This project is co-financed by
the European Union and the Republic of Turkey

Town Twinning Action between
Turkey and EU Grant Scheme Program

Partnership for Future of Smart Cities Project

Çanakkale - Tarragona

November 2019

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http://smartroas.com/

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INTRODUCTION

Partnership for the Future of Smart Cities Project", funded by the European Union and Turkey and carried out under the scope of 'Town Twinning Action between Turkey and EU Grant Scheme Program', is conducted by Turkish Ministry of Foreign Affairs Directorate for EU Affairs. With this program, where Union of Municipalities of Turkey (UMT), Union of Provinces (UP), and Ministry of Environment and Urbanization Directorate of Local Administrations are key partners, the aim is to establish sustainable partnerships for the promotion of mutual exchange between Turkish and EU Local Administrations in areas related to the EU Accession Period through the twinning projects.

Some of the objectives of the project, where Çanakkale Municipality runs the project as the beneficiary of the grant in partnership with the Municipality of Tarragona from Spain, Tarragona Smart City Platform and Turkish Informatics Foundation, are given below;

- Developing cooperation between the two municipalities within the framework of the Smart City partnership, launching the Smart City Platform based on the example of Tarragona.
- Long term cooperation to move further the advancement of smart city transformation of both cities by providing the necessary skills and building network structures.
- Designing joint projects within the scope of smart city transformation.

The municipalities of Çanakkale and Tarragona resemble in terms of their population and geographical location as well as their historical and cultural heritage. Both cities have an important place in their countries in terms of logistics. Besides, both cities are looking for solutions to similar challenges.

While the increasing population, cultural heritage and natural beauties reveal the importance of the need for sustainable growth, the development of mobility and tourism are also common working areas for both municipalities. Within the scope of this project, joint areas of cooperation will be determined by the cities, who try to do more with less and use their limited resources more efficiently, use information and communication technologies in an innovative way, share their experiences with each other and develop strategies together. This report aims to provide insight for the identification of the areas of cooperation and it is based on both desk research and presentations, studies conducted in Çanakkale and Tarragona.

SMART CITY TRANSFORMATION MODEL & SMART CITY TECHNOLOGIES

The increase in population affecting the world has already forced the efficient use of limited resources, and smart cities are seen as one of the solutions for this transformation process. Smart city term refers to a city that invests in information and communication technologies in order to use its limited resources more effectively, more efficiently, saves as a result of these investments, increases the quality of life and the service level provided with these savings, decreases the carbon footprint, respects the environment and natural resources and does all these by innovative and sustainable methods (Faruk Eczacıbaşı, Turkey Informatics Foundation President). The benefits of the smart city transformation process in this context are given in Figure 1 from different perspectives.

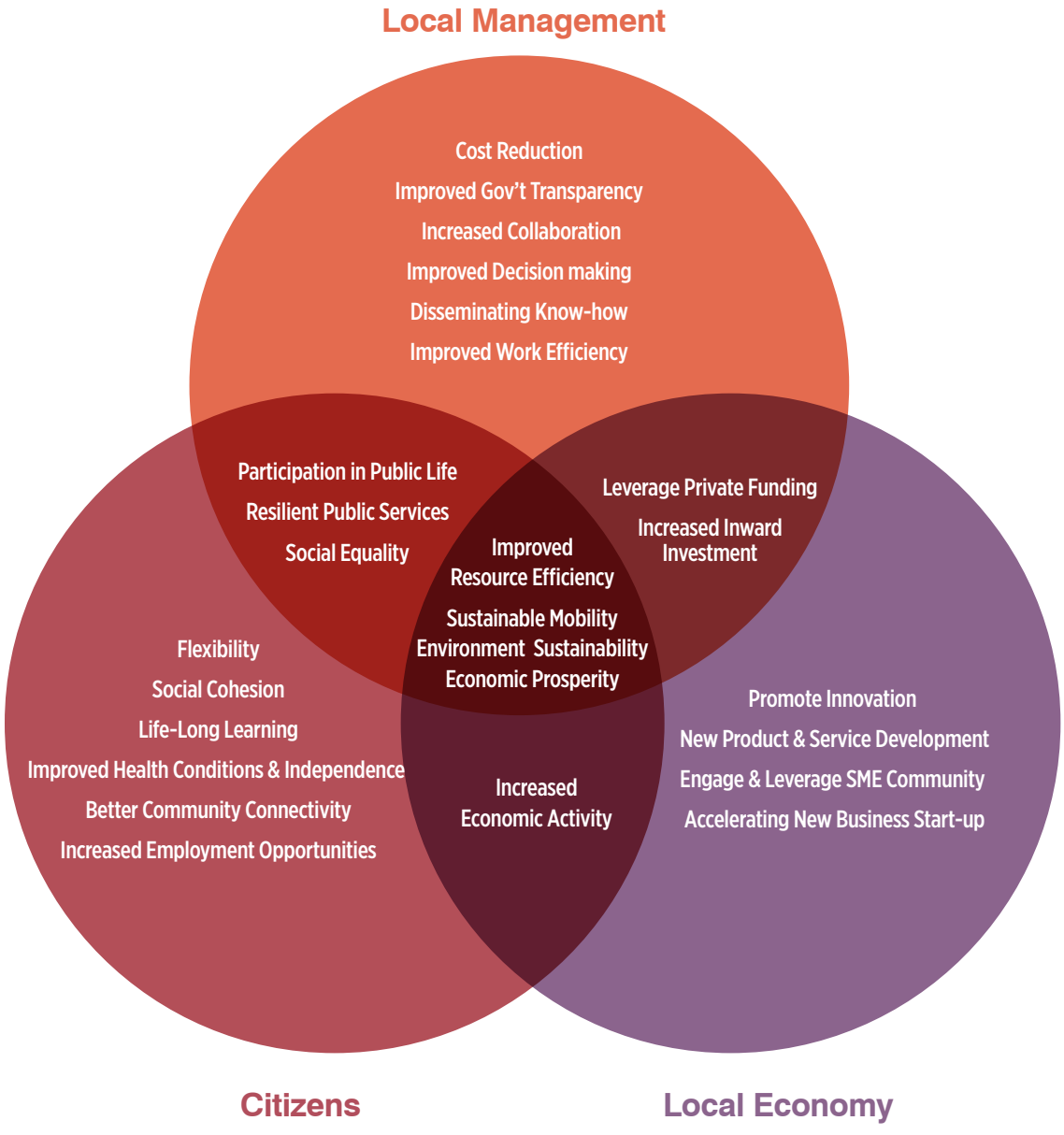


Figure 1- *Benefits of a Smart Cities Approach*
(Future Cities Demonstrator Program, Arup & TSB, 2013)

There are several approaches to transforming smart cities, one of them is given below (Figure 2). The concepts used in the model are described further below:

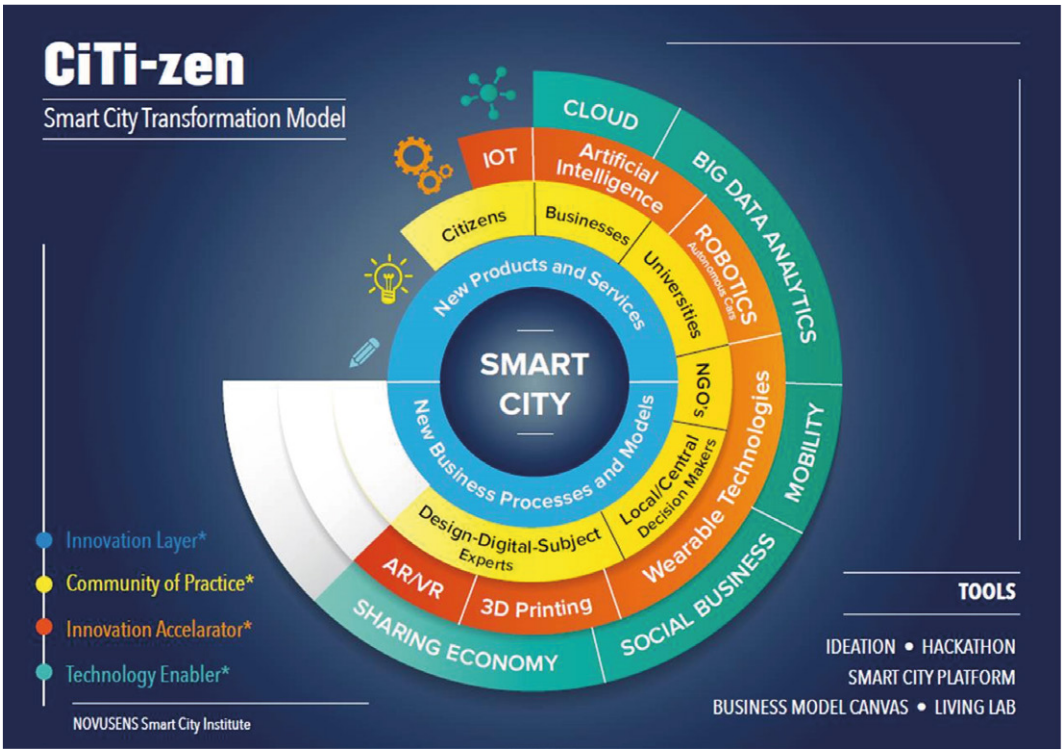


Figure 2- *Smart Cities Transformation Model*

Technology Enablers

Cloud, big data and data analytics, “mobility, social business / entrepreneurship’’ and “sharing economy” are the factors that create an environment which is suitable for digital transformation beyond the infrastructure.

Innovation Accelarators

The transformative nature of new technologies such as robots, 3D printers, virtual and augmented reality, internet of things, artificial intelligence and wearable technologies are included in this layer, with the help of technology enablers, they lead to development of new products, applications and services with new business processes and business models.

Smart City Stakeholders

This layer, which can also be called a community of practice, includes stakeholders who play an active role in the implementation of smart city projects. The smart city eco-system composes of flexible structures that bring together citizens, decision makers, businesses, academics, NGOs, subject matter experts and designers who develop projects on a common topic or challenge. These stakeholders come together to share their experiences, insights, tools and learn together and collaborate to contribute to the emergence of new business processes, models and products.

Innovation Layer

In this layer, new business processes and models transforming solutions to a smart city challenge are evaluated, where new products and services are developed. ‘Idea Generation Workshops’, ‘Hackathons’, ‘Business Model Canvas‘ are some of the means used under the leadership of a ‘collective intelligence platform' that is proposed to be established.

SMART TECHNOLOGIES

Smart technologies can be classified as Information and Communication Technologies (ICT) solutions (Figure 3 - Smart Technologies). They range from expensive hardware solutions such as city control centers, smart grids and self-governing tools to smartphone applications, multiple-source online platforms supported by citizen's ideas, and low- cost environmental sensors. Data, especially big and open data, are central to smart cities (Source: Open University, FutureLearn).

