

The European Commission's  
**INTELLIGENT CITIES  
CHALLENGE**

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# Heraklion: Intelligent City Transformation Overview

ICC Final Deliverable



# Executive summary

**Heraklion - The largest municipality in the island of Crete, 4th largest city in Greece with a population of 175,000**

- The long history of 3.500 years and the cultural heritage are the main characteristics defining the city's character
- The services sector - tourism, is the largest economic activity and the main engine for growth and sustainability
- The city's touristic identity has been formed by its unique mix of historical monuments, natural environment, climate, hospitality of its people and its traditional gastronomy
- Evidenced by more than 4.000.000 visitors per year

The city's involvement in ICC serves the vision to:

**Transform and Diversify the city's tourist identity, towards a digitally empowered sustainable tourist destination**

This vision is to be achieved by:

- Enhancing Digital transformation through the implementation & offering of value-added digital services to citizens and businesses
- Transformation and Diversification the city's tourist identity to an attractive destination offering tourist services and products, with a strong contribution to the local economy
- Ensuring a sustainable and healthy environment and quality of life for all

Solutions prioritized to achieve the above include:

- Smart tourism solutions: to enhance visitor experience, promote the city's tourist identity, transform the city from a "place to transfer" to "a place to stay"
- Use of Open data for businesses & tourism, Clustering between city businesses, Training in digital marketing, economy, ICT in green tourism, Training in digital skills.
- Smart Mobility: Buses as a service platform, ICT in solving traffic problems, controlled parking, implementation of smart solutions to improve inner city transportation, development of pedestrian networks / bike routes.
- Smart Environmental solutions: waste management and monitoring, environmental indicators monitoring, energy consumption monitoring & management

Challenges faced by the city:

- Urban and sub-urban transport network
- Overcrowding during the tourism season
- Human factors (stakeholders' willingness and capacity to change)

The involvement of stakeholders and citizens in the implementation of the city's strategic vision - a result of successful collaboration of all stakeholders over the past 5 years- is both the major success and the most difficult achievement during ICC. The development of a culture of cooperation still requires effort, and for this reason the progress made in this field is encouraging, especially in the tourist and entrepreneurship sectors.

Over the next three years, it is crucial to expand and -where necessary- adjust the strategic priorities of the municipality with regards to its smart city vision, to offer new smart services and ICT infrastructure projects in order to match the ongoing urban regeneration projects that transform the city's urban environment.

# Mayor Foreword

Heraklion joined the Intelligent Cities Challenge with enthusiasm, following its active participation in Digital Cities Challenge. As a City which has been engaged during the last decades in developing and maintaining a smart ecosystem, expectations were high. ICC gave us the chance not only to better target and therefore to strengthen our strategy, but also to validate initiatives on a European scale while confronting methodologies, implementations and results with the wider ICC Community.

Undoubtedly, the pandemic caused a general and widespread deceleration in translating policies from theory to practice. This affected ICC, too. Nonetheless, the impact the Challenge has had on the City is still measurable: progress has been made and shared with other participants across the EU.

This is encouraging, as ICC 2.0 will definitely represent a boost for Heraklion's strategy. The City shall continue to deploy human and financial resources in order to both complete its planned transformation and to improve it with new bold priorities and projects, taking into consideration the impellent need for sustainability and resilience which are brought to our attention by dramatic changes we all are witness of.

ICC and Heraklion will hopefully walk more ground on the common path they are building and find ambitious solutions to ambitious plans.

Vasilis Lambrinos  
Mayor of Heraklion  
June 2022

Section

1

# Heraklion: Preparation and assessment

ICC transformation

September 2020 to January  
2021

# Introduction

Heraklion - The largest municipality in the island of Crete, 4<sup>th</sup> largest city in Greece with a population of 175,000

The city enjoys:

- o A vibrant ecosystem, including acknowledged academic and research organisations, industrial formations operating across various sectors, engaged citizens and volunteer groups, and a large number of SMEs active primarily in the services sector, acting as enablers for digital transformation.
- o Committed public authorities with motivated policy makers working tactically on introducing innovative policies for reshaping the economic environment, introducing new services for the city's visitors and citizens, and for improving the quality of life
- o A large number of initiatives (both public and pp) investing on the introduction of solutions, applications, services and works in the field of tourism, green transition & urban development, and ICT/digital transformation.
- o A plethora of **Digital transformation and green policies** at local, regional and national levels (driven by the Municipality)

Digital Transformation particularly in the context of Tourism and sustainable development, coupled with a “Smart City” identity, can become the key advantages for the city to become more competitive and appealing, improving the overall quality of life of its citizens and visitors.

The city's involvement in the context of ICC aims to build on three key aspects:

- a place of innovation, development of entrepreneurship, improved quality of life and electronic and participatory governance.
- a lighthouse of culture with a strong creative industry, attractive tourism services and products, with a strong contribution to the local economy.
- A resilient city with effective social support infrastructure, citizen-centred social policies, participatory solidarity networks, organized structures of civil protection, employment protection and a high level of citizen security.

# City needs: State of the city overview

## The state of Heraklion today

Heraklion is the capital of Crete and one of the Mediterranean region's most fascinating and vibrant cities. The population of the city is 174.993 inhabitants. Heraklion is the largest city and the administrative capital of the island of Crete and the fourth largest city in Greece.

- extending over an area of 684.3 km<sup>2</sup> (264.2 sq mi)
- the Municipality employs 751 permanent staff

For many years the Municipality has developed a smart city strategy to become more competitive at national, Mediterranean and European level. This strategy is based on some key pillars including:

- the specialization of the economy and the workforce,
- the establishment of strategic objectives and their collective management,
- cooperation with educational institutions and FORTH
- the quality of life of the urban environment,
- the existence of strong transport and telecommunications infrastructures

The main goal of the Municipality of Heraklion is to attract international interest and to turn the region into a centre of creation and development. For that reason, the municipal authority is building communication channels with other European cities and at the same time, participates in activities concerning education, city planning, economy, politics, foreign affairs etc.

## Key insights from city performance analysis

### Higher performance observed

- 1 Digital transformation (city portal, electronic services for citizens, broadband infrastructure, open data repository, sensor coverage, open government)
- 2 Economic climate (strong business environment, favouring innovation and entrepreneurship in key areas of the economy - primary sector and tourism, together with the emerging fields of energy, environmental protection and new technologies)
- 3 Attractive tourism services and products with a strong contribution to the local economy.

### Lower performance observed

- 1 The design of actions based on the “sustainable development” model is the basis of the policy on the environment and energy issues. The vision is to make Heraklion a viable “green city”
- 2 Mobility (necessary to become a mobility-friendly city, to be transformed into a sustainable, pedestrian-friendly, accessible and truly smart city in mobility terms)
- 3 Citizen participation (digital social participation, all municipal services - digital services offered to citizens).

