quality of life and accessibility of its

inhabitants and ensures sustainable economic, social and environmental development in permanent improvement. A smart city allows citizens to interact with it in a multidisciplinary way and adapts in real time to their needs, in a quality and cost efficient way, offering open data, solutions and services oriented to citizens as people, to solve the effects of the growth of cities, in public and private areas, through the innovative integration of infrastructures with intelligent management systems´´

From this definition, five attributes are extracted:``holistic vision´´,``ICT´´, ``accessibility and open datA´´, ``interact´´ and ``efficient in quality and costs´´, as they are particularly representative of the concept of the Smart City.

Taking these five attributes as a reference, they have been translated into the reality of a municipal service, thus establishing these five evaluation indicators of a Smart Service:

- Strategic planning, which reflects whether the service is part of the priority areas of the city's strategy
- Technology (ICT), which evaluates the application of the Information and Communication Technologies (ICT) in the services analysed.
- Transparency (Accessibility and open data), which aims to evaluate the possibility of access to the service's information.
- Citizen interaction (Interaction), which aims to measure the level of electronic interaction that the citizen can have with the service.
- Monitoring (Efficient in quality and costs), which identifies whether indicators have been defined to monitor and control the service in terms of its quality and efficiency.

The following tables establish for each of the three types of services defined previously (Services for the City, Services of Attention and Relationship with the Citizen, Support services for an Intelligent City), the list of indicators and their different levels of evaluation corresponding in each case, being similar for all the services except for the Technology indicator, which varies according to the type of service.

Figure 3: Strategic Planning Indicator and his differents levels.

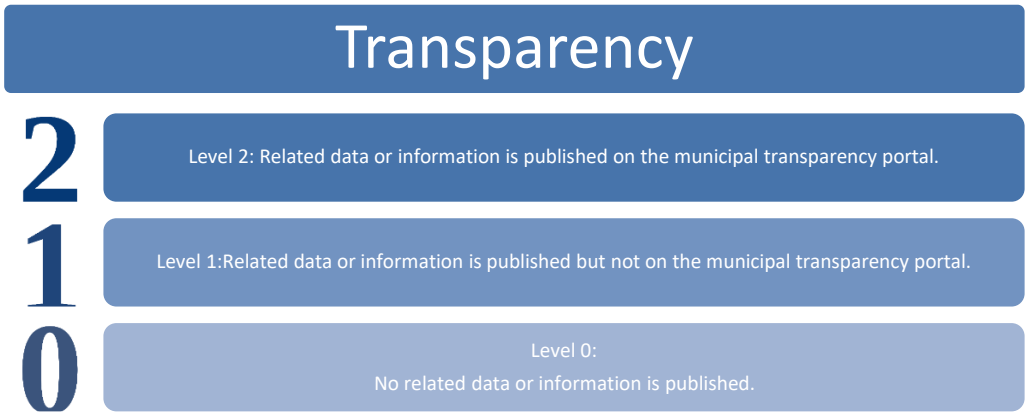

Figure 4: Transparency Indicator and his different levels

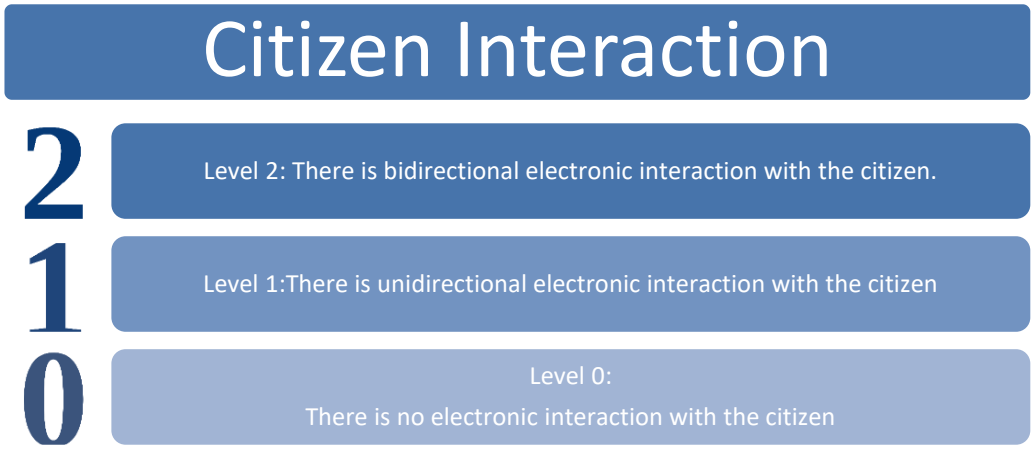

Figure 5: Citizen Interaction Indicator and his different levels

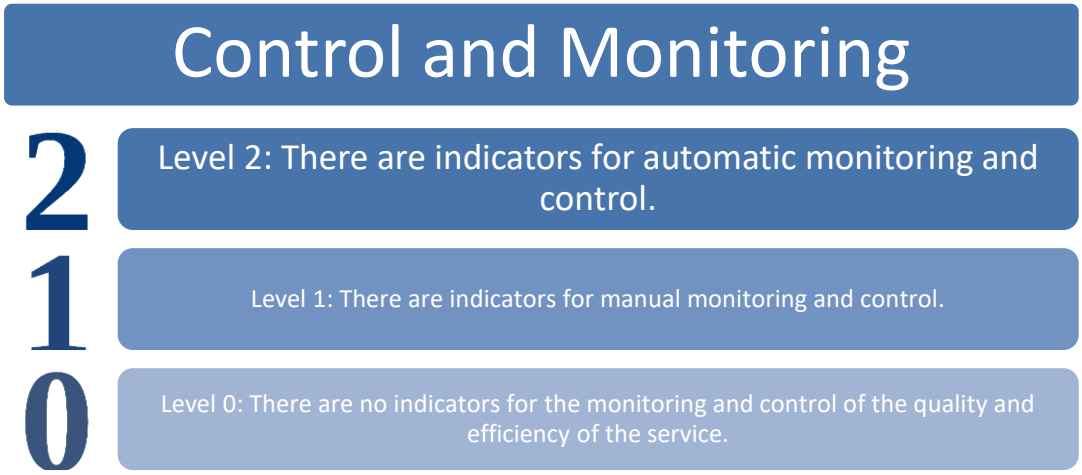

Figure 6: Control and Monitoring Indicator and his different levels

As we have said before, the Technology Indicator is different depending on the type of service it is, so if the service is ``Services for the City´´ type, the indicator and its different levels will be as shown in the following table:

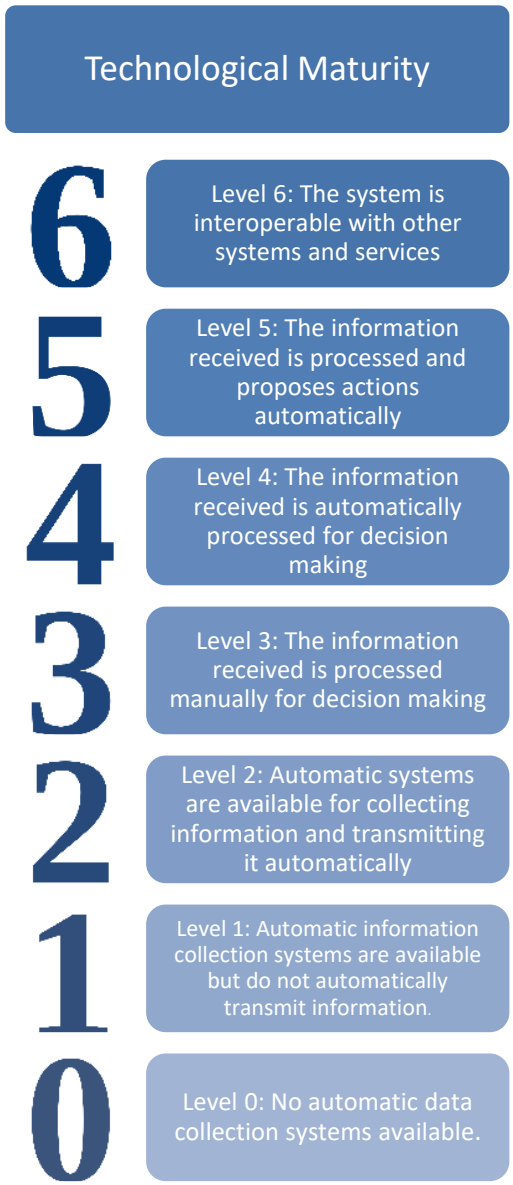

Figure 7: Technological Maturity Indicators and his different levels

If the service is of the type ``Services of Attention and Relationship with the Citizen´´, the indicator and its different levels would follow the following structure:

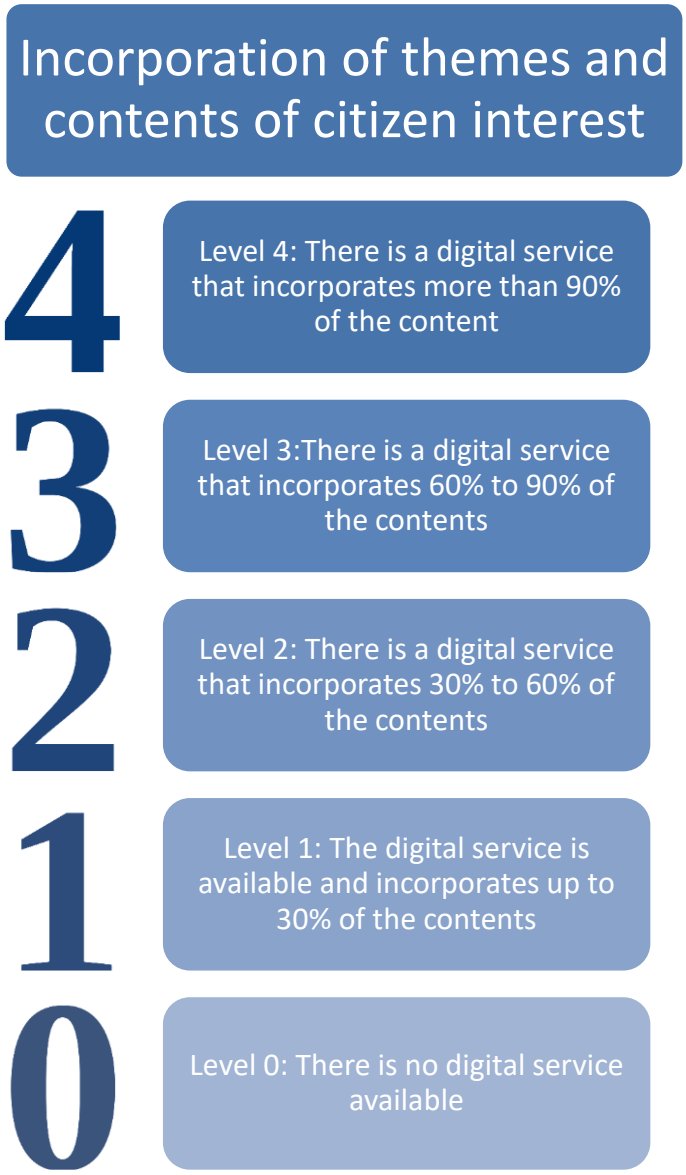

Figure 8: Incorporation of themes and contents of citizen interest Indicator and his different levels

Finally, if the service belongs to the ``Support services for an Intelligent City´´ type, the indicator and its levels would be as shown in the following graph:

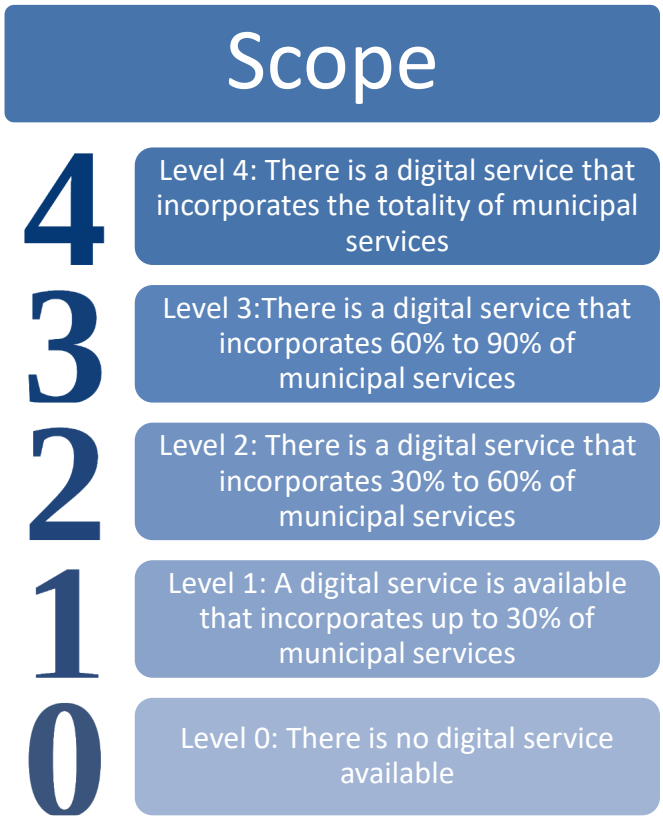

Figure 9: Scope Indicator and his differents levels

3.4 Value Chain of a Smart City

The value chain of a Smart City is a model that describes the different phases through which the activities involved in the city's ecosystem have to pass in the process of Smartization. [6]

This value chain is based on a stage achievement model formed by 4 main phases and 3 transversal or support phases.

3.4.1 Main Phases

The first stage deals with ``Generation of Information´´. In this stage all the information related to the city is originated and it supposes the beginning of the process of treatment and later management of these data. The main information generating groups are the following:

Figure 10: Information generating main groups

The second stage of the value chain of a Smart City, is the ``Information Collection´´, which consists of the collection of data and sensitive information derived from the daily activity of the city, generated by the agents described above.

This process is based on the use of systems and devices made available to the information generators mentioned above, with the aim of automatically collecting the information generated [6]. These devices or systems can be of the following categories:

Figure 11: Information collectors devices [6]

In third place is the stage of ``Analysis and Management of Information´´, whose objective is the extraction of data and relevant information from previous collection systems, with the aim of managing and treating this information in a way that facilitates telematic decision making.

This requires the use of different systems and vertical solutions, to carry out analytical activities, prediction, management, prescription, publication, etc. These vertical information systems are specifically designed for a certain area, aimed at the execution and support of particular actions in certain areas of the city.

The last stage of the value chain of the Smart City is the ``Integration of Information´´, which consists of the unification of the information coming from the different information generators, in order to obtain integrated knowledge about the functioning of the city that ends in a more efficient and effective integral decision making, oriented to the resolution of the problems of all the actors involved in the municipal ecosystem.

This stage is the last link in the value chain, and is composed of integrated solutions and systems for the global management of the city. The integration platforms that constitute it can be:

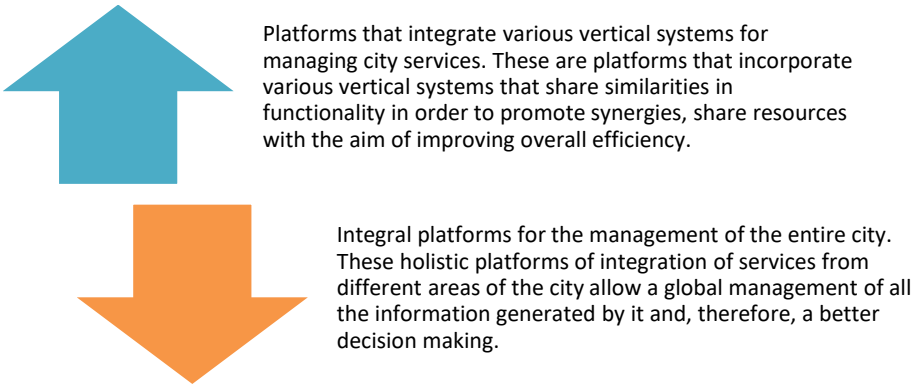

Figure 12: Integrated Solution Platforms [6]

The main beneficiaries of the results obtained from this stage of integration are the government, the citizens, the city itself and its services.

Thus, with these four stages, the Smart City value chain has been defined as a cyclical process in which the components of the information generation stage, which were the original demanders of a Smart City, are the beneficiaries of the improvements and benefits produced by the transformation of a city into a Smart City environment.

3.4.2 Support Phases

Transversally to the 4 stages previously defined, there are 3 other support stages: the connection stage, support and advice, and promotion.

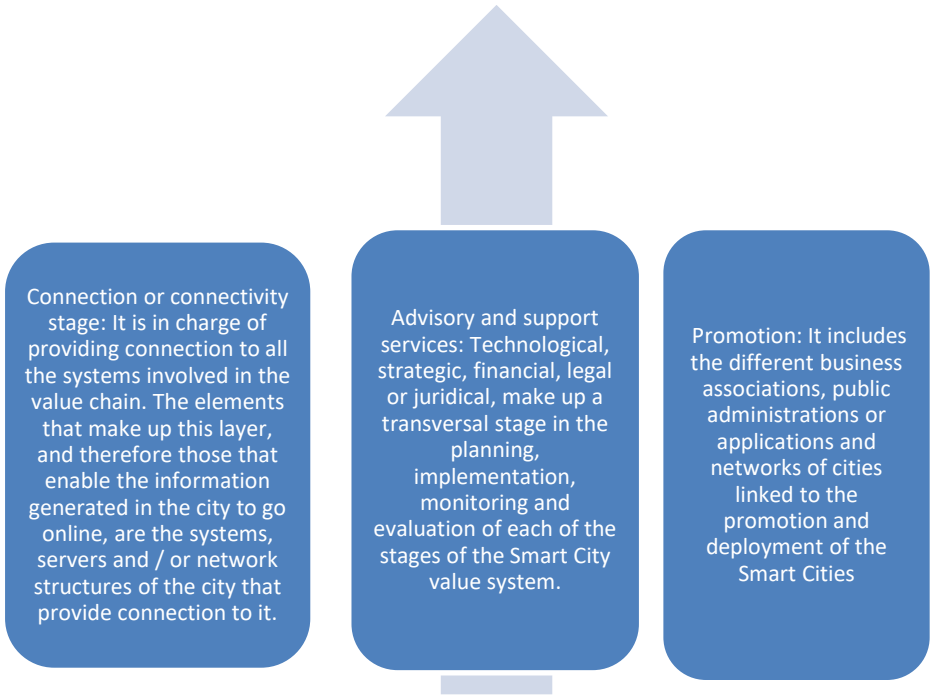

Figure13: Support Phases

4 APPLICATION CASE, CONIL FOR SMART CITY

In this section, I want to make a brief presentation of Conil de la Frontera, tell a little of its history and explain what its main economic drivers are today. Also, in the second section, it will be explained the main reasons why Conil should carry out the development of a smart city strategy, with the advantages that this implies.

4.1 Context

Conil is an enclave founded by the Phoenicians, but in which different civilizations have lived such as the Carthaginians, the Romans or the Muslims, as can be seen both in its architecture and in the hardworking personality of its inhabitants.

During the Roman period, the Almadraba was founded, which is still in use today, and has been the main economic activity during most of its history. Later, in the 17th century, the town was able to recycle itself towards other sectors such as agriculture and livestock, thus maintaining its level and development.

During the 20th century, Conil de la Frontera surrendered to the tourism sector. Its consolidation began in the 1960s, when Conil began to accommodate holidaymakers from Cordoba and Seville. The friendliness of the people of Conil and the amenity of the virgin coves positioned it as a preferential and booming destination. At the end of the century, this coastal town became a holiday reference for Germans, Dutch and Italians.

Nowadays, these three activities remain as the main productivity points of Conil, in terms of competitiveness and economic development:

- Fishing: Even though the fishing fleet has decreased significantly in terms of number of boats, it has suffered a process of modernizing and made itself more efficient in his consumptions. It has led to a 53.4% increase in the number of catches [10]. The most important bottleneck of Conil de la Frontera is his port. However, this point could be highly improved, in terms of dimensions and digitalization.

- Agriculture: The main problem of the sector is the competition with the real estate companies for the urbanization of the land. Nowadays, the urbanized lands are having a higher percentage of return than the non-urbanized ones.

- Tourism: In the last years, it has experienced an important tourist development and has become one of the three best beach destinations of the country, according to the Trivago internet portal. Conil has received and average of 200 000 travellers per year over the last decade, however, the city does not reach the average level of income per room (48.5 euros), being below the national average in holiday destinations (54.1 euros) [11]. This, together with the problems associated with the growth of the number of houses in unregulated areas, are the two main points for improvement in the sector.

4.2 Smart Background

Although this Smart City strategy is being developed for Conil de la Frontera, it does not mean that the city has not already taken the first steps in his Smartization process. In fact, Some projects are being carried out or directly affect Conil de la Frontera, which are based on the Smart City concepts, whose objectives are to facilitate the application of Smart City technologies and solutions to Conil's existing problems.

These projects or action plans aim to provide services that maximize the efficiency of resource use in public organisms.

Thus, from the European Commission and the Spanish Government, some objectives have been established that have accelerated the evolution of ICT, the engine for the development of the Smart Cities. These objectives have been translated by the different organisms of each geographical area into a series of action plans, which we can classify into four different groups:

4.2.1 European Level

From the European Union, in an attempt to promote a more efficient use of digital technologies with the aim of generating a more competitive economy, work has been done on different events or initiatives, the most important of which is the Europe Strategy 2020.

The priorities of this strategy are divided into three types of growth:

- Smart growth: Through more effective investment in education, research and innovation.
- Sustainable growth: through a decisive move towards a low-carbon economy.
- Inclusive growth: Strongly focused on job creation and poverty reduction.