Figure 3 – *Smart Technologies*

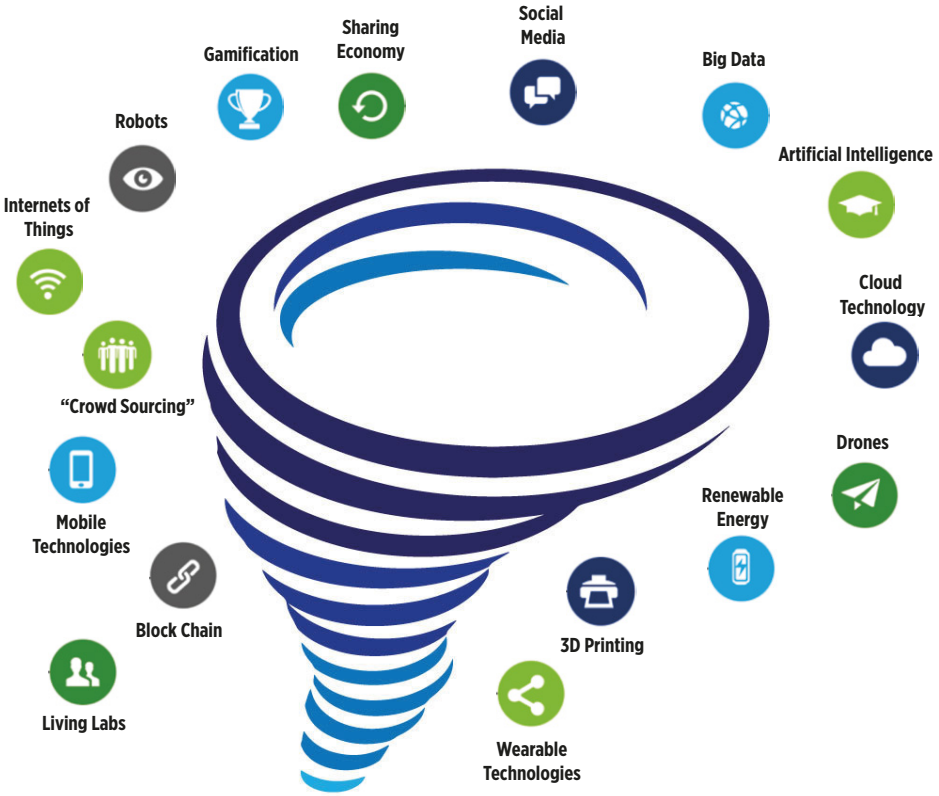
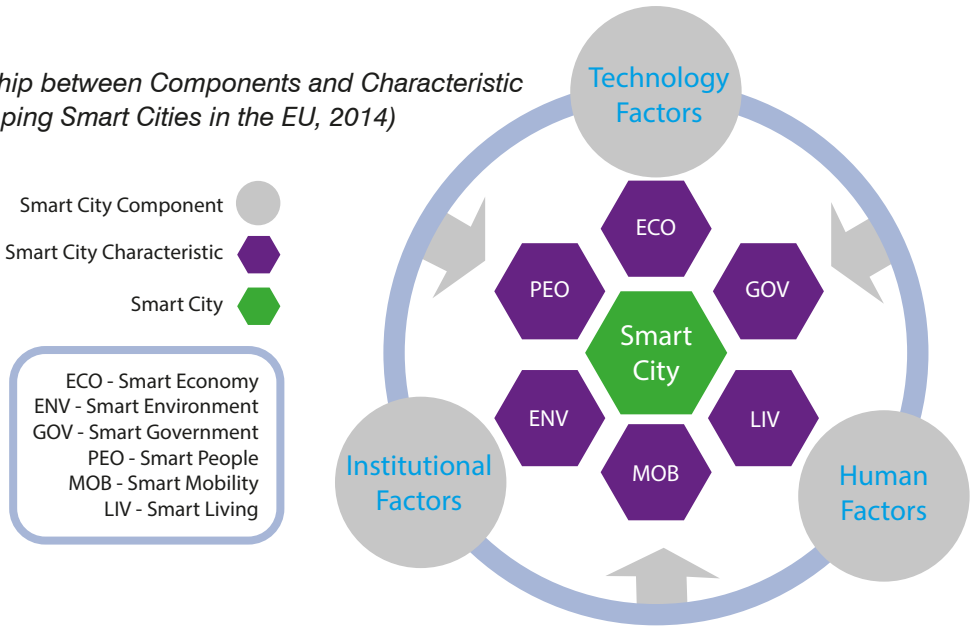


Figure 4 - *Relationship between Components and Characteristic of Smart Cities (Mapping Smart Cities in the EU, 2014)*



SMART CITY COMPONENTS

There are different definitions and terminology for subcomponents of smart cities and this study is based on the European Union definition (Figure 4). The “wheel of Smart Cities” developed by urban and climate strategist Boyd Cohen details the six components that make a city smart as in Figure 5, which are similar to the European Union study.

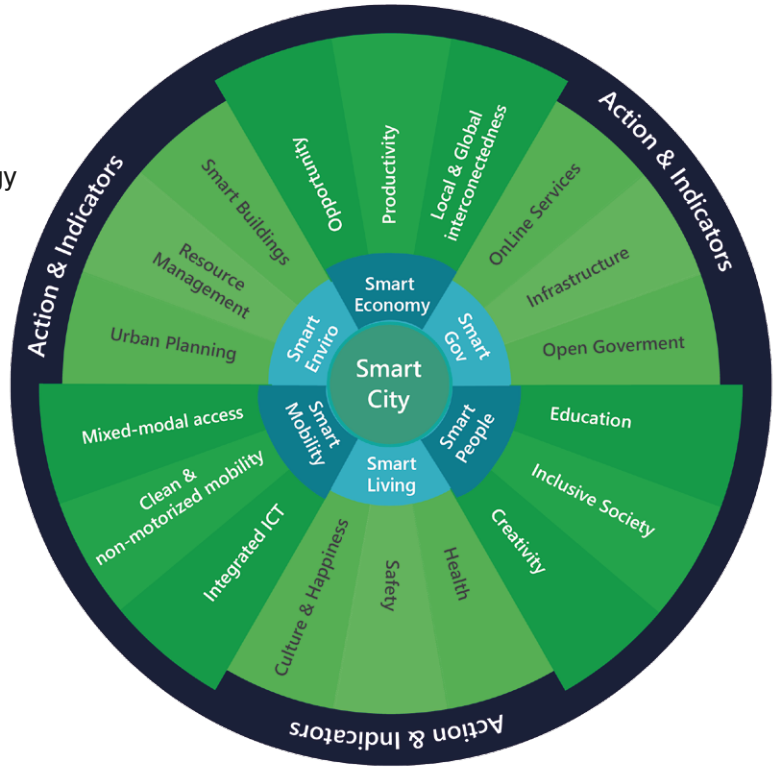


Figure 5 - *Smart City Wheel (Boyd Cohen)*

Smart Environment

The following topics are covered in terms of ensuring environmental sustainability, reducing energy water consumption, and implementing ICT supported solutions for the protection of natural resources:

- Renewable energy sources (wind, sun, etc.)
- Intelligent Energy Systems (electric, gas etc), Smart Meters
- Environment Friendly Buildings and Urban Planning
- Air/Water Pollution Monitoring System
- Energy Efficiency and Smart Street Lighting
- Solid Waste Management and Drainage Systems
- Intelligent Water Management Systems

Smart Mobility

Safe, ICT supported and integrated transportation (train, metro, bus, car, bicycle, and pedestrian) and logistic systems in a city related to sustainable mobility of the citizens are being addressed in this context. Under smart mobility, clean and mostly non-motorized alternatives stand out in general, saving time and resources by sharing real-time information, and reducing CO2 emissions. For example:

- Clean and non-motorized mobility (number of shared bikes/vehicles and charging stations)
- Mixed transportation models (integrated payment models, non-motorized journeys)
- Integrated ICT solutions (smart card payments, number of lights connected to real-time traffic management systems, applications integrating at least 3 types of transport modes, transportation systems providing real time information to citizens)

Smart Governance

In order to ensure the efficient management of the city, services and applications are provided in the context of using data-supported, participatory decision-making processes through ICT (infrastructure, hardware and software) and some examples are provided below:

- Online services reached by citizens via internet/smartphone
- Integrated services (natural disaster, transport, ambulance, fire, police, air quality) managed from a single center with real-time data
- Internet infrastructure (public wireless access areas)
- Sensor based applications providing real-time data
- Open government (new business and service models, applications based on open data)

Smart Economy

E-commerce and e-business services, productivity growth, advanced manufacturing services supported by ICT, new ICT-based products, services and business models are covered under smart economy. Smart clusters and digital entrepreneurship play an important role. In the context of smart economy, the following are also included;

- Sharing Economy
- Big Data Applications
- Industry 4.0 Applications

Smart People

ICT supported work environments, employees and citizens with e-skills, participatory community practices that increase innovation are within the framework of smart people and some examples are given below:

- Incorporation of data into decision-making processes with various data analytics tools
- Online Educations Opportunities
- Idea Generations Camps
- Hackathons

Smart Living

In the context of providing urban dwellers with comfortable living environments, increased social cohesion and social capital in which ICT plays a facilitating role, the following are covered:

- Healthy Living
- Safe Living
- Multi-cultural life intertwined with art
- Quality Accomodation

ÇANAKKALE and TARRAGONA: FINDINGS

Among the reasons why the cities of Çanakkale and Tarragona came together within the scope of the “Partnership for future of Smart Cities Project” are the natural and cultural heritage resources that both cities own. Some of the other commonalities are given below:

- Geographical locations and relationship with the sea
- Demographic structure
- Hosting of important universities within the city
- Historical and cultural backgrounds
- UNESCO world heritage listed locations

In addition to all of the above points, both cities have other strategic commonalities also. One of them is their interest in smart city applications (transportation, environment, economic development). This section of the report aims to identify potential areas of cooperation and capacity building among both cities, based on the visits, presentations and studies.

TARRAGONA MUNICIPALITY

A protocol visit was made to the mayor of Tarragona Municipality, one of the stakeholders of the “Partnership for Future of Smart Cities Project”, on July 8th, 2019 by the Çanakkale delegation. The visit aimed to observe smart city applications that contribute to the production of economic services and formation of sustainable cities with the support of technology. Pau Ricoma, the elected mayor, was informed about Çanakkale, the EU town twinning project and the ‘Sustainable and Smart: Çanakkale On My Mind’ transformation initiative.

After Mayor Pau Ricoma gave information about Tarragona's historical, cultural, geographical background and priority industries, the similarities of both cities were discussed and mutual satisfaction were expressed regarding the cooperation within the context of the town twinning program.

The fact that Tarragona is a Unesco World Heritage listed city due to the presence of historical Roman ruins in the city center and a corresponding similarity with the ancient city of Troy also being in the same list, cultural heritage has been observed as a potential cooperation area between the two cities.

The meeting ended with the extension of an invitation by the Mayor of Çanakkale, to the Mayor of Tarragona, for the closing meeting of the EU Town Twinning project, which is planned to be held in January 2020, in Turkey. News about the visit can be accessed via the links below.

http://diaridigital.tarragona21.com/una-delegacio-de-la-ciutat-turca-de-cannakale-visita-tarragona/

https://www.thesmartcityjournal.com/es/home-es/ciudades/1817-la-la-ciudad-turca-de-cannakale-visita-tarragona-denro-del-proyecto-europeo-comun-para-el-futuro-de-las-ciudades-inteligentes

http://www.tarragonasmart.cat/mediterranean-city/una-delegacio-de-la-ciutat-turca-de-cannakale-visita-tarragona/

https://rctgn.cat/cannakale-visita-tarragona-amb-la-visio-de-futur-de-les-smart-cities/

TARRAGONA IMPULSA

Tarragona Impulsa is a social innovation centre belonging to the municipality of Tarragona that designs and implements diverse programs and services to stimulate the city's economy, expand its sphere of influence and create jobs. The center, which has a 3000 m2 closed area, a 600 m2 public square and 800 m2 building which is still under restoration, is very close to the residential areas and it was used as a tobacco factory in the past.

The aim of the center, which contributes to the workforce and supports the growth of companies, is to promote the socioeconomic development of Tarragona and to improve the quality of life of citizens by taking advantage of geographical opportunities and to increase cooperation in the region.