# City ecosystem (1/3)

City ecosystem consists of:

**Governmental / Public Authorities:** Municipality of Heraklion departments and directorates, the Region of Crete, Heraklion Airport Authority, Heraklion Port Authority, Ministry of Culture - Ephorate of Antiquities of Heraklion

**Local Business Community /SMEs:** businesses active in the tourism sector, Hotels, Air/Sea/Land transport companies

**Academia / Research Institutions:** University of Crete, Hellenic Mediterranean University

**Technology / Network Providers:** Institute of Computer Science – FORTH, Science and Technology Park of Crete (STEP-C)

**Business associations:** Heraklion Chamber of Commerce, Technical Chamber of Heraklion, Association of Hotel owners, etc.

**Citizen organisations:** Municipal Volunteer groups (social policy, education, tourism, culture, environment)

## City ecosystem (2/3): Key findings

All Stakeholders involved recognize the importance of the Municipality's strategic vision, and the benefits for the city at large and are willing to support it. To a great extent, the development of the municipality's "Smart City" strategy has been a result of successful collaboration of all stakeholders over the past 5 years. Their active involvement is now crucial for its successful implementation.

**Governmental / Public Authorities**, actively support the implementation of the city's strategic plan at policy level, and aim to participate actively in co-designing projects and co-funding of solutions.

**Local Business Community /SMEs**, key enablers in the city ecosystem, providing valuable feedback regarding the needs and requirements that should be addressed to support the market, vital payers for the success of the city's strategy through their adoption and use of the digital solutions implemented/planned for development.

**Academia / Research Institutes**, will provide expertise and know how particularly regarding the design of solutions to address the needs of the citizens in order to improve the quality of life, increase citizen participation, address environmental issues.

**Technology / Network Providers**, will support by providing the necessary technical expertise and knowhow, co-design and develop specific solutions (applications & services) and provide the technical means/infrastructure/equipment where necessary.

**Citizens and citizen groups**, especially the city's volunteering groups need to be more actively involved in the ecosystem, to provide support through the co-design, testing and evaluation and overall adoption & dissemination of the services & applications implemented.



## City ecosystem (3/3)

The specified needs address different domains – tourism, economy, mobility and environment.

Needs are mutual and generate a great challenge: to locate solutions that address common issues and that serve many stakeholders simultaneously.

### Strengths:

1. Stakeholder engagement in ICC comes from the highest management level, which validates strong interest so far and it is expected to grow further.
2. Heraklion has extensive experience and a mature ICT infrastructure to develop a digital transformation strategy. Most of the stakeholders involved have implemented or currently implement various projects at local, regional, national and European levels.
3. There is an active local SME ICT community to support a broad and ambitious smart city project portfolio
4. There is a mature business environment to take over and further exploit innovative solutions

### Weaknesses:

1. Understanding varies between the stakeholders regarding project planning and implementation, which may result to fragmented deliverables.
2. Need to prioritize on common goals, aspirations and individual motivation
3. Complex bureaucratic procedures may slow down the implementation of innovative solutions

# ICC strategy: Vision and ambition statements

Overarching ICC city vision:

Taking advantage of the mature digital environment, a strong economic climate and citizen participation, the city aims to build on key areas that will improve the overall quality of life of its citizens and visitors and make it a

**Transform and Diversify the city's tourist identity: towards a digitally empowered sustainable tourist destination**

## Ambition statement 1

Enhance Digital transformation: to implement & offer value-added digital services to citizens and businesses that will:

- 1) Enhance citizen participation
- 2) Introduce new services / processes / business approaches for SMEs in the tourism sector
- 3) Create added value for the city's end users (tourists, citizens) by building on the merits of ICT/digital transformation

## Ambition statement 2

Transform and Diversify the city's tourist identity: Heraklion as a city with a strong cultural and tourist identity, an attractive offering of tourist services and products, with a strong contribution to the local economy. This will be achieved by:

- 1) Emphasizing its originality and local characteristics
- 2) Creating a unique experience for the visitor
- 3) Offering enhanced experiences through digital services and applications
- 4) Supporting the tourist sector through Open Data & smart apps

## Ambition statement 3

Sustainable development: Ensure a sustainable and healthy environment and quality of life for all through:

- 1) reducing the "energy footprint" of the Municipality
- 2) setting up a smart and green mobility and transport network

# City Vision

The **City Vision** is to become a **Digitally empowered, sustainable tourist destination** to strengthen and enhance the tourist identity of the city of Heraklion ...

- ...and its financial impact to the local economy
- within the next **4 years...**

through

- Digital transformation
- Green, sustainable development
- Supporting the primary sector (local products to support the local economy)
- Sustainable urban mobility solutions
- Smart applications and services for the tourism sector
- Open Data applications and services

# City strategy: justification

City strategy addresses 4 key domains and stakeholder needs – tourism, economy, mobility and environment.

- Smart tourism solutions: Solutions to enhance visitor experience, promotion of the city's tourist identity, transformation of the city from a “place to transfer” to “a place to stay”
- Smart Economy: Use of Open data for businesses & tourism, Clustering between city businesses, Training in digital marketing, economy, ICT in green tourism, Training in digital skills.
- Smart Mobility: Buses as a service platform, ICT in solving traffic problems, controlled parking, implementation of smart solutions to improve inner city transportation, development of pedestrian networks / bike routes.
- Smart Environmental solutions: waste management and monitoring, environmental indicators monitoring, energy consumption monitoring & management

Needs are mutual and generate a great challenge: to locate solutions that address common issues and that serve many stakeholders simultaneously.

# City strategy: justification

1. Stakeholder engagement in ICC comes from the highest management level, which validates strong interest so far and it is expected to grow further.
2. Heraklion has extensive experience and a mature ICT infrastructure to develop a digital transformation strategy. Most of the stakeholders involved have implemented or currently implement various projects at local, regional, national and European levels.
3. There is an active local SME ICT community to support a broad and ambitious smart city project portfolio
4. There is a mature business environment to take over and further exploit innovative solutions

# City strategy: justification

## Local enablers:

- City's reputation - makes it an attraction for an extremely large number of visitors and businesses.
- Smart City status - giving the opportunity to participate in innovative programs with very advanced cities that can contribute to experience and solutions.
- Presence of critical infrastructure - an important basis for the implementation of new actions.
- Experience in similar projects - almost all stakeholders have implemented or are implementing important projects.
- Maturity of the city's smart strategy and actions over the last 10 years
- History, Monuments, Museums - the presence of remarkable and different kind of historical monuments and museums is a competitive advantage for tourism activities.
- Natural environment – the magnificent landscape of the region contribute to the increase of the number of visitors in the area.
- Community cohesion - facilitates the planning and implementation of actions, as any needs research becomes easier and more reliable.

Section

2

# Heraklion: Ambition and roadmap

ICC Transformation

February 2021 to May 2021

# City Vision

The **City Vision** is to become a **Digitally empowered, sustainable tourist destination** to strengthen and enhance the tourist identity of the city of Heraklion ...