Thus, for the European Commission, Smart growth cannot be understood without an improvement in the European Union's performance in education, research and digitisation of society. The main objective of this Europe Strategy 2020, which serves as a reference for national and regional levels to achieve progress in their Smart growth, is to reach, in an appropriate period of time, the numbers shown in the following graph:

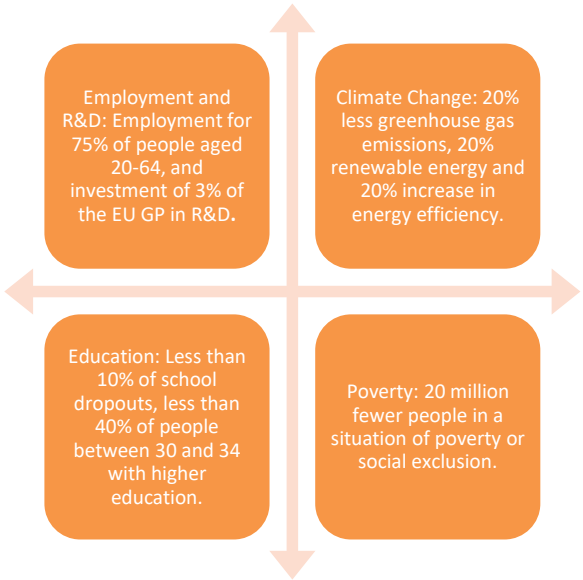

Figure 14: Europe Strategy main objectives in numbers

Figure 15: Strategy Europe main objectives in numbers

The EU member states have also adopted their own national targets, as well as agreed on a number of concrete actions at national level. They have also defined the main areas in which intervention is needed to boost growth and employment, as follows:

1. Innovation Union. It seeks to improve conditions and access to funding for research and innovation, so that innovative ideas can be turned into products and services that generate growth and jobs.
2. Youth on the move. It aims to improve the performance of education systems and facilitate young people's access to the labour market through various mechanisms (EU-funded study, apprenticeship and training programmes, platforms for young people to seek employment across the Union, etc.).
3. A Digital Agenda for Europe. This actor aims at accelerating the deployment of high speed internet and ICT.
4. A resource-efficient Europe. It aims to help decouple economic growth from resource use. It promotes energy efficiency, supporting the shift to a low-carbon economy, increased use of renewable energy sources, the development of green technologies and the modernisation of the transport sector.
5. An industrial policy for the era of globalization It aims at improving the business environment, in particular for SMEs, by facilitating access to credit and reducing red tape, among other measures. It also supports the development of a strong and sustainable industrial base, capable of innovation and global competition.
6. Skills and jobs agenda. It seeks to modernise existing labour markets and to increase the autonomy of individuals by developing their skills and improving security and flexibility at work. It aims to balance labour supply and demand.
7. Platform against poverty. Its aim is to ensure social and territorial cohesion, enabling disadvantaged people to access employment and integrate more easily into society. [12]

4.2.2 National Level

The ``Plan Nacional de Ciudades Inteligentes´´ (National Smart Cities Plan) [9] is the firm commitment of the Ministry of Energy, Tourism and the Digital Agenda to promote the Smart Cities technology industry in Spain and to help local entities in the transformation processes towards Smart Cities and Smart Destinations. The Plan establishes an industrial policy to promote the growth of the technology sector and its capacity for internationalisation, for which it is supported by the extensive industrial and municipal associative network that exists in Spain. All the areas involved in the development o Smart Cities and Smart Tourist Destinations are represented in it: institutions, the Spanish Smart Cities Network, industry representatives and experts.

The main objective of this Plan is to contribute to economic development, ``maximizing the impact of public policies on ICT to improve productivity and competitiveness, and transform and modernize the Spanish economy and society through an effective and intensive use of ICT by citizens, businesses and administrations´´ as stated in the Digital Agenda for Spain, thereby contributing to achieving the weight of the industrial sector in the Spanish GDP is 20%.

To this end, the Plan focuses on achieving the following objectives:

- Increase the contribution of ICTs to the GDP of the industrial sector.
- To advance in the governance of the Smart Cities system.
- To promote the standardization, regulation and norms of the Smart Cities.

Thus, the Plan Nacional de Ciudades Inteligentes is structured in the following way, in 4 differentiated axes:

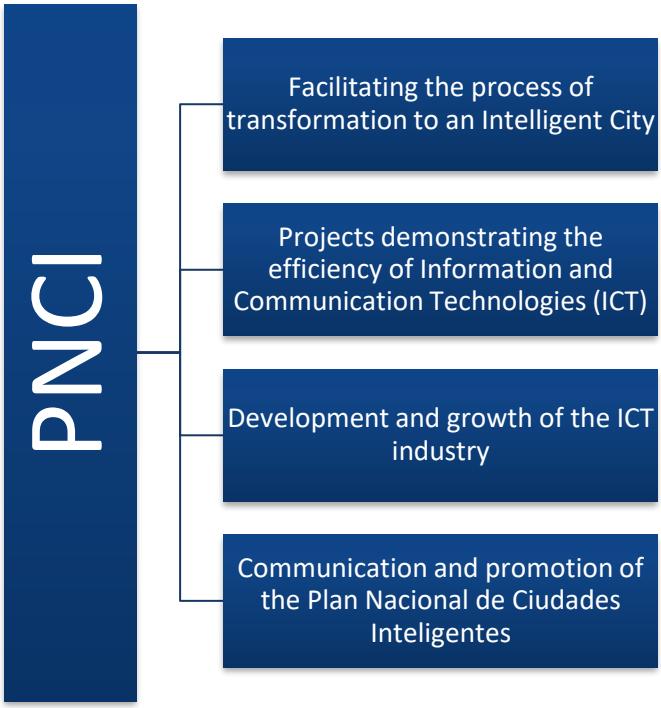

Figure 16: PNCI Main Axes [9]

4.2.3 Regional Level

AndalucíaSmart [7] is the initiative of the Andalusian Government that supports the development of the ``Smart Region´´ concept in Andalusia through different dimensions such as mobility, environment, open government and others, as well as promoting the development of this type of project in the Andalusian provinces and municipalities.

The objective of this action plan is to help the different cities and municipalities of Andalusia in their process of transformation to a Smart region. In order to achieve this general objective, three actions have been proposed, which are strongly linked to each other:

- To diagnose and analyse the initial situation of Andalusia in terms of the intelligent development of its cities and municipalities
- Prepare a reference document, which works as a methodological guide to document and advise municipalities in the process of building their smart city models and the roadmap to achieve it
- Formulate the AndalucíaSmart 2020 Action Plan, as a strategic document of the Junta de Andalucía for the task of promoting the intelligent development of the region.

Thus, in order to successfully carry out these three actions, the following seven strategic lines of action have been established for the implementation of the Smart Cities in Andalusia:

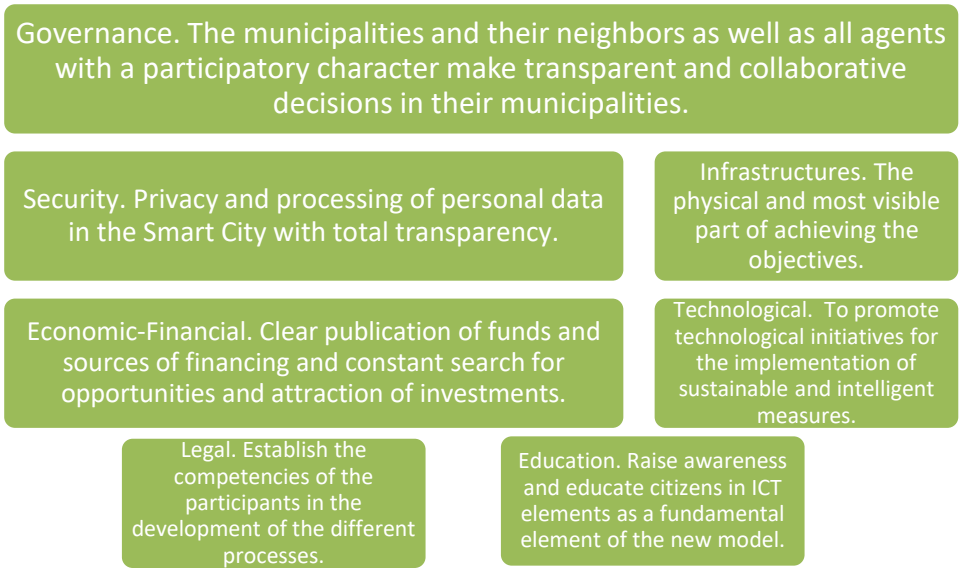

Figure 17: Strategic Lines of Action in Andalucía [7]

4.2.4 Local Level

The two most relevant action plans at local level, designed specifically for Conil de la Frontera, are the Plan Estrategico Conil 2025 [11] and the Edusi Strategy Revitaconil [13]. As we will see later in the Initial Diagnosis, these two strategies will be the ones that are helping Conil to move forward in its Smartization process.

4.2.4.1 Plan Estratégico Conil 2025

This plan, drawn up in 2015, is an initiative in which both the inhabitants of Conil de la Frontera and the town council have participated, and whose mission is to clarify the vision that was held at that time of the town, in order to be able to unify the vision of the situation to be achieved in 2025. This plan is an instrument of local governance that gives coherence and articulation to all the sub-plans of the municipality. By means of interviews and meetings with citizens, a swot diagnosis has been drawn up for each of the most important sectors, and based on this diagnosis, the main challenges and guidelines for approaching them have been established.

After this study process, it has been determined that the objectives that Conil wants to achieve in this period of time are the following:

- Optimizing the territory as a productive factor
- Adapting the use of territory to its contribution to the common good
- To increase the potential for occupation of equipment and production facilities
- Consolidate the tourist destination
- Improving welfare management
- Developing social economy initiatives [14]

The intention is to help fulfill these objectives with the following Development and Welfare Model, in which five major operations have been identified to be completed in the period of 10 years:

- Production and territory
  This operation aims to differentiate the local product based on the characteristics of the territory, incorporating added value to agricultural products and tourism services.

  As far as food is concerned, the aim is to differentiate the products as originating in Conil, produced or extracted with healthy and wholesome methods, which guarantee the renewability of the resources.

  In relation to tourism, it is intended to address the main challenges with a strategy of differentiation, thus consolidating the tourist destination, increasing activity in spring and autumn and the average daily

expenditure per visitor, and optimizing the capacity of tourism to create stable and quality employment. [14]

- Historic Center
  Revitalising the historic centre of Conil de la Frontera is essential to give its inhabitants an identity and sense of belonging. It is a question of getting this space to recover its function as a centre of relations in the city, with shops of permanent activity and vitality of activities and initiatives. This operation must combine instruments of regularization in ordinances of use and activity, of urban planning and of promotion and dynamization of initiatives. [14]

- Conil de la Frontera, Innovative City
  The purpose of this plan is to maintain Conil's identity while creating the optimal conditions for young people who prefer to live here to do so, developing the conditions to attract people who want to live and work here. To this end, it is crucial to ensure that Conil develops a great capacity for innovation, which crystallises into projects related to the incorporation of value into the local product, as well as projects related to new technologies. [14]

- Center for global change and solidarity
  The purpose of this strategic operation is to achieve for Conil a significant advance in the construction of an inclusive, integrating and supportive city and a low-carbon production model. By doing so, it will improve the level of youth employment, gender equality, water quality, noise levels and summer congestion, and the reduction of obesity. [14]

- Red de Redes R^2 Conil
  This network of networks aims to channel all the progress made in associations, business cooperation, shared projects, etc. as well as organising car pooling, shared work spaces, establishing relations with other locations in other countries, etc. The aim is to build a relational space, with strong local support and intense virtual presence, making Conil a city that is strongly connected to each other and to the outside world. [14]

4.2.4.2 PMUS (Sustainable Urban Mobility Plan)

This is a set of actions that aim to implement more sustainable forms of travel (walking, cycling and public transport) within Conil de la Frontera; that is, modes of transport that make economic growth, social cohesion and environmental protection compatible, thus ensuring a better quality of life for citizens. [15]

This plan is divided into 7 distinct groups of measures, which are:

- Measures to promote pedestrian mobility
- Measures to promote cycling mobility
- Measures to enhance public transport
- Car park management measures
- Traffic optimization measures
- Measures to optimize the circulation and distribution of goods
- Training and school education measures

4.2.4.3 Estrategia de Desarrollo Urbano Sostenible e Integrado:

The EDUSI strategy called ``Revitalización del Casco Histórico de Conil: REVITACONIL´´ has been developed by the Town Hall and financed by the European Union through the European FEDER Funds. Its main objective is to implement a series of measures that will help to revitalise the historical centre of Conil and to solve the important problems that the city is facing as a result of the current city-territory model.

REVITACONIL identifies 5 strategic objectives, which are aligned with the smart city model and which focus on the optimization of the territory as a productive and well-being factor, managing it in a collective way and adapting it to the common good; increasing the potential of occupation of facilities and productive establishments; and consolidating the tourist destination. The identified city model is committed to a low-carbon city, to general mobility, to centrality and to the creation of a space with an identity that is transferred to the tourist attraction and to the feeling of belonging. [13]

This Sustainable Urban Development Strategy is implemented through 14 lines of action. These lines of action have been defined by means of the challenges that the Strategic Plan seen above poses, therefore, the application of these lines of action contributes to Conil de la Frontera moving towards a Smart City, sustainable and inclusive.

Programmes	Action Lines
1. Conil de la Frontera, innovative city.	1.1. Conil, Smart and Sea City 1.2. Red de Redes. R2 Conil
2. Low-Carbon Historic Center	2.1. Sustainable and shared mobility for residents and tourists 2.2. Pedestrianization of public space 2.3. Reduction of emissions in waste collection 2.4. Energy efficiency in public spaces 2.5. Efficient housing for a new city model
3. Rehabilitated and habitable Historical Centre.	3.1. Rehabilitation of the public heritage 3.2. Valuation of resources from innovation 3.3. Reinforcement of noise controls 3.4. Promotion of the values of the new city model
4. Active and habitated space.	4.1. Protected housing for young people with insufficient income 4.2. Promotion of medium and long term private rental
5. Technical Assistance	5.1. Technical Assistance for EDUSI's management and communication

Tabla 4: List of Programmes and Actions Lines of the ``Estrategia Edusi Revitaconil´´ [13]

4.3 Why do we need Conil to be a Smart City?

1. Attract and retain smart people:

Fundamentally, a smart city is about people. Conil, as a small city with no university, is not a great competitor in terms of investment, jobs and talent. There is difficulty in retaining its youth, since most of them want to experience the joys of college life. Therefore, years later, they suggest that there are no jobs that meet the demands of a young college student, meaning graduates end up staying in major cities to pursue their careers.

Often, these young people eventually return to make a life and take advantage of the family-friendly scale of the city and its outstanding natural settings and lifestyle opportunities, but it's not the usual thing.

There is a great need to retain the talented youth throughout the periods in their lives when they have an appetite for risk and a drive to create. Increasing the number of these people calling the city home is central to providing opportunity for ideas to thrive, by supporting a culture that respects thinking, creativity and risk.

2. Innovation and Creativity:

It is estimated that over 50 percent of the jobs of the future to be undertaken by the next generation do not yet currently exist. The only way to prepare for this is to produce creative, adaptive and innovative thinkers. For these reasons creativity and critical problem solving routinely appear at the top of employer's lists of desired attributes.

For the smart city to take full advantage of these opportunities there is a need to develop an experimental mindset and methodologies for encouraging an appropriate appetite for risk, and providing permission to fail, learn and start over.

3. Collaboration, education and training:

A smart city is one that focuses its resources on improving wellbeing, liveability and amenity. Its goal is to turn the ingenuity of its people towards creation of a better city and improved living environment, and a more connected and cohesive community. An attractive city, one blessed with ample green spaces, high quality public domain, and vibrant city economies across the day and into the night is a critical element in efforts to attract and retain talent. Conil has a unique opportunity to build upon is natural advantages which include high quality city beaches, open waterfront space, its human scale and its heritage building stock.

The integration of technology into the urban liveability agenda raises the prospect of utilising sensor technology to collect ``open data´´ on key city systems such as traffic movements, parking and pedestrian mobility throughout the city. When integrated, this data can provide powerful insight into how the city functions and will further enhance urban, transport and development evaluation, and safety and emergency responses.

4. Promotion:

A smart city engages its people in the process of shaping the future of the city and gives them reason to be proud. In order to attract and retain creative and innovative people as well as see business growth and development within the city of Conil de la Frontera, there will need to be promotion of civic pride. Civic pride relates to how places promote and defend local identity and autonomy. This occurs at government, community and individual levels through successful execution of cultural policies that facilitate and promote identity formation.

People from Conil have many reasons to be proud. The city is a magnificent example of how a small fishing village can adapt to modern times and become a reference point for tourism in Spain. It is fascinating how the city grows day by day, always from sustainability, maintaining its essence and the virginity of its beaches. [16]

5 APPLICATION OF THE EXPERIENCEE

In this chapter we will see how to apply the previously described theory, by means of an initial diagnosis of the current situation of Conil de la Frontera's status. Afterwards, a comparison will be made with the situation in Algeciras. Finally, the conclusions of this initial diagnosis and its comparison will be presented.

5.1 Initial Diagnosis

When developing a smart city strategy, it is necessary to have an optimal knowledge of the starting situation of that city, concerning each area. To achieve the best results in carrying out this task, we will use the Herramienta de Gobernanza [17], developed by the Ministry of Industry, Energy and Tourism through the entity Red.es.

The purpose of this tool is to serve as a guide for the Councils when evaluating their degree of Smart development, according to their strategic priorities and the services they provide.

The Tool is divided into the focus areas that constitute a Smart City: Environment, Mobility, Governance, Economy, People and Living.

For each of the areas, we will score the level of their services through the previously defined indicators.

In this way, we will achieve the evaluation of all the sub-areas and services marked as priorities, thus marking the starting point of the Smart City strategy.

As we have seen before, the tool is divided into:

This tool aims to analyse the starting situation of the city, to define and provide a guide that can serve the council to move forward on the journey towards an Smart city. It is composed of:

- Focus Areas: Described above, named as: Smart Environment, Smart Mobility, Smart Governance, Smart Economy, Smart People and Smart Living. These areas are subdivided into services.
- City services: Activities carried out by municipalities in a uniform and continuous manner, aimed at meeting public needs, improving health and hygiene conditions and conserving the environment and natural resources in their area. These services have, at the same time, linked indicators.
- Indicators: Data or data sets that help objectively measure the evolution of a service. They aim to assess the level of smart development of each service, and therefore, each area. These indicators are subdivided in levels.
- Levels: They indicate the degree of development of each indicator, level 0 being the lowest.

To carry out this Initial Diagnosis, most of the information has been taken from the documents mentioned above in the Smart Background, such as the Plan Estratégico Conil 2025 and the Strategia EDUSI Revitaconil, except for some specific cases that will be specified.

In the event that no information about the service has been found, it has been assumed that there is no development in that service.

5.1.1 Smart Environment

The field of Smart Environment allows us to know to what extent Conil de la Frontera can be considered to have a sustainable urban environment. As we can see in the following graphs, it has a great margin of improvement

in all the services of the area.

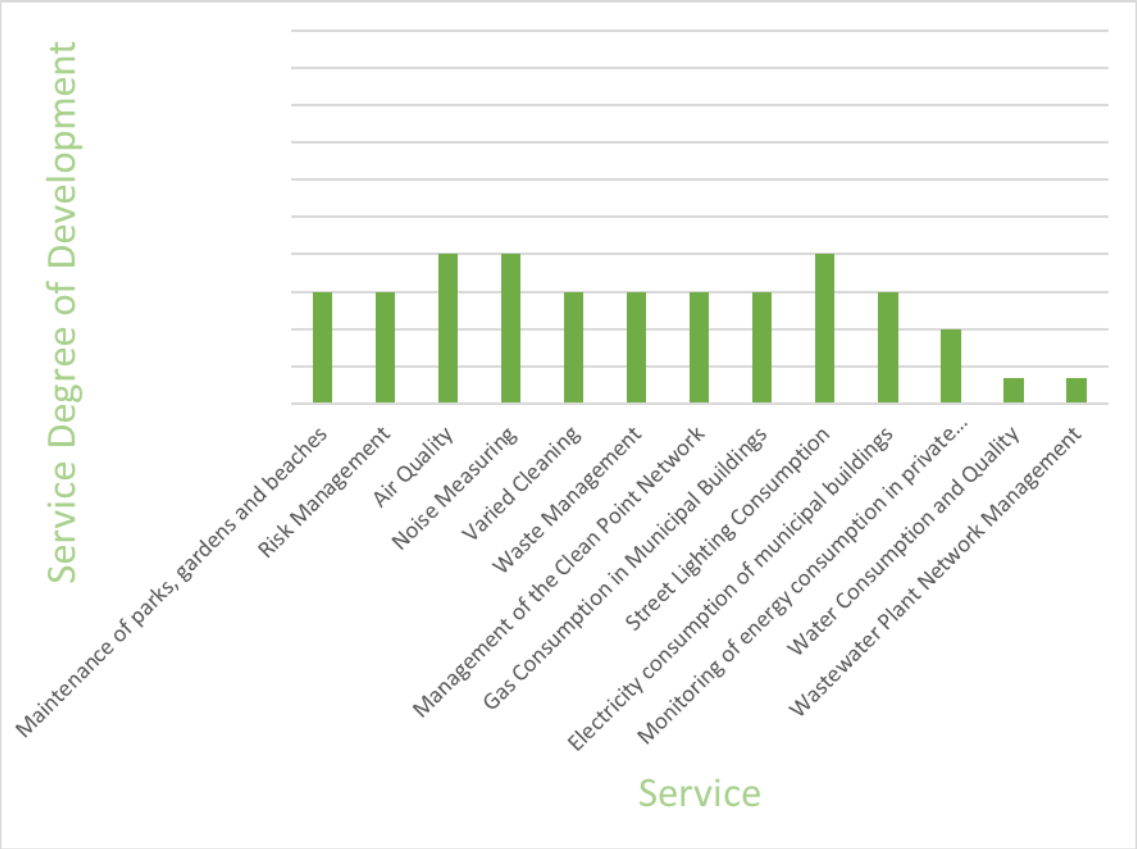

Figure 18: Smart Environment Services Bar Graph

In this first graph we can see, in a bar chart, the percentage of development of each of the services in the area. As we can clearly see, the least developed subarea is water. The number of houses in unregulated areas continues to grow, and the problem of supply adds to that of water quality.

Another underdeveloped subarea is waste management, although efforts are being made to improve it. Currently, the line of projects ``Reduction of emissions in solid waste collection" of the plan ``Dusi RevitaConil´´ is underway, among which is a redesign of the collection device and the acquisition of mobile containers and electric vehicles.

Services related to the environment and energy are somewhat more advanced, although not by much. Here you can see a higher degree of planning, having Conil a specific line of projects for noise control. In this line, a fixed network of sensors is planned to provide real time information on noise in different areas of the city. There is also an investment in devices and technologies with lower energy consumption for public spaces, with special emphasis on lighting.