In summary, services are organized for 3 different groups:

1. Those who work in an institution or are unemployed and want to improve their professional skills
2. Entrepreneurs who want to start their own businesses
3. Firms who wants to grow, looking for partners

Services to these different groups are also provided in 3 groups:

- Formation (Education)
- Business and occupational assistance
- Entrepreneurship

The center tries to ensure the development of companies, while benefiting from international funds. In economic terms, Tarragona Impulsa, founded with a funding of 2 million euros, and receives approximately €3.7 million in donations from external sources each year. The Strategic Plan of the Center encourages cooperation with many institutions and sharing of the outputs with the ecosystem.

Tarragona Impulsa operates under the Employment Council affiliated to the education and economic development units. They have a total workforce of 55 people, including management, technical and support teams. So far, the center has more than 7000 beneficiaries, while 580 companies have been engaged with, 700 people have been given vocational trainings and 1200 people have been given employment opportunities.

Information about the different units of Tarragona Impulsa was given during the study visit;

- Aurora de la Torre Trillo Figueva (Tarragona Impulsa Center)
- Valle Mellado Siesra (Tarragona Impulsa Department of Entrepreneurship)
- Rosa Mercade Bernel (Social Inclusion Program for the Disadvantaged)
- Montse Garcia Biosa (Respecta'm Project: Sexual Discrimination Prevention Project)
- Amat Callen (Civic Centers)

Tarragona Open Future

Tarragona Open Future program, sponsored by the telecommunications company Telefonica, is an important accelerator program with a focus on technology-supported and value-oriented entrepreneurship. The Tarragona Open Future program provides important opportunities for cooperation between public and private sector institutions, innovative and unique services to be provided to entrepreneurs (http://tarragona.openfuture.org/que-es).

The program which provides both economic and educational support and mentoring to companies, consists of 2 parts:

- 6 months entrepreneurship training programs for young people under 31 years of age
- A program that accelerates project ideas with the help of technology

The program, which is based on selected challenges, identifies a problem of a region or city that may be related to trade, logistics, environment or culture, and then develops projects to solve this problem and gives various incentive awards to the most innovative projects. These projects are carried out with the Municipality on both public and private sector front.

Entrepreneurs are provided with information about their jobs, place in co-working spaces without the need for opening an office, use of internet and office supports. Additionally, trainings are provided to entrepreneurs who want to start their own companies while advising them on business administration, contracting and similar issues.

The program is carried out in the UK, Spain, Ecuador, Brazil, Argentina, Colombia, Costa Rica, Guatemala, Peru and Venezuela in cooperation. The ecosystem of the program is also managed by Telefonica.

Equality Programs

According to the Spanish Constitution and the New York Declaration signed in 2006, citizens with disabilities also have the right to exist socially. According to official numbers, 11,600 disabled individuals live in Tarragona. These individuals can participate in the “Festival for all” event, which has been held for 28 years by the Municipality of Tarragona for the disabled.

The aim of these and similar programs is to promote social transformation processes through a cultural method, to provide diversity in the public sphere and to increase interaction among participants. Three programs are available in this context:

Festa Per a Tothom - “Festival for Everyone”:

It is a program developed to enable disabled individuals to participate in social life by taking part in cultural and art activities. As there are difficulties for disabled people to go out on their own, in this festival, citizens help them, meet with disabled people and participate in the entertainments. Festival attendance has increased considerably in the last 28 years.

The festival, where disabled people go out on the street and act like actors, also shows a great deal of attention to children. The” Festival for Everyone " Program has been an example of successful public, private and civil society cooperation.

Eclectic Festival:

It is a festival where musical and theatre performances are displayed.

Giant Frida:

In this event Frida’s giant models are used. The 3 reasons for Frida to be chosen as the subject are that she represents modernism, woman, and the disabled.

Respecta'm (Show me your respect)

Respecta'm is an awareness program that brings together global and diverse stakeholders. It is run by the Municipality, Police Department and civic initiative groups with the aim of preventing women from being subjected to sexist behavior and harassment in daily life and festivals.

Respecta'm

Respecta'm, launched in 2016 and constantly renewed with every year's feedback, is a campaign to change and prevent sexist behavior in different contexts, enabling women to make their voices heard more.

Between 2017-2018, relevant educational programs have been provided in schools for young people and the play 'Max in Love ' has been performed. In addition, a separate Police unit operates and handles complaints to prevent harassment during festivals. According to a study conducted in the city, while the rate of disturbance by males is 33%, a 25% decrease has been observed as a result of these actions.

Wise Decisions Project

Wise Decisions is a software project being implemented by the university, Mediterranean Smart City Platform, and the Municipality, that aims to facilitate the citizen's participation in the decision-making processes and is currently in development phase.

The project aims to strengthen communication between citizens and politicians and to provide a new type of decision-making mechanism in order to find solutions to different types of challenges that will be experienced in the future while increasing citizen participation.

For this project various ideas are collected and evaluated by different units. Citizens also have the option of observing the process without sharing any ideas.

All stakeholders are expected to participate in the process. Change in decision-making culture, finding solutions that will have real impact in the future, developing the feeling of belonging and co-creating with collective intelligence are distinguishing factors of the software.

The steps to be taken during the 3-4 years learning process are planned to start with different profiles of citizens and pilot applications in different areas to test the solution and to train technicians who will manage the "collective intelligence" processes.

EMATSA

During the visit to Ematsa, where Tarragona water management is conducted, information was given about the city's water resources and the way it was stored and distributed. Also, the control room have been visited and information about how the water management of the entire city has been done, and problems resolution techniques were provided. In addition, the following presentations were made about the best practices in Tarragona:

Tarragona Smart Tourism

For tourists who come to the city, their times of strolling, the places and frequency of visits are stored and related analyzes are made. Less visited places are identified and examined while solutions are devised for such places.

With augmented reality application developed by Imageen company, the state of the city dating back 2000 years can be seen on mobile phones, tablets and laptops. The application does not yet have gamification features but that will be planned for the near future.

Ematsa – Water Management

Founded in 1983, owned 51% by the municipality of Tarragona and 49% of Sorea, water management company Ematsa serves 225 municipalities through 44 drinking water installations and 18 waste water and sewage plants. There is also a social fund established within the company whose aim is to deliver water to the public in the best way possible (Fondo Social). This fund is used to ensure that citizens do not become dehydrated due to financial impossibilities.

Innovations in recent years include the provision of water distribution during interruptions lasting more than 4 hours, continuous control of water quality, the use of renewable energy and the training of employees and continuous improvements of applications.

All of the 15 technical support vehicles are electrified as of 2019 and there are plans to have a larger number of electrified vehicles by 2020.

Measures to prevent climate change and reduce waste production are being implemented, while the waste water obtained from the bio-gas vehicles are planned to be used as irrigation water in agriculture. The average daily production of biogas is 3000 m3, which is sufficient for the operation of 43 cars and 5 buses. In addition, the project started in 2018 for the use of purified water in agriculture is still ongoing, and 11 municipalities are included in the project.

Tarragona Smart Lighting Systems

In Tarragona, lighting is a priority to encourage more people to go out at nights. In addition, Tarragona is a Unesco World Heritage listed city which makes different types of lighting applications desirable. In this context, continuous experiments and measurements are made about use of lighting technology (intelligent lighting systems). Founded in 1912, Sece has been working on this with the Municipality of Tarragona since 1985 and has a technical office and laboratory with more than 20 employees.

In Tarragona, lighting is used for both tourism and security purposes. In the past, only the places used by vehicles were illuminated, now the places where people spend time outside their homes are also illuminated. Lighting system coverage has been doubled in the last 11 years while energy consumption has decreased. The current system, which uses the new technology, has more than 30,000 lighting devices.

Tarragona City Council utilize remote management solutions (Telecontrol) based on the latest technology to solve problems in different parts of the city, measure impact of lighting, such as which streets are more illuminated, where more lighting is needed and so on, to be able to make improvements. In addition, plans are made to provide solutions from more than one manufacturer and to develop solutions specific to different sections of the city.

The Tarragona Municipality believes that lighting is a very important tool in strengthening the identity of the city, and works to implement innovative smart city solutions that respect the environment and contribute to energy efficiency by making use of internet of things (IoT).

CLUSTER TIC – Carrier Office

The TIC cluster strives to ensure synergy between companies in the southern Catalonia region and to develop projects for companies, in order to respond to the technological needs of the sector and society, to provide both technological and professional training and to create new business opportunities.

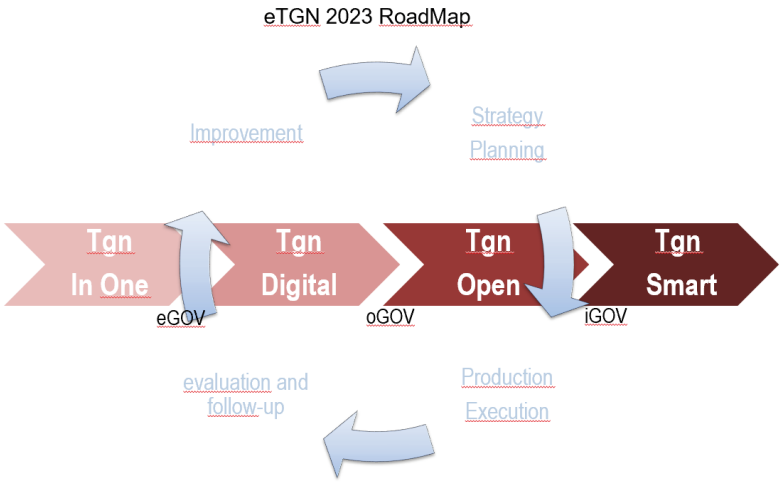
Founded in 2014, the firm brought together 46 companies and provided employment opportunities for a total of 1300 people. The TIC cluster, which also includes technology companies, works with companies, professionals and students, and has an annual budget of 1 billion euros.

In addition, various support services are provided for talented students to keep them at TIC. The TIC school helps graduates to prepare them for business life. Students have so far been more interested in coaching and connecting with companies.

eTGN 2023, Tarragona Municipality Information and Communication Systems

eTGN sets out Tarragona Municipality's information and communication systems strategy and aims to spread smart city practices through new innovative TIC model in infrastructure and services with a digital, transparent and participatory approach. Projects developed by making use of disruptive technologies such as internet of things (IoT), big data, open data, artificial intelligence, 5G, blockchain combined with innovative business models serve the citizens of Tarragona with which the city wants to be known for.

In this transformation process a four-stage roadmap for eTGN 2023 is being followed:
1- Tarragona in One (Tgn in One)
2- Digital Tarragona (Tgn Digital)
3- Open Tarragona (Tgn Open)
4- Smart Tarragona (Tgn Smart)



For TGN open, the data must be open, reusable and interoperable, for which all units will need to be restructured, all applications will be overhauled, and the data obtained will be of high quality. In this process, data collection and sharing are vital and it is believed that new business opportunities will arise as data is shared. Therefore, it is aimed to collect all information under one roof and to share it with the public. Meanwhile, trainings are provided so that the public can understand and interpret information that is shared through open data. This way the transition from Open Tarragona to Smart Tarragona will be possible.

Open Data Laboratory

Barcelona Open Data Initiative in collaboration with the Open Data Institute (ODI) promotes awareness, training, entrepreneurship and research on open data and its objectives are given below:

- Rising the awareness of citizens regarding the use of open data
- Providing self-development trainings on open data
- Promoting open data
- Supporting open data-based entrepreneurship projects

The Open Data Institute is a structure co-founded by Sir Tim Berners-Lee and Sir Nigel Shadbolt to raise awareness, make studies, educate and disseminate relevant work in the open data world.

