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REnaissance of PLaces with Intelligent Citizens And TEchnology

REPLICATE

EXPLOITABLE RESULTS

INDEX

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INTRODUCTION

The European project, Renaissance of Places with Innovative Citizenship And TEchnology (REPLICATE) is framed in the H2020 research and innovation programme, energy challenge. The objective has been the transition process towards the development of Smart Cities in the fields of energy efficiency, sustainable mobility and ICTs and Infrastructures, accelerating the rollout of innovative technologies and improving citizens' quality of life. The project has been coordinated by Fomento de San Sebastian and implemented in 3 lighthouse cities, Donostia / San Sebastián, Florence and Bristol.

The public-private cooperation in the project has promoted the development and validation of different kind of exploitable results un 4 areas of knowledge: energy efficiency, ICT and smart infrastructures, sustainable mobility and citizens engagement.

In the next pages the consortium present the principal exploitable results of the projects, the characteristics of these results and the partner responsible of the development and responsible for a future exploitation.

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ENERGY EFFICIENCY	Donostia / San Sebastian	Buildinf Retrofitting
	Donostia / San Sebastian	District heting DH system
	Bristol	Bristol district heating
	Bristol	Retrofit meassures
	Florence	GOALGREEN APP
SUSTAINABLE MOBILITY	Donostia / San Sebastian	Electric buses
	Donostia / San Sebastian	Deployment of electric vehicles in Donostia / San Sebastian
	Bristol	Wego Bristol
	Bristol	E-Bike monitoring system
	Bristol	Electric Car Club
	Bristol	Travel west journey planner
	Bristol	Parkus: Samrt parking APP
	Florence	FASTBOOKING APP
ICT & SMART INFRASTRUCTURES	Donostia / San Sebastian	Hich speed wireless broadband network
	Donostia / San Sebastian	Smart public lighting and related ip services
	Florence	SMART (Grid, Energy and Mobility)
	Florence	SMARTBENCH
	Florence	TIM CITY LINK
	Florence	SMART WATERING
	Florence	CIBERSECURITY AND GDPR COMPLIANCY
	Florence	SMART CITY PLATFORM
	Florence	SMART LIGHTING
CITIZENS	Donostia / San Sebastian	Citizen Participation Platform
	Donostia / San Sebastian	Operational dashboard
	Bristol	Bristol approach to citizen sensing

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DONOSTIA / SAN SEBASTIÁN REPLICATE EXPLOITABLE RESULTS

- BUILDING RETROFITING
- DISTRICT HEATING (DH) SYSTEM
- ELECTRIC BUSES
- DEPLOYMENT OF ELECTRIC VEHICLES IN DONOSTIA / SAN SEBASTIAN
- HIGH SPEED WIRELESS BROADBAND NETWORK
- SMART PUBLIC LIGHTING AND RELATED IP SERVICES
- CITIZEN PARTICIPATION PLATFORM
- OPERATIONAL DASHBOARD

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SAN SEBASTIAN.- 1. BUILDING RETROFITTING

PARTNER	GIROA, S.A.U.
TECHNICAL ASSESSMENT	
Result description	The Building Retrofitting intervention implemented in the lighthouse city of Donostia-San Sebastian consisting of the retrofitting of 156 private dwellings and 34 commercial premises distributed along 10 doorways, totalling 18.350m2. The project included: façade retrofitting (thermal isolating and windows metalwork), roof and basements. The intervention also included the general connection of the buildings to the District Heating system and all the individual and common installations within the buildings.
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	**ENVIRONMENTAL BENEFITS** • Energy efficiency improvement and reduction of GEH emissions thanks to the envelope retrofitting • Noise reduction by supressing individual gas boilers **ECONOMIC BENEFITS** • Increase in the dwelling value • A better isolation meaning more confort and less energy consumption. • Less expensive than gas boilers. Reduction of maintenance costs. **ADVANTAGES FOR USERS** • The heat demand is reduced or, if not, at equal demand, the comfort conditions are greater. • Homogeneity of facades - better integration into the district and its new constructed buildings. **BENEFITS FOR DEVELOPERS** • The demand for work for architects and builders increases. One of the relevant conclusions has been the increase in comfort that the neighbours have experienced in all the blocks 11-16, 22-23 and 31-32 due to the connection to the District Heating and the retrofitting of the building envelopes. The facades retrofitting has decreased the energy losses caused by the heat that was lost through the windows, shutters and the facade. By increasing the insulation of the facade, renewing the windows, and improving the closures these losses have been significantly reduced to almost zero. Monitoring first analysis has shown great decrease in both energy consumption and greenhouse gases emissions. Energy consumption has decreased almost 35% and because of this energy bills decreased an average of 12%.

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	Greenhouse gases emissions decreased both for the energy consumption and the biomass fuel used in the district heating. Greenhouse emissions have decreased in almost 100 tn, 45 of them are due to the retrofitting and the rest of them due to biomass fuel. Regarding the energy certifications of the dwellings, all the buildings have obtained the A energy certification. In addition, all the improvements produced energy savings in most of the dwellings in Txomin – Enea neighborhood. By having less loss, it is not necessary to consume the same energy that was used in the reference situation to reach the same level of comfort or even improve it. Another important point for the reduction of energy saving and improvement of comfort has been that the connection to the district heating implies to be generating heat energy in a more efficient way and with renewable origin. The district heating network generates energy much more efficiently than the boilers previously installed in each of the buildings, which were old and obsolete. The district heating network is fuelled by biomass.
Submitted patents	Not stated
Business Model	**BUSINESS MODEL** BM is based on a public-private collaboration in which GIROA provides to Fomento San Sebastian operation and maintenance regarding to the District Heating system for the retroffited buildings. Giroa as an Energy Services Company (ESCO) will try to recover the investment made, applying the know-how in other districts/communities (replication). **HIRING PROCESS** Several construction companies and architect firms in the area were asked to submit bids and their proposals were evaluated in different areas: human resources, performance guarantee, financial, etc. The bid that best met the criteria was selected for the work. Priority was given to contract local companies to promote the local economy.
Availability of prototypes/products of research	Not stated
IP position (define and mention if clear or not)	Not stated
EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	This intervention is the first retrofitting in a district level that has been done in San Sebastian, and it can be seen an innovative project for the city and the citizens. It is an

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	important step, as the retrofitting at district level could be replicated in other parts of the city.
Synergies with other results	The result is linked with the installation of the District Heating under Replicate framework.
Potential audience / interested stakeholders	Municipalities, neighborhoods
Social impact	The neighbourhood dwellings increased the value thanks to the retrofitting intervention. This is not only generating a surplus in economic terms of the housing value, but also the heat network connexions and the improvements with regard to accessibility is generating an increase in the quality of life and comfort of its inhabitants. By implementing the retrofitting the dwellings are homogenized, generating equality and a good integration inside the whole neighbourhood.
Keywords	Energy efficiency, Smart city, Clean Energy, Retrofitting,

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SAN SEBASTIAN.- 2. DISTRICT HEATING (DH) SYSTEM

PARTNER	FOMENTO DE SAN SEBASTIÁN, S.A.
TECHNICAL ASSESSMENT	
Result description	Distributing heat for Domestic Hot Water and heating generated in a centralized location through a system of insulated pipes. The District Heating (DH) project encompasses the implementation of a district heating system for the area of "Txomin Enea" (160,000m2, which will become a new residential area), supplying mainly homes in this area and including other public services. The district heating scheme has been sized to meet the needs of 1458 dwellings, including the connection of 156 retrofitted houses. • 2018 Service to 182 dwellings • 2019 Service to 611 dwellings • 2020 Service to 773 dwellings Next delivery dates expected: 2022:262 dwellings more, total 1035 From 2024, next phase of urban development is planned and it will allow reaching 1458 homes in service The framework for this project spans the development of the DH building, installation, setup, operation and maintenance. It will guarantee continuity and quality of the thermal energy supply to meet the heating and domestic hot water (DHW) demand of 1458 homes. For this purpose, the installations are composed of two biomass boilers (1400 kW) and two gas boilers (2300 kW). The hypotheses and calculations made on the proposed centralized system for Txomin neighborhood approximate that 97.2% of the energy demand for heating and domestic hot water (DHW) will be produced by biomass-based heating technology. In 2019, for an occupation of 611 homes, the demand was covered with 83% of biomass-energy production. The gas system mainly covers the demand peaks and heat generation during the maintenance of the biomass system. For decentralized boiler systems, efficiency is usually around 55%. The project will deliver better results in terms of performance, energy efficiency, and greenhouse gas emissions than a decentralized boiler system.
Main achievements /expected impacts of the research: why it would be of interest for the	ENVIRONMENTAL BENEFITS • The use of renewable energy (biomass). • Thanks to its superior performance, lower primary energy consumption.

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public. (Added and unique value of the project)	• Reduction of CO2 emissions **ECONOMIC BENEFITS** • Lower spending on preventive maintenance (carried out by specialist staff) • Lower spending on primary energy procurement (used to generate thermal energy) • Fewer incidents and therefore lower spending on corrective maintenance **ADVANTAGES FOR USERS** • 15% savings on the price of the thermal energy consumed. • Non-individual maintenance actions for each building • 365x24 availability and greater guarantee and quality of service **BENEFITS FOR DEVELOPERS** • Reduction of investment required in each building. • Removes the need for each home to have its own central heating system and gas mains connection. • Avoids the need to invest in the building's gas network. • Better use of floor space in each building
Submitted patents	Not stated
Business Model	**BUSINESS MODEL** BM is based on a public-private collaboration in which Fomento de San Sebastián is the owner and responsible of the service provided by the District Heating system, and the contracted company rents the installations from Fomento, and operates and maintains the service. The most important aspects of this collaborative model are that Fomento, within the framework of public management, is responsible for setting the rates to be paid by users, and the contractor participates in the initial investment by making an advance payment for rent. After that, and later during its management that lasts for several years, the contractor will only charge for the heat actually produced. **HIRING PROCESS** The process followed to select the company that operates the DH system consisted of a public bidding process called competitive dialogue. The bidding process contemplated the discussion of potential technical solutions to build, between Fomento and the companies interested in managing the operation of the District Heating. After this discussion period, the definition of a "Solutions Document" is reached, which includes all the technical and management requirements for the construction, start-up and management of the future District Heating.

