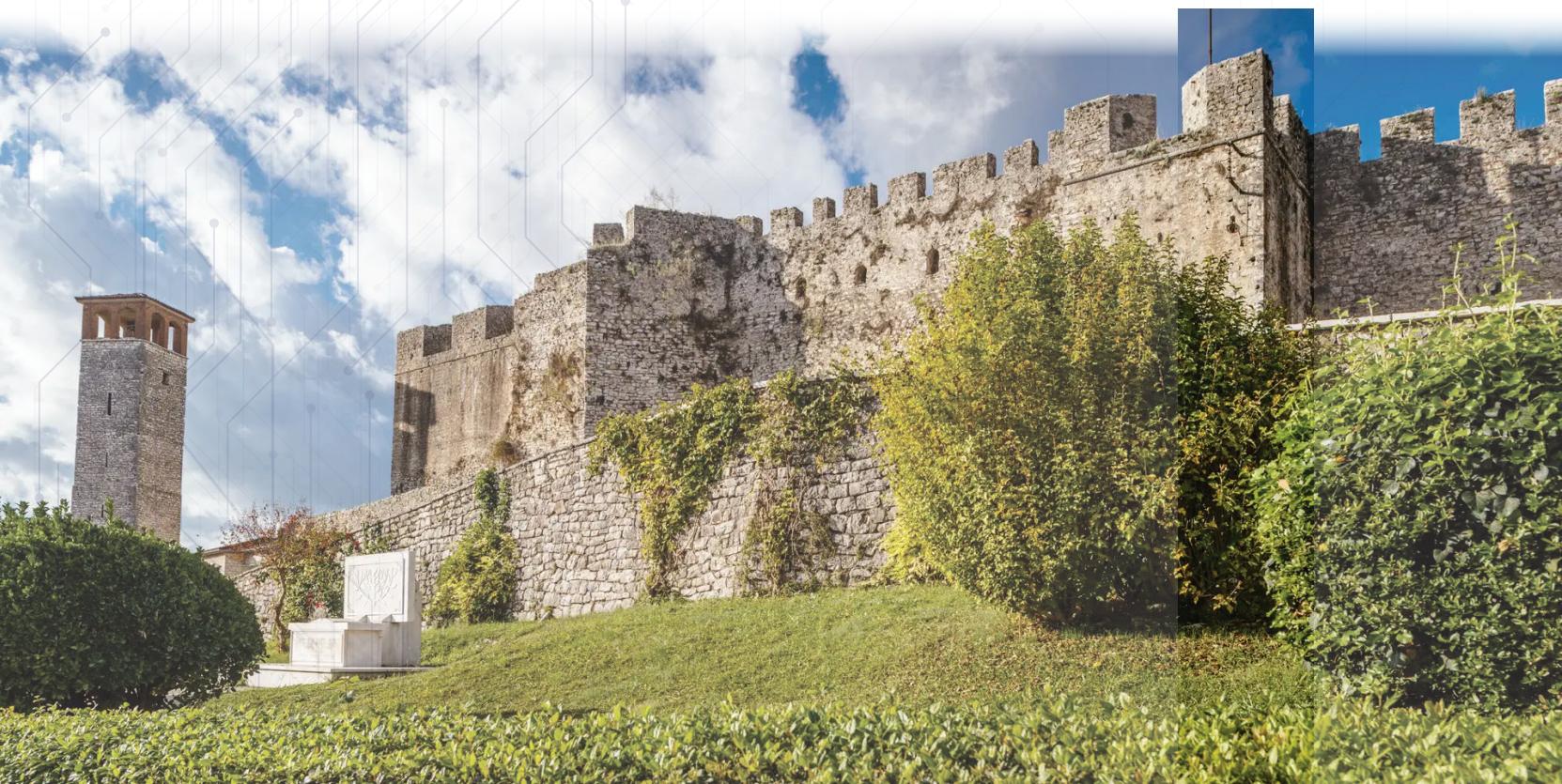
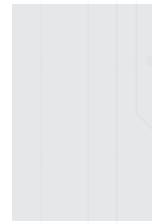


INTEGRATED ACTION PLAN

City of Arta



URBACT



Co-funded by
the European Union
Interreg

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Overall theme being addressed – including presentation of URBACT network topic and over- arching challenges.

The rapid digital transformation, accelerated by COVID-19, is expected to fuel interest in advanced technologies like the AI-powered metaverse. In the next five years, this emerging technology could offer cities new ways to manage services and engage citizens through immersive digital experiences, transforming urban planning. Networks like URBACT play a key role in promoting sustainable urban development by enabling municipalities to share knowledge and innovative solutions. The Industrial System Institution (ISI) represents the Municipality of Arta in the URBACT network, helping to drive digital evolution through strategic planning and preparing the municipality for future integration into the metaverse.



Arta, a city rich in history and cultural heritage, is situated in the Epirus region of Greece. Through participation in the METACITY project, Arta aims to take its first steps toward becoming a METAVERSE city by integrating smart city technologies, improving citizen engagement, and becoming a forward-thinking municipality that preserves its heritage while embracing modern digital solutions.



Current situation Location territorial context

Arta, the second-largest municipality in Epirus, covering an area of 402.3 km² with a population of 41,600 (Hellenic Statistical Authority). It includes the municipal units of Arta, Amvrakikos, Vlacherna, Xirovouni, and Filothei. The area features diverse landscapes, from the Pindos Mountains (Xirovouni, Tzoumerka) to the fertile plains and the Amvrakikos Gulf, home to the Amvrakikos National Wetlands Park. Rich in history and culture, it offers substantial tourism potential. Arta city, the regional capital, serves as a hub for services, commerce, and education, with key institutions like the General Hospital of Arta and the University of Ioannina branch. Its urban growth is shaped by its location along major national roads, reinforcing its importance within the Balkan Adriatic Area.

Population statistics and demography

The demographic profile of Arta reveals challenges driven by aging trends and population decline. Census data from 2021 shows a reduction in the younger population, with a notable 16.4% decrease in the 0–9 age group and a 25% drop in the 20–29 age group. In contrast, the elderly population (60–69 and 80+ age groups) has increased significantly, highlighting the growing dependency ratio. This demographic shift underscores the need for strategies to reverse population decline and reinvigorate local employment opportunities, particularly for younger generations.¹

¹ https://elstat-outsourcers.statistics.gr/Booklet_%CE%91%CF%80%CE%BF%CF%84%CE%B5%CE%B%CE%5%CF%83%CE%BC%CE%B1%CF%84%CE%B1%CE%A0%CE%B%CE%87%CE%B8%CF%85%CF%83%CE%BC%CE%BF%CF%852023_II_GR_FINAL2_WEB.pdf