Tarragona Open Data Laboratory

TARRAGONA
OpenDataLab

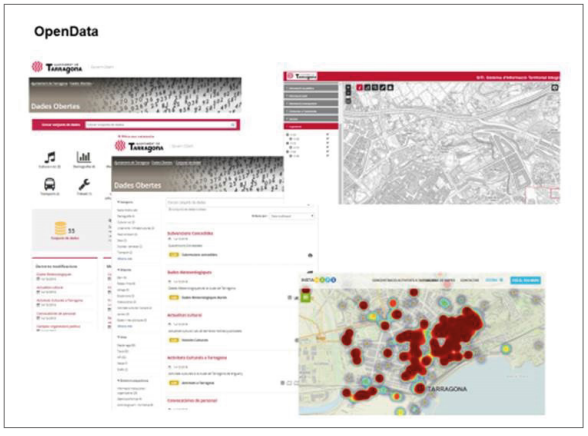
The Tarragona Open Data Laboratory was created for the dissemination, training and promotion of data-based entrepreneurship and its objectives are as follows:

- Explaining the importance of open data for local business ecosystem
- Encouraging studies on the economic value of open data
- Providing open data training tools for professionals
- Contributing to the design processes of local companies
- Revealing open data potential as an economic opportunity for citizens
- Determination of action steps to promote economic use of open data
- Establishing a coordination mechanism for companies and professionals who want to build economic activities on open data

Tarragona Open Data Laboratory Activities

The following activities are carried out in order to create a suitable ecosystem for projects whose priority is open data practices;

- Dissemination of open data practices to large masses
- Provision of free courses by experts on re-use of data and production of economic value through open data where vocational training certificates are also given.



University of Rovira i Virgili

The University of Rovira i Virgili (URV) was founded in 1991 and according to the Times Higher Education, URV ranks 78th among world universities under the age of 50 and is home to around 14,000 students with about 2,000 faculty members.

URV has five campuses spread over Tarragona, two of which are in Tarragona and the others are located outside. In the Technology campus where presentations are made, there are also departments like chemistry, computer, mechanics and social departments such as psychology and education. So far, the university has 18,000 graduates and has 52 masters and 24 doctoral programs. Up until now, 18 million euros of funding was utilized and 1,300 articles were published by the University.

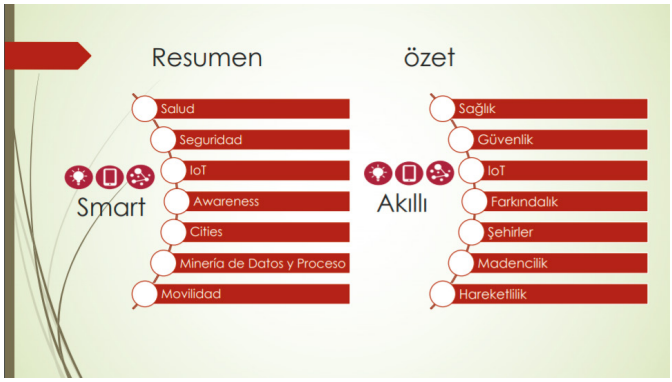
The university has 4 groups in the field of technology, and presentations on smart cities were made under the following headings:

- Smart Technologies Research Group
- Information Security and Data Privacy Research Group
- Intelligent Robotics and Computer Vision group
- Computer Aided Sustainable Process Engineering

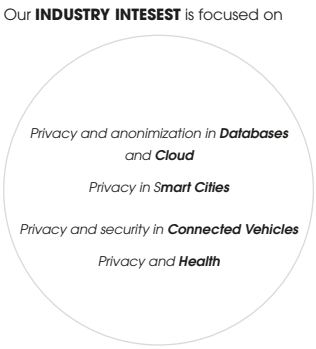
1. Smart Technologies Research Group

The group, which consists of 4 PhD students, conducts research in the fields of smart health, smart security, internet of things, smart and cognitive city, smart mining, smart mobility and smart awareness. Various projects are developed by the Group with international cooperation (America, Asia, Europe) to collect data for these processes and to investigate the effects of the data. Such collaborations are made through a foundation.

The studies are mostly done within the University and real-world applications are planned in the field for successful ones. For example, there are elderly care centers in the city, but the projects to be carried out in these centers are still at research level in the University.



2. CRISES Information Security and Data Privacy Research Group



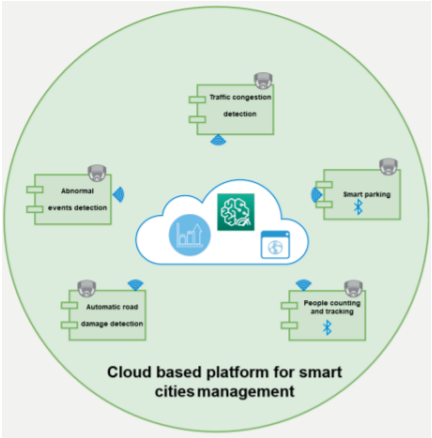
Founded in 1994, CRISES Information Security and Data Privacy Research Group has more than 25 members and consists of 15 active PhD-level researchers under 3 different and complementary subgroups. The group's mission is centered in the creation of technologies that are compatible with the three objectives:

1. SECURITY for companies, governments and individuals in an information society
2. PRIVACY of the individuals who are users or passive subjects of the information society
3. UTILITY of the underlying informatics systems.

The group's research interests include anonymization, data masking, sustainable mobility, connected vehicles, cloud technologies, internet of things and cybersecurity.

As for the industry focus, the group's interest areas consist of privacy and anonymization in databases and cloud, privacy in smart cities, privacy and security in connected vehicles, privacy and health. The group provides mentoring, patents development licensing, education and formation on demand and scientific advising in specific industrial R&D projects.

3. Intelligent Robotics and Computer Vision Group

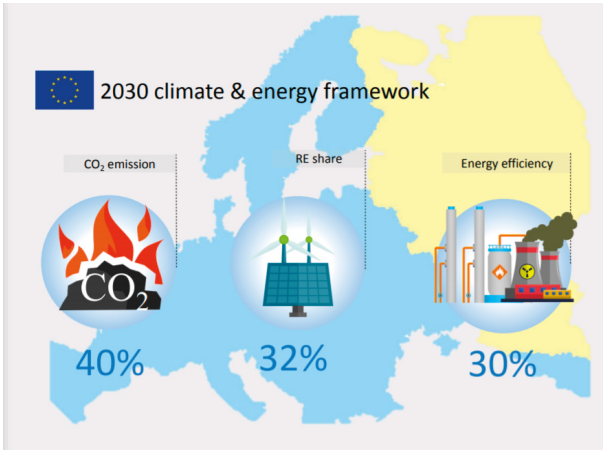


The group's experience includes areas such as computer vision, image processing, data analysis in general, embedded systems, pattern recognition, machine learning, deep learning, artificial intelligence and robotics. The projects are generally funded by Horizon 2020, FP7 Framework, Spanish and Catalan governments.

The aim of the group is to reconcile data with artificial intelligence, ensure that decisions are data-based and reliable, and provide solutions with computer vision analytics. These solutions visualize real-time results in a simple way due to their intuitive and user-friendly interface.

Some of the realized smart city applications are; detection, classification and communication of damaged infrastructure elements of highways and railways; smart parking systems; detection of congestion; predetermination of possible emergency situations at the public places such as airports, train stations etc., by using video analytics, counting and monitoring technics.

4. Computer Aided Sustainable Process Engineering



According to the EU 2030 climate and energy framework, it is aimed to reduce carbon emissions by 40%, increase renewable energy share to 32% and achieve 30% savings in energy efficiency by 2030. At the moment 75% of the energy consumed in the European Union countries is currently supplied from non-renewable sources. Due to this fact a project was initiated on this challenge which has technical, economic and political dimensions and applied to the EU Horizon 2020 program. Funding of the project was provided from Horizon 2020 Marie Sklodowska-Curie, RTI2018-093849-B-C33 (MINECO/FEDER) CTQ2016-77968 (MINECO/FEDER) and from the government of Spain and 2017 SGR 1409 from the Catalan government.

Port of Tarragona - SOM-INN PORT

The port of Tarragona is the second busiest port after the Port of Barcelona in Spain as 5% of the chemical industry of Spain and 20% of the region is being handled at this port. Tarragona port works with Turkish ports such as Derince and Gebze especially on wheat and corn products. The port is also home to cruise ships serving about 100,000 passengers annually. There are a number of new projects planned for 2018-2035, one of which is to strengthen the bond between Madrid and Tarragona. Other features describing the Port of Tarragona are:

- Having different functions (DIVERSIFIED PORT);
- Being environment friendly (GREEN PORT – Energy efficiency and waste reduction);
- Having an efficient infrastructure;
- Having an effective logistics base (Mediterranean Logistics Center)

SOM-INN PORT: Port of Tarragona Innovation Eco-system

Som-Inn Port is a collaboration among Port of Tarragona and its stakeholders which aims to encourage new collaborations and keep innovative talent at the Port of Tarragona while utilizing open innovation practices.

The Port of Tarragona is constantly working on innovations and improvements in order to achieve the following objectives:

SOM-INN PORT
Ecosistema d'Innovació del Port de Tarragona

- Improving port security and logistics efficiency
- To be able to use technological developments
- Being a sustainable port
- Connection of the port to the surrounding areas

In this regard, research and analysis studies have been conducted in 8 ports. According to the results of these analyses, it was determined how to replicate each of these port's best practices so that Port of Tarragona would benefit from their innovative models. A four-phase method was adopted with the principle of open innovation:

1. Exploring
2. Creating a Culture of Innovation
3. Generating Ideas
4. Acceleration

While all these activities were carried out, as in other international ports, the Tarragona Port has prepared an appropriate innovation model. For example, an open innovation ecosystem is created which did not exist before, in a way that encourages cooperation.

SOM-INN PORT has adopted the following principles in the field of open innovation:

1. Observation
2. Design Thinking
3. Prototyping
4. Capacity Development
5. Providing Network Connections Between Members

The main topics of the innovation process carried out within the scope of SOM-INN PORT are given below:

- Selection of project ideas for solving the problems identified at the beginning of the year
- Categorizing and prioritizing project ideas
- Selecting three activities
- Supervision and observation
- Benchmarking with other ports

During the process, network connection and formation are carried out in two ways:

1. Formation meetings (virtual environment) where all members participate
2. Innovation Commission attended by all members within the region

It is important to have participants from different departments during innovation processes and to share different ideas by ensuring diversity and using design thinking methods to reach solutions. After the prototyping process, an evaluation is carried out and successful innovation projects are supported.

Barcelona @22 Innovation District

A visit was carried out under the leadership of Barcelona City Council's Directory for Infrastructure, Standardization and Smart Cities to the 22@District of Barcelona, which is one of the most important cities in the world for smart cities,

Being one of the most ambitious urban renewal projects in the world, the 22@District project is intended to convert an old industrial area into an economically feasible area with an approach supported by technology and innovation. The region today is home to universities, R&D institutions, entrepreneurs and technology companies. More than 3.500 institutions settled in this innovation region since 2000 and the region's population of workers has increased approximately by 25%.

Before creating the 22@District, the Barcelona City Council sought to answer the question of what should be done to enhance and develop the interaction between the international community and local companies and institutions in Barcelona. In 2000, 22@District was established as an answer to this question in the name of transforming Sant Martí, a historic Cotton District, into a thriving Information Center.

The neighborhood of Poblenou in Sant Martí, with its 200 hectares of privately-owned land (about 250 city blocks) close to the city center, was a highly attractive place for redevelopment. Ten years later, the 22@ Innovation District has grown into an attraction area with 114,000 m2 of new green space, 7000 companies and stores. Meanwhile, the number of residents in the area increased by 23% and the number of employees reached 90,000. Today, the 22@District region is perceived as the model for innovative urban design and planning for cities around the world.

Barcelona Thinx IoT Lab

Thinx | 5GBarcelona laboratory, created in 2018 with the restoration of an old port building by Telefónica and 5GBarcelona, is designed for the testing of new 5G services and applications developed by entrepreneurs and SMEs.