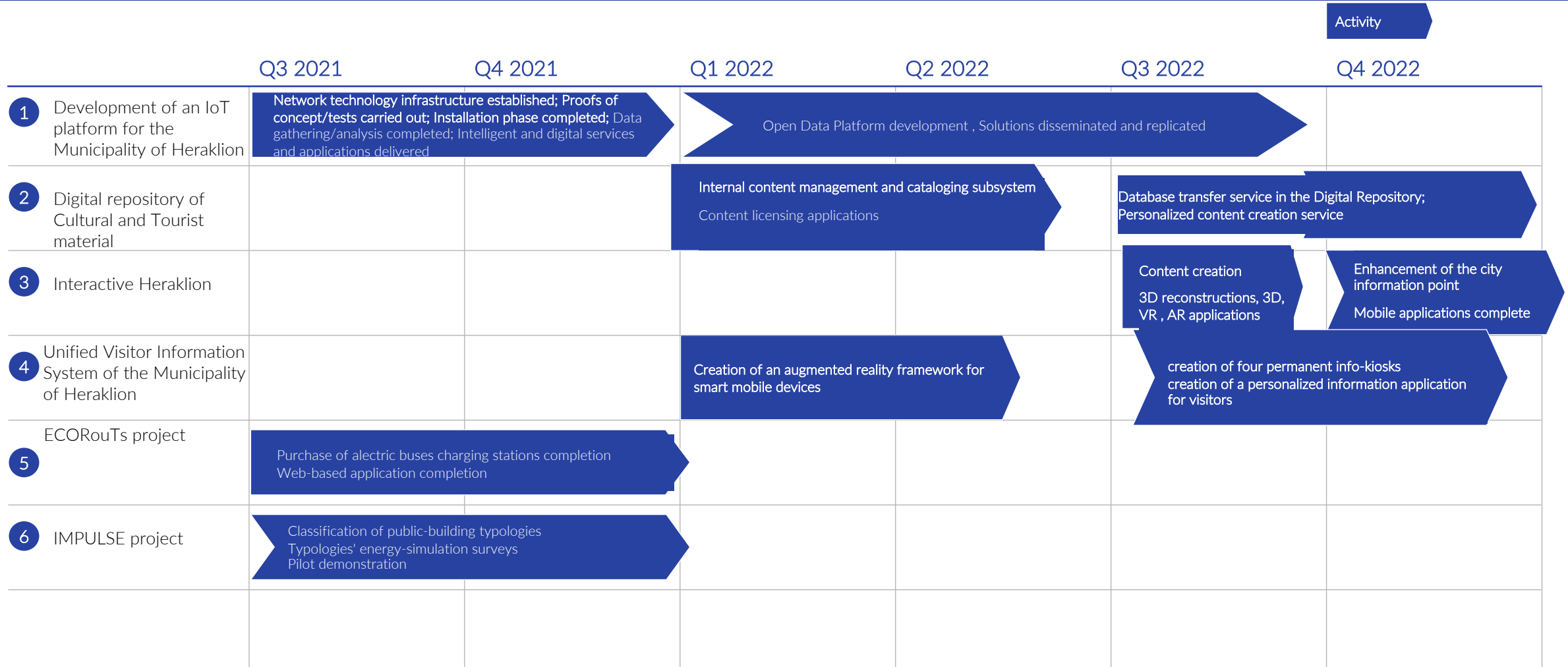
- ...and its financial impact to the local economy
- within the next **4 years...**

through

- Digital transformation
- Green, sustainable development
- Supporting the primary sector (local products to support the local economy)
- Sustainable urban mobility solutions
- Smart applications and services for the tourism sector
- Open Data applications and services



# High level implementation roadmap for solution (“10000m plan”)



# Rationale to road map

Overarching ICC city vision:

Taking advantage of the mature digital environment, a strong economic climate and citizen participation, the roadmap aims to transform and diversify the city's identity by building on key areas that will improve the overall quality of life of its citizens and visitors and make it a digitally empowered sustainable tourist destination

Key features – priorities of the city roadmap:


- Heraklion to be a real Smart City, a place of innovation, development of entrepreneurship, improved quality of life and electronic and participatory governance.
- Heraklion, a city with a strong cultural and tourism identity, to act as a lighthouse of culture with a strong creative industry, attractive tourism services and products, with a strong contribution to the local economy.
- Heraklion, a resilient city, with effective social support infrastructure, citizen-centred social policies, participatory solidarity networks, organized structures of civil protection, employment protection and a high level of citizen security.


## Roadmap summary

Priority	Initiatives
Enhance Digital transformation (#1)	<p>Development of an internet of things (IoT) platform for the Municipality of Heraklion (Initiative #1)</p> <p>Digital repository of Cultural and Tourist material (Initiative #2)</p>
Transform and Diversify the city's tourist identity (#2)	<p>Interactive Heraklion, (digital tourism applications for the "Sustainable Urban Development area" of Heraklion) (Initiative #1)</p> <p>Unified Visitor Information System of the Municipality of Heraklion and development of a personalized information application «Heraklion Gastronomy» (Initiative #2)</p>
Sustainable development (#3)	<p>Joint Actions for planning "Green"- environmentally friendly Routes in Touristic areas – ECORouTs (Initiative #1)</p> <p>IMPULSE Project ("Integrated Management Support for Energy efficiency in Mediterranean PUblic buiLdings" (Initiative #2)</p>


# Initiative charter Development of an internet of things (IoT) platform for the Municipality of Heraklion

## Strategy

**Description**  Major initiative towards urban innovation focusing on digital services, open high-value data, and information and communication technologies. Online platform for the collection, storage, promotion and sharing of urban data (environmental, traffic, noise, crowd measurement, etc.) from various sources in the external environment of the city and the development of data utilization applications.

**Link to vision**  Value-added digital services to citizens and businesses that will:  
 1) Enhance citizen participation  
 2) Introduce new services for SMEs in the tourism sector  
 3) Create added value for the city's end users

**Link to ambition statement**  Enhance digital transformation


**Expected impact and timing**  Initial implementation phase already completed, maintenance and upgrading of the infrastructure is continuous.

## Stakeholders involved


**Solution lead:**  Municipality of Heraklion


**Solution working team:** FORTH-ICS

**Contributors:**  Municipality of Heraklion


**Risks and mitigation**  **1)** Technical challenges; **2)** Costs related to implementation and maintenance; **3)** Bureaucracy in processes and complexity; **4)** Market solutions availability and maturity; **5)** Policy issues; **6)** Average broadband access speed inadequate for bandwidth demanding applications (e.g. IoT); **7)** Planned investments delaying the penetration of 5G (lock-in effect); **8)** Network saturation due to use of IoT devices; **9)** Security of the ICT and IoT deployed infrastructure.

## Inputs, outputs, outcomes and impacts

**Source of funding and estimated cost**  Own funds from the Municipality & ERDF funding












**Solution maturity outputs** 

- Expansion of LoraWan networks
- Digital Connecting Local Businesses
- Smart Controlled Parking slots
- Noise Levels Estimation
- Traffic Estimation
- Crowd Estimation
- Open Data Repository for third party data integration
- Interactive Dashboards for building custom Observatory panels over open data












**City performance outcomes and impacts** 

- 20% of city territory covered with a target of 10 antennas.
- 100% of city centre region covered.
- 30 % of city covered by IOT network.
- 30% coverage of the city territory.
- increase up to 40% of the available open datasets.
- increase up to 60% of new services, applications and businesses based on open datasets.