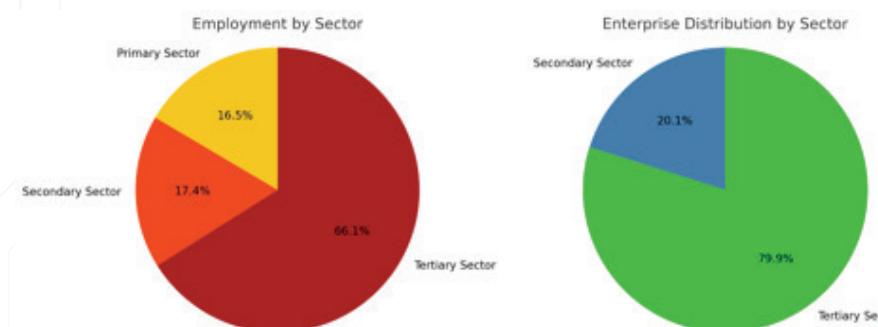




Age Group	Population 2021	Population 2011	Change %
0-9	24.704	29.553	-16.4%
10-19	31.736	33.021	-3.89%
20-29	29.876	39.835	-25%
30-39	33.727	44.635	-24.4%
40-49	44.289	44.006	+0.64%
50-59	44.094	44.663	-1.2%
60-69	44.915	40.015	+12.24%
70-79	36.633	37.379	-1.99%
80+	30.017	23.749	+26.39%

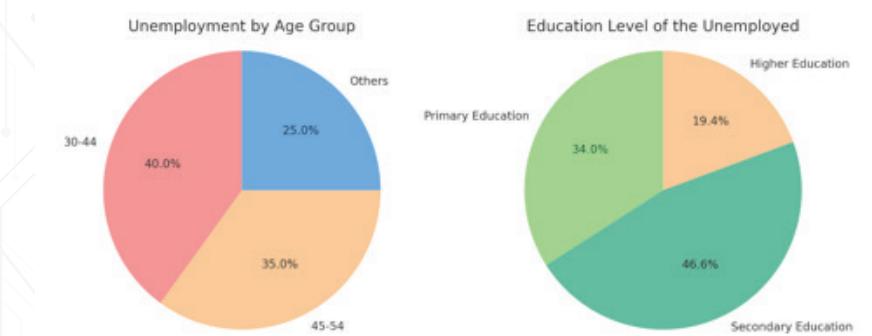
Industrial / economic composition, employment statistics

The Municipality of Arta's economically active population, according to the 2011 census, consist of 38.88% of the total population, similar to the Region of Epirus (38.51%) but lower than the national average of 42.4%. Arta's economy is predominantly reliant on the tertiary sector, with services, trade, tourism, and public administration constituting the bulk of employment. Data from the Arta Chamber of Commerce (2018) identifies over 4,200 businesses in operation, with a strong focus on agriculture (notably cheese, meat, and animal feed production), tourism, and retail. However, the area faces significant challenges in terms of unemployment, which stood at 19.06% as of the last census.



Social challenges and inequality, access to services

The municipality's social landscape is shaped by a combination of demographic aging and economic disparities. Over 57% of Arta's population is either too young or too old to work, placing a burden on the working-age population. This imbalance is compounded by limited access to services, particularly in rural areas, and an underdeveloped secondary sector. Addressing these social challenges will require a focus on skill development, employment generation, and improved access to services for vulnerable populations.²



Relevant existing strategies and policies (local / regional / national/European) including: Relevant local strategies and plans

The Integrated Action Plan (IAP) for the City of Arta is designed as a collaborative roadmap that aligns the objectives of various stakeholders, including the Municipality of Arta, to address shared urban challenges and foster sustainable development. The

² <https://www.arta.gr/wp-content/uploads/2024/07/1.-%CE%A3%CE%92%CE%91%CE%91-%CE%94-%CE%91%CE%A1%CE%A4%CE%91%CE%99%CE%A9%CE%9D.pdf>



IAP harmonizes local strategies and needs identified by the Urban Local Group (ULG) with the strategic priorities of the municipality, thereby ensuring a cohesive approach to urban transformation. The Municipality of Arta has developed a strategic plan, set to be implemented by 2027, which focuses on several key pillars aimed at transforming the municipality through digital innovation and sustainable development. This strategy includes well-defined objectives that enable the Municipality to seize opportunities aimed at enhancing quality of life, promoting social welfare, protecting the environment, and fostering cultural growth. These goals are supported by principles of good governance, transparency, effective organization, and optimized use of human resources and infrastructure. The Municipality's Digital Transformation Strategy will serve the foundational framework upon which the Integrated Action Plan is constructed.



2.1 Local Strategies and Plans

The Municipality of Arta's Strategic Plan defines five (5) Specific objectives, regarding the Digital Transformation of the City of Arta, more details for each are illustrated in the Table below.

Strategic Objectives of the Digital Transformation of the Municipality of Arta

- SO. 1** Improvement of the administrative capacity of the Municipality through the use of new ICT and RES to improve the quality of services provided to citizens and businesses
- SO. 2** Promotion of sustainable organisation, functionality and territorial cohesion in the region of Arta, in favour of the quality of the built environment, the efficiency of interconnections and adaptation to the new requirements of sustainable mobility and energy management.
- SO. 3** Protection of natural resources and promotion of the natural environment, the history of the city and the cultural heritage of the region as factors to enhance competitiveness and promote employment.

SO. 4 Improving quality of life and tackling social exclusion and poverty through active policies and preventive measures, as well as through the development of integrated social care, social protection and solidarity structures and functions.

SO. 5 Supporting social cohesion and promoting employment by strengthening competitiveness and innovative entrepreneurship. Promoting the social economy and developing the skills of human resources

These municipal objectives serve as the strategic umbrella for the IAP. The IAP will align with them and will build directly on this municipal framework

2.2 European Strategies and Policies

The IAP will also align with following key European policies that drive digital transformation across EU member states:

- **The European Digital Strategy:** Aims to make Europe a leader in digital innovation by 2030, promoting AI, 5G infrastructure, and cybersecurity.³
- **The Smart Cities and Communities Initiative:** Supports cities in adopting smart technologies to enhance urban sustainability.⁴
- **The New European Bauhaus Initiative:** Encourages the integration of digital solutions with cultural and environmental sustainability.⁵

The Digital Strategy of the Municipality of Arta aims

³ https://commission.europa.eu/publications/european-commission-digital-strategy_en

⁴ <https://digital-strategy.ec.europa.eu/en/policies/smart-cities-and-communities>

⁵ https://new-european-bauhaus.europa.eu/document/download/f9744f22-cb29-4363-935f-3b8a225d5e61_en?filename=overview_funding_opportunities_New_European_Bauhaus.pdf





to address the limitations of existing infrastructures while leveraging digital solutions to enhance urban functionality. The IAP establishes a clear roadmap to modernize public services, optimize decision-making through data analytics, and promote innovative tourism models. Additionally, the IAP incorporates strategic actions to integrate Arta into the Metaverse within the next decade, ensuring its digital evolution aligns with the European Green Deal and EU Cohesion Policy 2021-2027, which emphasize sustainable urban development and digital inclusivity.