Innovative companies receive various types of support from this center and can move their offices to this center if necessary. Designed as a business laboratory, the center is intended for companies to take advantage of state-of-the-art facilities.

Telefónica, being one of the world's major telecommunications companies, is trying to increase cooperation among companies, while also enabling other companies to enter to the ecosystem.

Doxa – Building Smart Cities

Doxa provides consultancy services to cities and firms on innovation and smart cities. Having managed Barcelona Smart City Transformation 5.0, the Doxa team has also prepared the transformation strategy of the Tarragona Smart Mediterranean Region. The team addresses challenges such as climate change and tries to find solutions by examining such common problems of cities and countries through a challenge-oriented method of work. In smart city transformation projects, DOXA considers the following principles:

1. 21st Century-> The Century of Cities

Today there are 34 cities, 53 countries and 13 companies in the world's 100 largest economy.

2. Local Difficulties -> Similar challenges despite different urban realities:

- Sustainability-restricted resources,
- Environment and energy efficiency,
- Economic growth,
- Quality of life and wellbeing.

3. Technology is a facilitator, not a goal. The following plays a positive role in similar matters:

- Better decision making and policy-making process,
- More efficient allocation of resources
- Empowerment of citizens / stakeholders
- More open, transparent and participatory services
- Opportunity to make existing processes different & smarter

4. Transformative City Projects

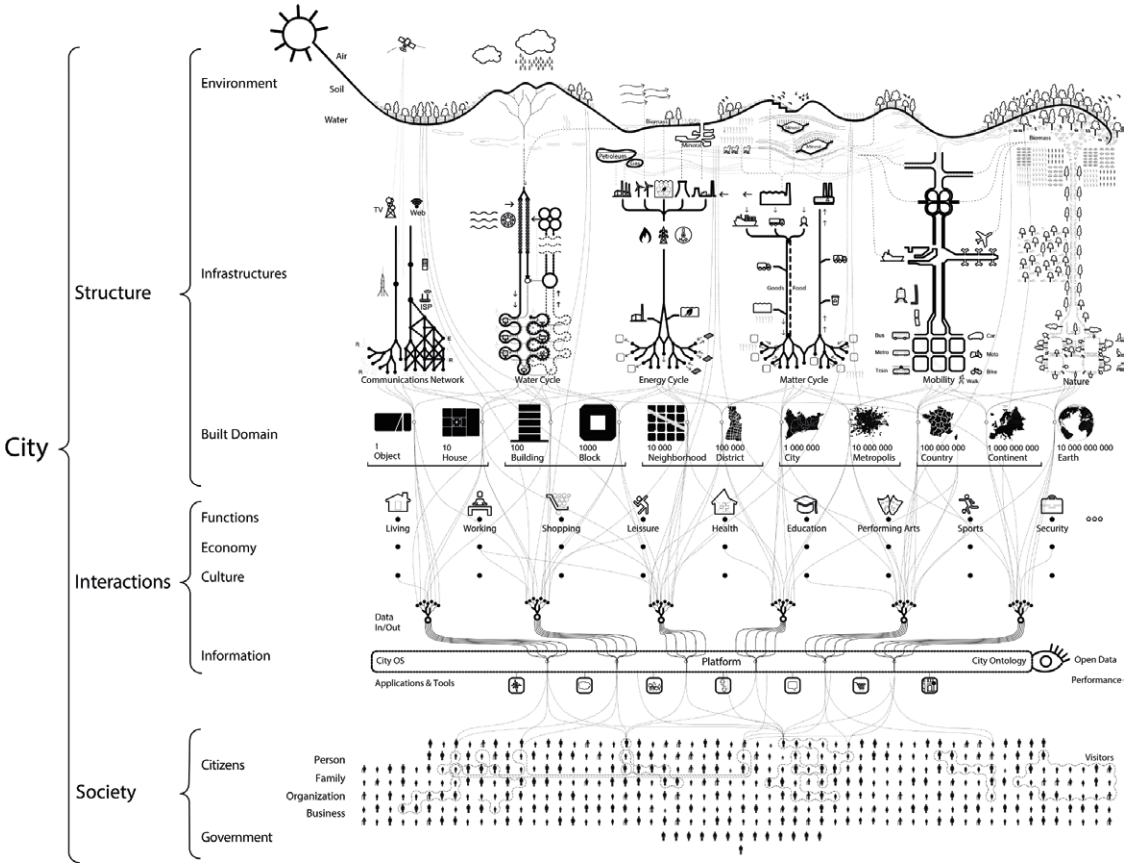
The smart city is a transformative city project; it is a plan. So, it is another opportunity to transform the city.

5. Long-term vision and leadership

- A long-term and ambitious vision is highly valuated
- The vision should reveal where the city likes to be in 20 or 30 years
- Quick wins are also important

6. Strategic, holistic plan: Removing silos

Adoption of integrated operating systems by eliminating silos at different levels in cities



7. Measurement and Impact Assessment

Evaluation of the return of the projects to the city and the citizens

8. Governance model: Relationship and Stakeholder Maps

Establishing appropriate governance model for the city

9. Citizen Participation: Citizen Focus

Developing projects for citizens with citizens

10. Competition and Cooperation: an ecosystem of urban innovation

Public-private partnerships, ecosystem of industry stakeholders and new business models.

CONCLUSION

The “Partnership for smart cities of the future” project brought together the cities of Çanakkale and Tarragona within the scope of the similarities and challenges of both cities that both have extensive natural and cultural wealth and resources. This section of the report sets out areas that could be the subject of potential cooperation and capacity building between both cities in the future.

COLLECTIVE WISDOM PLATFORM

The Tarragona Smart Mediterranean Region Foundation (Tarragona SMRF) is one of the highlights of the studies realized within the scope of the project. The foundation not only aims to develop policies and programs to transform the region of Tarragona while utilizing the collective wisdom of the region, but also plans to scale their experience to other Mediterranean cities, companies, public institutions, serving as a bridge between entrepreneurs and citizens. The Tarragona SMRF aims to create a strategy and roadmap for urban transformation that enables sustainable growth in the field of innovation, empower its citizens and the city, using the resources and wealth available.

Similar formations are also found in other cities carrying out successful smart city transformation projects and Tarragona SMRF also constitutes a good example for Çanakkale. Another possible example for the collective wisdom platform has been identified as that of the Port of Tarragona.

SOM-INN PORT model was developed by the Port of Tarragona for a collaborative, participatory international open innovation platform. An ecosystem-based approach has been adopted for developing product or services which includes the entire ecosystem of stakeholders (public, private sector, civil society, universities, youth, entrepreneurs, citizens) based on the principle of co-creation and development resembling to that of a Smart City Living Lab.

Although designed for a port, this open innovation ecosystem development model is easily applicable both for cities and for different institutions. There are practical aspects of both of the above mentioned examples that are usable for a Smart City Collective Wisdom Platform that is to be established in Çanakkale.

OPEN DATA

Open data is a concept that cuts every area horizontally in smart city applications and is also used in many areas in Tarragona. The Tarragona Open Data Laboratory was created for the dissemination, training and promotion of data-driven entrepreneurship. The priority of the lab is to create a suitable ecosystem for open data projects and to expand the use of open data to large audiences. For the case of Çanakkale, who is in the process of smart city transformation, work on open data is of great importance.

Both the Tarragona Open Data Laboratory and the open data studies carried out within the scope of Tarragona Port (https://www.porttarragona.cat/en/port-authority/open-data) may serve as examples for the city of Çanakkale. Training by Tarragona Open Data Laboratory experts on the use of open data and economic value generation through open data (such as trainer training) or possible pilot projects are among the possible collaborations that can be carried out jointly between the two cities in the future.

ENTREPRENEURSHIP

Tarragona Impulsa is a former tobacco factory which now serves as a social entrepreneurship center that develops and implements various civil initiatives, especially for young people and women. Some of the programs and projects developed within this scope are technology based and some are initiatives where technology is not as important.

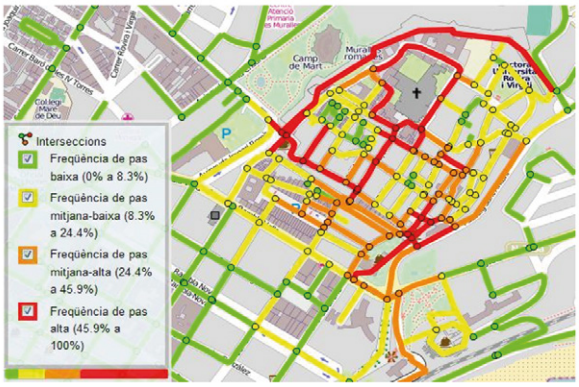
This center supports the growth of existing companies that contribute to reducing unemployment and employees who want to improve their professional skills while cooperating with many institutions. In this way, the center promotes the socio-economic development of Tarragona, contributes to the formation of smart economy through technology entrepreneurship activities and increases the quality of life and standard of Tarragona citizens.

Both Tarragona and Çanakkale have similar strategies especially towards young people and women. Entrepreneurship projects addressing these target groups appears to be a potential collaboration area for the cities. Creating employment is also a priority for both cities, which is one of the major goals of a smart economy and a building block of a smart city,

Additionally, given the importance of open data for Tarragona, the efforts to encourage technology entrepreneurship and capacity building in this regard emerge as another common area for cooperation between Tarragona Impulsa and the Municipality of Çanakkale.

TOURISM AND CULTURAL HERITAGE

Tarragona collects and analyses many data such as places visited, routes followed, times and frequency of visits in the city in order to provide different experiences and increase tourist satisfaction by means of technology. For example, less visited places can be analyzed and solutions can be proposed. In addition, the augmented reality application developed for Tarragona lets visitors visualize selected sites in the city as they were 2000 years ago, on devices such as mobile phones, tablets, laptops etc. (https://www.tarragonaturisme.cat/en/imageen-app).



Mapa 10- Interseccions i trams segons freqüència de pas

Tourism and cultural heritage are priority areas for both cities, covered under theme of smart economy. Augmented reality applications developed in Tarragona and analysis of tourist behaviors in the city are also concepts applicable to Çanakkale, that is another potential area of collaboration between the two cities.

SUSTAINABLE AND SMART ENVIRONMENT

Lighting in Tarragona is used for energy efficiency, for tourism and security purposes by making use of technology. In the past, only the areas used by vehicles have been illuminated, whereas now the places where people spend their time are also illuminated. Tarragona City Council is now able to solve problems in different parts of the city remotely through state-of-the-art management solutions (Telecontrol), by measuring the lighting amount, identifying streets that are illuminated more or less, deciding whether more lighting is needed or not and so on. In Tarragona, lighting is believed to play a crucial role in strengthening the identity of the city.

Sustainable and smart environment are among the priority areas in the Çanakkale's smart city transformation process, and intelligent lighting systems also have a role in this context. It is possible that the parks and the important places of the city can benefit from the lighting applications for purposes of tourism and security like in Tarragona and this is a potential area of cooperation between the two cities. Since both cities have been investing in energy efficiency and environmental protection for many years, it seems possible to initiate and conduct joint activities in this area.