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	The process ended with a technical and economic offer on requirements of the "Solution Document" by the participating companies.
Availability of prototypes/products of research	Not stated
IP position (define and mention if clear or not)	Not stated
EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	The District Heating system that has finally been put into operation is largely innovative because of the business model implemented. In this regard, it is highlighted that a public agent owns the District Heating, and consequently the policies that will govern the operation of the systems will be public. In fact, the DH development project is also highly innovative for the city and region, as it is the first publicly owned DH system in the Basque Country.
Synergies with other results	This result is linked with the buildings retrofitted and with the Demand Side Platform under Replicate framework
Potential audience / interested stakeholders	Municipalities, neighborhoods, EVE
Social impact	Impact and environmental improvement of the proposed system thanks to two biomass boilers, as well as generating employment and business growth in the renewable energy sector
Keywords	Heating, energy, insulated pipes, biomass, renewable energy

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SAN SEBASTIAN.- 3. ELECTRIC BUSES

PARTNER	DBUS (Compañía del Tranvía de San Sebastián)
Compañía del Tranvía de San Sebastián is the company managing public urban transport in the city of San Sebastian under the trade name Dbus. The Company was founded in 1886.	
TECHNICAL ASSESSMENT	
Result description	Within the framework of REPLICATE project, in July 2016 DBUS implemented two 100% electric buses in line 26-Amara-Martutene, that connects the Urumea Riverside district with the city Centre and, from that moment, the monitoring work and adjustments have been carried out. Apart from the 2 electric buses acquired in REPLICATE, the bus line 26 operates with another electric bus and another 3 hybrid buses (out of Replicate financing). The assignment of different bus models in the same line permits to test and compare the performance of the different bus typologies. Once the 2 new full electric vehicles were implemented, DBUS has monitored the results to adapt them to the necessities and try to increase the electric daily range of the buses in coordination with the manufacturer, Irizar (company located near San Sebastian) Along these lines, as a result of this monitoring, in Autumn-Winter 2017 DBUS decided to make some adjustments in the buses and also tailored a new assignment so the e-buses operated also in other lines. This assignment was designed to guarantee the complete service of the e-buses taking into account the recharging time of the batteries. The line 26 is one of the most demanding in the city due to its length (200 km per day approximately). The experience of the e-bus in this line has been very demanding and has led to improvements thanks to the experience acquired and lessons learnt. The idea was to meet the objectives and reduce the consumption of the auxiliary systems of the bus, in order to increase the electric daily autonomy of the buses. From November 2019 to February 2020 DBUS replaced the batteries in coordination with the manufacturer. As current batteries are more advanced than those developed in 2016, this action allows a better performance of the 100% electric buses. The new batteries achieve 210km per day more easily returning to the depot with a 15-20% of remaining battery-charge. This makes possible to achieve 210km per day, during 5 consecutive days, before the replacement of the batteries this was not possible, the improvement in the technology has improved the performance of the buses.

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	Furthermore, the depot has also been adapted to be able to use them with the installation of the 2 charging station for the 2 new full electric buses and drivers have received special training in the use of the new electric and hybrid buses.
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	The experience of the electric buses in line 26 is one of the toughest and most demanding experience of an electric bus has ever faced in the world. REPLICATE experience has encouraged San Sebastian to continue trying and analysing electric buses´ performance. Several cities from different countries are contacting DBUS asking for the performance and monitoring of DBUS electric buses. **ENVIRONMENTAL BENEFITS:** • Since the arrival of the 2 full-electric buses in REPLICATE project (July 2016), the operation of the 3 full-electric buses in DBUS has avoided the emission of 606 t CO2. • Thanks to the new assignment system, combining the use of the three electric buses and hybrid buses in lines 26 and 21, a total reduction of 240t CO2/year is expected. **OTHER BENEFITS:** • The noise reduction has improved the quality of life of the citizens. • Noise reduction will also help decrease some health effect costs and revalue the real estate in the city. • According to user satisfaction surveys, users value positively the effort from DBUS to be more respectful with the environment.
Submitted patents	Not stated
Business Model	DBUS purchased the two electric buses through a call for tender that was awarded to the manufacturer Irizar. Since then DBUS and the manufacturer have collaborated closely to improve the performance and make adjustments. After this experience, DBUS has launched several pilot projects to test clean buses of different technologies and manufacturers.
Availability of prototypes/products of research	Not stated
IP position (define and mention if clear or not)	Not stated
EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	The experience with 12 meters 100% electric buses has been the first step in the implementation of electric vehicles and electric bus lines in the city of San Sebastian. The monitorization confirmed first that the Irizar i2e bus was perfectly capable of dealing with bus lines of around 150 km (like line 21 of DBUS) and after the replacement of batteries

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	the bus is capable of achieving 210 km during 5 consecutive days
Synergies with other results	REPLICATE experience has encouraged DBUS to continue trying and analyzing electric buses´ behaviour. During the last years DBUS has tested A 100% electric articulated bus (also produced by Irizar manufacturer), a hybrid-electric bus manufactured by Vectia (CAF Group) and a Solaris 100% electric bus (CAF Group). The latter bus was also tested in line 26, giving service to the Urumea Riverside.
Potential audience / interested stakeholders	Municipalities, bus operators, manufacturers, citizens
Social impact	Emissions and noise reduction and improvement in the quality of life of people living or working in San Sebastian.
Keywords	100% electric buses, 0 emissions, low emissions, sustainable public transport, full electric bus line, electric batteries

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SAN SEBASTIAN.- 4. DEPLOYMENT OF ELECTRIC VEHICLES IN DONOSTIA/SAN SEBASTIAN

PARTNER	Donostia / San Sebastian Municipality. Mobility Department.
TECHNICAL ASSESSMENT	
Result description	12 electric vehicles have been acquired in the Replicate project framework. The City Council has acquired these vehicles with the purpose of renewing its municipal fleet (the municipal fleet includes 180 vehicles approximately, of which 29 are hybrid), but also to serve as an example for citizens, that electric mobility is a real alternative to the most polluting modes of transport in the city. The framework of the project matches with the commitment of the city to increase the quality of life of its citizens and related to transport, to reduce internally the use of private vehicles, recovering gradually the public space. Despite having a clear idea about reducing the presence of private vehicle in the city, the municipaliy is aware that there are groups that need the vehicle to develop their activity in the city, such as urban services, urban logistics or taxi service, among others. And it is in these groups where city council has led several actions with the aim of encouraging the transfer of their fleets to clean vehicles. In addition, the administration has clearly influenced on groups, private owners, that have an intensive use of mobility in the city to take a step towards electromobility, offering institutional support and complementary services to help them in the transition process. As a result, today there are 7 electric taxis in the city (there are 308 taxis in the city, so EV represent 2.23% of the fleet whereas Hybrid cars represent 22%) and with prospects that this number will gradually increase.
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	**ENVIRONMENTAL BENEFITS** • Reduction of GHG emissions (Reduction of 18 tn/CO2 year-4 municipal EV and e-motorbikes; Reduction of 45 tn/CO2 year-7 taxis) • Reduction of overall noise levels caused by transport. • Improvement in quality of life in the city • Health savings **ECONOMIC BENEFITS** • Cheaper to run • Cheaper to maintain • Savings arising from campaigns aimed at promoting EV (rebates on municipal taxes, exemption from payment of tolls, car parks .. etc.)
Submitted patents	Not stated

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Business Model	**BUSINESS MODEL** The purchase of the vehicles has been carried out through a purchase ran by a public tender, in which the vehicles have been purchased directly. The public employees for whom the vehicles are intended received training sessions in order to familiarise them with this type of vehicle. The maintenance and repair operations of the vehicles are mostly carried out by the car/motorbike manufacturer unless it can be performed by the municipal fleet management section.
Availability of prototypes/products of research	Not stated
IP position (define and mention if clear or not)	Not stated
EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	Despite the fact that electromobility is a technology that is still under development, the use of electric vehicles in groups with high demand for mobility in the city, such as those that have been tested within the framework of the project, have demonstrated its validity for the objectives that municipality has set itself to improve the quality of life of city's inhabitants.
Synergies with other results	This result is linked with municipality´s reference documents in which sustainable mobility and energy play an important role in the long-term vision on the city, such as the sustainable urban mobility plan (SUMP) and sustainable energy action plan (SEAP).
Potential audience / interested stakeholders	Municipalities, citizenship, target groups with high demand for mobility in the city.
Social impact	The introduction of new municipal fleets of electric vehicles has had a positive influence on the public and other bodies, helping them to become aware of the suitability of clean vehicles for their activity.
Keywords	Electromobility, clean vehicles, renewable energy, GHG (Greenhouse Gas) emissions, noise reduction.