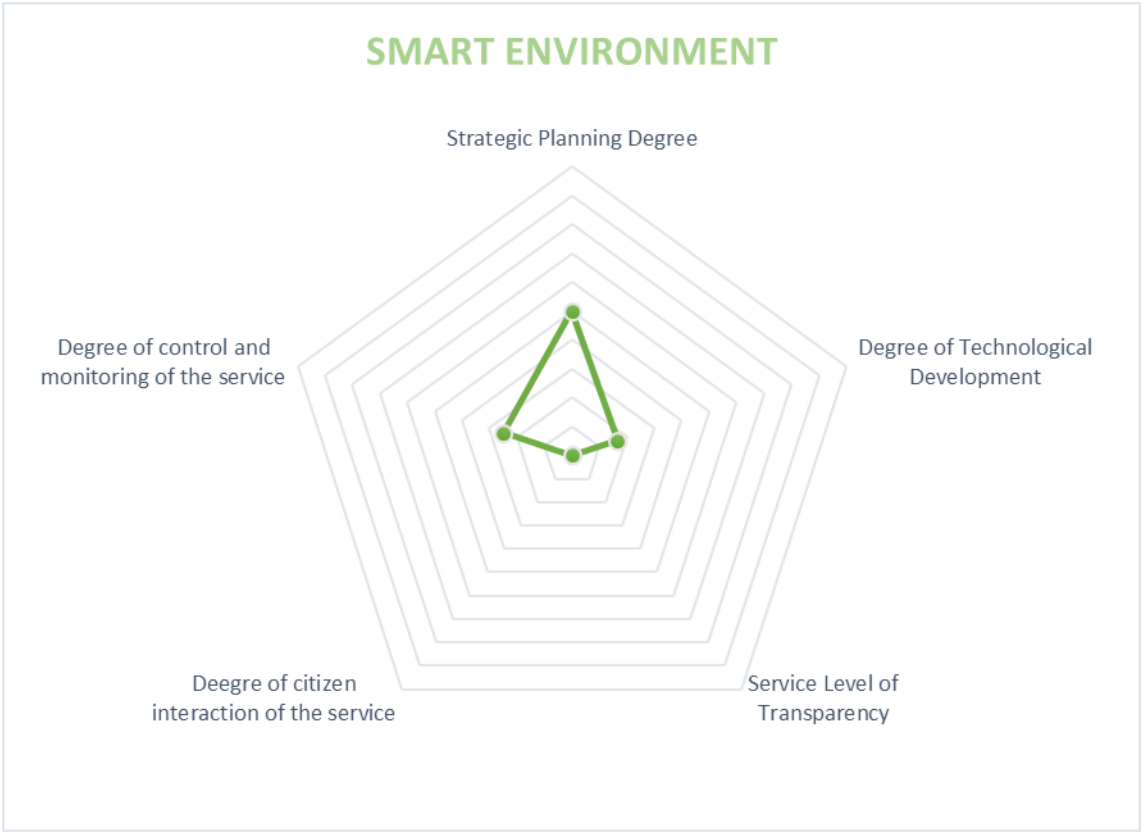

Figure 19: Smart Environment Indicators Spider Graph

This second graph shows, in spider form, the average level of each of the indicators in the area. From here we can highlight an improvement in the degree of strategic planning in the area of the environment, thanks to the development of Plan Estratégico Conil 2025 and the Estrategia Dusi Revitaconil.

An average level of control and maturity indicators is also observed. In the different services of this area, information is collected automatically, as we have been able to observe with the noise project lines, but this information is not treated in an automated way, but manually.

The indicators that worry most are those referring to transparency and citizen interaction. A lot of time passes between data publications belonging to this area. Furthermore, the little interaction that exists between citizens and the city is unidirectional and is not done electronically. It is in these indicators that Conil has the greatest room for improvement of all.

5.1.2 Smart Mobility

To talk about mobility in Conil de la Frontera is to talk about infrastructure problems, high parking occupancy and lack of adaptability between seasons. This last problem is the main challenge to overcome in the city, due to the great affluence of seasonal population in the summer period, which means an increase of 208% of the total trips per day with respect to the winter season [15]. Serious infrastructural problems must also be taken into account throughout the entire pedestrian network, described by citizens themselves as discontinuous and unsafe.

However, it must be said that in 2011 Conil launched the ``Sustainable Urban Mobility Plan´´ (PMUS), a medium- and long-term strategy, which aims to provide the city with action programmes to reduce the environmental impact of transport.

The initial diagnosis of this area aims to define the current situation of Conil, how connected and accessible it is, as well as to guide the council in its process of continuous improvement of the mobility infrastructure of its

city. The services within this area are divided into five different groups, which are traffic management, parking, mobility infrastructure, accessibility and ICT connectivity.

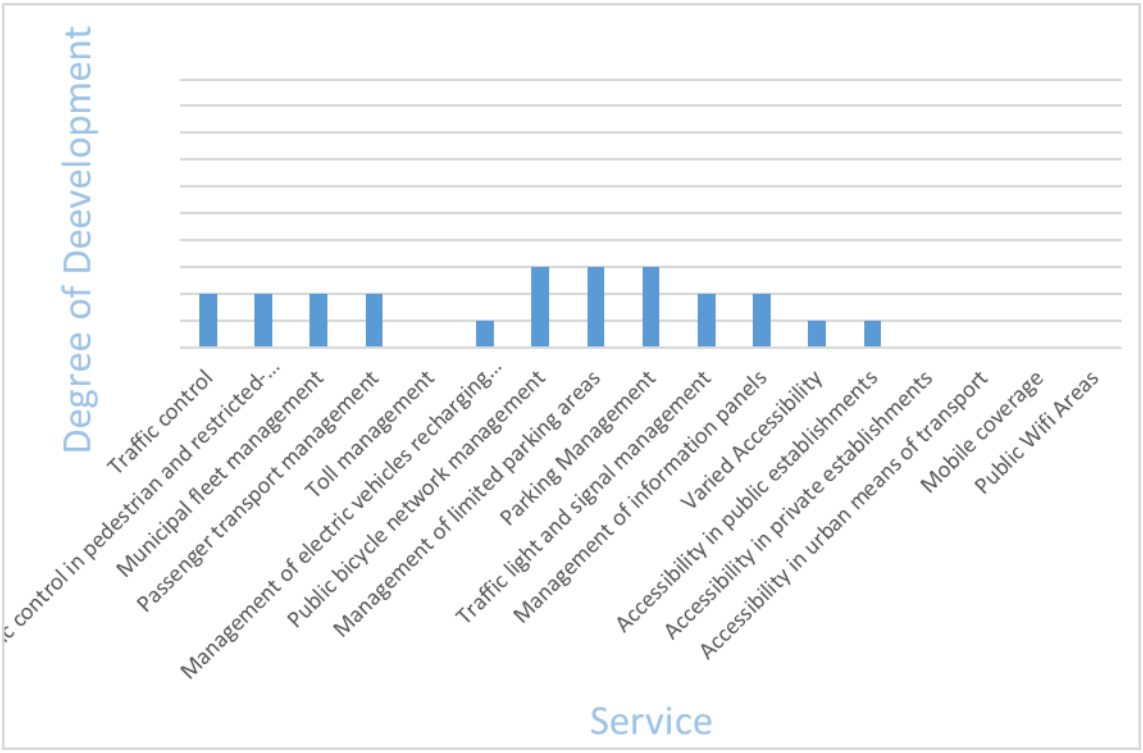

Figure 20: Smart Mobility Services Bar Chart

In this bar chart, we can see the lack of development in all fields of this area. The lack of digitization is of particular concern, as well as the fact that this situation is not expected to be reversed in the coming years.

Connectivity related services have no development, Conil is stuck in this section. There are no public wifi areas and the mobile coverage is not of the best quality, especially in summer when there is a greater number of mobile phones and televisions connected.

Accessibility services are in the same situation. However, the council is planning to improve accessibility to the beaches, providing them with new accesses and increasing the fleet of water vehicles for the disabled. [18]

More developed, though, are the municipal parking services. It should be noted that this is one of the priorities of the PMUS, and new spaces belonging to the 'Zona Ora' have been provided with parking management machines. [15]

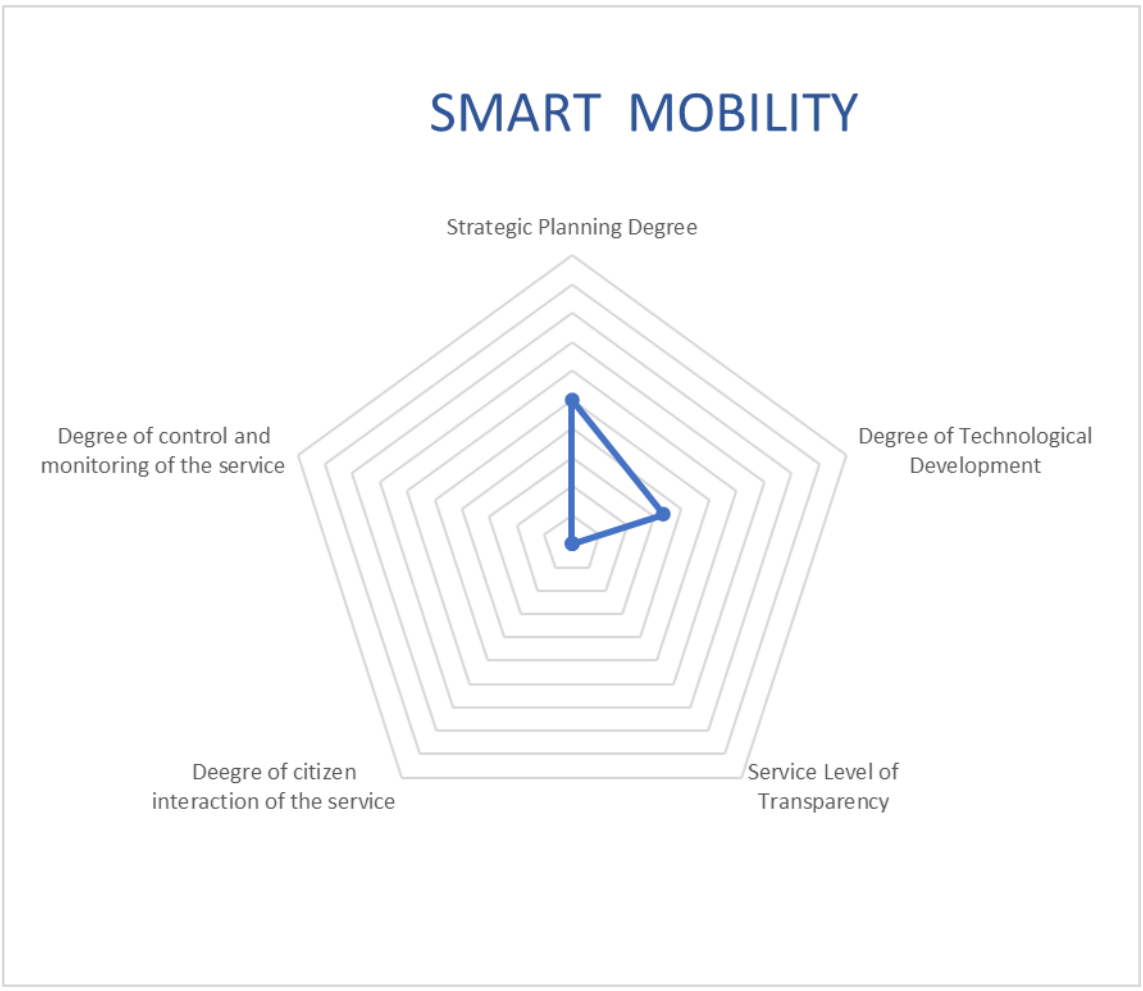

Figure 21: Smart Mobility Indicators Spider Graph

The spider graph is quite related to the previous one. It shows us again that, although there are plans for the future to reverse the situation, the current picture is not that of a properly interconnected city.

There is a clear shortage in monitoring the vehicles that pass through the municipality. There is no geolocation device for municipal vehicles, nor is there any control of the trips made by private vehicles. In addition, there are no mobile applications that allow citizens to communicate bilaterally with their leaders, which translates into a low degree of smart.

Likewise, no data on this area is published on the council's website, only that reflected in the mobility section of the Strategic Plan, collected in 2011.

However, a certain degree of strategic planning can be observed. One line of the DUSI strategy should be highlighted, through which it is intended to reinforce the pedestrianisation of new areas in the historic centre, extending pedestrian transit areas and replacing pavements with others more suitable for people with reduced mobility. It is also important to point out the public bicycle rental project included in the PMUS, as well as the EUROVELO project, a bicycle lane that aims to link Conil with Barbate in order to decongest the road for cyclists.

This Eurovelo project also aims to improve the signalling of areas intended for the use of bicycles in Conil, as well as the implementation of systems for collecting information regarding users of these areas [19]. This means that the average technological development of the Smart Mobility area is somewhat more advanced.

5.1.3 Smart Governance

The area of Smart Governance seeks to achieve an open and transparent government that uses technology as a basic tool to achieve quality and efficiency in its services and activity.

With ICT tools, governments can communicate directly with citizens. In addition, the same government could receive feedback and suggestions from the programmes, policies or actions carried out in the city. In the same way, citizens could access information related to funds, expenditures and investments. Except for information that affects the development of the city itself, the rest should be public to all citizens.

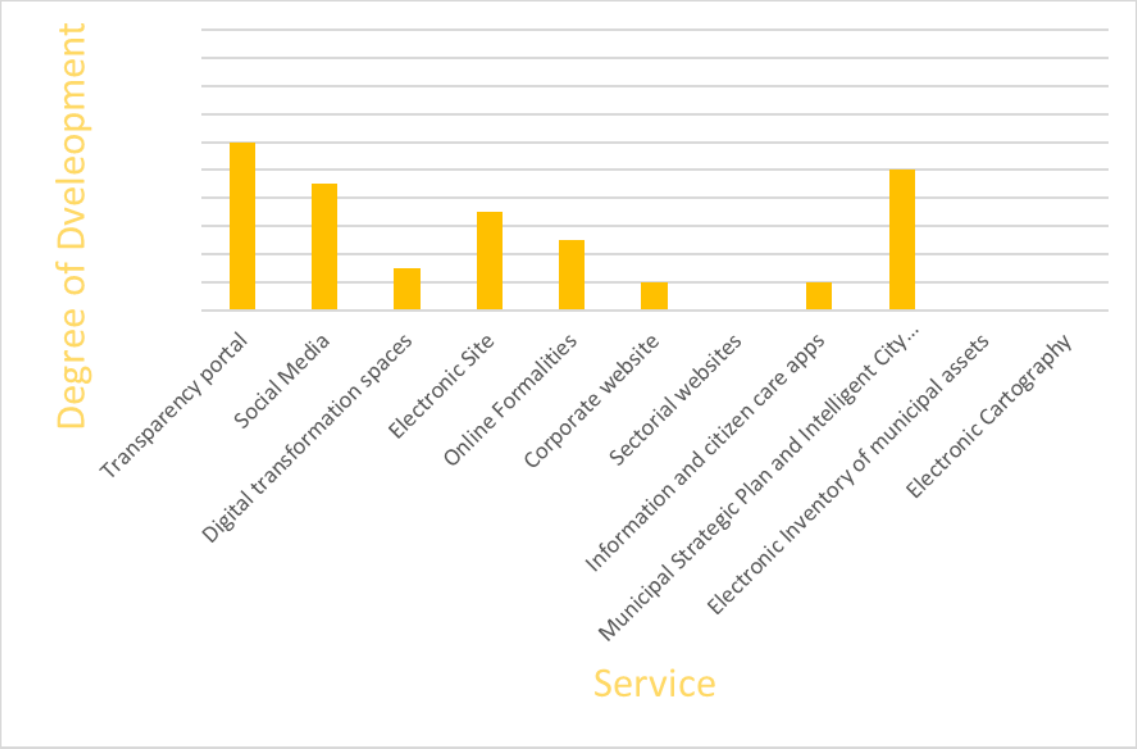

Figure 22: Smart Governance Services Bar Graph

In this first bar chart we can see how there are several services with high levels of development, while with the others we start from zero or almost.

The most developed services are those related to transparency. In this sense, it is worth mentioning the space dedicated to Conil de la Frontera within the portal Gobierno Abierto, of the Diputación de Cádiz (https://gobiernoabierto.dipucadiz.es/catalogo-de-informacion-publica?entidadId=901). Although the council could invest in the development of its own portal, the one that already exists is well implemented, and includes publications such as budgets, data related to public debt or information on new contracts or agreements. Here we should also mention the Instagram profile of the Conil City Council, https://www.instagram.com/ayto_conil/, in which all the sports events, news about the city, and other relevant information for the citizens are published.

Another aspect to take into account is digital management. The only service with some development within this sub-area is the electronic site(https://sede.conil.org/PLAN-E/PROD/SEDE/cnlSEDE.nsf?Open), which, unlike the transparency portal, is controlled by the Conil town council itself, although it is in a situation of low development. It is not yet possible to do any kind of electronic procedure through this site.

In addition, the degree of citizen participation remains low. The few means that citizens have to interact with their city council are not digitalized, except for a section on complaints and suggestions in the transparency portal.

Finally, it is possible to observe a very limited interest of the city council for its digital evolution. It only has a

corporate website, little developed, and no sectorial website, mobile application or electronic archive.

We will talk about the Municipal Strategic Plan later on.

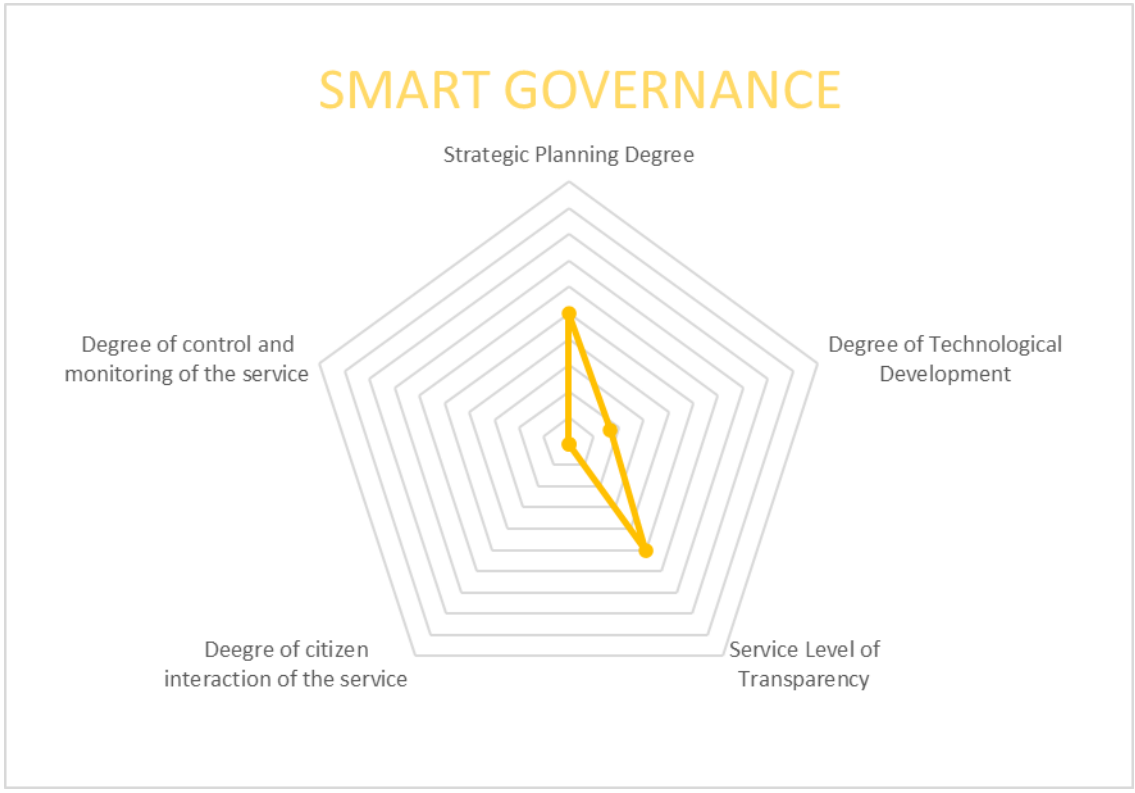

Figure 23: Smart Governance Indicators Spider Graph

From this graph we can highlight the remarkable degree of strategic planning, thanks obviously to the elaboration of the Plan Estrategico Conil 2025. In this plan, objectives of all kinds are defined, but the ones that contribute most to the smart development of the city are the future innovative approach, through which it is intended to retain the young talent that is currently fleeing Conil, and the creation of Red de Redes, a virtual space that aims to channel all the advances made in associations, joint projects, shared trips, etc.

As we have already discussed, the level of transparency is also quite developed. This is largely thanks to the Open Government portal.

However, we can observe a low degree of digital advancement. This lack of progress is due to the absence of a mobile app that allows citizens to make use of services such as the reservation of municipal facilities, know the opening hours of public buildings or consult the public holidays of the municipality.

Where we find no sign of development is in the control and monitoring indicator, nor in the citizen interaction indicator. The first is due to the absence of transversal communication protocols and data study between the different areas of the town council. The second is mainly caused by the lack of development of the electronic site and its section of requests and questions.

5.1.4 Smart Economy

This area determines and measures the economic development of Conil de la Frontera in relation to the application of technology. The Smart situation of the domains of the Conil council belonging to the Smart Economy area is quite similar to the situation of the other domains, all of them characterised by a low

digitalisation of their services.

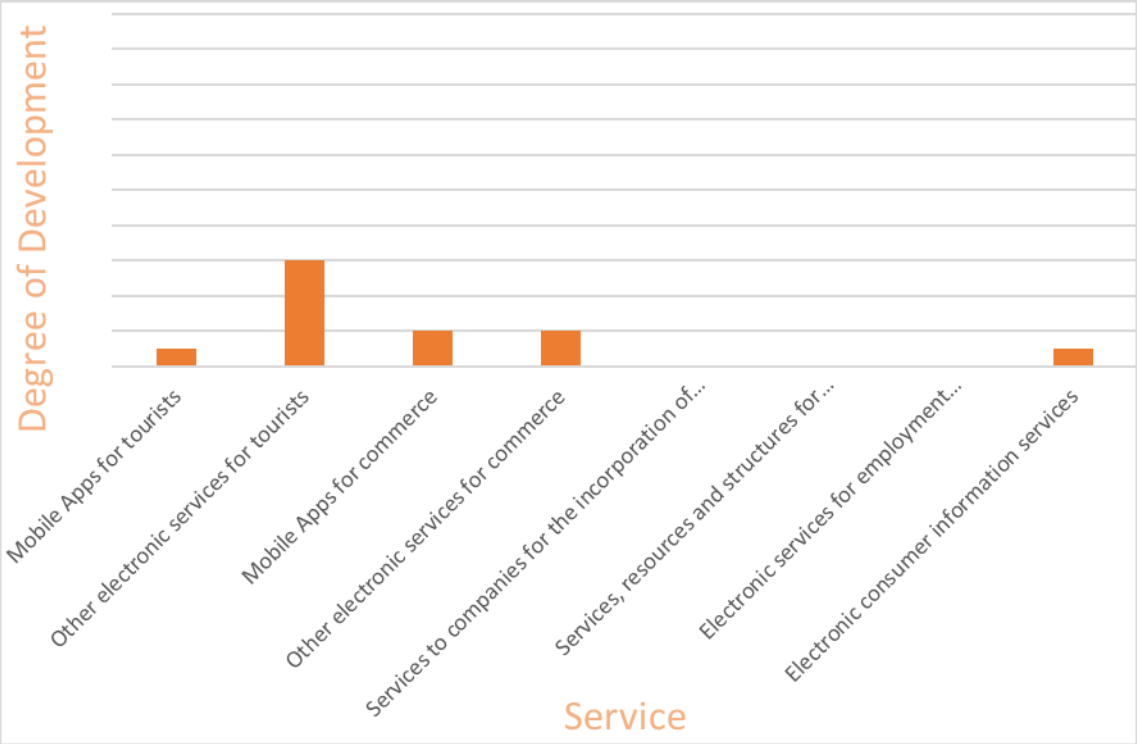

Figure 24: Smart Economy Services Bar Graph

To talk about economy in Conil is to talk about Tourism, and this is reflected in the previous graph. The only services with some development are related to tourism, the main productive engine of the city. In this area, it is worth mentioning the Portal Turismo (https://sede.conil.org/PortalTurismo/PortalTurismo.nsf) created by Conil's City Council as an extension of its Sede Electrónica. This portal provides people who want to or are going to travel there with information related to the city, possible accommodation options or suggestions for its gastronomy.