OTHER POSSIBLE AREAS FOR COOPERATION

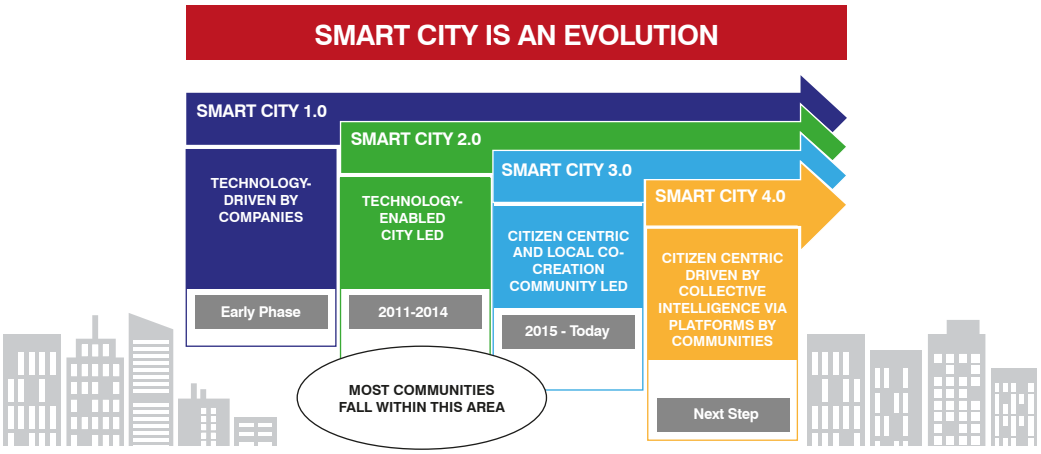
Smart Technologies Research Group within the Rovira i Virgili University conducts research in the areas of smart health, security, internet of things, smart and cognitive city, smart mining, smart mobility, and smart mindfulness. The group develops projects on how data collection can be possible in the respective processes and evaluates the effects of such data. Research areas such as smart mobility, smart environment and smart tourism are also priority areas in Çanakkale's smart city transformation.

The use of data in smart city applications is also of great importance for Çanakkale. It has been observed that cooperation could be developed, and joint research could be carried out between the University of Rovira i Virgili and the University of Çanakkale Onsekiz Mart.

In addition, it was determined that possible cooperation between the Tarragona Chamber of Commerce and Industry and the Çanakkale Chamber of Commerce and Industry could be developed. In particular, the idea that the presence of Çanakkale in the international network of the Tarragona Chamber of Industry and Commerce may be a possible action for the future.

TARRAGONA SMART MEDITERRANEAN CITY STRATEGY

The process of smart city transformation followed by Tarragona is based on a citizen-oriented approach in which products and services are developed together locally together with citizens, while technology is used as a facilitating tool. This approach has similarities with successful smart city applications in the world and contains elements that can be applied to Çanakkale also.



Tarragona's vision, according to the 2022 Smart City Strategy, is to be 'The Mediterranean city as an emerging region in a global polyhedral world'. To this end, Tarragona aims to create new employment opportunities while also attracting external human resources and investments that will bring value to the region by ensuring that the human resources in the region remain in place. Therefore, a consensus has been formed about technology development and the creation of companies based on the knowledge economy and the encouragement of entrepreneurship.

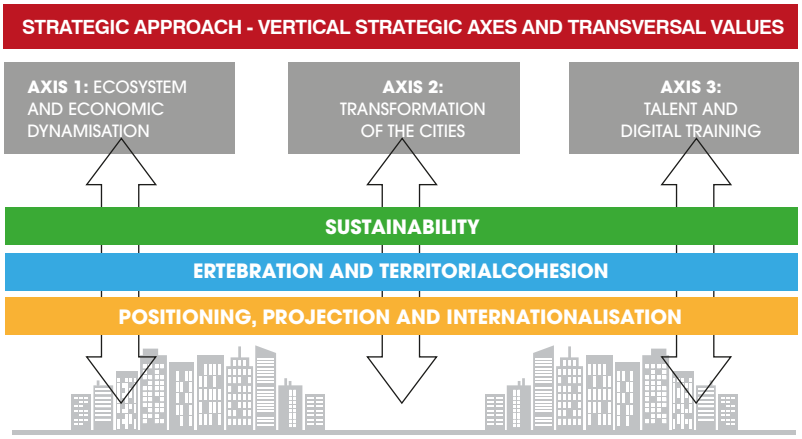
In this context, Tarragona City Council has launched Tarragona Impulsa entrepreneurship services to develop competitive companies that will contribute to innovation and provide added value to the business world. In addition to these programs, the City Council annually organizes the Tarragona Smart City Awards ceremony, which awards the top 8 initiatives on energy, water, health, cultural heritage and tourism under the city's smart city strategy. The Tarragona Open Future program also has an important place in the city's commitment to technology-based and value-added entrepreneurship.

Tarragona's strategic approach to the Smart City is summarized below. Here, the strategic axes are expressed in the vertical, while on the horizontal axis there are values that the city cares about.

Under the first axis aim is to stimulate the economic fabric as well as to involve all the agents in the quadruple helix to enhance their productive fabric through innovation and technology.

The second axis promotes a holistic vision of the city for urban transformation through innovative solutions to improve the quality of life of citizens and the emergence of new opportunities. This is done while preserving the entity and historical heritage of the cities of the Camp de Tarragona. At the same time, it tries to strengthen the role of local administrations to face the challenges of the future.

The third axis aims to extend open innovation to local talent and promote digital democratization, promoting the approach of research to companies for real applications. Likewise, it tries to empower the talent to innovate and to undertake the digital world, act as a potential motor of the society of the future of the region.



In addition, the Tarragona Smart Mediterranean City Strategy and the definition of the main axes use various international documents as references. Some of these are given below:

- United Nations Sustainable Development Goals (for example, mapping Tarragona's existing programs with these goals, determining fulfillment rates)

- HABITAT III, United Nation 2016

European Union Strategy 2020: sustainable – smart – inclusive growth targets

- 20% reduction of carbon gas emissions
- Increasing the share of renewable energy by 20% in final energy consumption
- Increasing energy efficiency by 20 %
- Male and female employment between the ages of 20-64 to reach 75%
- Decrease the dropout rate to less than 10% and have at least 40% of people in the 30-34 age group complete college or equivalent education
- Reducing the number of people at risk of poverty and social exclusion by at least 20 million
- Renewal of targets with Europe 2030 project

European Union – Vision About Smart Cities and Regions

The European Commission's approach to smart cities is currently city-oriented. The commission's guidelines and initiatives on Smart Cities encourage the following:

- Creation of City Networks
- Dissemination / Reuse of Solutions
- Sharing -> ICT Platforms and Data

According to the European Union, the model of strategic axes of Smart Cities has been adopted as follows:

- Smart Governance
- Smart Economy
- Smart Mobility
- Smart Environment
- Smart People
- Smart Living

Tarragona declares that it has referenced a total of 13 international documents, such as the above, in its smart Mediterranean city strategy, and relates its strategy to these documents.

NEXT STEPS

Çanakkale is in the process of developing a collective intelligence smart city platform in line with the vision of the smart city transformation journey that started in 2017 with the “Çanakkale On My Mind” initiative which brought together relevant stakeholders from the public & private sector, university and civil society, in line with the smart city priorities and needs.

As a result of the consultations and mutual visits between Çanakkale and Tarragona within the scope of the town twinning project between Turkey and the European Union, the business and management model of the Tarragona Smart Mediterranean Region Foundation and Port of Tarragona’s open innovation model appear quite relevant to the Çanakkale smart city transformation process in terms of approaches and objectives. In this context, the launch of a joint collaboration between the two cities is considered as one of the potential areas of cooperation.

In addition, both cities regard technology as a facilitating means for the sustainable growth and development of cities in the areas of cultural heritage, tourism, environment, mobility and has many initiatives. Also considering the commonalities such as cultural heritage, geography and demographics , the cities have potential to create exemplary and innovative collaborations building upon the town twinning project.

ANNEX 1 – KEY INDICATORS FOR ÇANAKKALE AND TARRAGONA

DEMOGRAPHIC INDICATORS*	Çanakkale	Tarragona
Area	9,955 km2	57.9 km2
Population-Provincial (2018 & 2015)	540,662	811,401
Population-Center (2018 & 2015)	180,823	134,085
Population Growth Rate (%) (2018 & 2015)	1.91	-0.11
Population Density (2018 & 2015)	54/km2	2,264/km2
Female Population (%)	49.54%	51.4%
Male Population (%)	50.46%	48.6%

OTHER INDICATORS	Çanakkale	Tarragona
GDP in million USD (PPP) (2018 & 2015)	$14,150	$33,338
Number of Museum	9	9
Universities / Students	1 / 53,000	1 / 14,000

** Source: Data from official institutions and organizations and Turkish Statistical Institute reports*

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ANNEX 3 – INTERNATIONAL EXAMPLES

In this section, smart city applications from selected European cities that are in the process of smart city transformation have been analyzed as examples.

Amsterdam/NETHERLAND

Amsterdam is the only country in the world where the traffic pollution created by pedestrians and bicycles outweighs the traffic pollution created by vehicles. In the city, 67% of all transportation is done by bicycle or on foot. Amsterdam has many highly innovative smart city apps that go far beyond smart bikes. Amsterdam is listed 3rd in Boyd Cohen's Smart City European ranking.

Amsterdam is included in the 'cities of the future' study, that Skift carried out with Mastercard support, which aims to leverage intelligent designs to help cities meet the needs of rapid urbanization where Amsterdam's Structural Vision 2040 and Energy Strategy 2040 are also elaborated.

The Structural Vision 2040 aims to ensure that Amsterdam will be ready to receive around 150,000 immigrants expected between now and 2040, while addressing the following sustainability goals:

- 40% drop in carbon emission rate in 2025 compared to 1990
- A 75% drop in the carbon emissions rate in 2040.

Smart City Vision

The Amsterdam structural 2040 Master Plan aims to replicate and develop existing communities through an integrative design, smart technology and infrastructure.

By re-evaluating hiking, cycling and public transport routes, Amsterdam plans to connect areas in the city and create new innovative zones on a broad scale, compared with other cities around the world.

NOTE: The population density of Amsterdam, which has a population of 813,562, is also quite high: 4,908 people/km2

Smart City Strategy

The priority areas outlined in Amsterdam's Smart City Strategy are:

- Resiliency & water management
- Circular use of materials
- Citizen engagement in the energy transition
- Pressure of mass tourism
- Affordable housing

Approaches Initiative and Programs

Amsterdam has taken a leading position in smart cities in the recent years with its smart city initiative that is part of the city's master plan. It has one of the most innovative, comprehensive, participatory and sustainable platforms across the world.

Examples of Smart City Applications

Amsterdam Smart City Platform

Launched in 2009 by the Amsterdam Economic Board, the Municipality of Amsterdam, internet service provider Liander and telecom operator KPN to help achieve the city's sustainability goals (ASC - Amsterdam Smart City platform).

The ASC platform is a partnership between enterprises, decision makers, research institutions and citizens of Amsterdam, that initiates and follows through smart city projects. The platform with a small central office reached 70 partners engaged in 37 projects in 2013. The Platform's 2009-2011 budget was €3.4 million, with 40% from European Union funds, 40% from private sector and 20% from public sources (https://amsterdamsmartcity.com).

Climate Street

'Klimaatstraat ' project is a holistic concept consisting of public space, logistics and entrepreneurial spaces for shopping streets. Among the aims of the' Klimaatstraat 'project is to reduce CO2 emissions and energy consumption in the 'Utrechtse Straat'. To achieve these goals in addition to changes in user behavior initiatives such as sustainable waste logistics, displays showing energy consumption, LED lighting, smart meters, energy management systems have been used. As a result, annual energy savings of 661 tons of CO2 have been achieved. While this alone may seem like a small amount, it amounts to 35 kilos-tons of energy savings per year when scaled to other streets in Amsterdam. One of the reasons for the success of the project is described as a visionary local association manager, while another factor is shown as starting with the support of a small group of stakeholders and then spreading it to the whole of the street (https://amsterdamsmartcity.com/projects/climate-street).