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SAN SEBASTIAN.- 5. HIGH SPEED WIRELESS BROADBAND NETWORK

PARTNER	SISTELEC
TECHNICAL ASSESSMENT	
Result description	A high-speed wireless communication network throughout the Urumea Riverside District has been deployed. This network, managed by Fomento de San Sebastián, increases the network capacity and security, supporting the connectivity of the district with the entire city of San Sebastián
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	**ADVANTAGES FOR MUNICIPALITIES** The main advantage for the Municipality is to have a wireless broadband network in property and not depend on commercial operators. **ADVANTAGES FOR MUNICIPALITY USERS** • Redundant network to provide services to the citizens. Both wired and wireless networks collaborate and complement each other. • Increased bandwidth for users. • Increased coverage. • Availability of services in places without any other way of communication. Sometimes because the orography or because it is very complicated to install a wired connection. **BENEFITS FOR DEVELOPERS** • Easy to commission new subscribers with connectivity requirements throughout the city. **ENVIRONMENTAL BENEFITS** • Reduces the need of new civil works in the city to deploy connectivity **ECONOMIC BENEFITS** • Lower spending on new wired access networks to subscribers • Reduces on-site maintenance works as the network is being monitored and managed remotely
Submitted patents	NOT APPLICABLE
Business Model	The deployed network is an infrastructure that the municipality operates in self-provision, ie the ultimate goal is not to conduct business as the network capabilities are not resold as a service
Availability of prototypes/products of research	NOT APPLICABLE
IP position (define and mention if clear or not)	NOT APPLICABLE

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EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	During the 3 years of implementation and almost 2 years of monitoring, the network has proven to be a robust platform for interconnecting different municipal departments without service outages. The operation of the network has been successful due to a combination of a 24x7 permanent monitoring platform along with a proven technology based robust devices.
Synergies with other results	The implemented network can give connectivity to other implementations of the REPLICATE project such as mobility, energy efficiency and IT fields. The solution proposed in San Sebastian is highly replicable also in Bristol, Florence, and other European cities, taking advantage of elevated locations that provide strategic points to generate total coverage in the city
Potential audience / interested stakeholders	The main municipal departments: • IT • Water • Firefighters • Police • Gardens • Buses • Municipal ISP Etc.
Social impact	The communication network deployed is the foundation over which several application and services can rely on, improving the services given to the citizens. Thanks to the networks deployed the several districts of the city count on an advanced infrastructure that gives support to the connectivity for the development of services an so the districts of the city are integrated in regards to the connectivity.
Keywords	wimax wifi wirelessbroadband fixedwireless wireless cambiumnetworks ptp ptmp networkthroughput microwave networkmanagement ruralbroadband

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SAN SEBASTIAN.- 6. SMART PUBLIC LIGHTING AND RELATED IP SERVICES

PARTNER	LEYCOLAN
TECHNICAL ASSESSMENT	
Result description	A high-speed wireless communication network throughout the Urumea Riverside District has been deployed. This network, managed by Fomento de San Sebastián, increases the network capacity and security, supporting the connectivity of the district with the entire city of San Sebastián.
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	**ADVANTAGES FOR MUNICIPALITIES** The main advantage for the Municipality is to have a wireless broadband network in property and not depend on commercial operators. **ADVANTAGES FOR MUNICIPALITY USERS** Redundant network to provide services to the citizens. Both wired and wireless networks collaborate and complement each other. Increased bandwidth for users. Increased coverage. Availability of services in places without any other way of communication. Sometimes because the orography or because it is very complicated to install a wired connection. **BENEFITS FOR DEVELOPERS** • Easy to commission new subscribers with connectivity requirements throughout the city. **ENVIRONMENTAL BENEFITS** • Reduces the need of new civil works in the city to deploy connectivity. **ECONOMIC BENEFITS** • -Lower spending on new wired access networks to subscribers • -Reduces on-site maintenance works as the network is being monitored and managed remotely
Submitted patents	NOT APPLICABLE
Business Model	The deployed network is an infrastructure that the municipality operates in self-provision, ie the ultimate goal is not to conduct business as the network capabilities are not resold as a service
Availability of prototypes/products of research	NOT APPLICABLE
IP position (define and mention if clear or not)	NOT APPLICABLE

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SAN SEBASTIAN.- 7. CITIZEN PARTICIPATION PLATFORM

PARTNER	EUROHELP CONSULTING
TECHNICAL ASSESSMENT	
Result description	We live in the era of open governments where citizens try to contribute by launching proposals to their municipalities about their point of view when it comes to improving their city. This type of process requires a technology that make it accessible: easy to use and available from anywhere and any kind of device. This will give any citizen or cluster thepossibility to be heard. At the same time, these types of platforms place citizens at the center of municipal policy, allowing them to launch proposals aimed at improving their place of residence and offering them an overview of how their municipalities manage their budgets. Transparency and citizen participation are key to citizen involvement.
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	**ECONOMIC BENEFITS:** • An investment by city councils in citizen participation platforms, enabling citizens the possibility of making proposals and voting in participatory processes, will allow the municipal policies to be shaped to the taste of citizens, an engagement that will make the city a more attractive place to live and to spend time in. These platforms encourage different social groups to carry out their activities within the city, causing the appearance of recreational, cultural or commercial exhibition centers. Enabling, in this way, that citizens spend more time within the city, having the establishments located in it more opportunities to offer their services, which will cause a more prosperous local trade and greater tax collection for municipalities. • The budget approach based on citizen needs increases the possibility that the new facilities or services created will be used by the population and will not end up being abandoned over time due to disuse. • Citizen participation in the budget allocation for different actions, in addition to favoring transparency and accountability, empowers citizens in the transformation of their city. **ENVIROMENTAL BENEFITS:** • The promotion of local activity will reduce the number of transfers between cities and communities, bringing with it a decrease in road traffic and the pollution it generates- **ADVANTAGES FOR USERS**

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	• A digital platform for citizen participation offers a convenient and fast way to participate and comment on proposals for the city council. This is because it prevents people from having to go to an administrative center owned by the city council and fill out paper forms. On the other hand, with a platform for city participation, this is ubiquitous, and can be done from their homes or mobile devices.
Submitted patents	Not stated
Business Model	The citizen participation platform has been designed in a way that is easily configurable, being able to add and monitor new participatory processes. It has been designed with the aim of being able to be replicated in other Public Administrations and, fortunately, it has been possible to carry it out. The Citizen participation Platform has been deployed in San Sebastian in the Replicate project framework. This solution has been replicated in 2 administrations at regional level.
Availability of prototypes/products of research	Not stated
IP position (define and mention if clear or not)	Not stated
EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	The replicability of the solution has been essential to implement the platform for citizen participation in new clients. But, in addition, it must be taken into account that each scenario requires certain functional and even technical adjustments, so when it comes to marketing, a margin must be reserved to tackle these tasks. The municipalities that chose to deploy a citizen participation platform quickly found a good reception from the different sectors of their population, improving the image of the entity through transparency and citizen involvement. With the adoption of this service, a series of proposals arose from the different budget items open to public opinion, which demonstrates the interest of citizens to be more active participants in the development of their urban environment.
Synergies with other results	Citizen participation is one of the elements of an Open Government, as is transparency and accountability. In this sense, the development of the Open Data and Linked Data platforms, also addressed during the project, are ideal complements to publish open data and completely interoperable and accessible information from citizens and external and / or automated agents.
Potential audience / interested stakeholders	Municipalities, Governments, Medium-big organizations

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Social impact	This type of solution favors the empowerment of citizens when they find a service where their proposals are heard and valued. This also helps cities growing to meet the needs of their citizens and thus improve the quality of life and wellbeing.
Keywords	Open goverment, smart goverment, engagement, open information, participation
Main exploitation conclusions	The replicability of the solution has been essential to implement the platform for citizen participation in new clients. But, in addition, it must be taken into account that each scenario requires certain functional and even technical adjustments, so when it comes to marketing, a margin must be reserved to tackle these tasks. The municipalities that chose to deploy a citizen participation platform quickly found a good reception from the different sectors of their population, improving the image of the entity through transparency and citizen involvement. With the adoption of this service, a series of proposals arose from the different budget items open to public opinion, which demonstrates the interest of citizens to be more active participants in the development of their urban environment.

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SAN SEBASTIAN.- 8. OPERATIONAL DASHBOARD

PARTNER	EUROHELP CONSULTING
TECHNICAL ASSESSMENT	
Result description	We live in the Information Age, where more and more devices, sensors and machines are connected and accessible. However, while capturing data is essential, it is not enough; it is necessary to process the data in order to expose the most appropriate indicators and, at the same time, make them also easily interpretable. We must rely on a simple and intuitive interface that fosters informed decision making operational dashboards. Operational dashboards are a key feature of a smart city as they provide a comprehensive snapshot of the performance of the city. It can be accessed by decision-makers but also opened to citizenship, allowing a better engagement. As this system is capable of adapting to different types of devices, this gives the option of being used on large screens, laptops, tablets, or even phones.
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	**ECONOMIC BENEFITS:** • Better understand of the city´s environment could help the municipalitiy's policy makers to choose wisely about their urban strategy **ENVIROMENTAL BENEFITS:** • Thanks to the KPI extracted from raw data and illustrated in the dashboards, it can help developing a better environmental awareness. Fostering close to zero carbon footprints and engaging citizenship in sustainability behaviours. • A digital dashboard, always available from anywhere with an Internet connection, avoids wasting office resources on daily printed reports to give decision makers an overview of the situation **ADVANTAGES FOR USERS** • Deep knowledge of how the heart of the city beats • Real time data allos almost real time recalculated KPIs • Highly customizable, allowing to check those KPIs that are more interesting for each user. • Easy to integrate different types of data sources, thus allowing for new KPIs
Submitted patents	Not stated
Business Model	This operational dashboard has been successfully replicated in different clients, adapting the software to the needs of each one.