However, a mobile application is missing to complement this web portal, as it does not allow much interaction between travellers and the town council.

It is in the field of innovation and employment that Conil has the greatest of its challenges. As we can see, the development of services related to employability and entrepreneurship are non-existent. No services are offered to companies for the adoption of ICTs, nor are infrastructure resources provided for innovation. People who want to find a job in Conil de la Frontera do not find in the City Council a digital ally in their search process.

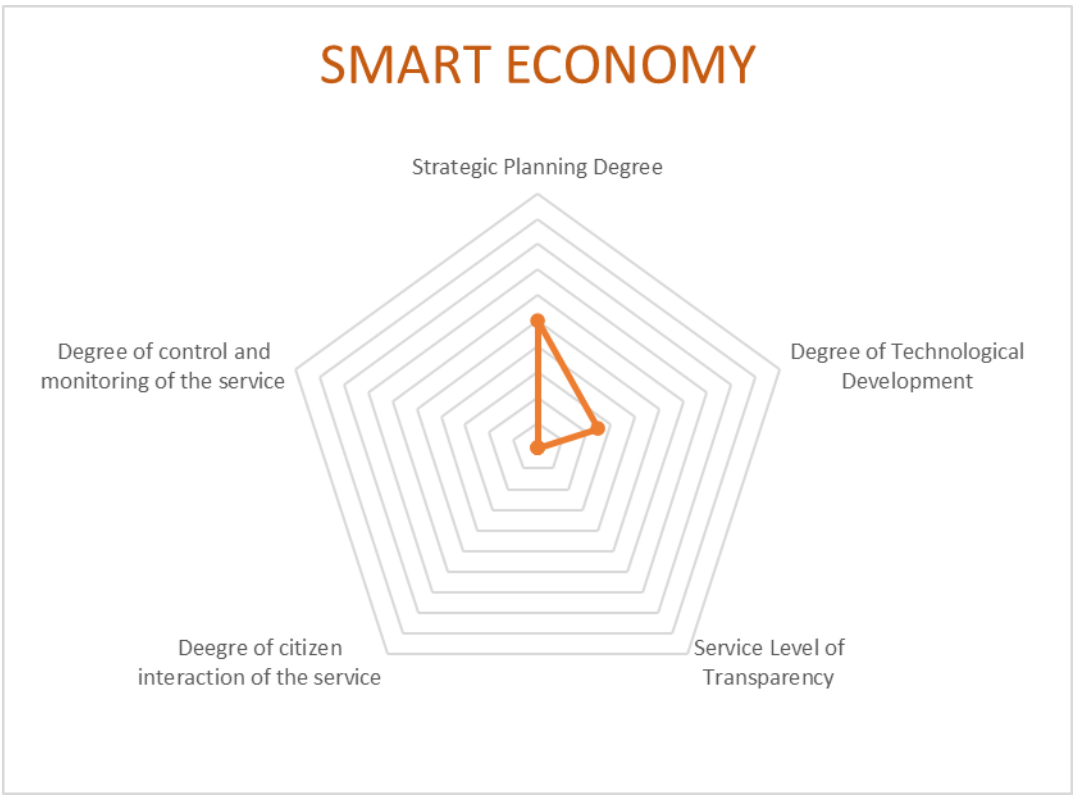

Figure 25: Smart Economy Indicators Spider Graph

The Strategic Planning indicator is once again the one with the highest level with respect to the others, this time thanks to the development in 2019 of the Plan Estrategico de Turismo (Strategic Tourism Plan). One of the objectives of this plan is the implementation of ICT in tourism services, which will improve the dissemination of the sector's offer, increase the competitiveness of companies and facilitate their development.

However, all other indicators have a very low or no development. A clear example of the lack of help from the Town Hall in terms of business is the recent creation of the Asociación de Empresarios de Conil de la Frontera, a non-profit group that defends the general interests of entrepreneurs in Conil, and develops mobile applications such as the Ruta de la Tapa which explains the minimal degree of technological advancement.

5.1.5 Smart People

The Smart People area is related to the increase and improvement of the human capital of the city, to the areas of citizen participation and to the possibilities of formation of the citizenship, especially of the unemployed and disadvantaged people.

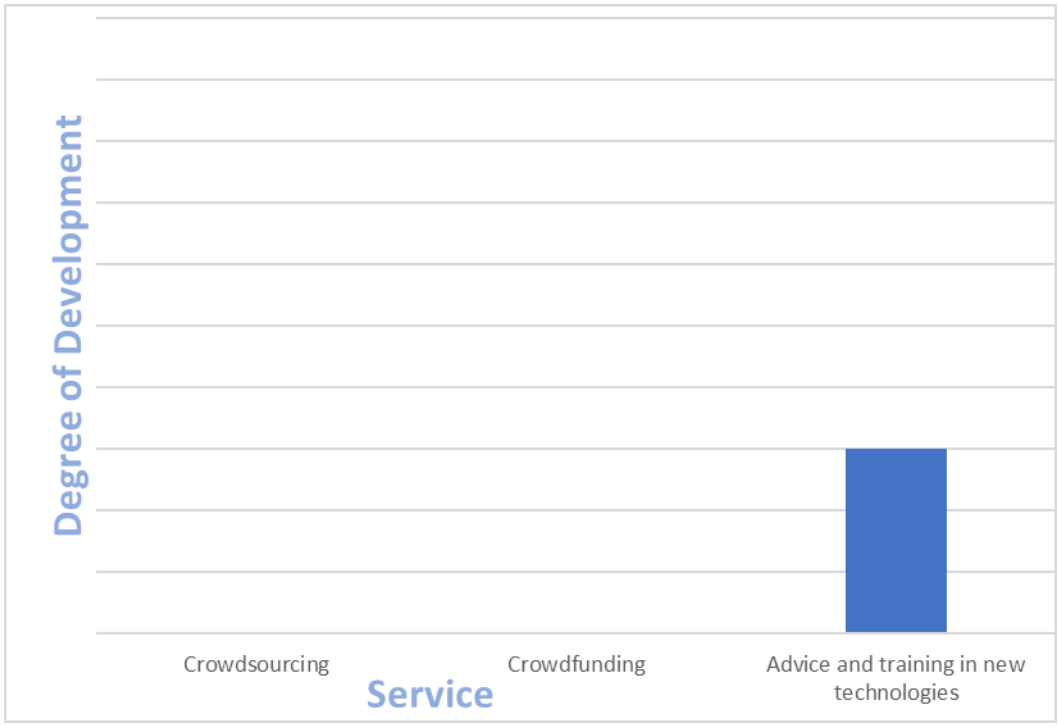

Figure 26: Smart People Services Bar Chart

In this first bar chart we can see the three services belonging to this area, the local platform of collective collaboration to face the challenges of the city (Crowdsourcing), the local platform of collective microfinance (Crowdfunding), and finally the training and advice of citizens in the world of new technologies.

As we can see, the degree of development of the first two services is zero. There is no common financing project between the inhabitants of Conil and their municipality to improve a local service. Similarly, no tasks that were previously the responsibility of the town council have been outsourced and are now carried out by its inhabitants.

However, something different occurs with the training possibilities of the inhabitants of Conil in new technologies. This service has a higher degree of development thanks mainly to the agreement of Conil's City Council with the Catholic organization Cáritas. Since 2013, this project has been carried out, which favours the use of new technologies among people in situations of risk and/or social vulnerability, with the aim of helping them in their social and labour integration processes.

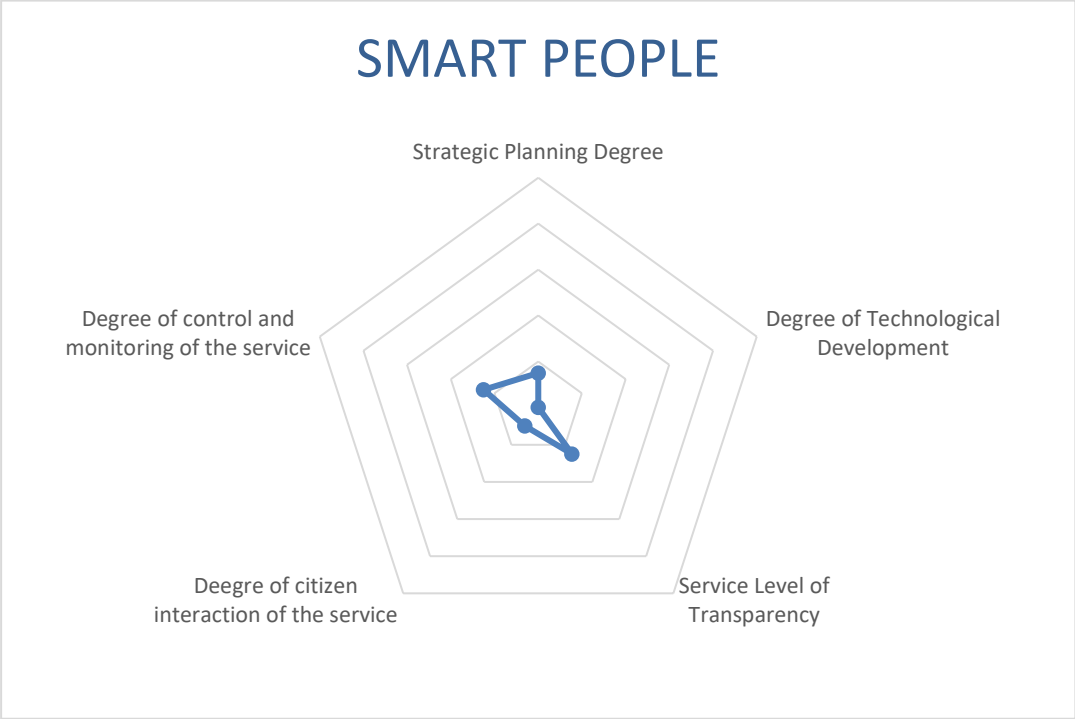

Figure 27: Smart People Indicators Spider Graph

The spider graph is quite similar to the previous ones. Although Conil de la Frontera's unemployment rate is below the regional average (36%), it is still very high (30%), making it the main problem related to the city's human capital. [20]

It is worth noting the gradual introduction of new technologies in agriculture, thanks to subsidies from the Cadiz Provincial Council from which several companies in Conil benefited, such as the agricultural cooperative 'Nuestra Señora de las Virtudes'. This fact makes the Transparency and Monitoring indicators the two most developed ones. However, the lack of digitalisation and, consequently, the lack of development of collective financing platforms means that the other indicators start almost from zero.

5.1.6 Smart Living

The area of Smart Living aims to guarantee and increase the quality of life of citizens. Although it is an area that includes a wide range of services, all of them are similarly underdeveloped. Consequently, the Smart Living area is the least advanced of the six focus areas.

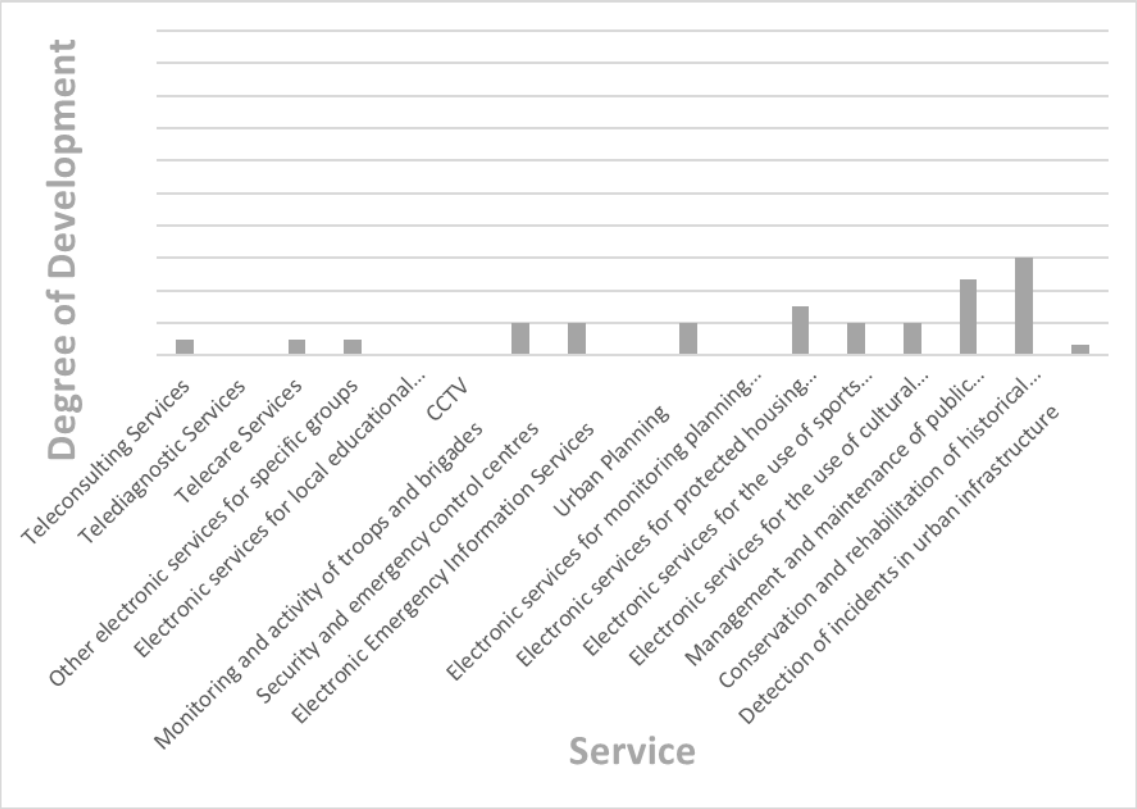

Figure 28: Smart Living Services Bar Graph

This is mainly due to the lack of digitalisation of municipal services. For example, we can find services provided by the City Council, such as job education offers, social housing, etc, but the non-existent technological transformation of these services is translated into a zero degree of development in most of the services in this area.

However, thanks to the Dusi RevitaConil Strategy, we can observe a higher degree of development in a few services related to public infrastructures. This strategy contains a specific programme that has allowed the development of these services, the programme "Recovery and rehabilitation of public heritage".

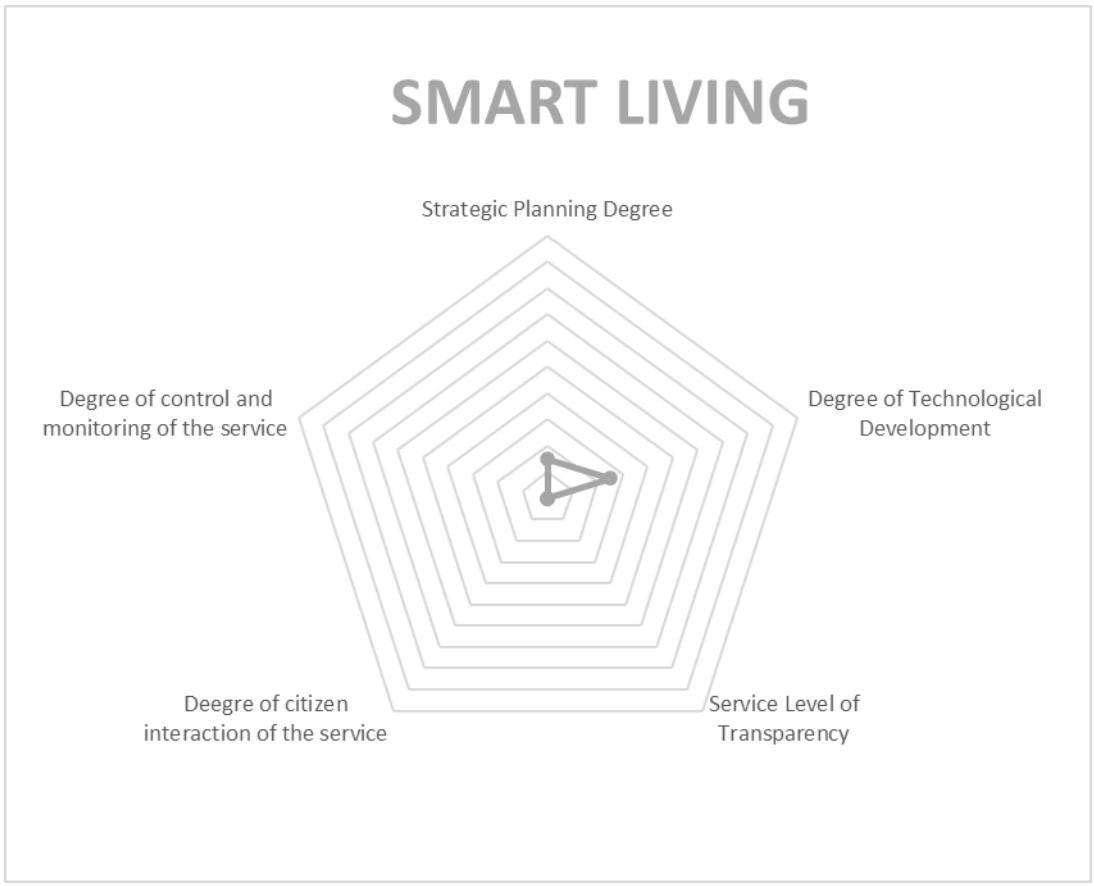

Figure 29: Smart Living Indicators Spider Graph

The spider graph also shows that the Smart Living area is the least developed, with only a certain degree of Strategic Planning and Technological Development.

The first is due to, as we have said before, the Dusi Revitaconil Strategy and its program 'Inhabited and Activated Space'. In this program, it is worth highlighting line of action 4.1: ``Protected housing for rent for young people with insufficient income".

The second is due to the fact that most services have at least one email contact, which means that this indicator does not start from zero.

Moreover, there is a wide margin for progress, especially in the level of transparency as well as in the degree of citizen interaction and control of the service.

5.2 Comparison with Algeciras

Algeciras is a city in southern Andalusia, in the province of Cadiz. It is the largest city in the area of Gibraltar, a strategic enclave. As a gateway to the Mediterranean, it has developed all the industrial activity around its important port.

Although it is a city that has gone through a process of modernization in the last years, it still has a low degree of smart development. However, we can find some plans referring to the city which are aligned with the fundamental ideas of Smart City. Among them we can highlight the ``Estrategia DUSI Algeciras Barrio de la Caridad: Gateway to Europe´´, similar to its homologue in Conil. This plan aims to revitalise the 'Barrio de la Caridad', as well as transform Algeciras by developing a long-term Smart City strategy. Another strategy to be mentioned is the Special Urban Mobility Plan, which aims to solve the problems in terms of mobility in the central area of Algeciras.

Conil de la Frontera and Algeciras are both similar and very different. Both cities have as the axis of their economy their relationship with the sea, the first focusing on tourism, and the second as a means of transport. The aim of this comparison between two nearby and similar cities is mainly to complement the initial diagnosis previously made. The aim is to have a better understanding of the current situation not only of Conil, but of the whole area, as well as to identify possible areas of improvement in which Conil de la Frontera could take Algeciras as a reference.

To make this comparison, we will use the data reflected in a Smart City plan for Algeciras from the prestigious consulting firm Deloitte [21]. Our initial diagnosis has the same structure as the one mentioned above, so we will use it to compare area by area the situations from which each of the two cities depart. To do this, we will superimpose the spider graphs of Conil de la Frontera and Algeciras for each area, then we will talk about the measures taken by Algeciras that can serve as good references for Conil de la Frontera.

5.2.1 Smart Environment

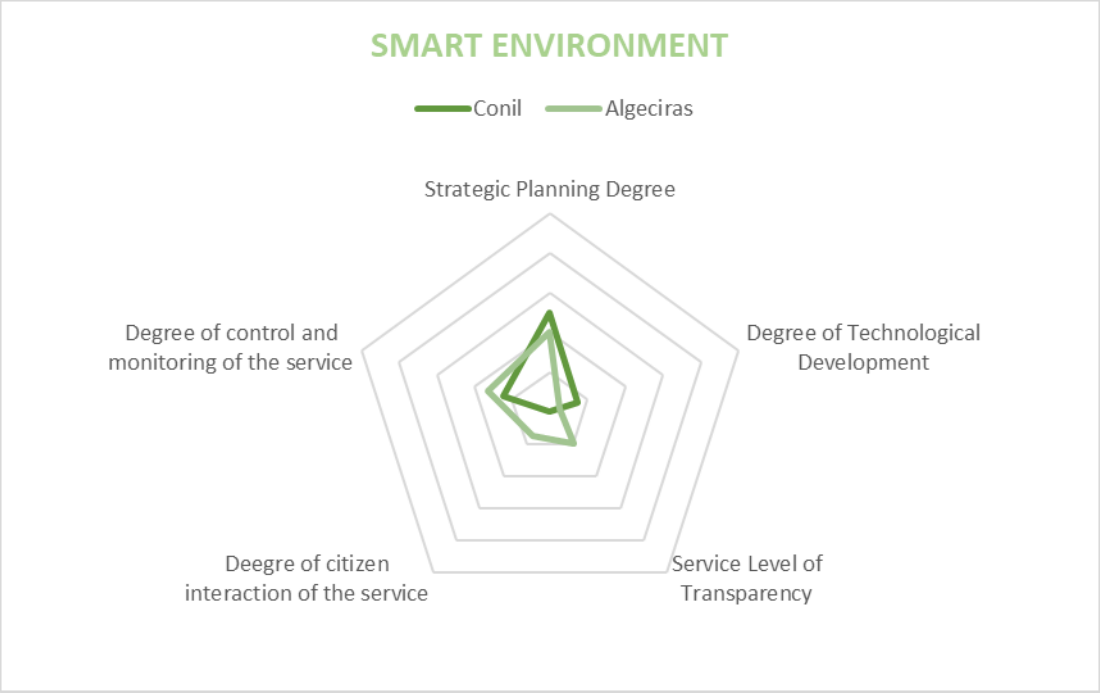

Figure 30: Smart Environment Indicators Spider Graph comparison

We can see a quite similar graph in the degree of strategic planning as well as in the degree of monitoring and

control of the service. This is mainly due to the DUSI Strategies implemented by both municipalities, where we find different lines of projects related to this area. For example, the strategy for Conil de la Frontera includes the implementation of a network of noise sensors in the centre of the city, while in Algeciras the use of a geolocation system for street lightning stands out, where they intend to install a remote management system. [21]

However, unlike Conil, Algeciras does not start from zero on the other indicators. Although they are underdeveloped, the degree of technological development and the transparency of the service exceed those of Conil. Data or information related to this area are published, although not in the ideal place, which would be the municipal transparency portal. Similarly, the citizens of Algeciras have greater opportunities to interact with their local council on issues related to the Smart Environment area than their equivalents in Conil de la Frontera.