# Initiative charter Digital repository of Cultural and Tourist material

Strategy	Stakeholders involved	Inputs, outputs, outcomes and impacts
<p><b>Description</b></p>  <p>The project will design and implement an open data platform for the storage, management and distribution of digital content of tourist and cultural interest of the Municipality of Heraklion.</p> <p>The aim is to offer an information system for the provision of services of various licensed content of high resolution to public bodies, citizen collectives or individuals</p>	<p><b>Solution lead:</b> Municipality of Heraklion</p>  <hr/> <p><b>Solution working team:</b> Municipality of Heraklion &amp; FORTH-ICS</p>	<p><b>Source of funding and estimated cost</b></p> <p>200.000 euros National Strategic Reference Framework 2014-2020</p> 
<p><b>Link to vision</b></p>  <p>Value-added digital services to citizens and businesses:</p> <ol style="list-style-type: none"> <li>1) Enhance citizen participation</li> <li>2) Introduce new services for SMEs in the tourism sector</li> <li>3) Create added value for the city's end users</li> </ol>	<p><b>Contributors:</b> Municipality of Heraklion &amp; FORTH-ICS</p>  	<p><b>Solution maturity outputs</b></p> <p>Creation of an open data platform for the storage, management and distribution of digital content regarding projects of tourist and cultural interest of the Municipality of Heraklion.</p> 
<p><b>Link to ambition statement</b></p> <p>Enhance digital transformation</p> 	<p><b>Risks and mitigation</b></p> <p>Main risk associated with delays in the tender - contracting procedures for the project</p> 	
<p><b>Expected impact and timing</b></p>  <p>Project estimated duration is 24 months It will involve:</p> <ul style="list-style-type: none"> <li>Internal content management and cataloging subsystem</li> <li>Digital content search and navigation subsystem for end users, operators and businesses</li> <li>Content licensing applications &amp; Database transfer service in the Digital Repository</li> <li>Personalized content creation service</li> </ul>		<p><b>City performance outcomes and impacts</b></p> <p>A large array of content accessible to the wider public related to culture and tourism produced by public bodies, through a standardized procedure for collection and presentation.</p> 

# Initiative charter Interactive Heraklion, (digital tourism applications for the “Sustainable Urban Development area” of Heraklion)

Strategy	Stakeholders involved	Inputs, outputs, outcomes and impacts
<p><b>Description</b></p>  <p>The project will develop cutting-edge technologies that will be used to provide access to digital content: (a) on-site, during browsing (b) remotely, at events and exhibitions, (c) through the web, using fixed and portable devices and (d) through the existing information and tourism promotion infrastructure. The aim is to highlight cultural routes and points of interest and offer an innovative, interactive presentation of exhibits and cultural events.</p>	<p><b>Solution lead:</b> Municipality of Heraklion</p>  <hr/> <p><b>Solution working team:</b> Municipality of Heraklion &amp; FORTH-ICS</p> 	<p><b>Source of funding and estimated cost</b></p>  <p>200.000 euros, Region of Crete, Programme for Sustainable City Growth, National Strategic Reference Framework 2014-2020</p>
<p><b>Link to vision</b></p>  <p>Heraklion as a city with a strong cultural and tourist identity, an attractive offering of tourist services and products, with a strong contribution to the local economy</p>	<p><b>Contributors:</b> Municipality of Heraklion &amp; FORTH-ICS</p> 	<p><b>Solution maturity outputs</b></p>  <p>Development of an augmented reality infrastructure to provide information regarding Digital applications for tourism promotion and new digital services in tourism - culture, to enrich, complement or differentiate the tourism product, thus enhancing the tourist interest within the city of Heraklion.</p>
<p><b>Link to ambition statement</b></p>  <p>Enhance Digital transformation Transform and Diversify the city's tourist identity</p>	<p><b>Risks and mitigation</b></p>  <p>Main risk associated with delays in the tender - contracting procedures for the project</p>	<p><b>City performance outcomes and impacts</b></p>  <p>Main outcomes and impacts are: Enhanced information and improved access and visitor experience regarding cultural routes, events and points of interest.</p>
<p><b>Expected impact and timing</b></p>  <p>An enhanced experience, an added value product for visitors of the city but also its citizens, to access cultural routes, events and points of interest. Enhancing participation in tourism events through innovative content and applications. The solution is expected to be delivered by June 2023.</p>		

# Initiative charter Unified Visitor Information System of the Municipality of Heraklion and development of a personalized information application “Heraklion Gastronomy”

## Strategy

### Description



The project will upgrade the existing info-kiosks infrastructure for city visitors through the use of innovative ambient intelligence technologies. An augmented reality application for smart mobile devices offering thematic routes, from Heraklion to various points of interest, presenting local history and tradition, customs and traditions will be developed. A dedicated theme on "Heraklion Gastronomy" will offer a gastronomic tour in the city.

Heraklion as a city with a strong cultural and tourist identity, an attractive offering of tourist services and products, with a strong contribution to the local economy, through

### Link to vision



- 1) Emphasizing its originality and local characteristics
- 2) Creating a unique experience for the visitor
- 3) Offering enhanced experiences through digital services and applications
- 4) Supporting the tourist sector through Open Data & smart apps

### Link to ambition statement

Transform and Diversify the city’s tourist identity



### Expected impact and timing



The impact can be described as an enhanced experience offered by the Municipality to the city visitor (valuable knowledge about the enogastronomical tradition of Heraklion by means of enhanced information provision, interaction and play through ICT)

The project is scheduled for completion by 31/12/2022 and is expected to start creating impact during the first half of 2023.

## Stakeholders involved

**Solution lead:** Municipality of Heraklion



**Solution working team:** Municipality of Heraklion & FORTH-ICS



**Contributors:** Municipality of Heraklion & FORTH-ICS



### Risks and mitigation



The uncertainties that had to be addressed are mainly related to the adoption of the solutions proposed by the stakeholders involved as well as the end users (visitors/tourists) .

## Inputs, outputs, outcomes and impacts

### Source of funding and estimated cost



Rural Development Program, National Strategic Reference Framework 2014-2020  
60.000 Euros

### Solution maturity outputs



Expanding the information infrastructure of the visitors of the Municipality of Heraklion by creating interactive information points, INFO kiosks, and connection with the existing infrastructure through innovative smart technologies.

### City performance outcomes and impacts



An alternative experience as an added value product for visitors of the city to experience traditional local winemaking.

# Initiative charter Joint Actions for planning "Green"- environmentally friendly Routes in Touristic areas – ECORouTs

## Strategy

### Description



The aim of the project was to realize joint actions for the creation of green - environmentally friendly routes within tourist areas in the participant cities. It focuses on the reduction of CO2 and other gas emissions that are harmful to both human health and the natural environment, as well as on the promotion of actions that help reduce the environmental risks created by urban transport.