Ship to Network (Green Energy)

The Port of Amsterdam aims to be one of the most sustainable ports by 2020, which is why it has invested in the Ship – to-Network project. With this project, the ships arriving at the Port of Amsterdam have been given the opportunity to use the green energy provided from the grid instead of their own diesel generators. This both reduces CO2 emissions and causes less noise and pollution. The ICT component of the project is that the ship owners can make their payments via mobile phone. A total of 195 ship - to-network ports have been established in the port of Amsterdam. The main challenge of the project has been the need for cooperation with very different stakeholders and it is recommended that such projects be organized from the top to the bottom.

Copenhagen/DENMARK

Smart City Vision

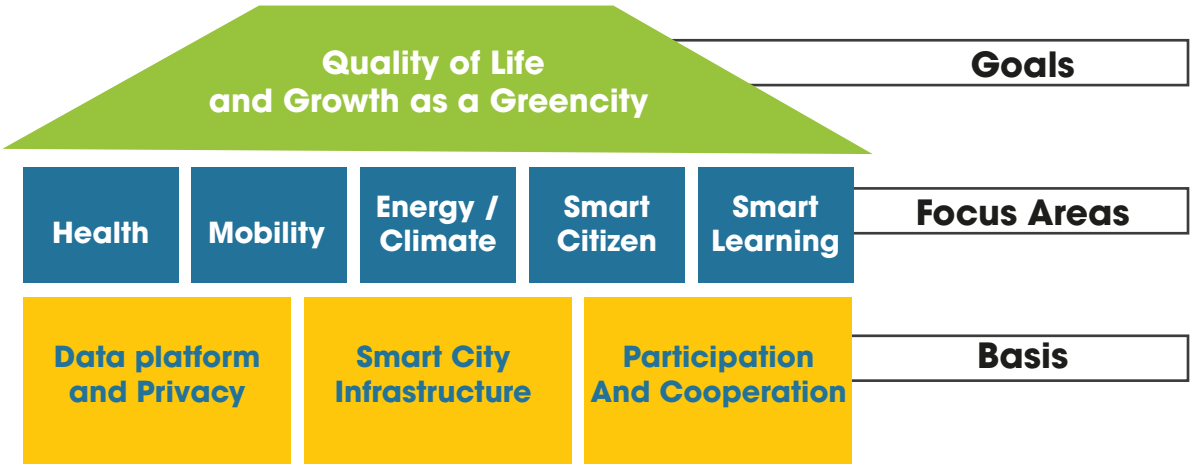
'Copenhagen has the world's best urban environment and a unique urban life' is the vision set out by Copenhagen and has the following objectives within this context (Reference: Copenhagen Smart City):

- Have zero carbon emissions
  - ✔ Be the first capital with zero carbon emissions
  - ✔ Have %20 less CO2 emissions than today
  - ✔ To become to the world's first carbon-free capital in 2025
- Be the best city in the world for cyclists
  - ✔ %50 of people go to their jobs or school by bicycle
  - ✔ Reducing serious cyclist injuries to %50 of today
  - ✔ At least %80 of cyclist feel safe in traffic
- Become a green & blue capital
  - ✔ 90% of the Copenhagens can reach a park, natural area, beach or sea in less then 15 minutes by walking
  - ✔ Copenhagen residents can go to a park, natural area, beach or sea twice as much as they do today
- Become a clean and healthy city
  - ✔ Copenhagen has at least 20% organic food consumption
  - ✔ Be the cleanest city in Europe
  - ✔ Collection of garbage from streets in maximum 8 hours
  - ✔ Copenhagens can sleep comfortably without street noise

Note: Copenhagen has a population of 2,000,000 and the city center population is 580,000. Population density is 6,800 people/km2.

Smart City Strategy

Copenhagen, which was selected as the green capital of Europe in 2014, aims to be the leader in green growth through data and technology. Copenhagen's Smart City strategy is given below:



Reference: Copenhagen Smart City

Priority Areas, Applications

Within the context of this strategy, the priority areas and practices identified for Copenhagen are as follows:

- ✔ Copenhagen Solutions Laboratory
- ✔ Basic Build-Operate-Transfer implementation for building smart city infrastructure
- ✔ Open City Data Platform
- ✔ Big Data platform with partners
- ✔ Mobility Projects and ITS
- ✔ Smart Street Lighting System
- ✔ Copenhagen Map
- ✔ Digital Infrastructure

(Reference: Copenhagen Smart City)

Approach

As an approach to smart city strategy and implementation, Copenhagen aims to realize lighthouse projects with the support of the project coordination committee by collaborating with institutions from different areas. In accomplishing this the city has adopted the following principles:

- ✔ Using data to solve problems
- ✔ Using new technologies or using existing technologies in new ways
- ✔ Effective use of the resources of the municipality or the city
- ✔ To increase participation of the citizens and business community by engaging in new processes

(Reference: Copenhagen Smart City)

Smart City Application Examples

Copenhagen Solutions Laboratory

Copenhagen aimed to create a specific test environment for intelligent urban solutions where both large and small companies can demonstrate solutions and help to develop future green urban solutions in Copenhagen. Therefore, it has initiated a formation that brings together the public sector, private sector, universities, non-governmental organizations, citizens, research centers, companies and system integrators.

While developing services related to garbage management, smart parking services and broadband access points for tourism, the lab is also working on innovative solutions for Copenhagen's problems such as 'Traffic Management' and 'Flood Management'.

Open City Data Platform

One of Copenhagen's most important smart city projects, this innovative platform was developed by Hitachi for Copenhagen. Its purpose is to ensure the sharing and trading of data between citizens, public institutions and private companies. It has great importance for being the first data exchange platform to provide public and private sector data from a single hand. It marks a major milestone for Copenhagen's goal of becoming fully carbon neutral by 2025.

Connecting to Copenhagen

This initiative is one of the best smart city projects in the world and was awarded in 2014. A strong plan has been created for a greener city with a high quality of life for its citizens and a more productive climate for the business community. Intelligent use of data from smartphones, the use of GPS in buses, and use of sensors in sewage and garbage collection systems are all helping Copenhagen's city managers to reduce air pollution and carbon emissions. The initiative comprises of 4 functions (Reference: Copenhagen Smart City):

- ✔ Flow of City Data
- ✔ Asset Tracking
- ✔ 'Sensor' Platform
- ✔ Data Connections

According to the Copenhagenize Index 2015, Copenhagen was named the most bicycle-friendly city in the world, taking the flag from Amsterdam in this area. In Copenhagen today, the number of bicycles exceeds the number of vehicles (World Economic Forum, 2016 News).

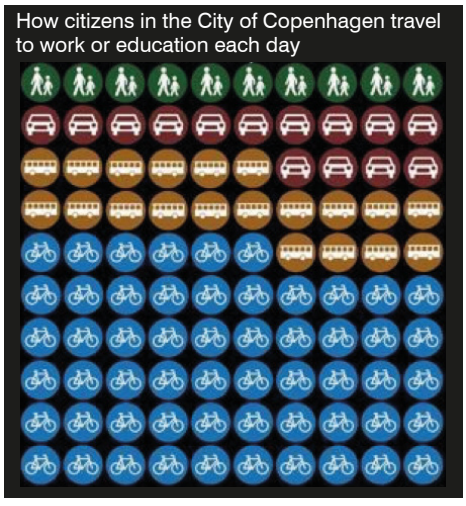
Each day around 265,000 cyclists tour around the city. 56% of the city's residents use bicycles, 20% use public transportation, and 14% use vehicles. As such, it has been one of the best examples of reducing traffic pollution.

Top 20 bike-friendly cities

Source: The Copenhagenize Index, 2015

1. Copenhagen
2. Amsterdam
3. Utrecht
4. Strasbourg
5. Eindhoven
6. Malmö
7. Nantes
8. Bordeaux
9. Antwerp
10. Seville
11. Barcelona
12. Berlin
13. Ljubljana
14. Buenos Aires
15. Dublin
16. Vienna
17. Paris
18. Minneapolis
19. Hamburg
20. Montreal

How citizens in the City of Copenhagen travel to work or education each day



Barcelona/SPAIN

Barcelona is a city that is the usual member of the smart city rankings in the world. In addition to all the activities and events in Barcelona, the city itself is a leader in adopting smart solutions for the needs of the city and making the most of local-international public and private partnerships.

Barcelona is implementing and scaling smart solutions ranging from smart mobility solutions (parking, micro mobility, public transport, etc.) to energy-efficient systems, from water loss solutions to mobile health and safety models, and from smart economy models to tourism and trade. The city has also been hosting the Smart City Expo World Congress, a worldwide event, organized since 2011. In the same year, the Barcelona City Council has prepared an information technology strategy with the aim of creating a global transformation plan to improve the overall functioning of the city management, create innovative use of emerging technologies in order to promote economic growth and improve the welfare of its citizens.

According to Josep-Ramon Ferrer, former director of Smart City and IT Programs in Barcelona and Vice-President of the Barcelona City Council, this strategy is both strongly aligned with the objectives of the European Union's Horizon 2020 Program, a more sustainable, smart and inclusive growth model for the future.

Barcelona's strategy is designed to respond to challenges related to the city's own organization, citizens' integration and challenges of private companies and local government while utilizing open data and replicable processes.

Based on Barcelona's smart city strategy and experience, Josep-Ramon Ferrer has put forward 10 key concepts that will improve and perhaps simplify the process of designing smart cities in the future:

1. Prepare for the most important problem of the 21st century: Rapid Urbanization
2. Accept technology as a facilitator, not a goal in itself
3. Incorporate the strategy into an ambitious, transformative city initiative
4. Define a long-term vision
5. Identify an action plan to respond to local challenges
6. Define the action plan with a holistic and integrated approach with other departments
7. Align strategy with current conditions and funding opportunities
8. Incorporate the citizens in the process
9. Build an efficient governance model that integrates all key stakeholders
10. Build alliances through industry partnerships and ecosystem stakeholders

Smart City Vision

Barcelona's long-term vision is to become a city that is self-sufficient, comprised of productive neighbourhoods at human speed, inside a hyper connected metropolis, with high speed and zero emissions.

Smart City Strategy

The city vision that has a transformative effect in Barcelona covers all areas. The Smart City Strategy provides a holistic approach and vision to the city's problems. With this holistic approach, 22 programs have been designed, covering all stakeholders with different initiatives, projects and strategies. According to the Barcelona administration, the sum of these 22 programs should form the basis of any future digital city.

Barcelona Smart City's 22 programs

1.Telecommunications Networks
2.Urban Platform
3.Smart Data
4.Smart Light
5.Energy Self-Sufficiency
6.Smart Water
7.Smart Mobility
8.Renaturation
9.Urban Transformation
10. Smart Furnishings
11.Urban Resilience
12.Citizenship
13.Open Government
14.Barcelona in the pocket
15.Smart Garbage Collection
16.Smart Regulation
17.Smart Innovation
18.Health and Social Services
19.Education
20.Smart Tourist Destination
21.Infrastructure and Logistics
22. Leisure and Culture

Best Practice #1: Governance

According to IDC's Understanding Smart City Transformation with Best Practices (2017), Barcelona is an exemplary case in governance. Barcelona's strong smart city vision and leadership is manifested by the restructuring of some of its local government units to align with the Smart City Vision. In July 2011, the mayor of Barcelona at the time, Xavier Trias, began implementing his vision of a smart city consisting of three basic parts:

- **Local Project:** Focus on better use of technology to improve citizens' lives.

- **International Vision:** To create a scalable platform for the repeatable implementation of Smart City projects.

- **Technology standardization:** Determining how technology standards (City Protocol) are specifically applied to cities.