5.2.2 Smart Mobility

The data of the Smart Mobility Area is quite similar to the previous area, as we can see in the spider graph below:

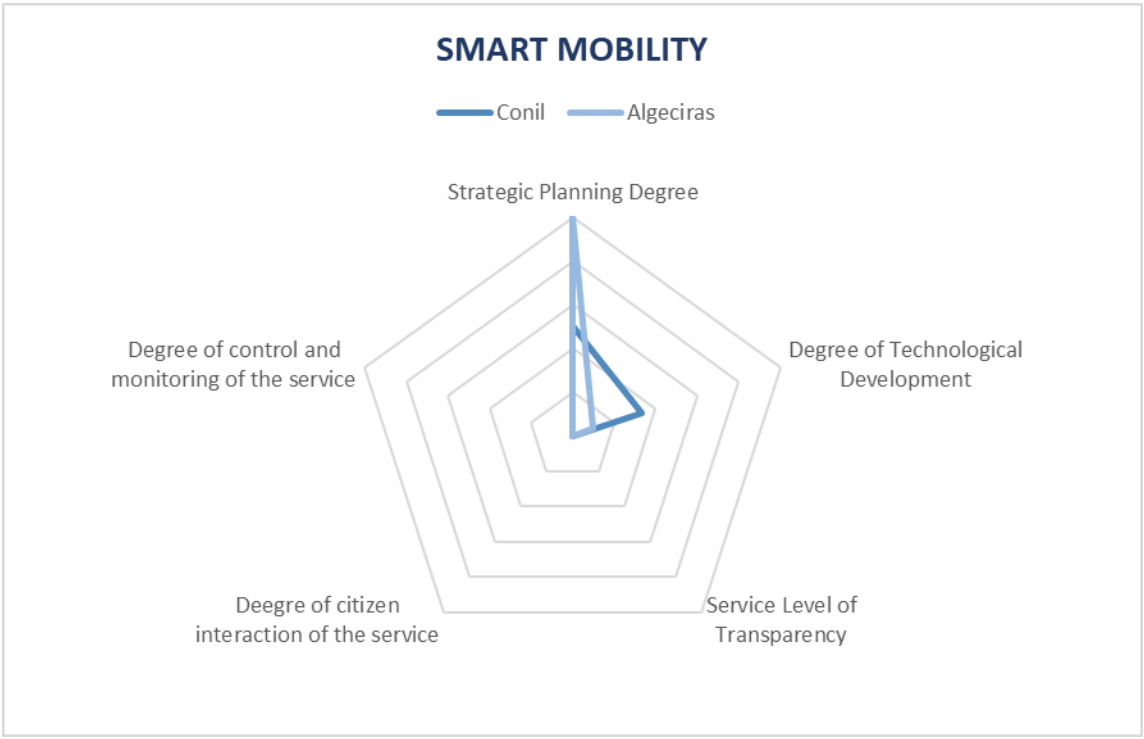

Figure 31: Smart Mobility Indicators Spider Graph comparison

The high degree of strategic planning in both cities is due entirely to the launch of the respective sustainable urban mobility plans, which represent the ideal tool for the development of mobility from a Smart perspective. Both intend to plan the implementation of a hundred different measures that will be implemented over the next ten years. These plans aim to improve the quality of life of citizens by reducing pollutant emissions and noise levels, while promoting the use of non-motorized transport. The difference in the degree of development of strategic planning between Conil de la Frontera and Algeciras is that, while the plan of the first was launched at the beginning of the last decade and is a little outdated at the moment, the second was launched only two years ago and is much more developed than the first one.

However, we can observe some more technological development in Conil de la Frontera's services. Although it may seem a contradiction, it is also due to the sustainable urban mobility plan. As it is older than the one in Algeciras, many of the measures have already been implemented, such as intelligent traffic signs that gather information automatically. The fact that this indicator is not fully developed is due to the fact that decisions are

subsequently made manually.

The lack of digitalization of most of the services, as well as the inexistence of indicators that allow measuring the efficiency of each of the transport services, make the other fields of the Smart Mobility area start from zero in both Conil de la Frontera and Algeciras.

5.2.3 Smart Governance

The main tool of a city council to improve its Smart Governance area is a versatile electronic government site, in which citizens have quick and easy access to all the services offered by the council. This is the main difference between Conil de la Frontera and Algeciras in the development of this area, because although both have their own electronic site, their characteristics are very different from each other.

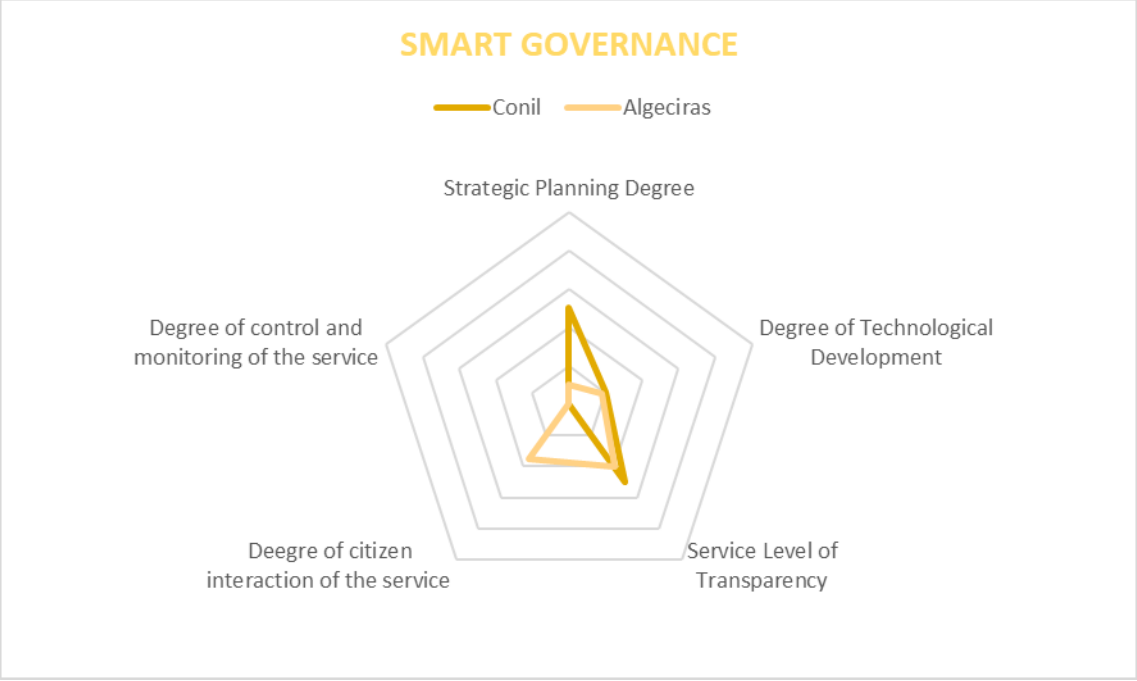

Figure 32: Smart Governance Indicators Spider Graph comparison

The first difference we find with respect to previous comparisons is the degree of development of the citizen interaction indicator. The electronic government site of Algeciras has many more digitized services than its Conil homologue, among which the possibility of paying taxes online, the presentation of written documents telematically or the registration to sports courses stand out. [21]

The second is that Conil de la Frontera has a higher degree of strategic planning than Algeciras. Contrary to the Sustainable Urban Mobility Plan, the Strategic Plan Conil 2025 is much completer and more updated than the Strategic Plan Algeciras 2015.

As we could see in the initial diagnosis, the Diputación de Cádiz forces the respective city councils of each city to publish data of citizen interest in its transparency portal, which is shared by Algeciras and Conil de la Frontera. This means that both cities have a similar level of development of the indicators of transparency and technological maturity of the services.

5.2.4 Smart Economy

The situation of the Smart Economy area in the areas of both councils find several aspects in common with the rest of the areas analysed, highlighting the lack of digitalization of their processes and services.

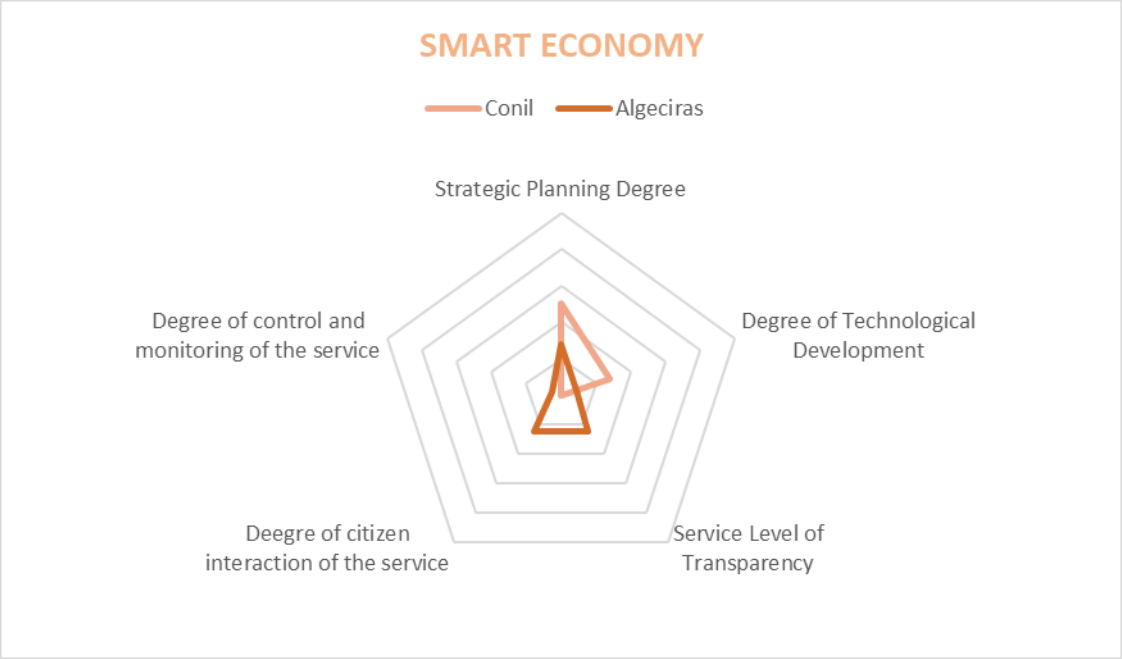

Figure 33: Smart Economy Indicators Spider Graph comparison

Despite the generalised lack of modernisation of procedures, it is worth highlighting the progress made by some delegations of Algeciras City Council, such as the one responsible for tax management, where a Virtual Office has been created, which has saved thousands of annual visits to its physical office. In addition, a system of interdepartmental internal communication flows has been successfully developed in recent years [21]. These improvements in processes, as opposed to the fact that the Conil de la Frontera Town Council has remained stagnant in these same areas, explain the greater degree of development of indicators of citizen interaction and transparency in Algeciras.

On the other hand, as we have observed in the previous areas, we find the strategic planning indicator more developed in Conil de la Frontera than in Algeciras. This is again due to the Strategic Plan Conil 2025, which includes a special plan for tourism, the main economic engine of the city. This plan also includes measures aimed at promoting initiatives by companies in the sector, as well as business cooperation in the creation of mobile apps focused on tourists, a fact that increases the scope of the digital service.

5.2.5 Smart People

An intelligent society must be characterised by enhancing the education of citizens, respect for plurality and promoting the social inclusion of the most disadvantaged members. As we can see in the following spider graph, both cities are still far from achieving their smart objectives.

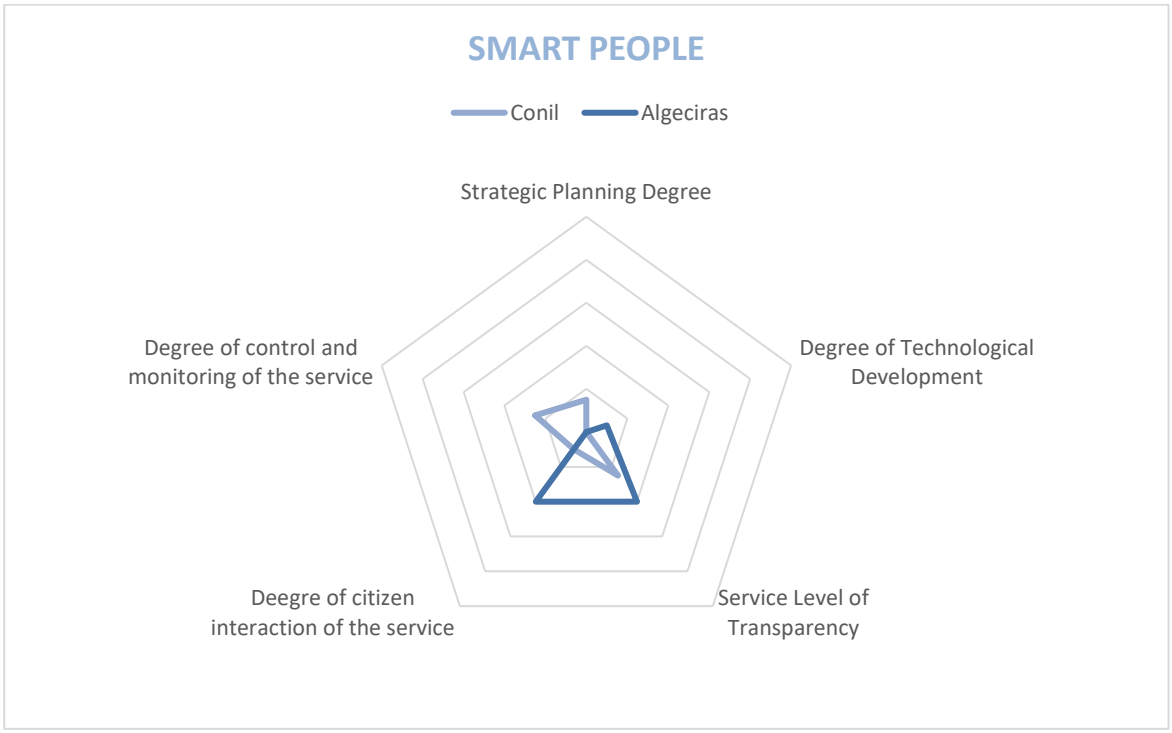

Figure 34: Smart People Indicators Spider Graph comparison

As a tendency in the previous areas, we find the degree of strategic planning more developed in Conil de la Frontera than in Algeciras, although not by much. This is due, as we have mentioned before, to the Plan Estratégico Conil 2025. Although it is not a priority objective of the plan, we find in the plan measures related to the training of citizens in new technologies, measures yet to be implemented.

However, almost all other smart indicators are more developed by Algeciras City Council. It should be noted that currently available training courses and events are published on the municipal website. Although the possibility of electronic registration is not offered, the fact that the Algeciras Strategic Plan is older than that of Conil de la Frontera means that many of its measures are already implemented, thus allowing for greater development of indicators of citizen interaction and transparency.

The low degree of internal monitoring and control of the service in both municipalities is shared, mainly due to the fact that the electronic interaction between citizens and their representatives does not have monitoring parameters in accordance with the size of their cities.

5.2.6 Smart Living

As in the initial diagnosis of Conil de la Frontera, the sub-areas of Smart Living in Algeciras are limited in their Smart growth due to their reduced degree of digitalization.

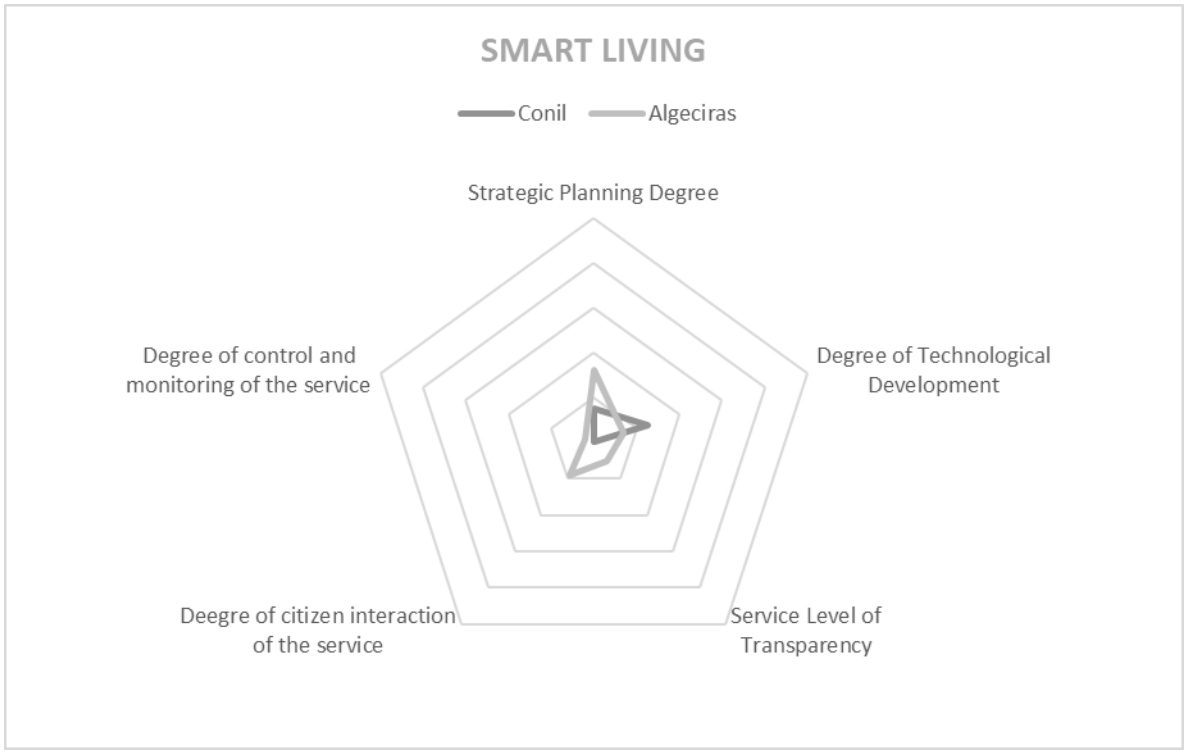

Figure 35: Smart Living Indicators Spider Graph comparison

Both municipalities have a fairly similar Smart situation in this area. We can see that in all the services belonging to the Smart Living area, the degree of monitoring and control is zero. Although there are some services implemented, such as the one relating to protected housing in Conil de la Frontera, or the new work-control system for maintenance operations in schools, the lack of indicators to facilitate decision-making makes this indicator the least developed in both cities.

The typology of problems in the other areas is common to both municipalities. The scarce development of Smart and the lack of strategic planning translates into aspects such as the impossibility of requesting appointments by electronic means, which means a greater expenditure of resources due to the scarce efficiency of the established procedures. The consequence of this is a lack of transparency and digitalization of contents of citizen interest that makes the Smart Living area the least developed of the six areas.

5.3 Conclusions

After having analysed the current Smart areas, both by services and by the degree of development of each of the indicators, and having compared the present situation of Conil de la Frontera with a city similar to it such as Algeciras, we can obtain the following conclusions:

- The first conclusion we can draw from this analysis is that, without a doubt, the strategic planning indicator is the most developed in all areas. This is mainly due to the Plan Estratégico Conil 2025, since many of the services of the different focus areas are strengthened thanks to the projects belonging to the plan, and also to the Estrategia Dusi RevitaConil, a plan whose main objective is to align the future projects of Conil de la Frontera with the Estrategia Europa for intelligent growth and sustainable development. Conil de la Frontera is in a Smart transition period, and although the steps it is taking in this process are the right ones, as we will see below, it is still far from becoming a Smart City.

- Indicators of transparency and citizen interaction of services have a small degree of development in Conil de la Frontera, but not in Algeciras. In terms of citizen interaction, the Algeciras Town Hall website offers many more possibilities than the Conil de la Frontera website, such as the ``Buzón del Ciudadano´´ section or the ``Área de relaciones con el ciudadano´´ where various requests can be made telematically. As far as transparency is concerned, the same applies to the electronic site. Furthermore, the number of profiles in the different social networks managed by Algeciras town council should be a reference model for Conil de la Frontera.

- The areas of Smart Living and Smart People are the least developed of all, and where Conil de la Frontera has the most room for improvement. The steps that have already been taken on the Smart path, are not related to the treatment that the council gives to its citizens, nor to the quality of life in Conil. Although they bring together a smaller number of services than the other areas, these areas are just as important as the others.

- Finally, the least developed indicator is the control and monitoring of services indicator. Except for some services belonging to the Smart Environment area, there are no indicators for an adequate monitoring of the quality and efficiency of the service. Through the use of sensors and data exchange agreements, cities can monitor the movement of the city, from the flow of vehicles and pedestrians, to air quality or energy consumption. This is undoubtedly the aspect that Conil de la Frontera should work on the most in its way to becoming a Smart City of reference.

To sum up, it can be considered that in general terms, with the exception of the specific cases of certain delegations, the status of Conil de la Frontera Town Council at Smart level can be considered in its initial stages, with a wide margin for improvement.

6 THE UNE PATH

Once the Initial Diagnosis has been completed and analyzed, as well as the comparison with Algeciras, it is time to define the paths that cities can follow in their Smartization process.

Undoubtedly, all cities should start this process by improving the services they already have, that is, being realistic, and trying not to put the cart before the horse. That is why public services, those that support the daily operations and activities of the community, are the most likely to be affected by these Smart changes.