### Link to vision



Ensure a sustainable and healthy environment and quality of life for all through:

- 1) reducing the "energy footprint" of the Municipality
- 2) setting up a smart and green mobility and transport network

### Link to ambition statement



European Sustainable development

### Expected impact and timing



Promotion of transport means and transport modes (electric vehicles) within the historical center of municipalities with zero environmental footprint and less noise.

Strengthening the environmental consciousness of project target groups through publicity actions.

Support the sustainable development of transport systems in the project area, creating added value for citizens and tourists

## Stakeholders involved

### Solution lead:



.Municipality of Heraklion

### Solution working team:



Municipality of Heraklion  
Municipality of Paphos (Cyprus)  
Municipality of Chania  
Municipality of Aradippou (Cyprus)

### Contributors:



Municipality of Heraklion  
Municipality of Paphos (Cyprus)  
Municipality of Chania  
Municipality of Aradippou (Cyprus)

### Risks and mitigation



Lack of experience in the use, maintenance, and repair of electric vehicles.  
Lack of facilities for their safe parking.  
Lack of administrative structure and staff for the operation of a public (municipal) transport system.  
Legal / Administrative difficulties in their use in cooperation with urban transport bodies.

## Inputs, outputs, outcomes and impacts

### Source of funding and estimated cost



Interreg V-A "Greece-Cyprus 2014-2020"  
616.000 Euros (Total budget)

### Solution maturity outputs



Reducing CO2 emissions and other harmful gases for both human health and the environment and promoting actions that reduce environmental risks from urban transport  
Improving the quality of services provided to the local population and visitors  
Reduction of gaseous pollutants in urban cross-border areas and particularly high-pollution areas

### City performance outcomes and impacts



Immediate benefits include the serving of residents in the south-end neighbourhoods to reach the city centre with sustainable means of transport. Indirect benefits of the route include energy savings for public fleet, reduction of air and noise pollution, less parking demand in the CC, information and awareness raising regarding the benefits of vehicle electrification.



# Initiative charter “Integrated Management Support for Energy efficiency in Mediterranean PUblic buiLdings”

Strategy	Stakeholders involved	Inputs, outputs, outcomes and impacts
<p><b>Description</b></p>  <p>The aim of the project was the pilot implementation of Trans-Mediterranean protocols for the elaboration of affordable energy upgrading plans for the Municipal Buildings. The classification of an initial representative sample of 76 municipal buildings (mostly school buildings) was completed by the Municipality of Heraklion</p>	<p><b>Solution lead:</b> Centre for Renewable Energy Sources and Saving (CRES)</p>  <p><b>Solution working team:</b> Municipality of Heraklion, Valencia Institute of Building, Elche City Council, EnvirobatBDM, Regional Agency Provence - Alpes - Cote d'Azur, Municipality of Ravenna, Energy Institute Hrvoje Požar, City of Osijek, City of Mostar</p> 	<p><b>Source of funding and estimated cost</b></p> <p>Interreg MED 2014-2020 (ERDF) 158.000 Euros</p> 
<p><b>Link to vision</b></p>  <p>Ensure a sustainable and healthy environment and quality of life for all through:</p> <ol style="list-style-type: none"> <li>1) reducing the "energy footprint" of the Municipality</li> <li>2) setting up a smart and green mobility and transport network</li> </ol>	<p><b>Contributors:</b> See above.</p> 	<p><b>Solution maturity outputs</b></p>  <p>Testing of typologies' classification, energy dynamics, cost-financial analysis, and IT protocols for the creation of a decision-support system for planning energy efficiency interventions in public buildings</p>
<p><b>Link to ambition statement</b></p>  <p>Green Sustainable development.</p>	<p><b>Risks and mitigation</b></p>  <p>Lack of available energy consumption data for the building stock and of easy-to-use decision-support systems to conclude the most affordable action plans with bankable and realistic solutions.</p> <p>Lack of a systematic approach to plan energy renovation projects for public buildings, and of a proper decision-support instrument for planning such renovations</p>	<p><b>City performance outcomes and impacts</b></p>  <p>Improving energy management capacities of Municipal buildings.</p> <p>Involving target groups and increasing energy efficiency plans</p>
<p><b>Expected impact and timing</b></p>  <p>Comprehensive and homogenized information on its public buildings (3rd -16th month).</p> <p>Pilot demonstrations of high impacts with low-cost measures and monitoring system (9th - 24th month).</p> <p>Integration into a web-based system (17th - 24th month).</p>	<p>Insufficient capacity of public administration to set-up reliable and affordable energy efficiency plans for their public building stock.</p> <p>Limited budget and/or insufficient capacity to attract funding for implementing ERB projects.</p>	

# Key Performance indicators (1/2)

Solution	Initiative	City performance – outcomes and impacts	Targets
Development of an internet of things (IoT) platform for the Municipality of Heraklion	Initiative 1	<ul style="list-style-type: none"> <li>- Smart Controlled Parking slots</li> <li>- Noise Levels Estimation</li> <li>- Traffic Estimation</li> <li>- Crowd Estimation</li> <li>- Open Data Repository</li> </ul>	CO2 Emissions reduction Environmental Noise Monitor and Reduction Effective Traffic and crowd management Better use of third party data for the city of heraklion
Digital repository of Cultural and Tourist material	Initiative 2	Creation of an open data platform for the storage, management and distribution of digital content regarding projects of tourist and cultural interest of the Municipality of Heraklion.	Develop new services on top of open data for the travel industry
Interactive Heraklion	Initiative 1	Development of an augmented reality infrastructure to provide information regarding Digital applications for tourism promotion and new digital services in tourism - culture, to enrich, complement or differentiate the tourism product, thus enhancing the tourist interest within the city of Heraklion.	Offer new experiences to travelers, city visitors / tourists and locals

## Key Performance indicators (2/2)

Solution	Initiative	City performance – outcomes and impacts	Targets
Unified Visitor Information System of the Municipality of Heraklion	<b>Initiative 2</b>	Expanding the information infrastructure of the visitors of the Municipality of Heraklion by creating interactive information points, INFO kiosks, and connection with the existing infrastructure through innovative smart technologies.	Offer new experiences to city visitors / tourists and locals
Joint Actions for planning "Green"- environmentally friendly Routes in Touristic areas – ECORouTs	<b>Initiative 1</b>	Reducing CO2 emissions and other harmful gases for both human health and the environment and promoting actions that reduce environmental risks from urban transport	Reducing CO2 emissions and other harmful gases
("Integrated Management Support for Energy efficiency in Mediterranean PUBlic buiLdings" - IMPULSE	<b>Initiative 2</b>	Testing of typologies' classification, energy dynamics, cost-financial analysis, and IT protocols for the creation of a decision-support system for planning energy efficiency interventions in public buildings	Improving energy management capacities of Municipal buildings. Involving target groups and increasing energy efficiency plans