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	The most important feature of this type of development is its ability to obtain data from different sources and combine it in real time to provide the end user with an overview of different KPIs of their city or business. On the other hand, this adaptability is the main point that allows the project to be deployed in all situations in which an easy way to access and visualize information is needed.
Availability of prototypes/products of research	Not stated
IP position (define and mention if clear or not)	Not stated
EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	Making the dashboard's widgets fully customizable allowed the replication of the solution. Not being attached to certain data domain and open to illustrate KPIs from different areas: energy, communications, demography… The municipalities that finally put the dashboard up and running found a way to achieve both a general and a concrete understanding of their cities and a new approach when trying to find the areas where they have room for improvement. On the other hand, the ability to add new data sources quickly gives them good adaptability capabilities to any dataset they want to assess.
Synergies with other results	A better understand of the city´s current and future neccesities will help the team of the cityhall to plan the kind of improvements that the city needs, and also important, they will be able to evaluate the outcomes of the new policies applied
Potential audience / interested stakeholders	Municipalities, Governments and any kind of Industry
Social impact	If open to public, it can increase transparency of the city, allowing a better citizen engagement and increasing awareness about the impact of and in the city of the different policies carried out in any field: movility, energy, ict…
Keywords	Dashboard, smart cities, open information

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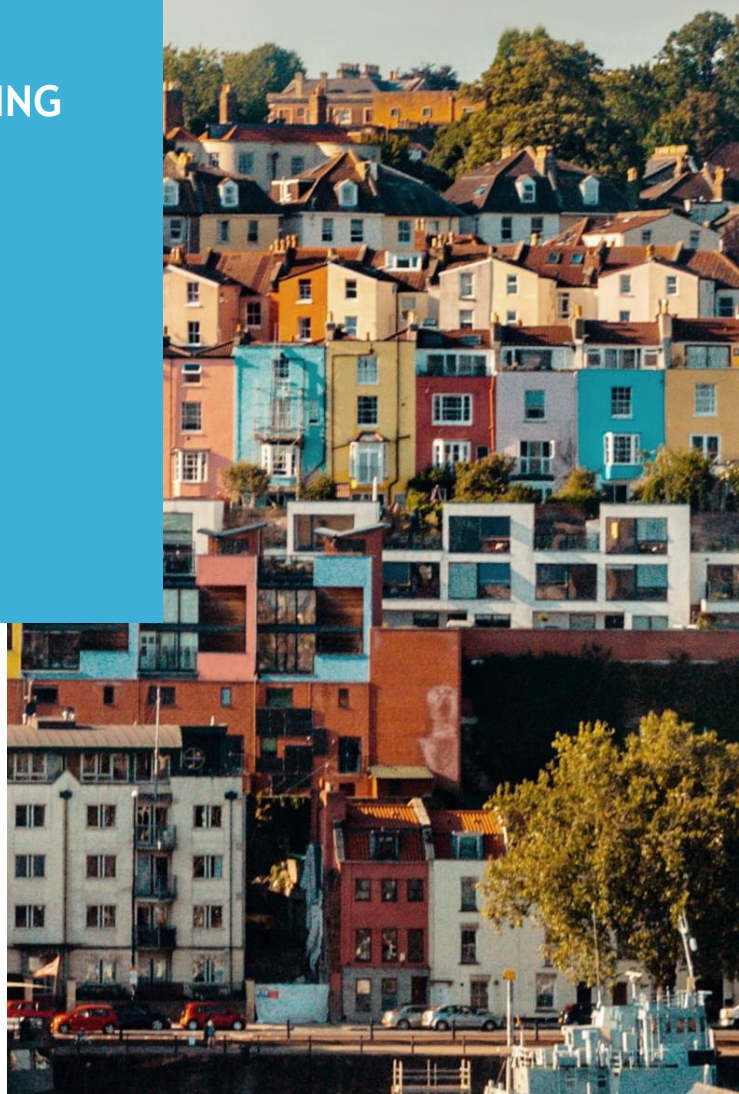
BRISTOL REPLICATE EXPLOITABLE RESULTS

- DISTRICT HEATING
- RETROFIT MEASURES
- WEGO BRISTOL
- E-BIKE MONITORING SYSTEM
- “ELECTRIC CAR CLUB”
- TRAVEL WEST JOURNEY PLANNER
- PARKUS: SMART PARKING APP
- BRISTOL APPROACH TO CITIZEN SENSING



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BRISTOL.- 1. DISTRICT HEATING

PARTNER	Bristol City Council
TECHNICAL ASSESSMENT	
Result description	Provide a lower carbon and more efficient heat to the existing and new District heating systems by linking together the operational Heat Network connecting 13 social housing blocks with a new network that will be powered by a Combined Heat and Power Engine improving the viability of gas CHP and making the most of the existing thermal generating assets.
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	• Client led design on this project rather than procure under a traditional 'design and build' contract which had several advantages in terms of timescale and quality control. • Increased security of supply as it connects two energy centres within a central location under the control of Bristol City Council. • 3D Technical design and HN Associates • Technical, commercial, financial, stakeholder management, programming, and construction contract management requirements.
Submitted patents	N/A
Business Model	The scheme focusses on the areas of Redcliffe (Broughton House) and 100 Temple Street which is composed of residential properties and the Temple Street system will be predominantly commercial and office use. It has connected separate existing heat network to Council offices in 100 Temple Street which can partake in holistic energy demand management and enable future connections to this network. The initial connection supplying heat to 100 Temple Street is 100% renewably fuelled from the existing 1MWth wood pellet boiler.
Availability of prototypes/products of research	• The ability to offer connection for hard to treat properties including historic properties within Bristol centre. • Providing a larger scale heat network with a mix of public and private users, large and small scale developments, new and historic buildings, as an example for other local authorities and developers going forward. • Improve viability for a low carbon Bristol and the Mayor's commitment to put Bristol on course to be entirely on clean energy by 2050.
IP position (define and mention if clear or not)	IP is property of BCC
EXPLOITATION AND COMMUNICATION ASSESMENT	

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Main exploitation conclusions	This project has seen success in the contracting and construction phases maintaining high quality through collaborative working across the project team. The project has been planned and elements designed to fit with the future smart city, but without over reaching the current capabilities of the city or the technology available.
Synergies with other results	This intervention could interact with Bristol's Smart City Platform but at the moent this is not possible.
Potential audience / interested stakeholders	Heat Network developers, Cities developing Heat Networks
Social impact	Reduction in air p[olution, climate emergency mitigation
Keywords	Heat Networks

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BRISTOL.- 2. RETROFIT MEASURES

PARTNER	Bristol City Council - Warm up Bristol
TECHNICAL ASSESSMENT	
Result description	Delivered energy efficiency measures, including loft insulation, boiler upgrades and solar pv systems to 151 domestic properties in Bristol
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	Expected impacts of research: Significant reduction in energy consumption and costs Understanding of reduction per measure in live setting over a year
Submitted patents	Not applicable
Business Model	Developed our own customer journey for the project
Availability of prototypes/products of research	Products widely available on the retrofit market - no innovative products created
IP position (define and mention if clear or not)	n/a
EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	Working with Community Energy groups helped engage residents of the project area Better understanding of Solar PV market demand within Bristol Delivering energy efficiency measure to homes with funding
Synergies with other results	N/A
Potential audience / interested stakeholders	• Residents who participated • Councillors of project wards • Community Energy partners • Bristol City Council • EU Commission
Social impact	Reduce energy consumption within the project area Reduce energy bill costs for partipants
Keywords	#retrofitmeassures #energy #boilerupgrade #cavitywall #insulation #solaPV #travelwest #Bristol #Replicate

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BRISTOL.- 3. WEGO BRISTOL

PARTNER	Esoterix Systems Ltd
TECHNICAL ASSESSMENT	
Result description	On-demand transport service in EV vehicles improving connectivity to 'dynamic hubs' defined by geographic location and time.
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	• Business model evolution for affordable, financially viable, transport services • Enabled 398 journeys; many of which would not have been able to be made without it. • Saved 110kg CO2 (conservatively based on 0.12kg/km)
Submitted patents	None
Business Model	Holistic business model which includes contributions from passengers and destinations. The latter benefit from improved accessibility and reduced pressure on parking. The model is financially viable as there are no fixed costs – supply is only arranged as and when there is demand for it.
Availability of prototypes/products of research	Yes • Routing and scheduling algorithm • Event organizer & passenger interfaces • Driver app
IP position (define and mention if clear or not)	All IP is software related and therefore not patentable in the EU. The core IP is provided through API and the binaries are not therefore available for others to attempt to disassemble. All the IP generated belongs 100% to the partner.
EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	Technology is highly transferrable to other geographic areas, including peri-urban and rural areas. The partner ascertained this by simulating WeGo operating in those types of environment. However it currently relies on local champions, the third sector or proactive local government to gain traction.
Synergies with other results	Improved connectivity within the project area for people unable to cycle (see Co-Wheels) or drive (see Toshiba).
Potential audience / interested stakeholders	Community organisations; health organisations; local authorities/municipalities; community transport operators; local taxi companies; third sector, especially charities
Social impact	Journeys to employment and social & health prescribed events.
Keywords	Mobility; intelligent mobility; mobility as a service; accessible; inclusive; affordable; social