In this project, we are going to focus on the path proposed by the AENOR organization through the UNE 178101 Smart Cities series of Standards (Infrastructures. Public Services Networks) This series of Standards aims to define the metrics applicable to public service networks, such as water, energy or waste, to provide the best services to citizens, while implementing these metrics with maximum efficiency and easy integration with the environment. The series is composed of the following five Standards:

- UNE 178101-1:2015 Smart Cities. Infrastructures. Public Services Networks. Part 1: Water networks. [22]
- UNE 178101-2:2018 Smart Cities. Infrastructures. Public Services Networks. Part 2: Waste networks. [23]
- UNE 178101-3:2016 Smart Cities. Infrastructures. Public Services Networks. Part 3: Transport networks. [24]
- UNE 178101-4:2015 Smart Cities. Infrastructures. Public Services Networks. Part 4: Telecommunication networks. [25]
- UNE 178101-5-1:2015 Smart Cities. Infrastructures. Public Services Networks. Part 5-1: Energy networks. Electricity. [26]

Each of these Standards has, obviously, different indicators, all of them of simple measurement and obtaining, without the need of a specific methodology. However, what is really important in this set of Standards is the way in which data relating to these indicators are collected and then used.

6.1 Procedure for collection and publication of metrics

Cities seeking to adopt any of these Standards must collect, weigh, score and publish the set of metrics that appears in each of the public service network Standards. The measurement and data collection must be at least annual. In this process, the city managers must collect the data from the open files (Open Data), treat them, and provide the information for measuring the indicators annually according to UNE 178301, which we will later talk about.

For each indicator, the city managers must establish a weighting of the importance for each one of them, which allows for the assessment of each Smart Public Service network. This weighting must have the following parameters defined:

- Worst Value: It is the minimum value that, according to experts, with current technology, the indicator can reach.
- Best Value: It is the minimum value that, according to the experts, with the current technology, the indicator can reach.
- Threshold value: It is the minimum value from which, according to the experts, with current technology, the indicator should improve.

6.2 Open Data

One of the pillars of a Smart City is the accessibility to the information of its citizens. An efficient local democratic system must have established transparency mechanisms, as well as spaces for citizen participation and collaboration.

The UNE 178301 Standard [27] establishes the way to evaluate the publication of Open Data of a city. It determines how to measure the degree of openness of data produced by the public sector, so as to facilitate its reuse.

This standard is structured in a series of domains, divided in metrics, the basis for the calculation of the associated indicator, and its different corresponding levels. The domains are as follows:

- Strategic Domain: Establishes the criteria to evaluate the strategic capacity of the council to establish a consistent vision of Open Data.
- Legal Domain: Establishes the criteria to evaluate the existence and verification of laws that facilitate the execution of Open Data policy.
- Organizational Domain: Establishes the criteria to evaluate the capacity to adequately exercise the management activities that the city council has defined for the development of the Open Data strategy.
- Technical Domain: Establishes the criteria for evaluating those activities that always guarantee the necessary mechanisms for the availability of data .
- Economic and Social Domain: Establishes the criteria to evaluate the mechanisms that relate the data producers with the reusers.

7 IMPROVEMENT ACTIONS

In this last part of the document a series of projects will be proposed, all of them belonging to the less developed areas of Conil, and in each of them the reasons why the council should invest in these services will be explained, as well as examples of cities where they have already been implemented. Some of these projects are more general, and would serve as base projects that would provide Conil with the necessary infrastructure to implement and maintain other more specific projects.

7.1 Multiservice Municipal Network

The first project to be carried out by Conil de la Frontera in this process should serve as a Smart Infrastructure, that is, a telecommunications structure that serves as a basis for present and future complementary projects. Therefore, the implementation of a Multiservice Municipal Network is necessary.

In this case, we will take as an example the UNE 178102-1:2015 Standard,``Ciudades Inteligentes. Infrastructuras. Sistemas de telecomunicacion. Parte 1: Red Municipal Multiservicio´´ [28]. In this document, information on the definition and application of the same is collected. According to it, the city council, in this case Conil, must start by identifying the city's assets to which to apply certain telecommunication services.

This first stage must be carried out in accordance with the UNE 178303 ``Ciudades Inteligentes.Gestión de Activos de la ciudad. Especificaciones´´. For example, in Conil de la Frontera, among many others, services related to accessibility, education, innovation and entrepreneurship, security or management of municipal facilities would be susceptible to incorporating these technologies.

The next step would be to distinguish a series of systems that allow the assignment of certain technologies or services to the different assets mentioned above. Depending on which assets we want to incorporate now or in the future to the Municipal Network, we will have to implement systems such as Dpc (Data Processing Centers), UCS (Unified Communications System) or TMS (Traffic Management Systems).

These systems must be supported by the Multiservice Municipal Network, which, as we will see now, is defined as an IP-MPLS network that develops multiple telecommunication systems and uses to connect devices and terminals, a series of access and transport networks, through transmission means such as optical fiber, Wifi, etc.

Depending on the capacity that the Network must have, and the extension of the city that it wants to support, each City Hall must choose between the following types of systems:

- Fiber Optics: If you want to implement in a medium or large city for the interconnection of control centers, supervision, security, etc., as it is included in the UNE 178107-1 Standard. [29]
- WMAN, Wireless Metroplitan Area Networks: If you want to implement between buildings and facilities in small cities or remote facilities in large cities, as is reflected in the UNE 178107-2 Standard. [30]
- WLAN, Wireless Local Area Networks: If you want to implement as an access network for short distance communications, according to the Standard UNE 178107-3. [31]
- WSN, Wireless Sensor Networks: If you want to implement it as a proximity communications access network, at a very short distance, according to the UNE 178107-4 standard. [32]
- CSR, Mobile Security and Emergency Networks: If you want to implement it as a private mobile communications access network for security and maintenance services, as included in the UNE 178107-5 standard. [33]

Finally, asset services must be characterized, starting by identifying the devices and services that apply to

each asset. From this assignment, we proceed to characterize the following parameters, in order to properly size the equipment and links that will be installed: Scope, Capacity, Mobility, Data Flow Management, Security Level, Content and Quality of Service.

7.2 Smart City Platform

In this section, we must first introduce the concept of horizontality, which is basically what differentiates a Smart City from a sensorized city. In a sensorized city, the different systems capture and process information, which is then analyzed and used by people, while in a Smart City, the platform in this case, simultaneously accesses different sources of information, shares resources, analyzes the data and coordinates the different services.

Therefore, based on the UNE 178104 Standard [34], once the functionalities of such a platform have been defined, we will try to explain why Conil de la Frontera should implement a Smart City Platform.

The Smart City Platform is the fundamental element of a Smart City as it is the piece that orchestrates all its functionalities. Its main objective is to provide the city council with an integrated vision of the city, so as to allow the integration of both the different vertical systems already in existence and those to come, in a single transversal system that constitutes a true Smart City.

Thus, this platform must collect information from the city, distribute it so that it can be processed, analyze it according to defined criteria, make decisions autonomously, and return these decisions to the systems in charge of executing the various functions.

Once the objectives and functionalities of the platform have been defined, we must detail the characteristics that make this platform different from others, which are the following:

- Horizontality: Support capacity in different fields of application, simultaneously deploying multiple services in the same infrastructure.
- Interoperability: Having a system that supports different technologies.
- Performance: Ability to handle a large number of devices, services and processes efficiently.
- Resilience: Ability to continue operating when faced with problems.
- Security guaranteed.
- Modularity: Easy decomposition into parts.
- Flexibility: Capacity to provide different services.
- Operability: Easy to handle, operate and install.

Finally, we will structure the model to be followed by the Smart City Platform, which is divided into multiple layers and is designed to meet the functionalities described above. Thus, the model must include the following layers:

- Acquisition/Interconnection Layer: Provides the mechanisms for receiving the data from the information collection systems.
- Knowledge Layer: Offers support for data processing, value addition and service transformation.
- Interoperability Layer: Facilitates the provision of services to the Smart City.
- Services Layer: Are the services connected through the interoperability layer.
- Support Layer: Transversal layer that supports the rest of the functionalities.

An example of application is the FIWOO platform which meets all the standards of ISO 37120:2018 [35]and the one specified above. This platform has been developed in conjunction with the Copenhagen City Council, among others, and currently already allows for the control of various services in a purely digital manner.

7.3 Public Wifi

Conil de la Frontera, as the Smart tourist destination it aspires to be, must give the importance it deserves to public internet access networks. Tourism is a variant sector both in the number of tourists and in their origin. In the province of Cadiz, especially in Conil, it is one of the most important economic activities in the region, which interacts directly with the services offered in the city. However, this activity is very temporary and dynamic, characteristics that can lead to the saturation of certain resources in a short period of time, thus negatively impacting the experience of the tourist in the destination, the main objective for the improvement of the tourist competitiveness of any city.

In this sense, the experiences that tourists live are changing very quickly with the introduction of new technologies, of which we already make use every day, and without which any type of trip is inconceivable. Conil must be aware of this change and must adapt and learn from these new social behaviours in order to improve the competitiveness of the tourist destination.

One of the possible options for the city to adapt well to this process of change is to be able to identify the fingerprint left by each person who visits Conil de la Frontera. A fingerprint that will be created with the technology that the tourist uses, but with the services offered by Conil, such as a Public Wifi Network.

This proposal has two lines of objectives, one is to offer a digital service that is considered basic in any intelligent tourist destination today, and the other one is getting enough information to improve the competitiveness of the tourist destination.

One of the companies that provides this type of service to municipalities that want to implement a public wifi network system in their municipalities is Wiongo.

This company offers the possibility to the city councils to implement their project, which has no cost for the administration or the citizen, thanks to the inclusion of the municipality in the ``National Smart Destination Deployment´´ of Wiongo, which includes both the deployment of the free Municipal Wi-Fi Smart Network and its maintenance and management, thanks to the advertising sponsorship agreements managed with third parties. [36]

One of the success stories of the implementation of this project is the Palma Smart Wifi network, a public wireless network installed at the end of 2015, which today has more than 300 external wifi access points, approximately thirty million connections per year, and more than one million unique users per year, with high rates of loyalty.

There are many advantages in joining the project offered by Wiongo [37], but they highlight the following ones:

- Analise : Manage and operate Wi-Fi infrastructure deployments at the destination, obtaining real-time analysis on urban mobility.
- Get to know: Gain complete visibility of the tourist route using data analysis of Wifi connections, obtaining a complete demographic and interest profile thanks to the interaction with social networks or services from Facebook or Google, thus discovering patterns of behavior that allow the council to discover new business opportunities and redefine the tourism strategy.
- Predict: Analyze loyalty data (permanence, repetition) based on wifi connections, along with data from surveys and interactions with information campaigns, gamification, etc.
- Influence: To influence the behavior of the tourist thanks to communication channels of the wifi network and the treatment of the obtained information, allowing later communications via Apps, Sms or Mail.

7.4 Accesibility

Almost 20% of Andalusian citizens are over 65, and in Cadiz alone, fifty thousand people have a disability equal to or greater than 33%. Conil de la Frontera, with an average age of more than forty years old, is one of the municipalities that should bet more on accessibility, however, this is not the case. [38]

Conil de la Frontera has the disadvantage of being located in a difficult enclave, urbanistically speaking. The difference in level of the city, the changes in height that it has to overcome, the lack of infrastructure, or the old urban development system are some of the problems faced by its inhabitants with some kind of disability.

Although it seems that this lack of infrastructure is an unsolvable problem, it is not so much so. It is true that the town hall can do little in private buildings or old and narrow streets such as those in the historic centre of Conil de la Frontera, but there are solutions that make life easier for citizens and tourists with disabilities in the town.

After all, an accessible city is not only a city that has wheelchair ramps, signage, curb cuts or other features, it is also a city that provides intelligent, effective solutions such as digital-accessibility maps, maps that warn of areas that are difficult to access or in need of improvement.

One of the enterprises that provides this type of service is the northern engineering company Idom, and one of its most relevant success stories is the mobile app developed for the Granada Human Smart City project, ``Granada Accesible´´.

The challenge of this project was, through new technologies, to promote accessibility for all citizens in one of the most famous neighbourhoods, although with very complicated mobility conditions, as it is El Albaicín in the capital of Granada, a neighbourhood with a very similar urban planning to the historical centre of Conil de la Frontera.

In this way, the Granada Human Smart City initiative is not only committed to accessibility, but also adds a component of intelligent tourism, since thanks to this project, anyone can walk around El Albaicín and adapt the most suitable route to their physical or personal conditions (people with reduced mobility, disabled people, accompanied by small children...). [39]

In the app Granada Accesible, or through its website, the visitor has an option to calculate the most accessible route according to their physical or personal conditions (it includes from the basic walking route option to others such as wheelchairs, baby carriages, elderly people, as well as information about obstacles, types of pavement...). Here is an example:

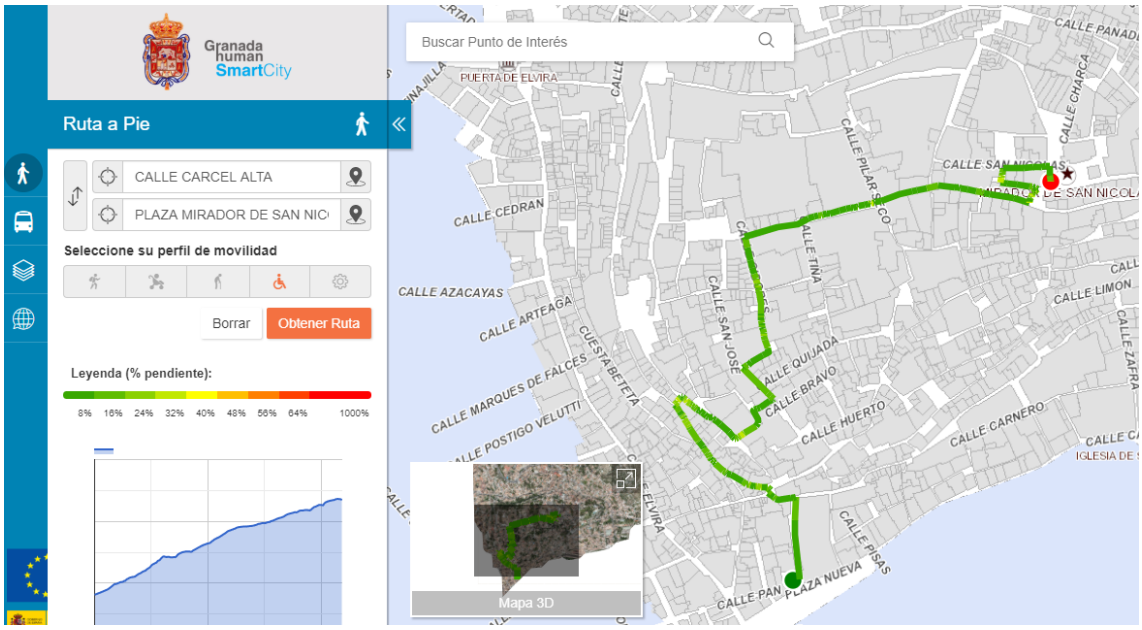

Figure 36: Route Example of the Granada Accesible WebPage

The application offers a 3-D mapping of the main streets of the historical environment of the capital of Granada, which also offers the possibility of virtually visiting the main monuments and points of interest for the visitor, as well as services as necessary as the location and distance of bus stops, taxi, parking for reduced mobility ...

In order for Conil de la Frontera to make the most of a project of this kind, the initiative must not only focus on the tourist experience, but also introduce the technology and the use of data into the local administration. To do this, the municipality must:

- To take this initiative as a complement to the previous one, and to bet on the Accessible Internet, developing an efficient system for consulting geographic information data.
- Develop a Business Intelligence solution, which offers the possibility of effective analysis and manipulation of the data obtained, in order to identify patterns, analyze trends and establish common guidelines.
- Develop a Customer Relationship Management (CRM) solution for the management, monitoring and exploitation of the target audience interactions with the application and services offered in Conil de la Frontera.

Once an application of this type is implemented, Conil de la Frontera should consider establishing a series of parameters with which to measure accessibility monitoring in the city.
A good option is to base it on the UNE 178105 [40], Universal Accessibility in Smart Cities. This document aims to establish a criteria for developing standardised indicators to measure whether and to what extent a community is accessible. Its main objective is to establish, implement, maintain and improve the accessibility of a Smart City using technology as the main tool.

7.5 ICT Education

It is a fact that the population is gradually aging, due to increased life expectancy, shortened working life, postponed retirement, etc. This, together with the rural exodus that most developed countries are facing, means that the average age in the cities is increasing dramatically in recent years. Without going any further, as we have said before, the average age of Conil de la Frontera has rised to over 40 years old. [38]

A characteristic that all experts agree should have a Smart City of reference is inclusiveness, with the disabled, with foreigners, but above all, with our elders.

In most cases, they feel distanced from the society in which they live, and the rise of new technologies is not exactly helping to solve this problem.

The lack of knowledge of its advantages, the scarce economic capacity of many elderly people, or the feeling of being out of step, are some reasons why the elderly are not the main users of ICT, but the most important of them, is the complexity of its use. Many are concerned about entering a world that is too complex for them. Many people do not dare to use these tools for fear of screwing up, thinking that at any moment they can touch an inappropriate key and lose all the information or even erase the content of the hard disk.

For this reason, a Smart City of reference must offer its seniors the possibility of overcoming these barriers by providing training courses in Information and Communication Technologies specific to them. An example of this is the city council of Mairena del Alcor in Seville, which, in collaboration with the company Expertclick, holds a course on ICT tools for the over-55s. [41]

This course aims to cover the uses and demands of older people on the Internet, aims to train this group in digital skills so that they can navigate the Internet with security and confidence and carry out everyday operations, especially those related to health, administration and online banking. [42]

The course is basically a free four-hour workshop, in which participants are taught to handle a mobile phone or tablet fluently, as well as discover the possibilities they offer.

Although they may find it difficult at first, this sector of the population is one of the ones that benefits most from acquiring this knowledge. Some of them are:

- They overcome prejudice: They show society that the elderly are not synonymous with the past and prevent them from straying from social life by feeling useless.
- -They improve their quality of life: Technology is also useful for the needs they may have.
- -They maintain and expand their network of relationships: The use of mobile telephony, and tools such as e-mail and instant messaging, speed up communication with others.
- -Strengthen their independence: Technologies such as the Internet encourage their autonomy as independent people. They can immediately access information about resources that can support them in their daily lives.
- Stay more active and healthy: Health is composed not only of the balance of the physical factor, but also of the psychic or mental one. The lack of mental activity explains the decrease in learning capacity in old age. Various studies have shown that learning new technologies stimulates the mental activity of older people, reducing the incidence of diseases such as Alzheimer's. [43]

In a historically modest municipality like Conil de la Frontera, with such an advanced average age, it is essential that the town council bets on the formation of its elders as one of the main pillars in its process of Smartization.

7.6 ICT Implementation in Companies

Once the Initial Diagnosis of the Focus Area Smart Economy has been completed, one of the services in which we have not been able to find any sign of development is in the assistance of the council for the implementation of Information and Communication Technologies in local companies.

Although there are many companies based in Conil de la Frontera that have these technologies already implemented in their businesses, there are many others that do not. And this is largely due to the council's management of its electronic resources. A city like Conil, which receives millions of tourists from all over Europe every year, must be prepared for its companies to be able to adapt to all the needs of their potential clients.

The use of these technological advances offers great advantages to companies, especially to small and medium sized ones, to which they also help to avoid problems and conflicts. Some of these advantages are:

- It facilitates decision making: Business management software or social networks offer key information, very difficult to obtain through other non-technological means. This data helps the companies to know the reality of them, the opinion of theirclients or the new tendencies in the market, and to take the most suitable decisions to reach their objectives.

- Favours the satisfaction of tourists: Thanks to ICTs it is easier to obtain information about customers, to know their buying habits, their tastes, their needs or their desires, and to design strategies, or to implement techniques, aimed at satisfying customers.

- It contributes to the expansion of the business network: The use of resources such as the corporate website or an online shop, together with other tools such as social networks, are key to this.

- Simplifies management processes: Actions such as planning, accounting management, temporary organization or business monitoring and control are much faster and more effective when the right tools are used. [44]

One of the city councils that has recently bet on the implementation of these technologies in its municipality is that of La Rinconada, in Seville. In June of last year, the project TICCamara La Rinconada was presented, in collaboration with the ``Camara de Comercio de Sevilla´´.

Its aim is to provide solutions that improve the competitiveness of businesses through the incorporation of new technologies, such as productivity tools in the cloud, e-commerce (web, online store, payment gateway, electronic billing, digital signature ...) and digital marketing with web positioning, email marketing, social media, mobile applications, among others. For the participating companies it means a minimum investment, improvement in productivity and process management, brand positioning, economic improvements in terms of cost and time savings, increased income and greater capacity for innovation.

The program is aimed at self-employed, micro, small or medium enterprises, belonging to the industrial, commercial and service sector belonging to the municipality.

The service is structured in two phases. A diagnostic phase in which the context of the company is analysed and the areas in which ICT can improve competitiveness are identified, an analysis of the degree of use of ICT and a proposal for projects to be undertaken. To do this, they will have technological advisors. The second phase is the implementation and has a subsidy of up to 70% for investments. [45]

Among the many platforms that may be introduced in Conil de la Frontera's companies, some of the most convenient would be Paypal, which allows transactions with customers around the world, Skype and Hangouts to make video conferences, Youtube, to make and promote corporate videos, e-Bay, Amazon and Alibaba to buy and sell, or Trello and Google Calendar to organize events and tasks.

7.7 Innovation and Entrepreneurship

Innovation and entrepreneurship are also one of the pillars on which an effective Smart City must be built. A successful urban centre is subject to a constant process of change.

Today, in the heart of the Digital Revolution, the urban centres that have created an entrepreneurial system around them, such as San Francisco or London, are capable of attracting the best technological talent and developing innovative responses to the challenges they face.

Although it is not necessary to leave the country to see cities that are betting on innovation. Thus, in Barcelona, Madrid or Santander we can find applications to facilitate street parking, energy saving solutions or apps that connect citizens with the authorities, which in most cases have their origin in solutions designed and developed by startups located in the city.

However, it is in smaller cities, such as Conil de la Frontera, where a stabilized entrepreneurial ecosystem is most needed today. One of the main problems of the municipality is the lack of opportunities for young people, who are forced to seek opportunities outside Conil.

For example, the ``Camara de Murcia´´ in collaboration with its city council, has developed a Point of Attention to the Entrepreneur. This is a non-profit service where entrepreneurs and businessmen are advised and provided with services for the creation of different company forms such as the Limited Company (SL), the New Company Limited (SLNE) and for the start-up of individual companies (Autonomos) through the telematic processing system, in a quick, easy and convenient way, bringing together several administrative procedures in a single management. [46]

Although Conil de la Frontera could also look at the Government of La Rioja, which has implemented a system of Professional Orientation for the Entrepreneur. This organisation has a business creation advice service with the aim of providing information and offering support to all those who want to start up a business, which has two different activities:

- Information and motivation sessions: These are sessions aimed at job seekers who, either because they have difficulties in entering the labour market as employees, or because they show interest and personal inclination towards self-employment, have considered the possibility of undertaking a self-employed activity or are likely to start one. In these sessions they receive information on how to evaluate the opportunity of a possible business project, how to draw up a business plan, what procedures have to be carried out to start up a business, or what aid and subsidies exist for them.