# Key Performance indicators – overview (1/3)

Solution	Activities – Inputs and actions	Solution Maturity - outputs	City performance – outcomes and impacts
<p>Development of an internet of things (IoT) platform for the Municipality of Heraklion</p>	<p>Network technology infrastructure established; Proofs of concept/tests carried out; Installation phase completed; Open Data Platform development . Data gathering/analysis completed; Intelligent and digital services and applications delivered; Solutions disseminated and replicated</p>	<ul style="list-style-type: none"> <li>- Expansion of LoraWan networks</li> <li>- Digital Connecting Local Businesses</li> <li>- Smart Controlled Parking slots</li> <li>- Noise Levels Estimation</li> <li>- Traffic Estimation</li> <li>- Crowd Estimation</li> <li>- Open Data Repository for third party data integration</li> <li>- Interactive Dashboards for building custom Observatory panels over open data</li> </ul>	<ul style="list-style-type: none"> <li>- Smart Controlled Parking slots</li> <li>- Noise Levels Estimation</li> <li>- Traffic Estimation</li> <li>- Crowd Estimation</li> <li>- Open Data Repository</li> </ul>
<p>Digital repository of Cultural and Tourist material</p>	<p>Internal content management and cataloging subsystem            Digital content search and navigation subsystem for end users, operators and businesses            Content licensing applications            Licensing - authorization subsystem regarding interoperability services            Database transfer service in the Digital Repository            Personalized content creation service</p>	<p>Number of content items            Number of end users            Number of stakeholders requesting access to content            Number of businesses of the ICT and culture and tourism sector requesting access to content            Number of licenses per year</p>	<p>Creation of an open data platform for the storage, management and distribution of digital content regarding projects of tourist and cultural interest of the Municipality of Heraklion.</p>

# Key Performance indicators – overview (2/3)

Solution	Activities – Inputs and actions	Solution Maturity - outputs	City performance – outcomes and impacts
Interactive Heraklion	<p>Content creation 3D reconstruction Implementation of 3D Virtual Narrators Implementation of AR and VR presentation modalities Enhancement of the city information point Mobile applications for branding Heraklion in the context of tourism events world-wide</p>	<p>number of visitors arriving in the city on a daily basis, time spend &amp; money during their stay Number of new services / processes / business approaches for SMEs in the tourism sector</p>	<p>Development of an augmented reality infrastructure to provide information regarding Digital applications for tourism promotion and new digital services in tourism - culture, to enrich, complement or differentiate the tourism product, thus enhancing the tourist interest within the city of Heraklion.</p>
Unified Visitor Information System of the Municipality of Heraklion	<p>Creation of an augmented reality framework for smart mobile devices, which can host thematic routes creation of four permanent info-kiosks in sub-urban / rural areas of Heraklion creation of a personalized information application for visitors of the Info-Point of the Municipality of Heraklion</p>	<p>Number of visitors arriving in the city on a daily basis, time spend during their stay Number of new services / processes / business approaches for SMEs in the tourism sector</p>	<p>Expanding the information infrastructure of the visitors of the Municipality of Heraklion by creating interactive information points, INFO kiosks, and connection with the existing infrastructure through innovative smart technologies.</p>
Joint Actions for planning "Green"-environmentally friendly Routes in Touristic areas – ECORouTs	<p>Purchase of 2 electric buses and 2 charging stations (Heraklion) Study of routes to historic sites setting up routes and bus stops Web-based application presenting GPS-based real-time arrivals/departures and information to be available for the nearest stop and the electric bus route.</p>	<p>Number of new cycling routes created Number of green bus routes created Number of passengers using the scheme Number of parking spaces saved</p>	<p>Reducing CO2 emissions and other harmful gases for both human health and the environment and promoting actions that reduce environmental risks from urban transport</p>

# Key Performance indicators – overview (3/3)

Solution	Activities – Inputs and actions	Solution Maturity - outputs	City performance – outcomes and impacts
(“Integrated Management Support for Energy efficiency in Mediterranean PUblic buiLdings” - IMPULSE	Classification of public-building typologies Typologies' energy-simulation surveys Typologies' renovation planning and potential financing Pilot demonstration and monitoring projects Recording of energy indicators and their time evolution illustration in an online monitoring system IMPULSE-system trial applications for SEAPs' development	% of energy consumption savings % of energy budget saved for the municipality	Testing of typologies' classification, energy dynamics, cost-financial analysis, and IT protocols for the creation of a decision-support system for planning energy efficiency interventions in public buildings

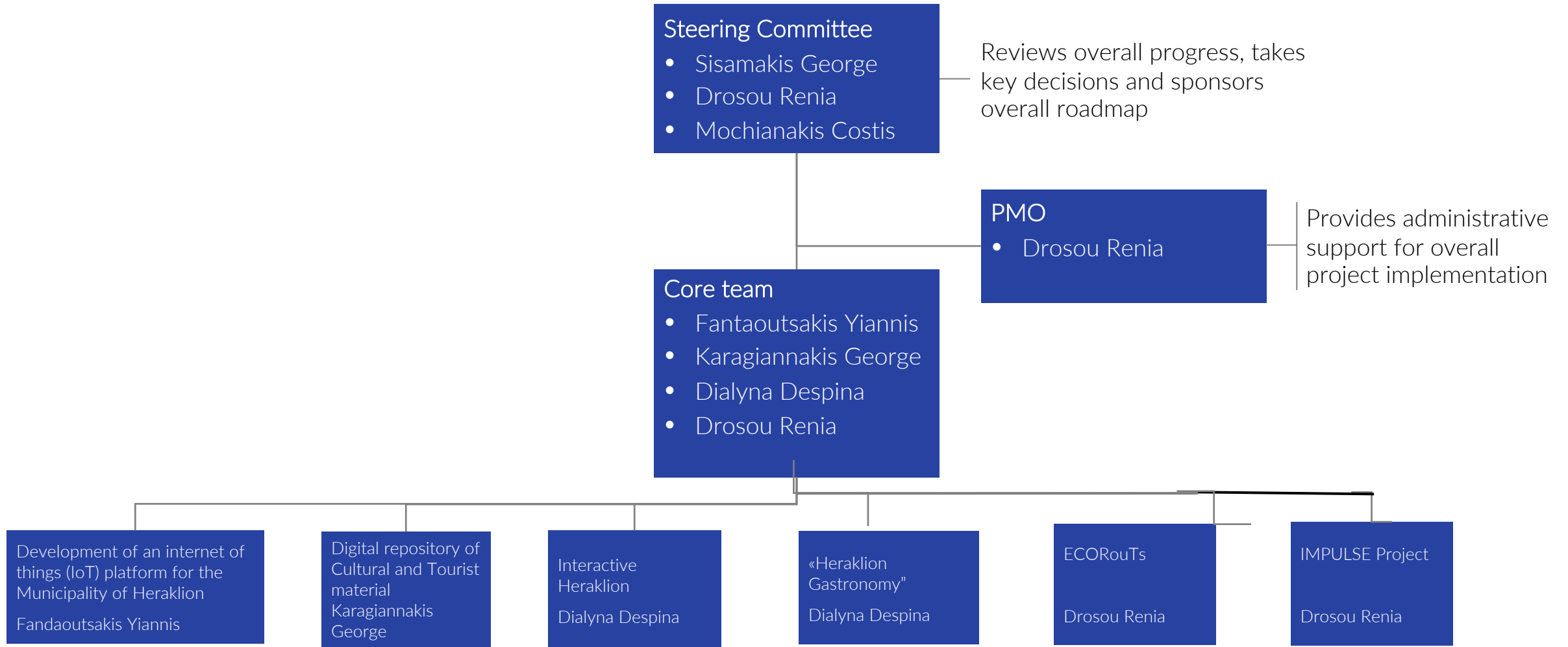
# Rationale to KPI approach

All KPIs are the product of collaboration of members of three Municipal Committees:

- The Committee for tourism and entrepreneurship (Institutional stakeholders)
- The Committee “Heraklion Smart City” (scientific and technology experts)
- The Committee for public consultation (active citizens and citizen associations)

The Committees accommodate the visions and aspirations of all actors participating to the city’s economic, social and innovation activities.