2.3 Projects Implemented in the Municipality of Arta

In the city of Arta have active stakeholders who are conducting several research projects. Here we will list projects that are part of Arta's digitalization

The Discover Arta - "Bridge of Seasons" project is an initiative of the Municipality of Arta, co-financed by Greece and the European Union, that combines cultural heritage with digital innovation to enrich the visitor experience and promote the city as a modern cultural tourism destination. Through mobile applications, interactive maps, augmented and virtual reality tours, high-quality multimedia content, and expanded public Wi-Fi, the project allows residents and visitors to explore Arta's landmarks and history in new, immersive ways. By integrating digital storytelling, accessibility tools, and participatory features, Discover Arta not only preserves and showcases the city's heritage but also positions Arta at the forefront of digitally enhanced cultural tourism.



SMARTIMONY is a cross-border initiative implemented from November 2019 to December 2022, designed to strengthen the capacity of tourism SMEs in remote, peripheral, and sparsely populated regions to innovate, compete, and enter national and international markets. Led by the University of Ioannina and partnering with municipalities and development centers across Greece



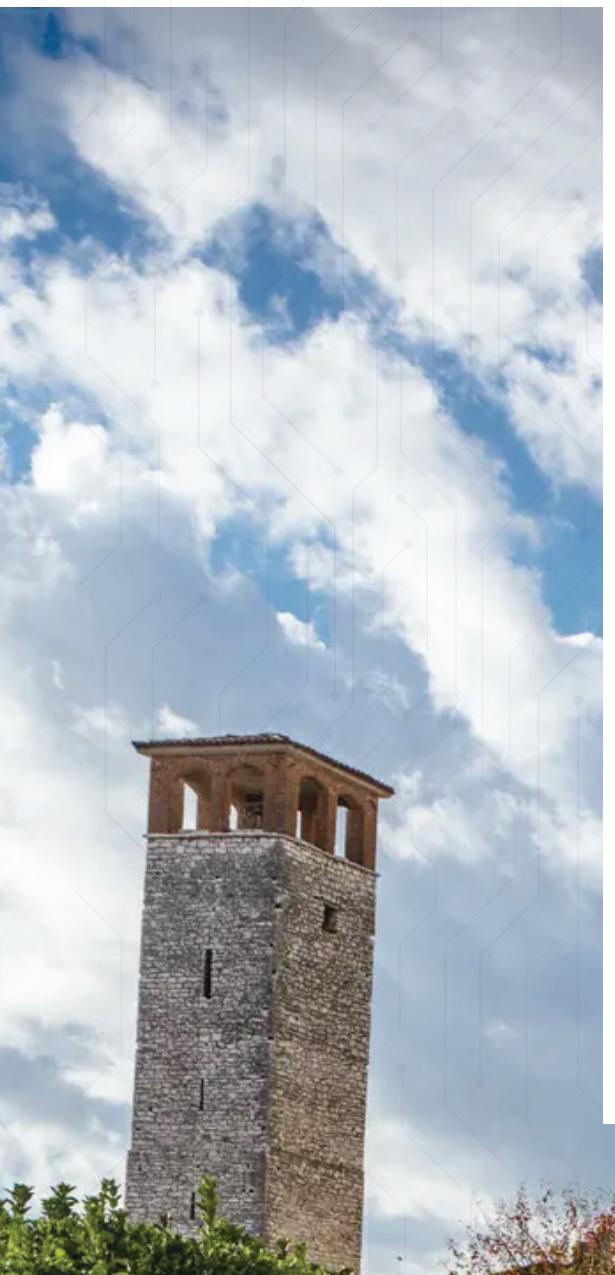
and Albania, the project mapped tourism potential, fostered new products & services, digitalized several monuments of the City and promoted cross-sector collaboration. It delivered tools including a booking app, creative tourism route experiences, low-carbon communication/dissemination tools, and an EQF-certified work-based training programme, thereby creating a lasting learning community and helping SMEs embrace process and product innovation in the tourism sector.

HERMES is a cross-border initiative (Greece-Italy) implemented from May 2019 to June 2023. The project worked to strengthen and restore cultural heritage through modern scientific technologies, enhancing the visitor experience at archaeological sites and museums via digitally processed information. It included development of virtual cultural pathways and interactive educational content (including a multilingual didactical manual and theatrical laboratories) and supported the creation of a virtual community platform to foster collaboration among artists, cultural associations, and other stakeholders.

HERMES
VIRTUAL REALITY - AUGMENTED REALITY | CULTURAL HERITAGE | THEATER | MUSIC



The project **"Digitization of the Collection of the Cultural Association of Arta 'Skoufas'"**, co-funded by the European Regional Development Fund under the "Digital Transformation 2021-2027" programme, aims to digitally preserve, showcase, and make accessible the valuable cultural heritage of the Skoufas Association's library and museums. It involves the large-scale digitization and documentation of books, manuscripts, artworks, sculptures, objects, and photographs, along with the development of a digital repository, an online portal, and an immersive Digital Museum. The project further enhances the physical museum spaces with interactive exhibits, VR experiences, digital timelines, and 3D maps, while providing remote access through a Virtual Exhibition Hall. By combining international best practices in digitization with innovative applications such as VR storytelling and interactive showcases, the project aims to strengthen public engagement, supports education and research, and ensures long-term preservation



3

and accessibility of Arta's cultural heritage.

Problem identification by local stakeholders

ULG Stakeholders list

ISI, as a member of the MetaCity network, is responsible for developing the integrated action plan for the City of Arta. To achieve this, they have identified and engaged several key stakeholders from different sectors of the city. These stakeholders bring diverse perspectives and expertise, essential for the successful creation of the action plan. The stakeholders are:

Industrial Systems Institute (I.S.I.) – ULG coordinator



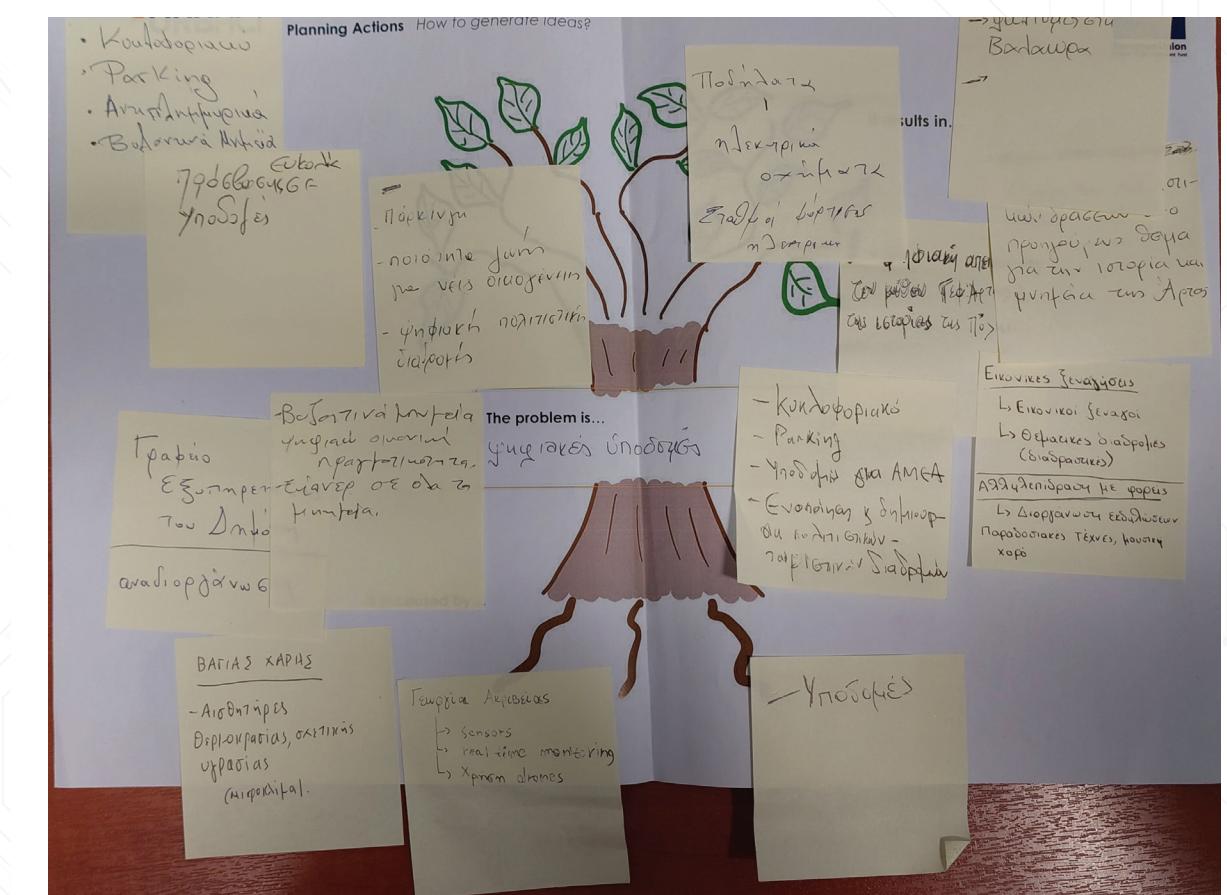
The Industrial Systems Institute (ISI), founded in Patras in 1998 and part of the Athena Research & Innovation Center since 2003, is a leading Greek research institute in information, communication, and industrial technologies. Hosted at the Patras Science Park, ISI focuses on applied and technological research to enhance the competitiveness of Greek industry through state-of-the-art digital solutions. Its expertise spans industrial systems integration, automation, machine vision, embedded and cyber-physical systems, industrial IoT, and Industry 4.0 edge solutions, alongside data science and AI for big data analytics. ISI combines strong collaborations with universities, European projects, and the industrial sector to develop innovative products, services, and methodologies. With a proven track record in designing and implementing real-time systems and scalable AI architectures, ISI is a recognized national hub for cutting-edge research and technology transfer to industry.

Municipality of Arta



The Municipality of Arta is in north-western Greece, serving as the capital of the Arta regional unit within the Epirus region. Formed in 2011 through the merger of five former municipalities, it covers 437 square kilometers with a population of approximately 43,680 residents, including 21,799 in the city of Arta itself. As both an administrative center and transport hub, Arta Municipality provides essential local services including urban planning, environmental management, and business licensing while preserving its rich historical heritage from ancient Ambracia and showcasing significant Byzantine architectural monuments.

As the primary stakeholder, the Municipality of Arta holds a pivotal role in the Urban Local Group (ULG).





"Makriyannis" Association



The "Makriyannis" Association is based in the City of Arta and founded in 1980. Their aim is to promote culture and the arts in region of Arta and beyond. It organizes several folklore events, dance festivals, theater performances, film screenings, and book presentations. The "Makriyannis" Association offers workshops and seminars on folklore and culture, and activities including dance, theater, painting, chess, and creative writing for kids and adults. It also keeps traditional costumes and takes part in local celebrations.

Skoufas" Cultural Association



Established in 1896, the Skoufas Association is one of the oldest associations in Greece and it is a pillar of cultural and intellectual life in Arta and the surrounding region of Epirus in Greece. For over a century, the Association has preserved and promoted the area's cultural heritage, while nurturing strong community identity and interconnectedness among residents. Skoufas Asso-

ciation boasts a library of nearly 30,000 titles, with unique or unreplicable editions which cannot be found anywhere else in Greece. The Association has not only extensive library collections but two museums, the Folklore Museum and the Historical Museum, that showcase everything, from traditional crafts and clothing to important events in the development of humankind from antiquity to the modern era. Skoufas Association has, in recent years, embraced technology, and is part of a digitization project to create a digital archive of 4,186 items and 195,200 pages of printed materials.

The Association of Room - Apartment and Hostel Owners «Arachthos»

**THE ASSOCIATION OF ROOM -
Apartment and Hostel Owners
«Arachthos»**

The Association of Room - Apartment and Hostel Owners «Arachthos» is a group of accommodation providers in Arta and Koroni, Greece. They work together to promote tourism and hospitality in the Arta region, ensuring visitors have a comfortable and enjoyable stay. Actively involved in the community, they strive to not only provide excellent lodging options but also promote the region's rich history, culture, and natural beauty.



Arta's Chamber of Commerce



The Arta Chamber of Commerce is a vital organization supporting businesses in the region of Arta. It supports over 4,100 businesses in the region and promotes economic development through various initiatives. Arta is a prefecture known for its agricultural products, natural beauty, and historical sites. Tourism is a growing sector with potential for agritourism, eco-tourism, and sports activities. The region is striving for modernization and attracting investment while preserving its unique character.

University of Ioannina

The City of Arta hosts the Department of Informatics and Telecommunications of University of Ioannina.



ΠΑΝΕΠΙΣΤΗΜΙΟ
ΙΩΑΝΝΙΝΩΝ

The Department of Informatics and Telecommunications offers a rigorous education in information technology and telecommunication fields, preparing students for successful careers. They keep pace with the latest advancements in the field to ensure graduates can design, develop, and contribute to modern technological systems and services. The department actively engages in research and collaboration to stay at the forefront of emerging areas like Artificial Intelligence, Big Data, and the Internet of Things. Their faculty is highly accomplished with publications and international connections, ensuring a top-notch educational experience for students.

Role of each stakeholder

Each stakeholder has a unique field of expertise that will allow ISI to gather comprehensive information and co-create the integrated action plan for the City of Arta. ULG. ISI brings deep expertise in digital twins, artificial intelligence, the Internet of Things, and immersive metaverse applications. Within the IAP, ISI acts not only as a technical contributor but as a strategic knowledge partner, ensuring that the solutions tested in Arta are designed with scalability and transferability in mind.

Role of each stakeholder:

- As a knowledge and practice facilitator in digital transformation, the Industrial Systems Institute plays a critical role within Arta's Integrated Action Plan. ISI has considerable experience in developing Digital Twin applications therefore it takes the role in leading the development of a digital shadow of the city for the Small-Scale Action (SSA) and providing more structured knowledge transfer to the Municipality. As an established research institute, ISI will assist the members of the ULG in developing an IAP that is specific to the needs of Arta and able to be adapted and replicated in another city



in Greece or EU. In this instance, Arta will be the demonstrator city, illustrating the results of a complete and harmonized digital transformation, but also serving as a lighthouse for replication and upscaling.