- Advice on business projects: Aimed at job seekers who have defined, but not developed, a business initiative and need guidance to carry it out. Through this action, technical and individualized assistance is provided, supporting the creation of entrepreneurial projects through advice from the birth of the business idea until it takes shape and is implemented. In short, it helps to know and understand the administrative and legal framework that surrounds the process of creating a company. To this end, individual information is provided on how to make the economic forecasts essential for the proper functioning of the business, what the most appropriate legal form is for your company or what administrative procedures you need to carry out to start the activity. [47]

In short, through the two actions described above, the future entrepreneur is made aware that the establishment as a self-employed worker or the creation of a company must be preceded, in order to guarantee the survival of the project, by a phase of maturation and analysis that allows the viability and profitability of the project to be determined. This reflection crystallizes in the elaboration of the Business Plan.

Smart cities are linked to innovation and digital development. Entrepreneurs are currently the origin of great ideas and solutions for the great challenges that the development of cities will pose in the coming years.

Supporting digital entrepreneurship in smart cities creates a circular flow in which urban centres benefit from the solutions developed by the entrepreneurs who have chosen them as their headquarters, while at the same time promoting the local economy and talent.

Conil de la Frontera must develop a strategy that places entrepreneurship at the heart of its local policies and innovation becomes an inherent feature of the city concept. Such a strategy must use a series of tools and concrete measures to make the long-term vision tangible.

7.8 Crowdfunding

When we talk about a Smart City, we are not really referring to the intelligence of the city, but to the intelligence of the citizens who transform it while living in it. These are really the beneficiaries of the improvements in the quality of life of the city, so it seems logical that they are the ones who, in one way or another, propose, decide and even finance the projects that are carried out in their city.

This last thing is called Crowdfunding, and it is a service that in the last years the city councils are little by little promoting it. Basically, the concept consists in giving a project to a group and obtaining its financing through contributions from each group member. These contributions would be limited according to the various forms of participation outlined by the organisers, ranging from lesser to greater contributions, from mentions as members of the project, to receiving the complete end product once manufactured and launched on the market.

Essentially, a Crowdfunding project grows around an idea with the firm intention of making it a reality, irrespective of whether it is a technological product, an audiovisual production, a concert tour, a journalistic publication, an artistic initiative or an altruistic and humanitarian project, just to name a few of the many types of initiatives possible. To a certain extent, a Crowdfunding project is also a form of natural selection, where only the ideas that attract the attention of the minimum number of people intending to contribute economically, will actually go ahead. [48]

In a town like Conil de la Frontera, where, like the size of the town, the per capita income of the citizens has risen considerably in recent years, and they themselves are mainly responsible for this, it would not be surprising to see initiatives of this kind in the coming years. The people of Conil are very aware that their main economic engine is tourism, and to be as competitive as possible in this sector, they must have a village that is as developed as possible.

In Spain we can see initiatives of this type, for example, in Valencia. The company of the scientific park of the University Miguel Hernandez, Disabled Solutions, in collaboration with the Generalitat Valenciana, has launched a campaign of crowdfounding called ``APParca la desigualdad´´. The aim of this park is to promote the creation of innovative and technology-based companies, as well as to encourage knowledge transfer between the University and the business world. This is how the campaign has come about, which aims to publicise its purpose and obtain funding for its Disabled Park project. This consists of a web platform and application that aims to make it easier for people with reduced mobility to find adapted parking spaces. In addition, it allows the user to add new parking spaces and report those who use them without the identification card. [49]

Although these campaigns are after all private, it is the town council, in this case Conil de la Frontera, that must create an ecosystem and promote initiatives that will encourage these projects. For example, this Valencian campaign arose from the UMH's Sprint Business Creation programme, of which it was finally the winner.

Conil de la Frontera should be committed to this type of initiative. And the first step towards this is to teach the citizens what it is, and above all, how to carry out a Crowdfounding project or, as we will see below, Crowdsourcing.

7.9 Crowdsourcing

Crowdsourcing is defined as open distributed collaboration or open task outsourcing, and consists of outsourcing tasks traditionally performed by employees or contractors, leaving them to a large group of people or a community, through an open call. This way of giving power to third parties has been used in different fields of action such as social innovation, design, marketing, among others, and is currently gaining importance in the concept of Smart City, with the aim of giving voice to citizens and make them participate in the improvement of the places they live. As Julian Petrin, urban planner and co-creation expert says, crowdsourcing applied to cities is an open innovation process to solve public problems.

One of the biggest advantages of Crowdsourcing is the visibility of citizens' ideas. But for that, it is necessary to offer a real scenario, where people's ideas become visible so that they can be discussed or improved by others. Conil de la Frontera could implement a project similar to the one implemented by the city of Bogota last year, called ``My Ideal City´´. The project is based on a platform in which Colombian citizens are invited to share complaints about their city, which are then raised as questions, finally to be answered by other citizens or experts on a specific issue, such as mobility, recycling, etc. [50]

Another important characteristic is that it is a process with a defined goal, that is, not only to obtain creative and authentic ideas from citizens on how to improve urban spaces, but also to implement them. To motivate citizen participation from the very beginning, it is advisable to establish a promise and a concrete goal. This is so that the collaborators know how their ideas will be used and how they will contribute to the transformation of their environment. Another example of Crowdsourcing that Conil de la Frontera could imitate, and which would help considerably in the development of the next Strategic Plan, would be the case of Los Angeles 2050. This initiative consisted of inviting people to share their vision of what they imagine the city to be like in the mid-21st century. The purpose of this action was that citizens would help set goals to achieve a 'dream city' and also could propose concrete actions to make those goals a reality. [50]

In short, with these two forms of financing, we have seen that being a Smart City is not only related to technology. Just as important is to encourage the creation of new ideas or challenges. The key is to make citizens see their key importance in the process of making their city a Smart City.

7.10 Sport Facilities Management

The Covid-19 crisis has forced all companies and public bodies to reinvent themselves, without distinction. Among the most affected activities is the service sector, but in general, any company that provided services in a physical way has been forced to seek solutions in record time. One of the measures that has most affected these businesses is the drastic reduction of capacity in both public and private spaces, a measure that according to experts has come to stay for a long period of time.

One of the collateral damages of the reduction of the capacity is that these organizations, in this case the City Councils, will have to improve their performance in the management of reservations and use of their facilities. ICTs play a fundamental role here. Conil de la Frontera must make use of Information and Communication Technologies for the efficient management of its facilities, both for leisure and sport.

One of the possible measures to be implemented is the collaboration of Conil's town hall with the company Sporttia, creator of the facilities management app of the same name.

The Platform has a double modality and it is addressed to two types of public, the sportsmen and the managers of the sports facilities. The first ones are provided with a Platform from which they can create their profile and access all the sports offer in their city, as well as make the reservation of the court and formalize the payment of it. The second ones are provided with a direct communication channel with the user, as well as a management software for all their sports facilities or events. In this way Conil could give a new approach to the management of its Pabellon Municipal de Deportes. In addition, Sporttia is very involved in the Smart City concept, and also offers automation services for facilities with automatic door opening, lights with mobility sensors, etc. [51]

The great advantage for the citizens of Conil de la Frontera is that they can know online the availability of the courts of, for example, the Pabellon Municipal de Deportes, immediately, in addition to being able to book at any time of the day without having to make calls or show up personally at the facility. The great advantage for the city council is that it considerably reduces the number of calls to manage reservations from its users and facilitates the management for payment, since reservations can be paid online. In addition, they offer their users a 24-hour management of reservations, without depending on office hours. Another important aspect for Conil's town hall is that it would have a complete platform to manage activities, events or matches optimizing resources and control of the facilities.

In addition to the management advantages mentioned above, I sincerely believe that the implementation of this type of application contributes favourably to two very important aspects in a Smart City. The first is the promotion of sport. A Smart City is a healthy, exercise-friendly and healthy city. The other is social inclusion. With this app, there is the possibility of playing games of any sport between people who did not know each other before.

In summary, Conil de la Frontera should introduce ICT in all possible aspects of the municipality, but one of the easiest to implement is in the management of its sports facilities. It is a measure of easy implementation and does not have an excessively high cost. Furthermore, in the post Covid-19 world, the municipality must provide its inhabitants with electronic facilities.

7.11 Electronic Employment

We spoke before about how the Covid-19 crisis has affected all areas of our lives. The worst part has undoubtedly been taken by those who have lost their jobs, leaving some families without any kind of income. In Conil de la Frontera the previously worrying unemployment rate has risen from 27% to 31% [38]. This is one of the areas where the municipality must work hardest, not only to become a Smart City, but to ensure that Conil continues to grow at the same rate as before.

Nowadays, Conil publishes its public job offers in its transparency portal, in a way that is not very appropriate for these times. It is also true that the average citizen of Conil does not possess the electronic knowledge that would be necessary if the jobs were published otherwise, but with the initiative of training citizens in ICT, this problem should be solved.

In this regard, we must emphasize that the City Council has presented the Reactivation Plan Conil, which wants to address the crisis of Covid-19 with public investment, aid and subsidies to the self-employed and SMEs, measures to revive tourism and trade promotion. However, we find no sign in the plan of the digitalization of the labour supply, a point that I consider key in the medium term.

In the same way, we find in Albacete the Reactivate Albacete plan, a plan that differs from Conil's in several aspects. The most important one is the launch of a website with the same name as the plan, whose main objective is to support and promote employment. The city council wants to get out of this crisis in a digital way, so they have promoted services and tools to make it easier for their citizens to find, manage and advise on employment. This interactive portal is a dynamic tool that aims to enable the unemployed, self-employed or businesses to consult measures and aid provided from any administration. From the portal you can access resources from other public administrations, consult job offers, download templates, make a video curriculum or have access to individualized tutorials. [52]

Figure 37: Reactivate Albacete numbers

Conil de la Frontera should implement a measure similar to that of Albacete, so that citizens do not have to go to the Town Hall every time they want to do any employment-related paperwork. A similar platform would be the first step in a process that would culminate in a public job offer similar to that which Barcelona City Council has at its electronic site, where citizens have all kinds of procedures available, including telematic job applications or telematic access to the job bank.

7.12 Security

One of the most important aspects of a Smart City is the safety of its citizens. It is just as important for the city to have clear and defined protocols against possible accidents or natural disasters as it is for the citizens to be aware of them and know how to act in case they occur. On May 30th there was a fire that burned more than half an acre of pine trees in the neighboring district of Los Caños de Meca. Fortunately, the wind prevented the fire from spreading towards the mountain, and no one was injured, but the delay of the authorities in reaching the place of the fire was more than worrying.

Another important aspect of urban safety is traffic control and accident detection. Due to the ancient morphology of the city, and the seasonality of tourism, accidents that occur have a great impact on traffic in the city and its surroundings. In fact, as we saw in the initial diagnosis, one of the least developed indicators in all areas was the Control and Monitoring of the Service. Conil de la Frontera must invest in security and control, as Ceuta has done with its ``Safe City´´ project.

The project encompasses an integral solution for the improvement of citizen and traffic safety that will allow, by means of its own communications system and advanced technology cameras, the automatic reading of license plates, search by appearance, facial recognition and detection of loitering and incident behaviour by means of artificial intelligence. Ceuta's main tool will be 65 traffic surveillance cameras, license plate reading and facial recognition.

Ceuta will implement a system for early detection of forest fires using thermal cameras and an integrated weather information system. It will also install citizen information panels for warnings related to mobility and security, all of which will be accompanied by the modernization of the two control centers in the Local Police and the National Police. [53]

The main measures that Ceuta is going to implement are:

- Fire detection: Early automatic detection, location and monitoring of possible forest fires in the mountains and peri-urban areas.
- Information panels: A system of seven citizen information panels, software to integrate all the systems, mainly video management, a proprietary communications system consisting of a fiber optic network that practically covers the city, reusable for other sensors in Smart City strategy, complete this project.
- Facial recognition, traffic and incidents: Thanks to highly sensitive cameras to be able to work in low light conditions and with infrared spotlights for those places where there is no ambient lighting. [53]

A project of similar characteristics would be ideal for Conil de la Frontera, since, as previously mentioned, the measures and sensors to be installed not only serve to recognize accidents or fires, but are also reusable for other services related to the Smart City.

8 IMPACT OF THE PROJECTS

In this section we will try to explain how the different proposals in the previous section would significantly increase the degree of development of the indicators for each of the six Focus Areas.

This project is made with the intention that, if someday in the next few years, Conil's City Council decided to implement a Smart City strategy, it could do so with a budget in accordance with the size and economy of the city. That is why we have focused on improving the less developed areas, while the more developed areas, the areas of Governance and Environment, would not suffer any remarkable changes.

It is true that, as we have said in the previous section, the first two proposals, that is, the Multiservice Municipal Network and the Smart City Platform, would provide a structure that would positively affect the future development of each of the six areas. In this way, the following spider-shaped graphs detail how the indicators of the other four Focus Areas would turn out if the City Council decided to implement each and every one of the measures proposed above.

8.1 Smart Mobility

I n the Smart Mobility area, as we can see in the figure X, the indicator that would advance the most would be the Degree of Control and Monitoring of the service. This is mainly due to the implementation of the Public Wifi Network, which, among other things, would allow those responsible to obtain strategic information on the users of the service in real time. Such a system, by which citizens and tourists would be continuously generating data, would significantly increase the possibilities of monitoring all services, especially those in this area.

Another indicator that would increase its degree of development thanks to the Public Wifi Network would be the Degree of Citizen Interaction with the service. Obviously, at the same time that there would be communication from the Town Hall to its citizens, there would also be the opposite, since the citizens, through this Network, would have the possibility of filling in surveys or sending messages to the Town Hall through this Network, thus making the communication bilateral.

The Technological Development indicator would also advance, but this time thanks to the Accessibility proposal. Improving the quality of life of people with disabilities is a task for any city, but translating this into new technologies is what defines a Smart City.

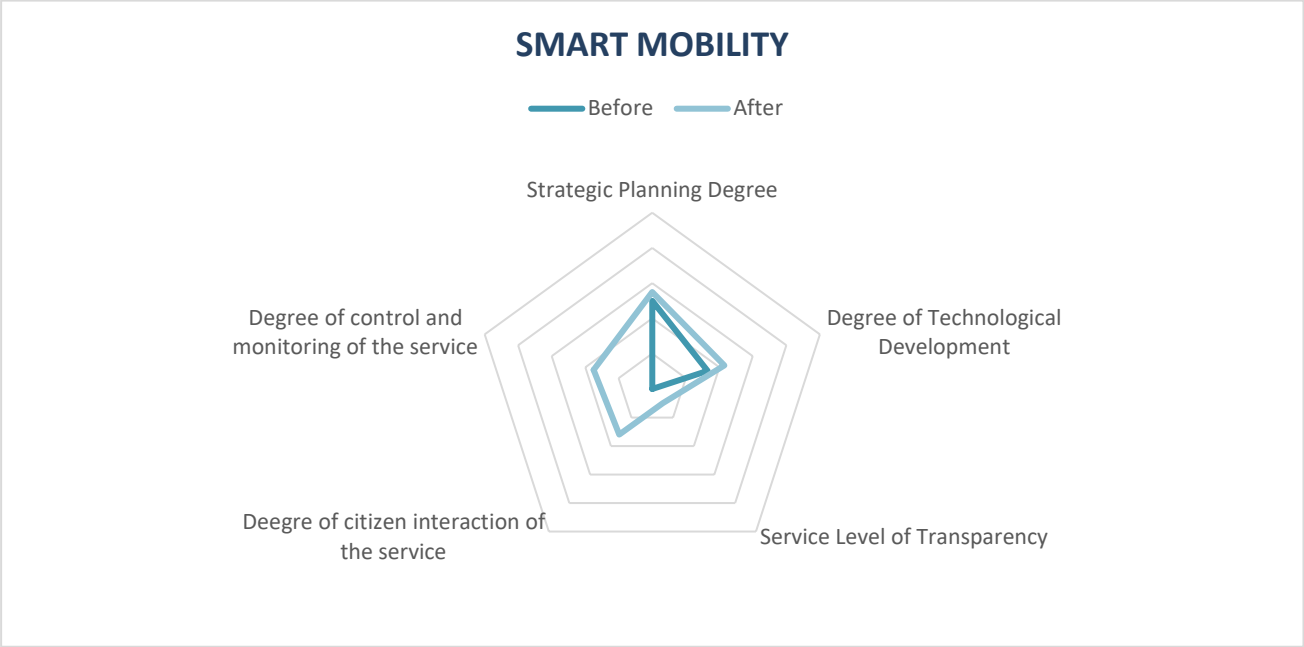

Figure 38: Smart Mobility Indicators Spider Graph comparison

8.2 Smart Economy

As in the previous Area, one of the indicators that has advanced the most with respect to the initial diagnosis is the Degree of Control and Monitoring of the service. The implementation of New Technologies in companies and their introduction to them for the citizens, are not a zero-sum game, but both parties win. On the one hand, citizens and companies evolve in a fundamental area in our current society, and on the other hand, the city council uses this new development to capture information from its citizens.

Also, thanks to the Education of the citizens in the Information and Communication Technologies, the indicators of Citizen Interaction and Technological Development are developed, mainly thanks to the inclusion of the citizens, who are encouraged to interact more with their peers and their city council.

Another proposal that would allow for the development of the Citizen Interaction indicator would be the Entrepreneur Service Point. Nowadays, the greatest enemy of entrepreneurship is ignorance, so a service that solves the doubts of this type of people would greatly encourage the interaction of citizens with their City Council.

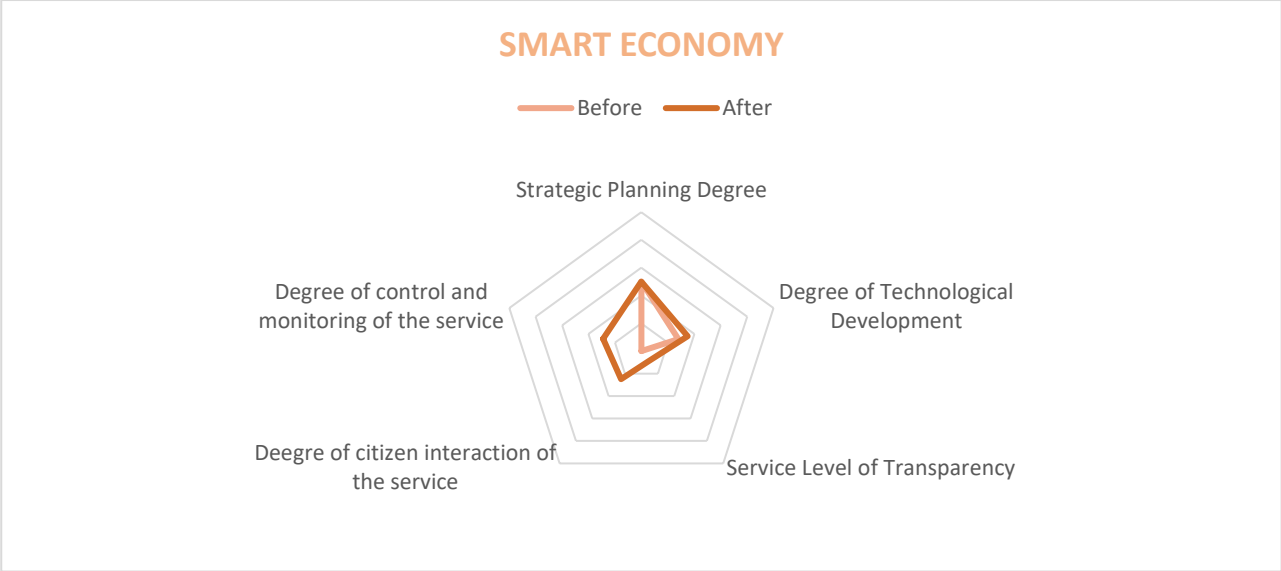

Figure 39: Smart Economy Indicators Spider Graph comparison

8.3 Smart People

The spider graph in the Smart People area is one of the most changed from the initial situation. It was not difficult, since only three services belong to this area, and in the proposals for improvement appear the only two that did not have any kind of development. The proposals of Crowdfunding and Crowdsourcing would develop all the indicators of the area, but especially the Technological Development and above all the Citizen Interaction. The effort of a city council to create an ecosystem that promotes collaboration is directly proportional to the degree of interaction that citizens will have with such a system. In addition, together with these two initiatives, a system of citizen collaboration would be implemented in which all kinds of issues of interest to citizens could be incorporated.

Obviously, including these proposals in a Strategic Plan would also increase the degree of development of the Strategic Planning indicator.

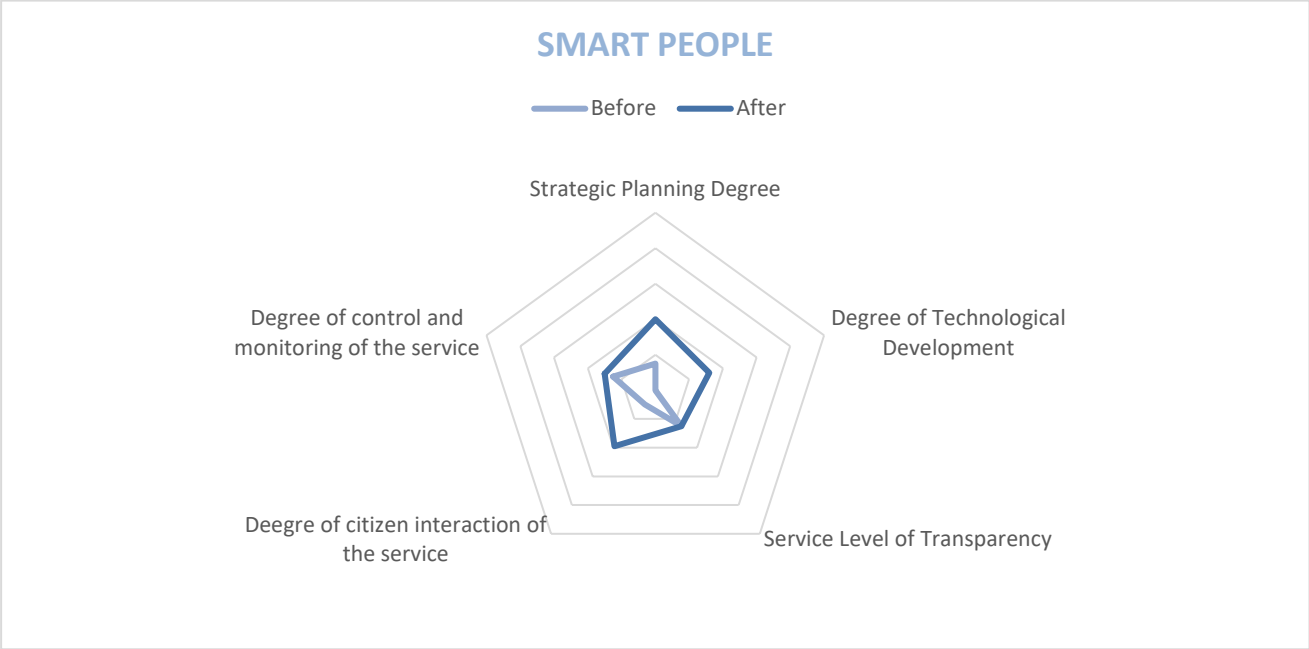

Figure 40: Smart People Indicators Spider Graph comparison

8.4 Smart Living

Last but not least, let's talk about the Smart Living Area. Without a doubt, this is the area that has grown the most with respect to the initial diagnosis, since three proposals have been made in regard to this field.