# Governance structure for roadmap implementation





The European Commission's  
**INTELLIGENT CITIES  
CHALLENGE**

Section

3+4

# Heraklion: Impact

ICC Transformation

February 2021 to May 2022

## Impact executive summary

- The involvement of stakeholders and citizens in the implementation of the city's strategic vision is at the same time the major success and the most difficult achievement during ICC. The development of a culture of cooperation still requires effort, and for this reason the progress made in this field is encouraging, especially in the tourist and entrepreneurship sectors.
- One of the main commitments is very ambitious: to expand the participation of stakeholders and citizens to the decision-making process as far as the general (non-technical) development strategy is concerned. This does not mean to rule by referendum, but to offer to the Municipality a governance which - following the model adopted by numerous ICC Cities - takes into account to the maximum possible level needs and inputs deriving from the citizens and the economy, including the creative cultural industry.
- Over the next three years, it is crucial to expand and -where necessary- adjust the strategic priorities of the municipality with regards to its smart city vision, to offer new smart services and ICT infrastructure projects in order to match the ongoing urban regeneration projects that transform the city's urban environment.

# Impact executive summary

## Major Obstacles

- Initial hesitance to change
- COVID-19 Restrictions
- Limited Budget dedicated to ICC

## Major Successes

- Stakeholder engagement
- ICC as city priority
- Assessment of KPIs is positive

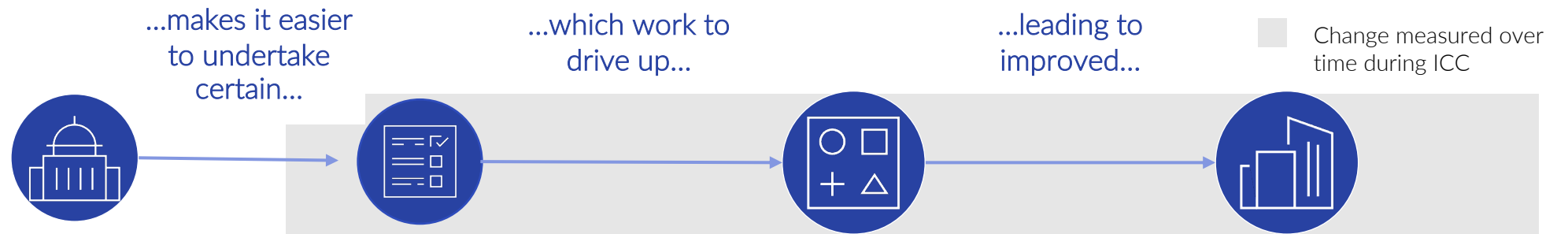
## KPIs Progress

- Satisfactory given existing conditions
- The good progress is a stimulus to continue ICC strategy and vision

## 3-year commitment

- Expansion of the Smart City Infrastructure.
- Exploitation of data analytics.
- Generation of new applications (citizens, visitors and SME's).
- New finance opportunities for funding projects which could be part of future ICC initiatives.
- Ensuring political commitment to continue the Smart City Strategy plan.
- Enhancing stakeholder collaboration and increasing citizens engagement

# There are four types of measurable concepts that come together to drive success in the ICC



Idea	Local enablers – city characteristics	Activities – actions and inputs	Technology maturity – outputs	City performance – outcomes and impacts
Description	Each city has <b>unique strengths and weaknesses that help action happen</b> . These can be stakeholder networks, local capabilities, cultural factors or many more that drive success in ICC projects.	A cities main intervention on the ICC is to <b>take actions</b> . These can be <b>direct</b> (e.g., procuring technology), or <b>indirect</b> , (e.g., forming a working group on a topic). The right actions can lead to the right <b>inputs going in to the ICC</b> (e.g., funding, time)	<b>Cities can drive technological solutions</b> to try and improve city performance. <b>How well these solutions are currently used can be described as their 'maturity'</b> , - considering whether they are available for stakeholder use, what stakeholders think of them, and so on	Success of an intelligent city is ultimately measured by its ability to <b>address city needs</b> . These can be considered an <b>improved quality of citizen life</b> and a <b>better environment for stakeholders</b>
Example	A history of strong collaboration between city and a local university...	...allows the creation of a new e-health pilot project using social housing in the city...	...leads to the launch a new tele-health solution utilising 4G data connections...	...resulting in pre-emptive diagnosis and lower wait times at medical facilities

# Assessment of city performance - progress against KPIs – discussion (1/2)

The city's ICC strategy and vision is describes by the following three priorities:

Enhance Digital transformation: to implement & offer value-added digital services to citizens and businesses that will:

- 1) Enhance citizen participation
- 2) Introduce new services / processes / business approaches for SMEs in the tourism sector
- 3) Create added value for the city's end users (tourists, citizens) by building on the merits of ICT/digital transformation

Transform and Diversify the city's tourist identity: Heraklion as a city with a strong cultural and tourist identity, an attractive offering of tourist services and products, with a strong contribution to the local economy.

Through establishing a new, diversified holistic framework for smart tourism to enhance the city's position and reputation as a "smart" tourist destination

Green Sustainable development: Ensure a sustainable and healthy environment and quality of life for all through:

- 1) reducing the "energy footprint" of the Municipality
- 2) setting up a smart and green mobility and transport network

Quantification of the city's performance against the ICC strategy is not yet possible. However, essential KPI's are measured per specific solution to assess progress.

## Assessment of city performance - progress against KPIs – discussion (2/2)

- Out of the 6 Solutions selected in the context of ICC, 4 have been completed and results have either been measured or are expected in the next two years.
- The implementation of one Solution is ongoing, while one is due to be contracted and start in September 2022 (foreseen completion by Q2 2024).
- The overall performance of the proposed Solutions has produced a positive footprint for the City, while there is always room for improvement.
- The main factor influencing ICC as a whole and the City performance specifically has obviously been the unforeseen in 2018/9 pandemic and its consequences.

# Assessment of solution maturity - discussion

The degree of correctness of solutions' scaling and measurement has been undoubtedly affected by the COVID-19 pandemic and its negative impact on public administration and city activity in general.

The extension of ICC will also enable participating Cities to correctly assess the maturity, effectiveness and overall impact of solutions adopted during the first phase.