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BRISTOL.- 4. E-BIKE MONITORING SYSTEM

PARTNER	University of Bristol Intelligent Transport Systems Group
TECHNICAL ASSESSMENT	
Result description	e-Bike tracker, data back end and overall shared bike scheme tracking architecture
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	• The creation of a novel e-bike tracking system able to automatically monitor e-bike usage. • The data generated by this system would be of interest to 1) the general public, allowing them to monitor their individual fitness levels, 2) city planners, providing insight on cycle journeys and 3) public health officials, giving insight into the fitness of e-bike users.
Submitted patents	None
Business Model	Not applicable at this stage (no commercial exploitation plans)
Availability of prototypes/products of research	12 devices available and in-use
IP position (define and mention if clear or not)	Open hardware architecture and thus replicable, fair attribution would be expected in third party publications/reviews
EXPLOITATION AND COMMUNICATION ASSESSMENT	
Main exploitation conclusions	Research equipment at working proof of concept level, demonstrated data collection potential. Would require further effort for commercial exploitation coupled with detail from an actually planned deployed scheme.
Synergies with other results	Providing quantitative data to the qualitative research undertaken by UWE. Contribute to further Urban Observatory research, undertaking urban mobility and the adoption of active mode transportation.
Potential audience / interested stakeholders	Academic researchers, city transportation officials, cycle hire scheme providers, and the general public.
Social impact	Enabling optimisation of e-bike cycle hire schemes, potentially reducing theft of e-bikes. Enabling e-bike cycle uptake, which would in turn improve public health.
Keywords	shared e-bike scheme, fitness tracking

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BRISTOL.- 5. "ELECTRIC CAR CLUB"

PARTNER	Co-wheels Car Club
TECHNICAL ASSESSMENT	
Result description	Implementation of a Electric Car Club across the project area
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	Reduction of vehicle emissions across multiple levels including the expectation that continuation and growth of the club would see reduced car ownership, more journeys being made in electric vehicles including the transition of traditional car club journeys also being made in electric vehicles.
Submitted patents	N/A
Business Model	Car Club allowing car sharing access to members of the public/SMEs/Large businesses on a PAYG basis
Availability of prototypes/products of research	Whilst telematics solutions are widely available off the shelf, Co-wheels use a proprietory booking system which facilitates the business activity
IP position (define and mention if clear or not)	
EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	Adoption of the Electric Vehicles has been steady and where users have used an EV (and there is a local choice between ICE and EV vehicles) they tend to have maintained that usage. On the other hand less regular users (less than 2 bookings per month) of the car club tend to stick to the ICE/Hybrid vehicles, as such there needs to be increased awareness and marketing to users to increase adoption rates. Additional developments regarding the state of charge allow an enhanced user experience with users being confident that at the start of the booking the vehicle will have sufficient charge to complete (in most cases) the user's journey. We see this initial development as a point of further development of the user journey where the charge level and the charge status (plugged in charging/not charging etc) are fundamental to the user experience as the Car Club moves towards being dominated by electric vehicles. A further conclusion is that, whilst it is accepted that sometimes charging infrastructure choices will be dictated by local geography/supply/budget, where possible, any proven advanced solutions should be considered.

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	The development of electric vehicles, charging capabilities and charge post capabilities continue to develop at significant pace and as such, often, solutions can become dated quite quickly. Any implementations should consider this and whether the solution being considered will meet with user expectations for a reasonable amount of time and also whether the solution implemented is supportive or prohibitive of the results of the project. For example in the case of EV Car Clubs, the car club must be sustainable and as such vehicles available for members when they need the vehicle. As such slow chargers that can take up to 7 hours to provide a full charge, depending on vehicle capacity, would be prohibitive compared to rapid chargers. Similarly V2G capable solutions may not be appropriate due to the fact that a vehicle may be booked at a moment's notice
Synergies with other results	N/A
Potential audience / interested stakeholders	Local Authorities/Community Groups/Businesses/Public Sector Bodies/Members of the Public Essentially the audience is open and could be any person/group body that has an interest in the introduction or development of a car club either on a PAYG basis or a Pool Car basis and/or that is need is potentially driven by the reduction of vehicle usage and or vehicle emissions
Social impact	Social accessibility to transport, sustainable transport, reduced emissions, environmental enhancement
Keywords	Car-club, electric vehicle, shared mobility, zero emissions, public, fleet,

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BRISTOL.- 6. TRAVEL WEST JOURNEY PLANNER

PARTNER	Route Monkey's client for this deliverable has been (Travel West) TW, which is part of Bristol City Council and owner of the current Travel West journey planner (TWJP).
TECHNICAL ASSESSMENT	
Result description	**ST5.2.3.1 ALGORITHMS FOR OPTIMISED PERSONAL MOBILITY IN THE TRAVEL WEST JOURNEY PLANNER (ROUTE MONKEY)** TWJP allows users to input a start point and an end point, and also an optional arrival/departure time. From these it calculates a range of journeys: • Walking • Cycling • Combination of walking, bus and train (This is known as "transit"). • Car These are called "unimodal" journeys. Travel West want to extend the TWJP to do "multimodal" journeys, which are journeys with more than one mode. Part of the rationale for this is to reduce car use.
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	**ST5.2.3.1 ALGORITHMS FOR OPTIMISED PERSONAL MOBILITY IN THE TRAVEL WEST JOURNEY PLANNER (ROUTE MONKEY)** • This was the first Journey Planner developed for Bristol which successfully combined in an intelligent way all of the following multi-modal forms of travel when calculating journey options: Car Parks, Cycling, Rail, Bus, Walking, Driving and Park and Ride locations.
Submitted patents	N/A
Business Model	The primary objective of the deliverable was to align with the purpose of REPLICATE: • Identify, develop and deploy **replicable**, balanced and **integrated solutions** in the **energy**, **transport**, and **ICT** actions through partnerships between municipalities and industries Route Monkey has specifically introduced the following two aspects to the TWJP: • Car + Park & Ride (P&R) • Incorporating considerations of cost and convenience for different parking options is relevant to encourage shift away from using the car for the whole journey

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	• P&R waypoints include the three P&R sites in Bristol – Portway (NW), Long Ashton (SW) and Brislington (SE). • Bristol Parkway train station is also included as a P&R waypoint - this is in NE Bristol and has ample parking and frequent trains to Bristol Temple Meads. Hence it is suitable for commuting, reducing traffic through the districts of WP5. • Cycling + Train These new components of the TWJP raise awareness of alternative means of multi-modal travel within the Bristol area, for both business and leisure journeys. In addition, they support delivery of Bristol's specific objectives (sustainable mobility, improvements to health and wellbeing, access to training and employment, Citizen engagement, behaviour change and CO2 emission reduction) and TW's policy goals of improved journey planning, reduced road congestion and behavioural change
Availability of prototypes/products of research	See: https://journeyplanner.travelwest.info/
IP position (define and mention if clear or not)	Route Monkey owns the IP for the back-end algorithms that créate the multi-mode journey plans Travel West owns the front end platform
EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	The development of the Travelwest Journey Planner has allowed Bristol to develop and trial new technologies that allow it to provide cutting edge optimised personal mobility services to its residents. To achieve this REPLICATE partners have accessed new data sources, and repurposed them to allow for development of complex new algorithms that provide new multimodal journey options which were not previously available.
Synergies with other results	Some tailoring of the algorithm would be required for each additional city it was deployed in (e.g. identifying travel hubs and available modes of transport). This work is not trivial and would require a new specification and scoping exercise for each new city to quantify and determine costs.
Potential audience / interested stakeholders	Users within the TWJP footprint Other local authorities
Social impact	Pre-Covid19 lockdown restrictions, the TWJP site was typically visited by over 27,000 users every month to: • Find multi-modal travel options (29% of users) • See timetables and routes (64% of users) • See Live Arrivals (11% of users)

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	• Encouraging behaviour change towards more sustainable travel to reduce congestion
Keywords	#multimode #MaaS (Mobility as a Service) #journeyplanner #algorithm #travelwest #Bristol #Replicate

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BRISTOL.- 7. PARKUS: SMART PARKING APP

PARTNER	Toshiba Europe Limited (Bristol Research & Innovation Laboratory)
TECHNICAL ASSESSMENT	
Result description	ParkUs, a smart parking application, is an infrastructure-less, and crowd-sensing based solution for parking availability detection. It is a cost effective solution that is rapidly deployable and can fine tune on-the-fly. The app requires collection of sensor data from a user's smartphone. An AI model is then used for parking availability detection by recognising the behaviour of parking search i.e., cruising. User can query parking availability at any destination and the app displays parking availability information using a heatmap on the user's smartphone. This heatmap is based on the parking search behaviour at the destination.
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	A real time on-street vehicle parking information system was developed and tested through several trials. The main aim with this system is to reduce the time required to find parking. Thereby assist reduction in vehicle congestion, emissions and fuel consumption. ParkUs can be used anywhere in the world and therefore has a very high replicability potential. However, being a crowd-sensing based application, ParkUs requires a critical mass of users for a successful deployment.
Submitted patents	N/A
Business Model	N/A (ParkUs is currently available free to use)
Availability of prototypes/products of research	ParkUs is available in the Google Playstore ready to be used. For large number of users or larger scale deployments, a suitable backend provisioning will be required.
IP position (define and mention if clear or not)	The app is currently freely available for anyone to use at https://play.google.com/store/apps/details?id=toshiba.parkus.
EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	ParkUs has been tested in various trials and therefore has seen several stages of development. Through this project, we demonstrated algorithms for accurate parking detection, crusing detection and accelerated map-matching. In total 4 trials were conducted. Future success of ParkUs, as identified through these trials and assessments, relies on a critical mass uptake.
Synergies with other results	ParkUs trials provided data for monitoring analysis to UWE. In the future, other options may also be considered such as integration within TWJP.
Potential audience / interested stakeholders	ParkUs users, city transportation administrators, academic researchers, and the general public.