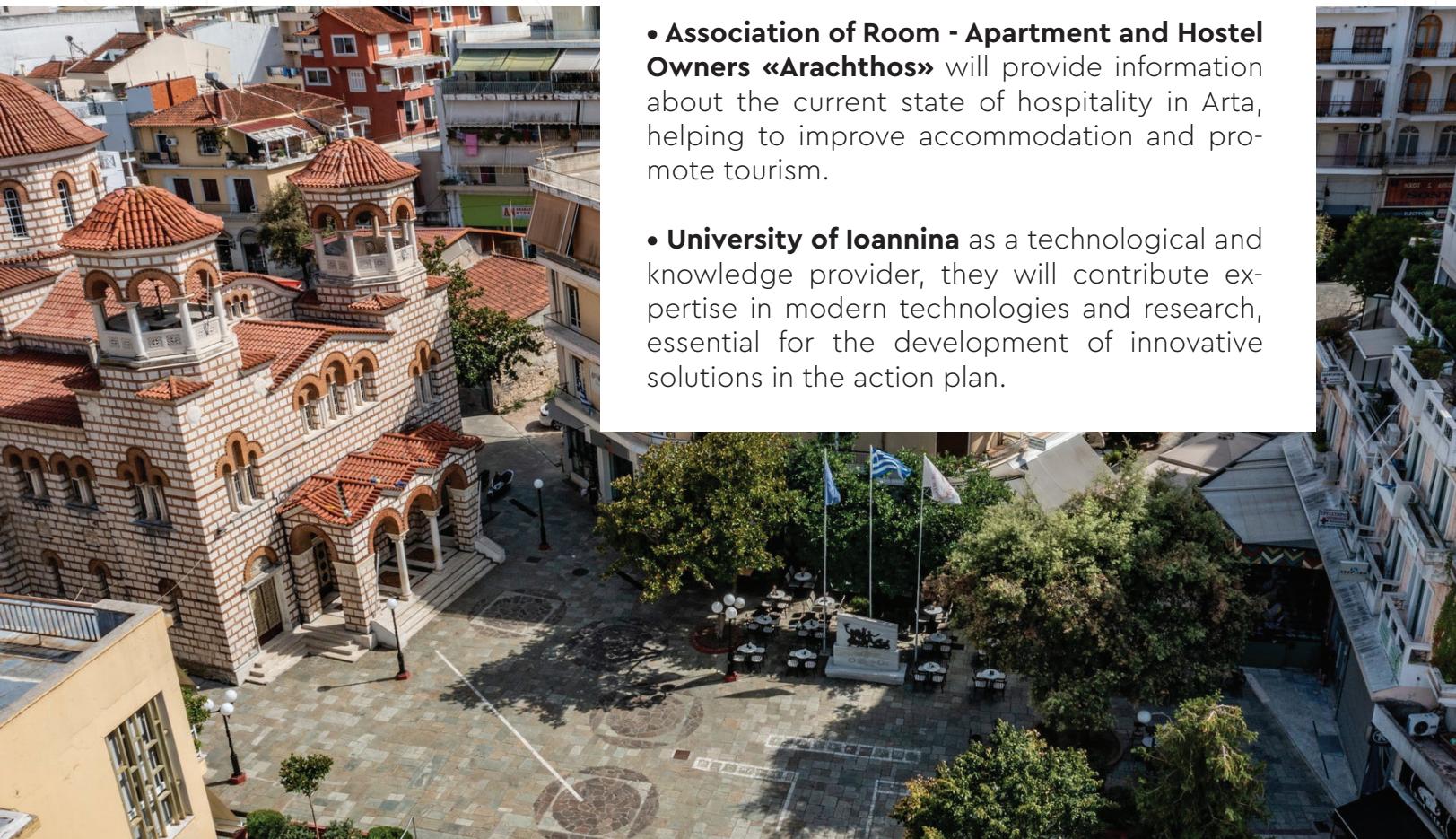
- **The Municipality of Arta** plays the most important role in the ULG. They possess detailed knowledge of the city's issues, including its infrastructure and municipal needs, and the authority to make changes on a city level.

- **Arta's Chamber of Commerce** will provide valuable insights into the demographics of Arta and the needs of the business community, which are crucial for economic development strategies.

- **Makriyannis Association and Skoufas Association** will offer insights into the cultural heritage of the City of Arta. Their input will help create an action plan that focuses on enhancing tourism and preserving cultural traditions and follow the strategic objectives of the municipality.

- **Association of Room - Apartment and Hostel Owners «Arachthos»** will provide information about the current state of hospitality in Arta, helping to improve accommodation and promote tourism.

- **University of Ioannina** as a technological and knowledge provider, they will contribute expertise in modern technologies and research, essential for the development of innovative solutions in the action plan.



Stakeholder	Role in the IAP	Key Contributions
Municipality of Arta	Urban planning, governance, and smart city integration.	Strategic urban planning, governance, and integration of smart city solutions.
Arta's Chamber of Commerce	Supporting businesses in digital adaptation, innovation, and economic growth.	Providing guidance to local businesses, facilitating networking, and promoting digital transformation initiatives.
Makriyannis Association	Cultural heritage preservation	Contribution to digital heritage projects and smart tourism initiatives.
Skoufas Cultural Association	Cultural heritage preservation and Community engagement	Promoting digital literacy and cultural preservation via technology.
Association of Room & Hostel Owners (Arachthos)	Digital transformation in tourism and hospitality.	Supporting digital transformation in tourism services, integrating smart applications.
University of Ioannina (Department of Informatics & Telecommunications)	Researcher and AI, IoT, and VR technological expertise.	Development of AI, IoT, and VR-based solutions for smart city infrastructure.
Industrial Systems Institute (ISI)	Research and metaverse expertise	Leading the design and implementation of the digital twin and metaverse-related initiatives.



iPESTLE analysis

iPESTLE analysis conducted during the 4th ULG meeting, and the results are the following:

I	Information	<ul style="list-style-type: none"> • Lack of IoT infrastructure • Manual data collection on paper • Poor communication between government officials and agencies
P	Political	<ul style="list-style-type: none"> • Fragmented administrative structures • Overlapping agency responsibilities • Complex regulations and unclear party roles
E	Economic	<ul style="list-style-type: none"> • High implementation costs requiring multiple, distinct funding streams
S	Social	<ul style="list-style-type: none"> • Limited digital literacy among municipal staff and citizens
T	Technological	<ul style="list-style-type: none"> • Gaps in broadband/5G coverage • Interoperability issues with legacy IT • Insufficient local IoT expertise
L	Legal	<ul style="list-style-type: none"> • Outdated procurement frameworks • Complex regulations and unclear responsibilities
E	Environmental	<ul style="list-style-type: none"> • Climate change impacts on agriculture and heritage sites • flood-prone wetlands requiring resilient monitoring and adaptation



SWOT Analysis

In the following sections, the results of the SWOT analysis conducted for the City of Arta will be presented.