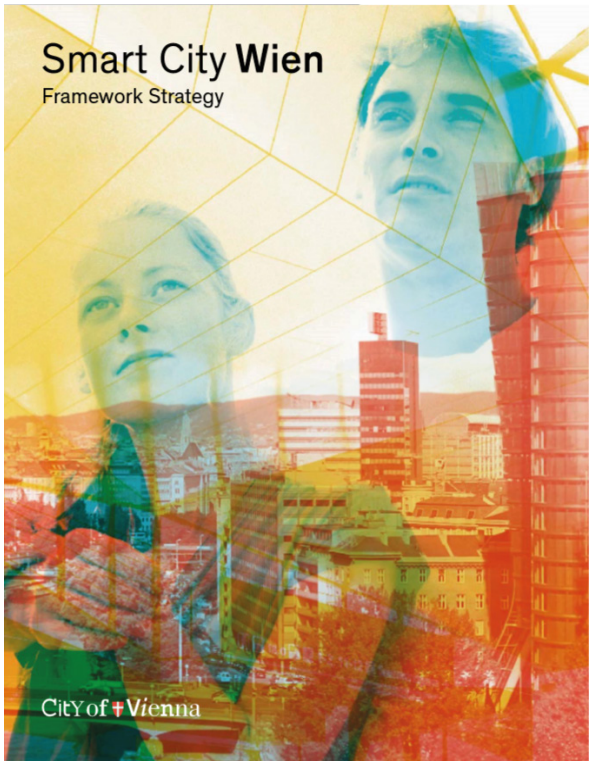
Trias reorganized the city council and established the Department of Urban Living Space (Smart City), a new structure combining the Departments of Planning, Environment, Information Technology and Infrastructure and Transport. The goal of this new organization was to eliminate traditional silos that impeded the delivery of the next generation of citizen services. For example, this new department coordinates all services on city streets, ranging from lighting to parking and street repairs. This change focuses restructuring of processes, responsibilities and communication channels as well as technology innovation.

Best Practice #2: Technology - Platform based architecture of sensors and devices (IoT)

According to the same study done by IDC, Barcelona has best practice in developing a platform-based architecture for the city's sensors and devices. Barcelona's Smart City platform, known as the Urban Platform, combines data from the open-source 'sentilo' network of sensors and actuators, the city's information systems and social networks to solve urban challenges.

NOTE: The population density of Barcelona is 723.8 people/km2 with a total population of 5,663,000

Vienna/AUSTRIA



Vienna, the capital of Austria, is the top city in the Smart City Index, where Roland Berger analyzes 153 cities in the world that has a comprehensive smart city strategy, complemented by a digital agenda. According to Roland Berger, the Austrian capital is in the first place with its integrated framework strategy and the innovative solutions it has developed for mobility, environment, education, health and public administration together with its system used for monitoring the projects.

Most other cities provide monitoring of such projects, but Vienna not only evaluates projects, but also follows progress towards long-term goals, such as reduction of emissions.

The Smart City Agency supports Vienna's efforts to achieve the goals defined in the Smart City Vienna framework strategy adopted in 2014. The main objective for 2050 is to ensure the best quality of life for everyone living in Vienna and to make the best use of resources. Vienna believes that this goal will be achieved through comprehensive social and technological innovations.

Smart City Vision

According to Smart City Vienna Vision 2050, Vienna aims to be a livable city for children, young people, women and men, elderly persons, families, entrepreneurs, artists, researchers, persons with special needs – in short: a city that is open to all, no matter how long they have been living here.

With its Smart City Vision 2050, Road Map 2020 and Action Plan 2012-2015, Vienna is among the leading cities of smart city transformation. The city administration enhances its visionary leadership by following up the work that has been initiated. In addition to this, architects from Vienna work as stakeholders in matters such as reducing carbon consumption in buildings, facilitating urban planning and transportation, in cooperation with the municipality.

Smart City Strategy

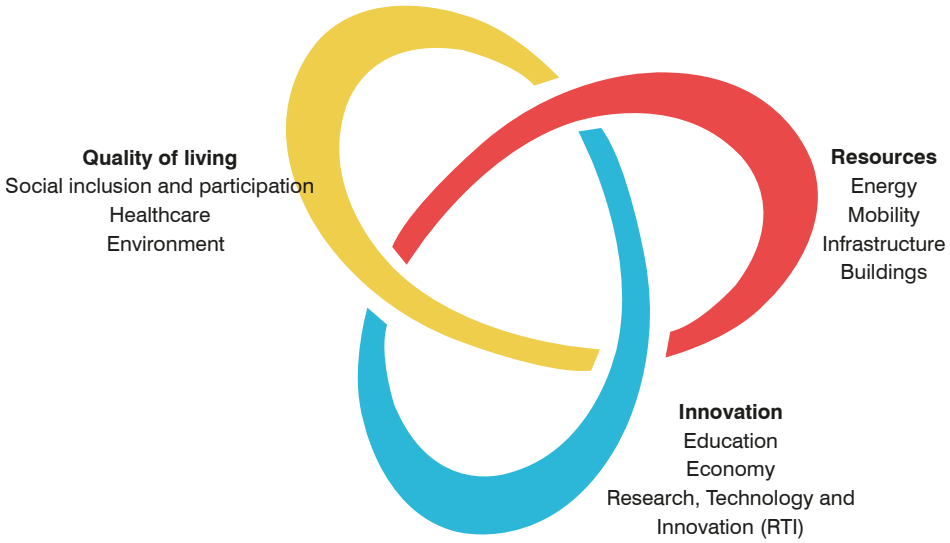
While most cities still do not have an integrated smart city strategy, successful smart cities implement their strategies through a central decision-making organization and pilot projects. What is interesting about Vienna's performance is that the city has not only provided integrated solutions for mobility and the environment, an improved e-health approach and open public data, but also developed a standard monitoring system for all smart city projects. Everything is coordinated by the central Smart City Agency, a unit that brings together the necessary technical expertise and supports the links between city administration, researchers, businesses and industry.

The Smart City Vienna strategy includes three core and interconnected elements: resource conservation, quality of living and innovation. The strategy is based on the strengths of Vienna and includes externally determined binding objectives.

Smart City Vienna defines the development of a city that prioritizes and connects energy, mobility, buildings and infrastructure, and includes the following:

- Radical measures for resources protection
- Development and efficient use of innovations / new technologies
- A socially balanced and high quality of life

According to Smart City Vienna 2050, providing an optimum quality of life with the highest possible level of resource efficiency for all citizens is the main goal, and this can only be achieved through comprehensive innovations.

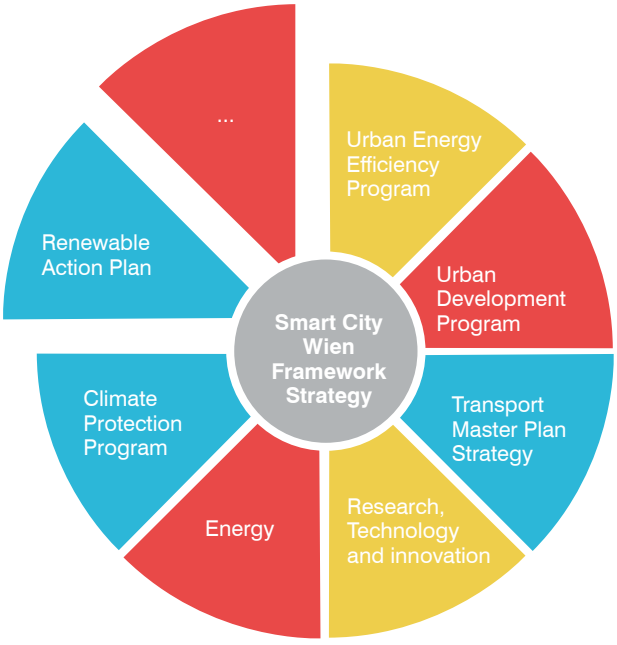


Principles of Smart City Vienna

The Smart City Vienna is primarily committed to protecting its resources. The development and modification of processes in the energy, mobility, infrastructure and building management sectors aim to significantly reduce CO2 emissions by 2050. In order to achieve this goal, it is essential that the existing energy is used much more efficiently. Highlighting the ways and means by which Vienna can contribute to achieving its major European climate and energy goals is one of the key elements of the Vienna Smart City framework strategy (for 2020, 2030 and 2050).

Another feature of the Smart City Vienna is the use of new action and coordination mechanisms in urban policy and administration with a holistic approach. The relations of the Smart City Vienna framework strategy with the city's current and future strategies are given as follows:

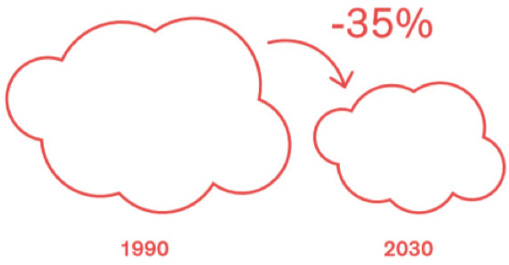
Smart City Vienna Framework Strategy sets out ambitious targets grouped under resources, innovation and quality of living for a socially and environmentally acceptable development and for maintaining the city's competitiveness both nationally and globally. Here are some of these goals for example:

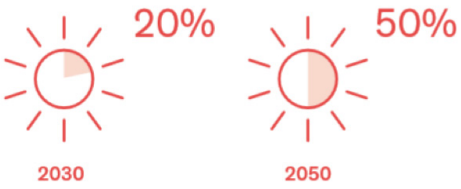


Resources:

Objective: Reducing per-capita greenhouse gas emissions in Vienna by 80% by 2050 (as compared to 1990)

Intermediate objective: Reduction of per-capita CO2 emissions in Vienna by at least 35% until 2030 (compared to 1990)





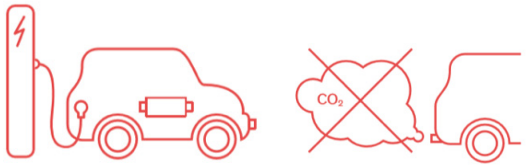
Some other goals:
20% of Vienna's gross energy consumption in 2030 and 50% in 2050 will be provided from renewable sources.

Strengthening of CO2-free modes (walking and cycling), maintenance of the high share of public transport and decrease of motorized individual traffic (MIT) in the city to 20% by 2025, to 15% by 2030, and to markedly less than 15% by 2050.

By 2030, the largest possible share of MIT is to be shifted to public transport and non-motorized types of traffic or should make use of new propulsion technologies (e.g. electric-powered vehicles).

By 2050, all motorized individual traffic within the municipal boundaries is to make do without conventional propulsion technologies.

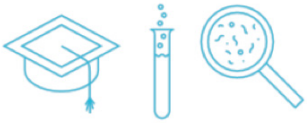
By 2030, commercial traffic originating and terminating within the municipal boundaries is to be largely CO2-free.



Innovation:

Objective: In 2050, Vienna is an innovation leader due to top-end research, a strong economy and education.

Some other goals: In 2050, Vienna is one of the five biggest European research and innovation hubs.



10,000 persons annually set up an enterprise in Vienna.
The direct investment flows from and to Vienna have doubled as compared to 2013.

In 2030, Vienna is a magnet for international top researchers and students.

Quality of living:

Objective: Vienna in 2050 is the city with the highest quality of living and life satisfaction in Europe.

Some other goals: All people in Vienna enjoy good neighborly and safe life conditions irrespective of their background, physical and psychological condition, sexual orientation and gender identity. Vienna is a city of diversity that is expressed to the fullest in all areas of life.

Women are involved in planning, decision-making and implementation processes in keeping with their share in the total population.

Strengthening of health-promoting conditions of life and health literacy of all population groups.

The inhabitants of Smart City Wien are happy with the quantity and quality of their leisure time.

NOTE: The population density of Vienna is 5,736 people/km2 and it has a population of 1,868,000.

Town Twinning Action between
Turkey and EU Grant Scheme Program

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http://smartroas.com/

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