# Assessment of city ecosystem and activities - progress against KPIs

	Where we started	Midway through the challenge	Final results
City performance Development of an internet of things (IoT) platform for the Municipality of Heraklion			
1 KPI 1 - Expansion of LoraWan networks	1 LoraWan Gateway	1 LoraWan Gateway	3 LoraWan Gateway
2 KPI 2 - Smart Controlled Parking slots	0 Parking Slots	5 Parking Slots	27 Parking Slots
3 KPI 3 - Noise Levels Estimation	No sensors installed	1 Pilot Sensor node	2 Operating Sensor nodes
4 KPI 4 - Traffic Estimation	No sensors installed	1 Pilot Sensor node	2 Operating Sensor nodes
5 KPI 5- Crowd Estimation	No sensors installed	1 Pilot Sensor node	3 Operating Sensor nodes



# Assessment of city ecosystem and activities - progress against KPIs

	Where we started	Midway through the challenge	Final results	
<b>City performance - Digital repository of Cultural and Tourist material</b>				
1	KPI1 - Number of content items	0	Project started 6/2022 – Too early to assess	Expected competition by Q2 2024
2	KPI 2 - Number of end users	0	Project started 6/2022 – Too early to assess	Expected competition by Q2 2024
3	KPI 3 - Number of stakeholders requesting access to content	0	Project started 6/2022 – Too early to assess	Expected competition by Q2 2024
4	KPI 4 - Number of businesses of the ICT and culture and tourism sector requesting access to content	0	Project started 6/2022 – Too early to assess	Expected competition by Q2 2024
5	KPI 5- Number of licenses per year	0	Project started 6/2022 – Too early to assess	Expected competition by Q2 2024

# Assessment of city ecosystem and activities - progress against KPIs

	Where we started	Midway through the challenge	Final results
<b>City performance - Unified Visitor Information System of the Municipality of Heraklion</b>			
1 KPI1 - Number of visitors arriving in the city on a daily basis	45.000 – 60.000 daily average on yearly basis	90% Decrease in arrivals due to pandemic	55.000 – 60.000 daily average on yearly basis (Expected)
2 KPI 2 - time spent during their stay	1 Overnight on average, on a yearly basis	90% Decrease in arrivals due to pandemic	Approximately 2 Overnights average on yearly basis (Expected)
3 KPI 3 - Number of new services / processes / business approaches in the tourism sector	1 Info Point	1 Info Point	4 Info Points

# Assessment of city ecosystem and activities - progress against KPIs

Where we started

Midway through the challenge

Final results

## City performance - Joint Actions for planning "Green"- environmentally friendly Routes in Touristic areas – ECORouTs

1	KP1 - Number of new cycling routes created	3 cycling routes	3 cycling routes	5 cycling routes
2	KPI 2 - Number of green bus routes created	1 route – 2 buses	1 route – 2 buses	3 routes – 4 buses
3	KPI 3 - Number of passengers using the scheme	~ 12.000 passengers per month	~ 14.000 passengers per month (due to pandemic restrictions)	~ 62.000 passengers per month
4	KPI 4 - Number of parking spaces saved	150 Parking Slots (daily)	170 Parking Slots (daily)	400 Parking Slots (daily)

# Assessment of city ecosystem and activities - progress against KPIs

	Where we started	Midway through the challenge	Final results
<b>City performance - ("Integrated Management Support for Energy efficiency in Mediterranean Public buildings" - IMPULSE)</b>			
1 KP1 - % of energy consumption savings (4 buildings)	-	-	Radical renovation of the pilot buildings that will lead to reducing the annual consumption of primary energy by 4.8 GWh (expected 25% energy consumption savings for Pilot buildings until 2030)
2 KPI 2 - % of energy budget saved for the municipality (4 pilot buildings)	0	0	Estimated reduction of annual energy costs by €250,000 until 2030 (2021-22 pricing).

# Assessment of city ecosystem and activities - discussion

- Although the plan has been difficult to respect due to necessary adaptations to COVID restrictions, the City is satisfied with progress made.
- Despite partial reorganization of municipal services and initial hesitance to contribute on behalf of some stakeholders, all involved actors did in the end achieve a positive level of collaboration which constitutes a solid basis for the continuation of ICC and other forms of synergies.

# 5 key lessons

Lesson	Reflections
1	Expansion of the technological infrastructure is necessary in order to accommodate additional services and applications planned.
2	The cooperation with City stakeholders is key to success (but challenging to achieve)
3	ICC methodology could be extended to other fields of city planning
4	Need to find ways to better exploit city collaborations in the context of ICC
5	Less bureaucracy and more targeted funding will help in improving ICC & city's performance

## Reflections on city collaborations

City collaboration has been rather limited during ICC.

Cities which share experts, or which have common projects either as a result of common planning or casually, have the chance to cooperate beyond the experience sharing occasions ICC offered.

In the case of Heraklion, even though online common sessions during the Labs did represent the ideal moments to communicate strategies and to look for potential areas of collaboration, truth is that this lack of active cooperation was felt within a Challenge which is open to exchanges at all levels.

One of the engagements and challenges for the next three years with ICC is that City collaborations – also through the key role played by ICC experts – will become a political priority sided by budget, expertise and joint efforts, both within Greece and with Cities abroad.

# Commitments

## Commitments to on-going resources

The city is willing to engage human and financial resources in order to continue progressing in current and future ICC projects.

## Commitments to on-going collaboration

One of the engagements and challenges for the next three years with ICC is that both cooperation among local stakeholders and City collaborations – also through the key role played by ICC experts – will become a political priority sided by budget, expertise and joint efforts, both within Greece and with Cities abroad.

## Commitments to on-going KPIs

City is continuously measuring all ongoing KPI's in order to assess overall future progress and implementation of Smart City Strategy.



## 3 Year plan - ambitions

Building on the ICC, what would the city aim to achieve in 3 years time?

1. Expansion of the Smart City Sensors Grid.
2. Exploitation of data analytics over the data that is collected.
3. Generation of new applications (citizens, visitors and SME's) by using the collected data.

What steps will you take over the next 3 years to achieve these goals?

1. Explore new finance opportunities for funding projects which could be part of future ICC initiatives.
2. Ensure political commitment to continue the Smart City Strategy plan.
3. Enhance stakeholder collaboration and increase citizens engagement

# 3 Year plan - targets

KPI	Category	What commitments will the city make to this end?
1 # of Sensors	Expansion of the Smart City Sensors Grid.	Human and financial resources will be dedicated to this category
2 # of data applications	Exploitation of data analytics over the data that is collected.	Human and financial resources will be dedicated to this category
3 # of applications and services	Generation of new applications (citizens, visitors and SME's) by using the collected data.	Human and financial resources will be dedicated to this category
4 Budget obtained	Explore new finance opportunities for funding projects which could be part of future ICC initiatives.	Political engagement and commitment for targeted budget allocation
5 Output of stakeholders committees	Enhancing stakeholder collaboration and increasing citizen engagement	Investment in stakeholders' cooperation