STRENGTHS
<ul style="list-style-type: none"> • Rich cultural and historical heritage. • Presence of academic and research institutions. • Strong civic engagement and cultural associations. • Emerging business ecosystem for digital innovation. • Favorable geomorphology with biodiversity and natural resources. • Strong civic engagement through cultural associations.
WEAKNESS
<ul style="list-style-type: none"> • Limited digital literacy among citizens and businesses. • Gaps in broadband and 5G infrastructure. • Underutilization of digital tools in tourism and urban management. • Talent migration due to lack of opportunities. • High unemployment and limited secondary sector development.
OPPORTUNITIES
<ul style="list-style-type: none"> • Positioning Arta as an investment-friendly destination for new businesses. • Expanding alternative tourism (historical, sports, eco, rural, religious tourism). • Strengthening local employment through digital economy initiatives. • Access to European and national funding for digital transformation. • University-industry partnerships to drive economic innovation.
THREATS
<ul style="list-style-type: none"> • Economic instability limiting public and private investment. • Bureaucratic and regulatory constraints slowing digital progress. • Declining population and lack of youth retention policies. • Global competition in primary production affecting local businesses. • Environmental risks impacting infrastructure resilience. • Resistance to digital change among parts of the local population.



Local strengths/opportunities

Strengths

- Diverse natural landscape: Arta boasts a mild geomorphology with excellent biodiversity, creating opportunities for eco-tourism, agriculture, and sustainable energy production.
- Strategic infrastructure: The presence of major transportation networks, such as the Egnatia and Ionian Road, enhances connectivity and economic opportunities.
- Strong agricultural economy: As a center of primary production in Epirus, Arta plays a key role in regional food supply and agribusiness development.
- Rich Cultural and Historical heritage: The city's riverside location, archaeological sites, and cultural associations support diverse tourism opportunities.
- Educational and Research Institutions: The University of Ioannina fosters technological innovation and entrepreneurship, enhancing Arta's potential for digital transformation.

Active community engagement: A strong network of cultural associations, sporting organizations, and knowledge institutions promotes local cohesion and civic involvement.

Opportunities

- Investment in Urban and Business development: Promoting Arta as an attractive location for new businesses and start-ups through incentives and infrastructure projects.
- Sustainable Urban Growth Strategies: Implementation of smart city solutions, energy-efficient policies, and sustainable transport initiatives.



- Expansion of alternative Tourism: Developing historical, sports, eco-tourism, religious tourism, and rural tourism for year-round visitation.

- Utilization of EU and National Funding: Access to financial resources for digital transformation, urban regeneration, and economic development.
- University-Industry collaboration: Strengthening ties between research institutions and local businesses to enhance innovation.
- Revitalization of inactive infrastructure: Utilizing existing unused buildings for business incubation, coworking spaces, and cultural hubs.

Local challenges/weaknesses

Weaknesses

- Outdated Administrative structures: The need to modernize and upgrade existing governance and municipal services to improve efficiency.
- Limited Digital Infrastructure: Gaps in broadband and 5G coverage hinder digital transformation and smart city initiatives.
- Economic disparities: Low per capita income compared to national and EU averages affects economic resilience and spending capacity.
- Fragmented Municipal services: Spatial dispersion of services leads to inefficiencies and lack of coordination among departments.
- Underdeveloped Industrial sector: The absence of industrial zones limits secondary sector growth and employment opportunities.
- High Unemployment: The local labor market struggles with job creation, particularly in emerging technology and innovation sectors.



- Insufficient Digital Tourism Initiatives: Despite its rich heritage, Arta lacks comprehensive digital marketing and immersive tourism experiences.

Threats

- Economic instability: Ongoing economic crises, reduced funding, and fluctuations in financial markets pose risks to long-term growth.
- Regulatory and Bureaucratic Hurdles: Time-consuming procedures and complex legal frameworks slow down project implementation and business investments.
- Demographic Challenges: Population decline due to youth migration and aging demographics threatens workforce sustainability.
- Competition in Global Markets: Arta faces challenges in maintaining competitiveness in primary production sectors due to globalization.
- Environmental risks: Climate change impacts on agriculture, tourism, and infrastructure necessitate proactive sustainability strategies.
- Local resistance to change: Scepticism toward private investment, entrepreneurship, and technology adoption may slow economic progress.



Vision/overarching objective

The long-term objective is to transform the City of Arta into a **vibrant, resilient, and forward-looking town** that fully embraces the potential of digital solutions to address contemporary challenges. By gradually adopting advanced technologies, Arta will be empowered to respond proactively to the needs of its citizens, fostering economic growth, environmental sustainability, and cultural preservation. This digital transformation aims not only to modernize the town's operations but also to elevate the quality of life for residents and enrich the experience of visitors.

"By balancing technological advancements with Arta's his more connected, sustainable future that honors its past."

The key vision of the IAP is the transformation of the City of Arta into a digitally empowered town, where advanced digital tools are integrated into urban management and decision-making processes. The primary goal is to leverage technology to enhance both the city's infrastructure and its cultural heritage, positioning Arta as a smart town that capitalizes on its historical and natural assets to improve the quality of life for its citizens and attract visitors.

At the core of this vision is the creation of a digital twin of the city, allowing city officials to remotely monitor and manage urban systems in real time. This digital infrastructure will enable more effective governance by providing data-driven insights for optimizing traffic, resource management, and public services. Additionally, the integration of advanced technologies, such as sensors and cameras, will allow Arta to implement proactive solutions for urban challenges, from improving parking and traffic flow to enhancing public safety.

Simultaneously, the digital twin will play a crucial role in promoting tourism and cultural heritage. Through immersive technologies and interactive platforms,





visitors will be able to engage with Arta's iconic monuments and learn about the town's rich history. This not only serves to boost tourism but also helps preserve and enhance the visibility of Arta's cultural assets, creating a year-round destination for both local and international visitors.

Objectives

The digital transformation strategy for Arta revolves around the following key objectives:

- Improving the city's management: By integrating sensors, data systems, and other digital tools, the municipality will be able to optimize decision-making processes, to increase operational efficiency, and enhance the delivery of public services. This will allow Arta to tackle pressing issues such as traffic congestion, public safety, and resource management in a more effective manner, creating a better, more responsive urban environment.
- Boosting economic development: Digital infrastructure will foster new business opportunities and job creation, particularly in the emerging digital and service sectors. By promoting entrepreneurship and technological innovation, Arta aims to revitalize its economy, particularly in the context of challenges such as high unemployment and an aging workforce.
- Enhancing tourism: Arta's rich cultural heritage and historical sites will be promoted through digital platforms and immersive technologies. These tools will create interactive experiences that attract visitors, showcasing iconic monuments and providing educational opportunities about the town's history.
- Ensuring sustainable growth: By incorporating digital tools for environmental management, such as energy-efficient technologies and resource monitoring systems, Arta aims to promote sustainable development. These efforts will reduce the environmental impact of urban operations, contributing to long-term ecological stewardship

and making the town more resilient in the face of environmental challenges.

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5

Main integration challenge(s)

5.1 Strategic Objectives

The strategic objectives of this Integrated Action Plan (IAP) align with the broader vision of enhancing the municipality's digital infrastructure and promoting sustainable urban development. The objectives serve as foundational pillars for addressing key challenges and leveraging opportunities in Arta. The Specific Objectives will focus on two areas, as shown in the image below, the Urban Management & Sustainability and the Tourism & Cultural Heritage.