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Social impact	The main aim with ParkUs has been to reduce CO2 emissions and fuel consumption for users. ParkUs heatmap can be used to warn users of low parking availability, effectively discouraging users from driving. In cases, where users who rely on driving to get to their destination, ParkUs can significantly reduce the parking search times effectively reducing CO2 emissions. ParkUs can also be used by transport administrators or event managers to manage parking in specific areas, such that users spend minimal time searching for parking.
Keywords	Smart parking, cruise detection, mobile sensing, automated annotation, crowd-sensing, Urban areas, Road traffic, Sensors, Map matching.

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BRISTOL.- 8. BRISTOL APPROACH TO CITIZEN SENSING

PARTNER	KWMC
TECHNICAL ASSESSMENT	
Result description	The Bristol Approach is a new way of working that puts communities and their needs at the heart of innovation by exploring how technologies could help them. The project worked with several neighbourhoods exploring fun and creative ways to tackle issues identified by the community, such as poor air quality or damp in their homes.
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	Engagement with communities and individuals has increased awareness of smart city technology as well as carbon emissions
Submitted patents	n/a
Business Model	Presentations, training and workshops to be delivered by KWMC staff
Availability of prototypes/products of research	n/a
IP position (define and mention if clear or not)	uncertain
EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	This is an exploitable, replicable form of engaging via co-design with communities. We have had local, national and international interest in this service.
Synergies with other results	Training in Bristol Approach could be delivered concurrently with the implementation of interventions by other partners.
Potential audience / interested stakeholders	Citizens, local government, industry, academia
Social impact	We have engaged with over 1000 citizens since the beginning of the project. This has raised awareness of smart city infrastructure, air quality issues, and carbon emissions associated with different forms of travel
Keywords	Co-design, engagement, community, technology

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FLORENCE REPLICATE EXPLOITABLE RESULTS

- GOALGREEN APP
- FASTBOOKING APP
- SMART (GRID, ENERGY & MOBILITY)
- SMARTBENCH
- TIM CITY LINK
- SMART WATERING
- CYBER SECURITY AND GDPR COMPLIANCY
- SMART CITY PLATFORM
- SMART LIGHTING

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FLORENCE.- 1. GOALGREEN APP

PARTNER	Mathema and Comune di Firenze
TECHNICAL ASSESSMENT	
Result description	A mobile app designed to raise the environmental awareness of the general public.
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	A mobile app to bring citizens closer to conscious consumption and to the improvement of their habits, with the aim of giving a positive push towards energy saving and respect for the environment.
Submitted patents	NONE
Business Model	The app is released for free and, to foster its diffusion, no in-app purchase or advertisement is foreseen. For this reason the GoalGreen app has been conceived to be supported by Pubic Administrations (and other big players, such as energy providers) for its sustainability and scaling-up.
Availability of prototypes/products of research	The GoalGreen App has been relesead ad available on several platform: • Comune di Firenze App Store (http://app.comune.fi.it/) • Play Store (https://play.google.com/store/apps/details?id=com.mathema.goalgreen&gl=IT) • App Store (https://apps.apple.com/it/app/goalgreen/id1455965444?ign-mpt=uo%3D4) • Mathema web site (https://www.mathema.com/goal-green/ as apk)
IP position (define and mention if clear or not)	The foreground is owned by Mathema while the owner of the App is the Comune di Firenze
EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	The solutions developed by Mathema is easily replicable and can scale to different scenarios. To this end, Mathema's participation with public institutions is key to launch official applications. The collaboration with the Comune di Firenze has been a success and the Municipality itself represents a key prescribing channel for scale-up and replicate these types of solutions in other public institutions. The GoalGreen app, based on energy efficiency, can focus on other relationships, not just with the Public Administration, to scale or replicate. To this end, as Mathema argues, it would be interesting to obtain strategic agreements with companies that install meters to be able to directly record consumption. Mathema offers blockchain technology to generate security and traceability of data and offers confidence to energy companies if their clients can

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	directly record consumption. These are two important aspects for a selling proposal to reach agreements with these companies. Having said this, Mathema, as a local company, must consolidate itself with the public client and companies from the Florence environment, such as those that are dedicated to building management, through strategic agreements and generic/standard developments to monitor any device through interfaces, such as the city platforms. Finally, Mathema's future is to reach strategic agreements with strong and consolidated companies that require its solutions, as would be the case with multinationals. On the contrary, it is important to point out that not all these companies are committed to innovation as Mathema does. In this sense, it seems that Public Administrations could represent best partner to innovate. That said, Mathema should make a strong commitment in sales force to reach these strategic agreements and introduce its solutions to the market in a broader manner.
Synergies with other results	There is a synergy with the "FastBooking" App, developed in the REPLICATE project, that share the same synergies with the Comune di Firenze.
Potential audience / interested stakeholders	As end-users the GoalGreen app is addressed to the general public to raise awareness about energy consumptions and to foster "green" habits. Due to envisaged business model the app is addressed to Public Administrations and Energy Provider for its adoption and adaptation to different scenarios.
Social impact	The GoalGreen app is addressed to the needs of rasing environmental awareness among citizesn by offering to the user the possibility to record a detailed curve of consumptions - with higher granularity and also clarity with respect to the ones usually made available by the energy providers in their bills - and to empower the consumer awareness through an integrated view of his consumptions (i.e. water + gas + electricity) and fostering the propension to a regular check, being a step forward to similar apps which offer a lower details and are monothematics (e.g. presenting only one type of energy or resource consumption).
Keywords	Mobile App, Energy Consumption, Environmental Awareness, General Public

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FLORENCE.- 2. FASTBOOKING APP

PARTNER	Mathema and Comune di Firenze
TECHNICAL ASSESSMENT	
Result description	A mobile app designed to reserving time-slots at the Fast Recharge columns thus allow time saving to taxi drivers optimising the recharge time.
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	A mobile app addressed to e-taxi drivers and, in the future, any possible user authorized by the Municipality of Florence. The aim of the application is to allow professional drivers to find the more convenient electric recharge using a dedicated mapping (based on the open data made available by Municipality of Florence). The application is intended to optimize the fast recharge by: • allowing the e-taxi driver to find the nearest electric recharge free and available • making possible to book a recharge in a convenient slot time (e.g. at the end of working turn)
Submitted patents	NONE
Business Model	The app is released for free and, to foster its diffusion, no in-app purchase or advertisement is foreseen. For this reason the FastBooking app has been conceived to be supported by Pubic Administrations (and other players, such as the owners of the Fast Recharge coluns) for its sustainability and scaling-up.
Availability of prototypes/products of research	Due to the nature of the app, addressed to professional (e-taxi) drivers, it has been released as a "private" app and only drivers authorized by the Comune di Firenze may use it for reservation.
IP position (define and mention if clear or not)	The foreground is owned by Mathema while the owner of the App is the Comune di Firenze.
EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	The solutions developed by Mathema is easily replicable and can scale to different scenarios of reservation. To this end, Mathema's participation with public institutions is key to launch official applications. The collaboration with the Comune di Firenze has been a success and the Municipality itself represents a key prescribing channel for scale-up and replicate these types of solutions in other public institutions. Having said this, Mathema, as a local company, must consolidate itself with the public client and companies from the Florence environment, such as those that are dedicated to building management, through strategic agreements and

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	generic/standard developments to monitor any device through interfaces, such as the city platforms. Finally, Mathema's future is to reach strategic agreements with strong and consolidated companies that require its solutions, as would be the case with multinationals. On the contrary, it is important to point out that not all these companies are committed to innovation as Mathema does. In this sense, it seems that Public Administrations could represent best partner to innovate. That said, Mathema should make a strong commitment in sales force to reach these strategic agreements and introduce its solutions to the market in a broader manner.
Synergies with other results	There is a synergy with the "GoalGreen" App, developed in the REPLICATE project, that share the same synergies with the Comune di Firenze.
Potential audience / interested stakeholders	As end-users the FastBooking app is presently addressed to e-taxi drivers and, in the future, may be extended to other professional e-drivers or also to the general public (e.g. with a Premium Account giving precedence for reserving time-slots). Due to envisaged business model the app is addressed to Public Administrations and Energy Providers for its adoption and adaptation to different scenarios.
Social impact	The FastBooking app is addressed to taxi drivers, who need to optimize their work shifts with the time needed for electric recharge in order to promote the use of e-mobility. The further deployment of Fast Recharge columns and the consequent wider diffusion of the FastBooking App to a wider public may ensure a proper scalability of the efficient use of the recharge stations over the whole territory.
Keywords	Mobile App, e-mobility, e-taxi drivers, efficency of the use of the charge stations.