Firstly, we must talk about the Management of Sport Facilities. The indicator that would be most developed with the implementation of this system would be the Transparency of the service, since by means of a mobile app like the one described above, the City Council would be able to report digitally on the use and benefit of the facilities. Another indicator that would increase in degree would be the Citizen Interaction, since the sportsmen and women could communicate with those in charge of sports in their city through this app.

The second proposal is related to Security, so the indicator that would most benefit from the implementation of this measure would obviously be the Degree of Control and Monitoring of the service.

The third and last measure, like the first, would significantly increase the degree of Transparency. It is vitally important that citizens can check digitally what jobs their municipality offers, as well as apply for them and objectively know why a particular person has been given a job. In addition, it would also increase as we can see the indicator of Technological Development, since through these employment portals the city council could have automatic information collection systems.

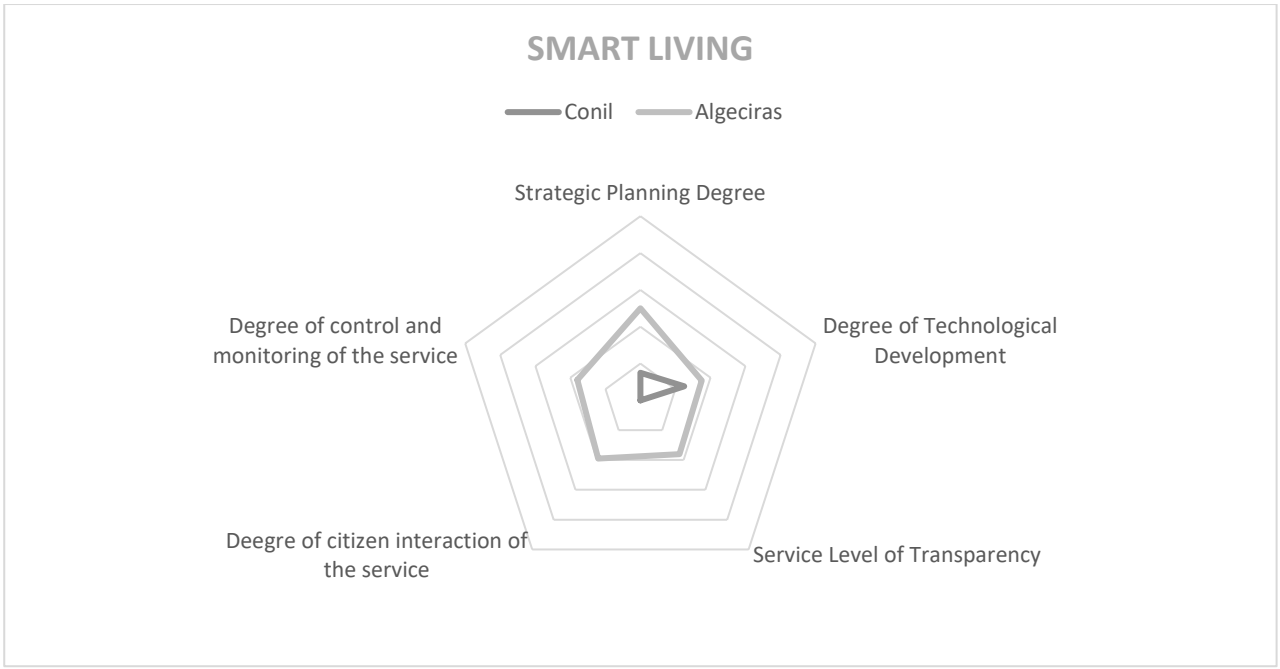

Figure 41: Smart Living Indicators Spider Graph comparison

9 SUCCES CASES

In this last section of the project we are going to talk about some cities which have already successfully implemented a Smart City project. Although we previously made it clear that the concept of developing a city into a Smart City is not a goal, but a path, there are some Spanish cities more advanced in this process than others. Thus, we wanted to present two of them, Benidorm, and Santander, both with very different but complementary approaches. Each in their own way, they can be references for Conil de la Frontera in their Smart City process.

9.1 Benidorm Smart Destination

Within the profound impact that the information and knowledge society is generating in all areas and in all human activities, be they social, cultural or economic, one of the sectors that is changing the most is tourism.

In the so-called 4th industrial revolution, the tourism industry is obliged to evolve, adapting to a new profile of hyperconnected and interactive travellers and offering them products, services and experiences that are increasingly comprehensive, flexible, and personalized.

Benidorm, like Conil de la Frontera, is a national tourist reference, and has implemented the first certified intelligent tourist destination management system in Spain, in accordance with the new UNE 178501 Standard [54], using new technologies. These have allowed to be more efficient in the electronic public administration, the citizen participation, the transparency, and the security, as well as to achieve a more fluid communication with their neighbours, companies and visitors.

The City Council of Benidorm began to take steps towards an intelligent destination from the tourism strategy and tourism intelligence to lead the city to a new model of innovative destination, accessible and sustainable. The management is therefore the element of the transformation of the tourist destination to face the changes of a complex tourist scenario, both of the competitors, of the tourists themselves, and of the marketing channels, etc.

Mainly, the objectives [55] that the city council wants to fulfill in this process are:

1. To position Benidorm as a leading intelligent and sustainable tourist destination.

2. To define a system of management through tourist intelligence, so that it helps Benidorm to develop proposals that make the tourist's experience and the citizen's quality of life increase to the maximum, taking advantage of data, information and taking advantage of ``Big Data´´ and communications to facilitate, expand, personalize and connect the existing offer.

3. Creation of a forum for meeting, consultation, promotion and permanent advice that participates in the decisions and actions carried out by the Town Hall and that affect the municipality of Benidorm as a ITD.

4. To enhance the competitiveness of the town, through innovative actions applied to the Intelligent Tourist Destination.

To achieve this, the Benidorm Town Hall, in 2018, carried out a series of projects that achieved progress in the following areas:

9.1.1 Governance

The Benidorm Intelligent Tourist Destination Master Plan is drawn up. This is the reference document for the different public and private agents of the new tourism management model of the municipality that allows the establishment of action plans. Within this plan, the strategic measures with the most weight to be implemented in Benidorm DTI are focused on Tourist Satisfaction/ Profitability, Improvement of Tourist Activity, Attracting Investment and Greater Economic Benefit. [55]

Strategic Measures Benidorm DTI	
Governance	STRATEGIC PLANS BY AREAS/FIELDS OF ACTION STAKEHOLDER PARTICIPATION COMMUNICATION PLAN
Innovation	LAB INNOVATION AND TOURISM TECHNOLOGY SMART OFFICE: OFFICE OF INNOVATION AND INTELLIGENCE TOURISM INTELLIGENCE SYSTEM
Technology	INFORMATION SYSTEMS PLAN IMPROVES CONNECTIVITY AND SENSORIZATION SCORECARD/ BUSINESS INTELLIGENCE
Sustainability	PAES WATER CYCLE BENIDORM SMART BEACHES
Accesibility	PMUS UNIVERSAL ACCESIBILITY PLAN

Tabla 5: List of Strategic Measures of the Benidorm DTI

9.1.2 Innovation

In this sense, one of the most important advances has been the implementation of the tourism intelligence system. During 2018, new tools were implemented to speed up surveillance and intelligence tasks (through the company Innguma), monitor the activity on the beaches (through Wiongo) and carry out much more effective monitoring thanks to the software Visit Benidorm Analytic.

In addition, the Smart Office has been created with the aim of obtaining data, information that incorporates knowledge of the destination to become a smart tourist destination, in the same way as incorporating indicators for the day-to-day management of Benidorm as Smart City. It carries out actions such as data strategy, tourism intelligence, scorecard, transparency and open data, data analysis, quality management and search and implementation of pilots, innovation and technology laboratory, among others. [55]

9.1.3 Technology

In this area, the Information Systems Plan 2018-2022 has been determined by the new ICT department. The main objective is to achieve a digital transformation of services to citizens and visitors, accompanied by the adequacy of the necessary information systems, and acts in areas such as mobile telephony and data in mobility, security services, e-government, etc.

On the other hand, Benidorm, in collaboration with the company Wiongo, incorporated 30 wifi points on Playas de poniente y levante and the old town. This network is capable of simultaneously serving 20,000 concurrent users. The sessions are 30 minutes long for safety and to avoid abuse by automatisms. After this time, users can reconnect to the network, and user data is then complemented by tools such as Google Analytics that allow user profiling. All this data is then processed by Visit Benidorm, to plan tourism and management strategies in areas such as security or mobility. [55]

9.1.4 Accesibility

In January 2018, the 'Accessible Benidorm Tourist Experience' was created, which proposes to get to know the city in three days. The first experience created proposes a tour of the centre of Benidorm and its seafront promenades, while the second focuses on the leisure parks located on the outskirts of the city. The last experience proposes to live Benidorm at night. Each of these proposals includes what to visit, where to sleep, where to eat and other resources, always in a suitable way for people with physical or psychological disabilities.

In April, the area of universal accessibility was created, integrated within the Department of Mobility, reaffirming its commitment to universal accessibility, recognized as a Fundamental Right in the ONU International Convention on the Rights of Persons with Disabilities. This department has a transversal character, since accessibility is incorporated as an essential and necessary condition in all municipal management, to be taken into account in the design of the activities, programs and policies developed by the different areas of the City Council.

Later, the accessible map of the city centre was drawn up, making Benidorm one of the few Spanish and European cities to have a fully accessible tourist map for blind, visually impaired and/or hard of hearing people.

These measures have led to Benidorm to achieve the Accessible Tourist Destination 2018, which annually delivers the entity Thyssenkrupp Home Solutions, and which distinguishes cities that are committed to tourism without barriers. [55]

9.1.5 Sustainability

In this area, different environmental actions have been developed following the Sustainable Urban Mobility Plan (PMUS), such as the Water Cycle and the Sustainable Energy Action Plan for the municipality of Benidorm.

But the area in which progress has been made in sustainability is undoubtedly the social one. The Strategic Plans for Citizen Participation, Sports, Film Office and Citizen Security and the Local Development and Employment Agency and the Human Resources Plan have been drawn up. In addition, the Employment area has worked to incorporate different employment and training programmes for different groups, including tourism. [55]

9.1.6 Indicators

As we have seen throughout the project, one of the most important aspects in the development of a Smart City

strategy is the existence of indicators that allow the municipalities to have a degree of control and monitoring of services according to the city in which it is being implemented. In this sense, Benidorm is one of the most advanced Spanish cities in this aspect, since in the web page https://benidorm.org/smart-city/es we can observe the percentage of development of each one of the areas of which we have spoken previously, which remain like that at the moment:

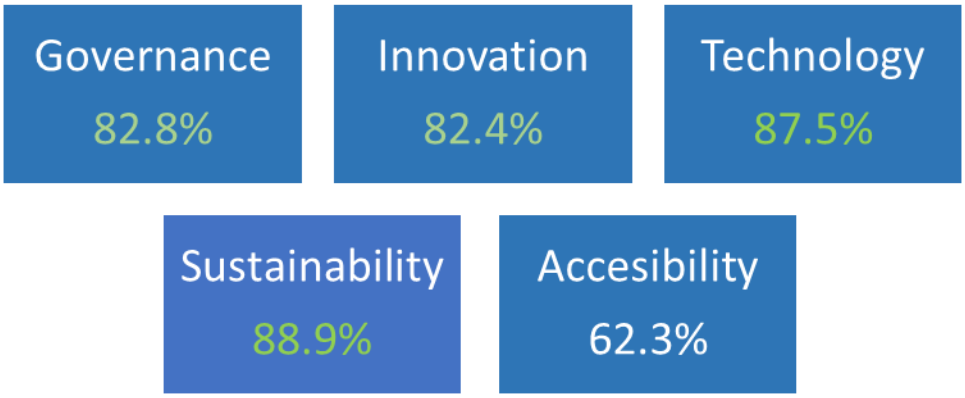

Figure 42: Benidorm Smart City Indicators Development

[56]

In addition, the city council also offers its residents the possibility of consulting all the more of 80 different indicators available to the city on the same website, allowing them to compare the degree of development of the service with respect to the previous year, here an example:

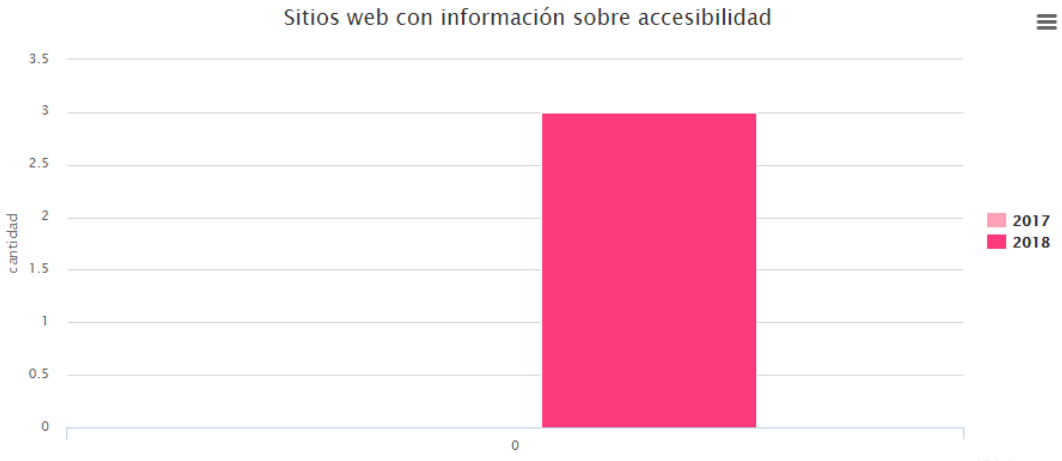

Figure 43: Example of a Benidorm Indicator

[57]

9.2 Santander Smart City

The case of Santander is quite different from that of Benidorm. In this case, the city chose to focus more on information collection devices than its Valencian counterpart. Furthermore, Santander does not manage to isolate a specific area from the city council, but has managed to acquire a global vision of the city through a transversal management, with an efficient and coordinated management of services.

Santander's history as a Smart City is long overdue. For a decade now, the city has been committed to technology as a pillar of growth and development and has established itself as a major urban laboratory in the field of IOT and as one of the most intelligent cities in Europe.

The first step came with the SmartSantander Project 2010-2020 [58], whose main objective was the creation of an experimental facility for the development and study of architectures, enabling technologies, services and applications for IoT within the urban environment. This installation was based on the deployment of IoT elements throughout the urban territory, with center in Santander. This facility had at the time more than 12,000 devices, distributed in different key locations of the city's infrastructure, from public transport, logistics facilities such as the seaport and waste management, parks, squares, gardens and public buildings, to workplaces and residential areas. This project provided the city with two different exploitation profiles. In the first one, the researchers were the main beneficiaries, since they were provided with a unique infrastructure where to make real experiments. The second and most important is the possibility of implementing different services on the same infrastructure, thus adapting to the changing needs of citizens.

At present, the above-mentioned technological infrastructure of SmartSantander has IoT devices for environmental control and sensors for detecting free parking spaces, augmented reality and participatory sensing applications, deployments for mobile environmental sensing, irrigation in intelligent parks and gardens, traffic intensity measurement at city entrances and exits, etc.

The plan also includes the Innovation Master Plan [59], which encompasses the following three axes: modernization of the administration, open data and Santander as a Smart City. The aim was to improve urban mobility, the local economy, energy and the environment, promote the development of local entrepreneurs and developers, encourage citizen participation and make municipal services more efficient.

In 2016 it is published in Plan Santander Smart City [59], in collaboration with the prestigious consulting firm Deloitte. After an obligatory initial diagnosis, by means of which the state of the situation at the time and the needs of the city were known, the key projects were identified to continue with the transformation in the near future.

The Project is thus divided into three strategic lines of action, Governance-Economics-Employment, Sustainable Development and Infrastructures, and Quality of Life, all of them different but with the same common objective, which is to ensure environmental and economic sustainability and to improve the quality of life of its inhabitants.

Although these axes are composed of specific objectives and vertical policies for each area, it is necessary that the complete Project is based on a solid and common structure of transversal projects and enablers that establish the bases of the necessary technology for the real improvement of the efficiency of the municipal management. These projects [59] were the following:

- Citizen 360^0: Manages in a unified way all the information of all the people who live or relate to the city of Santander. The citizen is made the center of the municipal action, but from a complete knowledge of their needs, demands and relations with the administration.

- Municipal Systems: Improvement of current systems through modernization. Incorporation of new functionalities aligned with the possibilities allowed by new technologies.

- GIS: Consolidation of the available information, both that generated by the municipal activity and by the network of sensors and public information available in Santander, in order to be able to visualise it effectively.

- Intelligent City Platform: Interoperability and information sharing between services. It also offers greater transparency to citizens through the transparency and open data portal, as well as using indicators to measure the development of public services.

- Sensor Network: Maintain and improve the current sensor network with the objective of providing information on the city and its citizens to the Smart City Platform, as a basis for developing strategies to optimize public services.

The development of the Santander Project has been divided into three different parts [60], with an execution period of years.

The first phase deals with the implementation of the platform and its basic configuration. Here we model what the solution should be in terms of requirements, services and technological and human resources. The scope of this first phase includes the implementation of the Smart City Platform (STDRi), with the integration of all its IT services, and the associated technical office work.

The second phase is the development of the service integration work plan. This plan describes in detail the form and order in which the services will be integrated into the Platform, as well as, the integration of all the indicators in each of the services and how to measure and evaluate them. For the city council, the priority services were:

- Waste management

- Integral water cycle

- Public lighting

- Parks and gardens

- Coordination of public works

- Central technical services

- Local Police

- Fire and Emergency

- Urban Transport Service

- Traffic Management / Traffic Light

- Social Services

- Employment Service

- Human Resources

- Parking Management

The third and final phase is the implementation of the municipal services, which includes their integration, the use of the platform as the integration work described in the work plan developed in the second phase, the operation and maintenance of the platform throughout the duration of the contract, and the creation of a coordination center for the management of the city.

Currently, the infrastructure deployed in Santander [61] is the largest in the world in terms of devices. These allow to know in real time the status of all the services: water, waste, mobility, lighting, etc.

With this, the city council has achieved its goal of opening up to the citizen. All the information collected by the sensors is then made available to the citizens, through mobile applications or different information panels deployed around the city, which allow to know in real time, among other things, the traffic status, as we see in the following image:

Figure 44: Information Panels in Santander

In addition, the citizens of Santander now have several mobile applications that allow them to interact with their city. One of them is called the ``Pulse of the City´´, and in it the neighbors have the possibility to report parts of the city that they think are not in good condition or should be changed. Another is Smart Santander RA, which uses augmented reality technology, and offers information on tourist attractions, cultural agenda and information on events and services. Within this app there is a service widely used by citizens that is the transport timetables.

The last step that Santander has taken in its Smartization process is the implementation of Telefonica's Thinking City platform, which has become the basis of the city's great brain. The platform offers open APIs that allow the integration of data from both urban services (water, waste, energy, transport, parks and gardens, etc.) and traditional systems existing in the City Council (Police, Social Services...). This data is stored in a common data repository, which is the basis for the development and implementation of all the city's intelligence. Thanks to the platform, integral control panels are established for the city and for each of the services, which facilitate decision-making for both municipal heads and service technicians. Likewise, citizen scorecards are implemented, so that, in an exercise of transparency, the city makes information on all its services available to citizens. The infrastructure deployed in the city is a world reference; During the two years it has been operating and collecting information, the infrastructure deployed has become a world reference. Now, the challenge is to apply big data technology to sort and correlate it, and thus be able to improve all the services that the city offers to its inhabitants.

10 CONCLUSIONS

In this final chapter of this project, the different conclusions obtained from the previous research are presented, as well as a number of recommendations for future strategies to transform a city into a Smart City. All these conclusions and recommendations come from the theoretical-analytical framework previously presented.

The first conclusion I have reached, after the initial study on Smart Cities, is that, to this day, it is still not clear what exactly the term Smart means. The concept covers multiple meanings, as we saw in the first section of our project. In fact, there is no uniform and accepted definition, which is the main cause of confusion about what a Smart City is or should be, or what its characteristics should be.

Indeed, in Spain, two of the most important organizations involved in the Smart Cities sector, do not completely share the same concepts. AENOR, the Spanish Association for Standardisation and Certification, and Red.es, the public entity attached to the Ministry of Economic Affairs and Digital Transformation that is responsible for the execution and deployment of the plans for the digitalisation of Spain, differ in certain aspects from their idea of what a Smart City is. Although they both agree on the definition of the main areas of the city, neither the indicators nor the way to measure the development of the services is the same in both organizations.

There is a need to measure or quantify what it is or how to become a Smart City, as well as to obtain a measure with which we can differentiate when a city is a Smart City and when it is not. In the coming years, the governments of the different countries of the European Union must reach a consensus to clarify the definition of the term, standardize the standards and define the goal.

The second conclusion I have had is that every city is a different challenge. Each of them is a living organism of great complexity and difficulty to manage. They are dynamic ecosystems, which are constantly being modified and altered, many of them by external factors. Each one has its own identity, its own culture and its own structure. Moreover, different stakeholders live together in them, most of the time with conflicting interests, which must be taken into account. Therefore, not all Smart City strategies can be planned in the same way, nor can the same methodologies and strategies be applied. Each city council must adapt its strategy to its own circumstances, as is the case of this project with Conil de la Frontera. Its main economic engine and investment for the future is tourism, and we have focused on strengthening it. Each city develops and implements its Smart City project based on the sectors or dimensions it considers most important and substantial for the city.

To conclude, I have come to the conclusion that the concept of Smart City is not a passing fad, nor is it an invention of cities to attract talent, companies and improve their economy, Smart Cities are here to stay. Their main objective is none other than to improve the quality of life of their citizens and to establish an infrastructure from which to grow in a sustainable manner. New technologies are changing the world as we know it and the cities of the future must adapt and grow with them.

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