Urban Management & Sustainability

SO1: Enhance the efficiency, transparency, and responsiveness of municipal operations by leveraging advanced digital tools.

SO2: Foster sustainable urban development and improve quality of life by incorporating energy-efficient technologies, smart resource management, and green infrastructure.



Tourism & Cultural Heritage

SO3: Drive economic growth and tourism by using digital platforms to showcase Arta's rich cultural heritage, support local businesses, and create job opportunities.

5.2 Intervention Areas

The key areas of intervention for the implementation of the strategic objectives are derived from the identified challenges and opportunities for Arta. Below are the Intervention Areas for each strategic Objective.

SO1: Digital Transformation of Public Services

- IA1.1 ICT Infrastructure Modernization:** Upgrade digital infrastructure, including cloud migration and enhanced network connectivity, to support efficient and secure municipal operations.

- IA1.2 Integrated digital city management platform:** Develop a centralized platform that integrates real-time monitoring, data analytics, and



citizen services to improve urban management and engagement.

- IA1.3 Digital Skills and capacity building for municipal staff:** Provide training and resources to equip municipal staff with the necessary skills to operate and manage new digital systems effectively.

SO2: Sustainable Urban Growth

- IA2.1 Optimized Mobility and Traffic Management:** Implement intelligent traffic systems and data-driven solutions to optimize traffic flow, reduce congestion, and enhance urban mobility, leading to a more efficient and sustainable transportation network.

- IA2.2 Climate Resilience and Environmental Monitoring:** Deploy environmental monitoring systems and climate-resilient infrastructure to safeguard the city against climate-related risks.

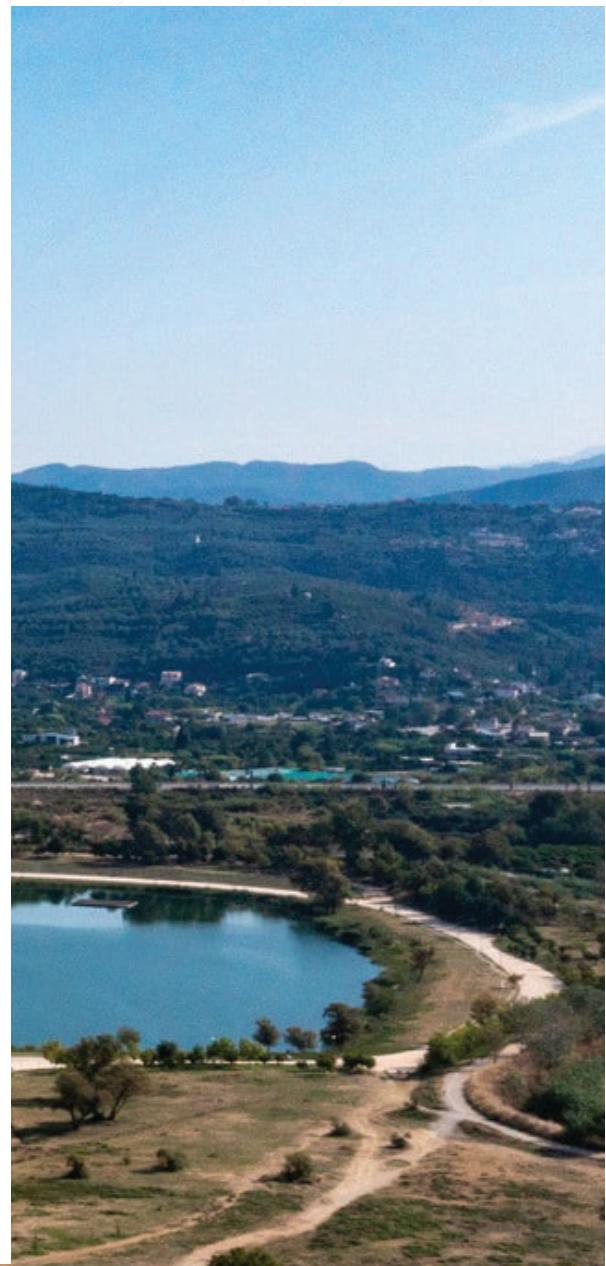
SO3: Economic Revitalization and Tourism Development

- IA3.1 Digital Tourism and Cultural Heritage Promotion:** Use immersive digital tools to showcase Arta's cultural and historical assets, enhancing its appeal as a tourist destination.

- IA3.2 Support for Local Entrepreneurship and Digital Economy:** Foster local business growth by supporting digital entrepreneurship, providing training, and incentivizing innovation in key sectors.

5.3 Actions

For each intervention area, specific actions are proposed to achieve the strategic objectives. These actions will be presented through a visual mapping of the complexity of interventions, followed by an action table summarizing each initiative.



5.3.1 Digital City Infrastructure Development

Action Title: Digital City Infrastructure Development		Owner of action: Municipality of Arta		
Short Description	Stakeholders	Links to strategy:	What success looks like	
The action establishes a resilient digital infrastructure for the Municipality of Arta. Real-time data captured by an extensive IoT sensor mesh will travel over newly expanded fiber and 5G links into a unified data platform where predictive analytics will be able to support decision-making. A city-scale digital twin will allow for the visualization of the insights and provide the ability to the city officials to make data-driven decisions as well as monitor the city remotely.	<ul style="list-style-type: none"> Municipality of Arta Industrial Systems Institute (ISI) University of Ioannina local tech SMEs regional authorities citizens 	<p>SO1: Digital Transformation of Public Services</p> <ul style="list-style-type: none"> IA1.1 ICT Infrastructure Modernization IA1.2 Integrated digital city management platform 	<ul style="list-style-type: none"> 80% sensor coverage in the municipal of Arta 100% of municipal departments actively using the data platform An operational Digital twin. 95% system uptime and reliability maintained 20% reduction in administrative processing time Enhanced data-driven decision making across all municipal services 	
Risks:		Risks:		
<ul style="list-style-type: none"> Cybersecurity incidents threaten critical systems. Cost escalation driven by hardware or energy prices. Low user adoption among municipal staff. Interoperability issues with legacy municipal IT Minor implementation delays 				
Action Readiness		Action Readiness		
The initiative is still at a very early, exploratory stage. Concept design and technical architecture are complete. Current activity is limited to seeking partial financing for an initial sensor rollout and incrementally upgrading public Wi-Fi access points.				
Finance & Resources				
ERDF Regional Programme				
Interreg Programme				
National Programme				

	Sectoral	Sustainability	Territorial	Governance
Current	The municipality relies on fragmented ICT systems that are not interoperable, limiting efficiency and coordination across departments. There are currently no IoT devices, and most data is gathered manually, which restricts real-time monitoring and informed planning.	Existing digital tools provide minimal sustainability benefits, as resources are duplicated and systems are not optimised to support greener and more efficient management practices.	There is very limited collaboration with neighboring municipalities.	Municipality is responsible on most of the infrastructure changes with very limited collaboration between Regional and National bodies. Municipality still relies on funding from Regional and National Authorities
Intervention	This activity aims to deliver a modern ICT infrastructure combined with an integrated digital city management platform that streamlines operations, facilitates cross-sector coordination, and provides shared data access.	The upgraded infrastructure will increase efficiency, reduce resource waste, and enable environmentally friendly practices such as energy monitoring, predictive maintenance, and data-driven decision-making.	We don't expect many changes in this sector.	We expect to make funding for interventions easier due to the data driven decision making.
Future Impact	As a result of this action, Arta will have an operational ICT infrastructure and data streams that can be actively used for planning, monitoring, and service optimisation.	The availability of structured and reliable data will make service delivery more sustainable and resilient, supporting efficiency, environmental protection, and improved citizen services.	We don't expect many changes in this sector.	We expect to make funding for interventions easier due to the data driven decision making.