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FLORENCE.- 3. SMART (GRID, ENERGY & MOBILITY)

PARTNER	E-Distribuzione OWNER OF THE RESULT
TECHNICAL ASSESSMENT	
Result description	E-Distribuzione has carried out in the Florence actitivites for • ENERGY EFFICIENCY - Smart Info Platform: Provide consumers with an easy access to their electricity data collected by the smart meter (Smart Info Kit) • SUSTAINABLE MOBILITY - Fast Recharching columns: installed Fast Recharge Station Plus 1G (EFRP). The secure integration of EV charging in the operation of the grid, the monitoring and controlling of charging process and the customer operations are guaranteed by EMM system. • ICT & SMART INFRASTRUCTURES - Smart & Resilient Grid: Implementation of a Smart Grid in the pilot area
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	• Smart & Resilient Grid: improving grid performances in terms of reliability, resilience, continuity and quality of service. Smart Grids are crucial to increase the power generation originating from renewable energy sources (RES), able to reduce CO2 emissions. Furthermore, the Smart Grid implementation is the enabler to develop the Electric Mobility and other active user services. • Smart Info Platform: increase customer awareness about energy consumption, that will help to lead a energy saving and CO2 reduction • Fast Recharching columns: the installation of the fast recharging infrastructers meets the requirements of the e-taxi allowing fast charging (in 20-30 minutes) of three electric vehicles simultaneously. This solution is a key point of the public transport framework developed in the project
Submitted patents	N/A
Business Model	E-Distribuzione runs R&D activities with the aim to constantly improve its digital and smart technologies ensuring an advanced automation and control system for the network able to guarantee high quality of service levels. E-Distribuzione is the distribution system operator (DSO) with exclusive granting of distribution network management in the Municipality of Florence, a necessary condition to participate in this project where its intervention is focused in a pilot area of Florence
Availability of prototypes/products of research	N/A
IP position (define and mention if clear or not)	it is possible download the Smart Info+ APP from apple and google store: https://apps.apple.com/it/app/smart-info/id1452836337

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	https://play.google.com/store/apps/details?id=com.enel.mobile.smartInfo It is free and clear to everyone.
EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	The grid in the Florence pilot, is now more resilient and high-performing thanks to the innovative remote control system and provides real-time data with the fast broadband communication technology to the control centre in order to optimise each intervention. Thanks to the implementation of an advanced automated function for automatic fault selection and isolation (Smart Fault Selection), it is possible to quickly reconfigure the network and automatically isolate faults in less than a second. A real failure test, carried out on a line involved in the project, showed that 327 customers were affected instead of the more than 2.500 expected. What's more, the fault was isolated in just 427 milliseconds. E-Distribuzione installed six Fast Recharge Plus 1G charging stations, for exclusive use of taxi in public areas identified together with the Municipality and with the taxi drivers' association. Each of them allows three vehicles to be charged at the same time, with a maximum of 50kW of continuous current, and real time remote management via the "Electric Mobility Management". In four years, there have been almost 30,000 charges for a total of over 310,000 kilowatt hours. More over the smart grid ensures a more sustainable and conscious lifestyle thanks to easier access to information on each users own consumption. E-Distribuzione has delivered an electricity energy monitoring kit (Smart Info) to the customers involved in the project that allows them to collect consumption data in close real time, using a dedicated energy monitoring system (Energy Management System) that makes data available to citizens remotely via their own device. This system has already recorded 239 MWh of consumption in 13 months of monitoring under the control of the customers.
Synergies with other results	The measurements registered from the two mentioned platforms (EMM and EMS) are shared with Smart City Control Room of the Municipaly
Potential audience / interested stakeholders	European Commission, Member States, Municipalies, researchers, Pubblic Administration, Taxis driver associations, citizens, Technology manufacturers, electromobility providers are the mainly stakeholder in Replicate. More generally, E-Distribuzione is a concessionaire with the exclusive granting of distribution network management subject to a strict regulatory framework. Therefore, by definition and where E-Distribuzione is the DSO, stakeholders are the users of the distribution network

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	and all those who can benefit from the new services enabled by the implementation of smart grids.
Social impact	CO2 reduction, environmental enhancement, quality of electrical service, Energy safety
Keywords	Smart Grid, Smart City, resilience, EV, e-mobility, charging station, energy consumption, smart metering, active demande, power outage, Distributed generation (DG), Renewable source energy (RSE), active demande, hosting capacity.

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FLORENCE.- 4. SMARTBENCH

PARTNER	TIM (Telecom Italia)
TECHNICAL ASSESSMENT	
Result description	Field trial of a smartbench located in "Museo del '900" in Florence
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	The services provided by smartbench are appealing for people and therefore it is appreciated from visitors of the museum. Environmental data and people transits are sent to TIM IoT platform (ICON) for monitoring and analytics purposes. Smartbech provides hotspot Wi-Fi, captive portal for interacting with the smart bench, environmental sensors, audio station, bluetooth connection, automatic and configurable external lighting, USB recharging, administration and management portal for remote management.
Submitted patents	N/A
Business Model	Smartbench could be used for advertising (via browser or loudspeaker)
Availability of prototypes/products of research	The supplier of the smartbench is Canavisia, an italian company
IP position (define and mention if clear or not)	
EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	The smart bench has proven to be an appealing product for citizens in terms of smart urban furniture. Moreover, it may provide services to public administration to monitor people flows. As provider of Smart City services, TIM may include smart bench services in its portfolio. Currenly another installation is available in TIM Innovation Labs: this installation and representation of related data, together with the ones from Florence, are constantly used to showcase the possible exploitations to potential customers.
Synergies with other results	N/A
Potential audience / interested stakeholders	Municipalities / Public Sector / Museum / Exhibitions / Malls/ Parks
Social impact	Social aggregation
Keywords	WiFi, public, smartbench

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FLORENCE.- 5. TIM CITY LINK

PARTNER	TIM (Telecom Italia)
TECHNICAL ASSESSMENT	
Result description	Field trial of a multiservice/multimedia kiosk in Beccaria square (Florence)
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	The services provided by multimedia kiosk are used by people for different purposes (e.g. browsing) and also for touristic information. TIM new City Link is a multiservice kiosk in use to provide digital signage/advertising and video surveillance for business, while for consumers they provide phone calls, recharging, WiFi/Internet navigation and mobile payments.
Submitted patents	N/A
Business Model	Kiosk could be used for advertising (via browser or loudspeaker) and to provide paid multimedia services
Availability of prototypes/products of research	The kiosk is provided by TIM
IP position (define and mention if clear or not)	
EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	TIM City Link has been trialed also in other Italian Cities (e.g. Milan) and is considered the evution of the public telephones traditionally installed in cities.
Synergies with other results	N/A
Potential audience / interested stakeholders	Municipalities / Public Sector / Museum / Exhibitions / Malls / Shops / Tourist offices
Social impact	Digital divide reduction providing free info services
Keywords	WiFi, Internet, public, infopoint, advertising

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FLORENCE.- 6. SMART WATERING

PARTNER	Municipality of Florence
TECHNICAL ASSESSMENT	
Result description	Implementation of an IoT eco-system across gardens of the city with multiple sensors and actuators to improve capabilities of environment monitoring and water usage optimization.
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	The solution is a mix of IoT, BigData and advanced wireless solutions exploited to improve the Public Green space of the city. The solutions is very promising since it created a first network of sensors in Florence mixing LoRaWAN connectivity from sensors to the network gateway with OneM2M usage to collect data from gateways. Two gardens were connected to the smart city platform with this approach, that can be easily scaled to other gardens of the city, thus allowing a complete control of the city watering system and gardens environmental parameters.
Submitted patents	
Business Model	The business model has been significantly simplified by the recent Decreto Semplificazioni (DL 76/2020) which removed the necessity to renew every six months the permit for city LoRaWAN experimentation, thus allowing cities in Italy to implement IoT solutions similar to the one here described with a more settled regulatory context. Moreover, with the advent of 5G and the corresponding evolution of NB-IoT systems and the OneM2M platform, the solution may also have new business development opportunities connected to such technologies
Availability of prototypes/products of research	
IP position (define and mention if clear or not)	
EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	Part of the solution based on LoRaWAN has been deployed in Marseille with thousands of sensors. The solution in Florence allowed to remotely detect piping network leakages and pump failures and it is improving digital skills of environmental operators. The solution has been communicated through a dedicated videoclip on social media and large national IT sector web portals. Finally, the solution is part of the “Firenze Green Smart City” eco-system of smart initiatives on Public Green monitoring and development, which has been awarded as Local Digital Agenda best project in 2019 from Politecnico di Milano (national Observatory for

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	eGovernment) and in 2020 with the annual innovation "Premio dei Premi", awarded by the President of the italian Republic.
Synergies with other results	In Florence the solution is complemented with the Big Data platform delivered by REPLICATE project, as well as with the OneM2M platform provided by TIM in REPLICATE.
Potential audience / interested stakeholders	City Public Green maintenance workers and managers, operators of the Smart City Control Room monitoring city environmental parameters, citizens engaged in parks and gardens care
Social impact	Engagement of citizens on environmental and public green care. Awareness on water consumption and its optimization. Improvement and creation of new skills for operators maintaining public green in the city and for IT employees of the Municipality.
Keywords	smart, water consumption, innovative, solution, saving, people

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FLORENCE.- 7. CYBER SECURITY AND GDPR COMPLIANCY

PARTNER	THALES Italia
TECHNICAL ASSESSMENT	
Result description	Implementation of Cyber Security best practices and quick wins to increase Replicate project security.
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	Big data need to be protected and made safe. Malicious attacks can regard Networks, Programs and Data. For this reason cyber security deal with the entire Replicate Project in Florence at 360 degree. The steps needed for evaluate, study and apply the solutions to improve the security of the entire system are: Security Audit, Security Testing, Risk Analysis and finally the Remediation Plan. These steps made clear that nothing is secure by itself but mitigation of risks are necessary to manage vulnerabilities that are ever present in a new infrastructure.
Submitted patents	N/A
Business Model	Provide a snapshot of the current protection status of an infrastructure, in order to provide a taylored improvement that aims to the foreseen Cyber Security target.
Availability of prototypes/products of research	The operational steps applied in Replicate project needed for evaluate, study and apply the solutions to improve the cyber security, can be replicate for any system or subsystem.
IP position (define and mention if clear or not)	
EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	Cyber Security activities set itself such an objective to protect the integrity of Networks, Programs and Data from attack, damage or unauthorized access. A smart city of the future cannot disregard a Cyber security approach on data protection and privacy for collecting and processing personal data of individuals.
Synergies with other results	THALES activities have been fully integrated with all the partners's new platforms. All the subsytems that compose Replicate project have benefited from the security plan provided to the respective stakeholders.
Potential audience / interested stakeholders	In contemporary society, as well as in the society of the future malicious attacks can concern everything. Cyber Security activities are at the center of the ongoing digitalisation process, so the increasing number of personal e sensitive data managed by the several infrastructures that will arise in the years to come need protection.
Social impact	The continuos evolution of IT security observed during the last years, with an increasing of cyber-attacks on private and

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	public networks, make Cyber security a central aspect for Smart Cities. Devote more attention to this matter is the only solution to protect data and people from the growing number of malicious actors present on the international scenarios.
Keywords	Big Data, Cyber Security, Confidential Information, Risks, Vulnerabilities, Remediations, GDPR, Mitigation, Security

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FLORENCE.- 8. SMART CITY PLATFORM

PARTNER	UNIFI-DINFO
TECHNICAL ASSESSMENT	
Result description	A complete solution for Smart City Platform: collecting data of any kind, performing data aggregation and transformation, performing data analytics and allowing the user to access at public and private data via dashboards and app which can be easily created and customized. Data can be in push and pull, open and private, and the full platform passed the Vulnerability Test, and it is GDPR compliant. It presently collects in real time a relevant amount of data, performing data processing and analytics, and provide a set of Dashboards for the Florence municipality control room.
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	Smart Cities/Industries companies need to set up a flexible solution to cope with the city evolution in terms of services and city users' needs and sustainability. Snap4city solution (https://www.snap4city.org) as updated of km4city one provides a flexible method and solution to quickly create a large range of smart city applications exploiting heterogeneous data and enabling services for stakeholders by IOT/IOE, data analytics and big data technologies. Snap4City applications may exploit multiple paradigms as data driven, stream and batch processing, putting co-creation tools in the hands of: (i) Smart Living Lab users and developers a plethora of solutions to develop applications without vendor lock-in nor technology lock-in, (ii) final users customizable / flexible mobile Apps and tools, (iii) city operators and decision makers specialized / sophisticated city dashboards and IOT/IOE applications for city status monitoring, control and decision support. Snap4City improves city services, security and safety by offering a sustainable solution for smart city and Living Lab, thus attracting industries and stakeholders. Snap4City is capable to keep under control the real time city evolution: reading sensors; computing and controlling key performance indicators, KPI; detecting unexpected evolutions; performing analytics; taking actions on strategies and alarms.
Submitted patents	N/A
Business Model	The solution is based on Snap4City platform, 100% open source, licence free. Snap4City sustains by selling different services over the platform. It is presently a FiWare platform, a NODE-RED official library, is EOSC platform, BeeSmart platform, and E015 official API, etc.

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Availability of prototypes/products of research	The early solution produced for Replicate has been strongly improved with a large number of new activities which allow us to use the derived solution on other cities/Organizations. The main access is https://www.snap4city.org
IP position (define and mention if clear or not)	100% open source, licence free.
EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	The City Officials need to get an overview of the city in glance on the basis of relevant aspects to make corresponding decisions if needed. DISIT Lab of UNIFI-DINFO, in the context of REPLICATE project of the European Commission has set up a Smart City Control Room by collecting a relevant amount of data and performing the data analytics to provide a set of Dashboards for the control room. The whole set of Dashboards start from a main panel that is H24/7 accessible for the city major, where each tile/widget is autonomously updated and interactive to bring the user to a set of more detailed views on data and maps. The observed views on the Control Room Dashboards are related to: • Mobility and Transport • Key performance indicators of several gov services • Civil protection alerts and conditions • Major parking status and their predictions • Major Public transportation mean delay at the bus stops • Energy and consumption aspects for: e-Vehicle recharge, meters • Environmental aspects: pollution, pollination, waste, irrigator • Social aspects: social media, tags, citations • Resilience of the city: civil protection, evacuation paths The Smart City Platform has been based on km4city ontology and then updated in Snap4City. It provides a range of solutions and a secure environment for Smart City Control Room. Relevant aspects are also related to the Data Analytic and Analysis Tool by which the City Operators can perform What-If analysis dynamic routing on the basis of eventual unexpected events and taking into account: city context, pollution, traffic flow, cycling paths, etc.
Synergies with other results	Initially the solution was called Km4City and as derived from a former activity of Sii-Mobility project for data aggregation and mobility. Then REPLICATE allowed us to start working on dashboards. In a second phase, the platform added the

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	possibility of using IOT with Snap4City project and thus the name of the platform is now Snap4City, including the formers Km4City, plus Dashboard Builder developed thank to REPLICATE together with the work/processes for data collection, user interface design, security on Dashboards, the related analytics, etc. The present REAPLICATE Smart City Platform is based the whole set of Snap4City. The Snap4City is operative with services and data of several cities/Organizations such as: Helsinki (Fi), Antwerp (B), Lonato del Garda (I), Valencia (S), Pont Du Gard (Fr), WestGreece (Gr), Mostar (Bosnia), Dubrovnik (Croatia), Santiago di Compostela (S), Pisa (I), Prato (I), Pistoia (I), Lucca (I), Arezzo (I), Grosseto (I), Livorno (I), Siena (I), Massa (I), Modena (I), Cagliari (I), Venezia (I), Roma (I), etc.; and from regions as Tuscany (I), Garda Lake (I), Svealand Region (Sweden), Sardegna (I), Belgium (B), Finland (Fl), Emilia Romagna (I), Spain (S), WestGreece (Gr), Occitanie (Fr), Bosnia-Herzegovina, Croatia, etc. The technology is used for developing integrated sentient solutions in the domains of smart city, Industry 4.0, Smart Home, Smart Farm, Smart Health, smart retail, etc. In most cases, they are installations on premise and/or on some private/public cloud, this portal is the primary access to Snap4City.org cloud for Smart City as a Service and trials of all the solutions. Presently there is a number of other installations of Snap4City tools as on premise, some of them are totally private other partially public. Sbao4City is Gold Member of the FIWARE Foundation and it is an official powered by FIWARE Solution. Snap4City has been 1st place Award in the Select4Cities challenges and PCP launched by the cities of Antwerp, Helsinki and Copenhagen. Snap4City is also member of the European Open Science Cloud (EOSC) marketplace and E015 digital ecosystem.
Potential audience / interested stakeholders	Local Authorities, Public Sector Bodies, Developers, Research Institutions, Companies and Businesses, Industries
Social impact	The Smart City Platform is a technical enabler that potentially has impact in different aspects. As a technology for the Smart City, it facilitates better targeting of government support and universal access to services, tailoring services for the community and citizen participation.
Keywords	Smart City, Control room, IOT, Big Data, Visual Analytics, Data analytics, Predictions

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FLORENCE.- 9. SMART LIGHTING

PARTNER	Silfi spa/Municipality of Florence
TECHNICAL ASSESSMENT	
Result description	After a first test of new adaptive public lighting system in the Cascine park, Florence realized its "change light" program installing LEDs together with an intelligent remote point to point control system to better match environmental and lighting needs detecting the presence of people or vehicles.
Main achievements /expected impacts of the research: why it would be of interest for the public. (Added and unique value of the project)	From the Replicate pilot action involving 1000 lamppost, the lighting revolution has already been extended, reaching other 4 districts with more than 30.000 new LED lights in streets, squares and parks. Smart public lighting has become a valuable infrastructure of the city, carrying on board additional services (like video-cameras, wi-fi, environmental sensors, traffic control systems…) with the double benefit of reducing costs and impacts and anchieve environmental benefits (Energy and CO2 high savings >30%, reduced lighting pollution and space for services infrastructure)
Submitted patents	
Business Model	The business model of the project is based on costs savings: from energy bills to installation costs and maintenance of all the services the smart lighting is now equipped with. The impact on the electricity consumption, for the extension phase already started, is estimated about 12 GWh saved, with consistent direct savings on energy bills (between 1,5 and 2 million €/y depending on electricity tariffs) and on indirect potential external costs (340.000 €/y related to the impact of electricity production).
Availability of prototypes/products of research	
IP position (define and mention if clear or not)	
EXPLOITATION AND COMMUNICATION ASSESMENT	
Main exploitation conclusions	The smart lighting system is already exploited at city level and the "change light" project has been analized at metropolitan level and by other municipalities as Tirana (AL) with which a peer-to-peer exchange has been realized. As best pactice, the project and its scaling up at city level has been already shared to the 14 metropolitan national cities being part of the "ONP Metropolitan cities 2014/2020"
Synergies with other results	Our Smart public lighting is a fundamental part of the smart city design as it is actively connected to the e-distribuzione smart and resilient grid and to the smart city control room.

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Potential audience / interested stakeholders	City Public Green maintenance workers and managers, operators of the public lighting, developers
Social impact	The smart lighting system will increase the public safety and services. For users: • Better lighting in public spaces • Safer streets • Public wi-fi
Keywords	smart, lighting, innovative, solution, saving, people

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https://replicate-project.eu/