ACTIVITY	INPUTS	RELATED ACTIVITIES	OUTPUTS	CONCERNS
Sensor & Data Collection	IoT sensors, installation crews	Hardware and Networking Infrastructure Upgrades	Operational sensor network covering traffic, parking, air quality, noise levels	Device failures, data privacy compliance and maintenance costs
Hardware and Networking Infrastructure Upgrades	Network switches, fiber optic cabling, cloud service credentials	Sensor & Data Collection	Upgraded municipal network with enhanced security and reliability	Supply delays
Centralized Data Management Platform	Database software licenses, application servers	Sensor & Data Collection, Hardware and Networking Infrastructure Upgrades, Predictive Analytics	Functional platform with real-time data access and analytics dashboard	Integration bugs, data quality issues and user adoption
Predictive Analytics Module	Machine learning software stack, data science personnel	Centralized Data Management Platform, Sensor & Data Collection	Analytics system enabling proactive urban management and forecasting	Model drift
Digital Twin Platform for Urban Management	Three-dimensional graphics engine, Building Information Modeling data	Sensor & Data Collection, Hardware and Networking Infrastructure Upgrades, Centralized Data Management Platform, Predictive Analytics Module	Interactive digital twin for simulation, monitoring, and planning	Skills gap



5.3.2 Environmental Monitoring Systems Implementation

Action Title: Environmental Monitoring Systems Implementation		Owner of action: Municipality of Arta (Lead)	
Short Description Deploy a city-wide network of monitoring infrastructures that streams real-time data into the municipal digital-twin platform, to enable real-time environmental management, improve citizen services, and support climate adaptation strategies for Arta's sustainable urban development.	<p>Stakeholders</p> <ul style="list-style-type: none"> Municipality of Arta University of Ioannina regional environmental authorities emergency response teams public health officials citizens local businesses tourism operators 	<p>Links to strategy: SO2: Sustainable Urban Growth</p> <ul style="list-style-type: none"> IA2.1 Optimized Mobility and Traffic Management IA2.2 Climate Resilience and Environmental Monitoring <p>Risks:</p> <ul style="list-style-type: none"> High budget maintenance on sensors Data accuracy issues Citizen privacy concerns Minor installation delays <p>Action Readiness:</p> <p>The action is still at an early-adoption stage. A complete site study for the smart-parking activity has been carried out, with target streets and car parks mapped and installation schematics drafted. Concept designs for the air-quality, flood-risk, weather and urban-heat networks are outlined and preferred technologies selected, but procurement has not yet started. Funding proposals are being prepared, smart parking will be deployed first once resources are secured.</p> <p>Finance & Resources</p> <p>ERDF Regional Programme</p> <p>Interreg Programme</p> <p>National Programme</p>	<p>What success looks like</p> <ul style="list-style-type: none"> Real-time air quality data available to all citizens through digital platforms 60% reduction in parking search time through smart parking system Comprehensive flood early warning system operational Urban heat island mapping completed with actionable cooling strategies Integration of all environmental data into the city's digital twin platform Improved emergency response time by 30% for weather-related incidents

ACTIVITY	INPUTS	RELATED ACTIVITIES	OUTPUTS	CONCERNS
Smart Parking System	Parking sensors, mobile app development, data analytics software	Air Quality and Pollution Monitoring, Urban Heat and Temperature Monitoring	Real-time parking availability system, reduced traffic congestion, improved citizen mobility	Sensor vandalism, connectivity issues
Air Quality and Pollution Monitoring	Air quality sensors, weather stations, data transmission equipment	Smart Parking System, Digital Twin Platform for Urban Management	Continuous air quality monitoring network, public health alerts, pollution source identification	Calibration drift, environmental exposure damage
Flood Risk and Weather Monitoring	Hydrometric sensors, weather monitoring stations, emergency alert systems	Urban Heat and Temperature Monitoring System, Digital Twin Platform for Urban Management	Early flood warning system, weather forecasting capabilities, emergency response coordination	Extreme weather sensor damage, false alarm risks
Urban Heat and Temperature Monitoring	Temperature sensors, humidity monitors, thermal imaging equipment	Air Quality and Pollution Monitoring, Flood Risk and Weather Monitoring System	Urban heat island mapping, climate adaptation planning, cooling strategy development	Sensor placement optimization, data interpretation complexity

	Sectoral	Sustainability	Territorial	Governance
Current	There are no dedicated data sources for environmental monitoring within the municipality. Arta relies only on third-party weather stations.	Because reliable data is missing, the municipality operates in a reactive mode rather than proactively addressing climate and environmental risks.	Collaboration with neighbouring municipalities takes place only during major environmental incidents such as fires or floods, and this coordination is reactive rather than based on continuous monitoring.	Environmental responsibilities are mainly handled by the national government and the Region of Epirus. The municipality itself has limited power and joins only in emergencies.
Intervention	The activities of this action will establish dedicated environmental monitoring and warning systems, deploying IoT sensors and platforms to generate real-time local data on climate and environmental conditions.	The system will enable proactive resilience measures, reduce long-term costs through accurate monitoring and predictive capabilities.	The new infrastructure will allow Arta to extend monitoring close to municipal borders, share warnings with neighbouring municipalities, and provide a platform for integrating external sensors into one system.	Better and proactive collaboration with regional and national authorities
Future Impact	As a result of this action, Arta will have reliable real-time environmental data available for planning, risk prevention, and citizen information.	Reliable data will allow the municipality to act proactively, enhancing climate resilience, improving resource management, and ensuring effective protection of the natural and urban environment.	Arta will be able to participate in regional and cross-border climate monitoring networks, moving from reactive emergency cooperation to proactive and preventive collaboration.	Better and proactive collaboration with regional and national authorities



5.3.3 Digital Competency Development Program

Action Title: Digital Competency Development Program		Owner of action: University of Ioannina		
<p>Short Description A comprehensive program to enhance digital literacy, cybersecurity awareness, and advanced technical skills among municipal staff, local entrepreneurs, and citizens, ensuring that Arta can leverage new digital infrastructure and services effectively and inclusively. The action will integrate formal training modules with public engagement activities including workshops, open laboratories, and hackathons to foster inclusive digital transformation and community participation in Arta's smart city development.</p>		<p>Stakeholders</p> <ul style="list-style-type: none"> University of Ioannina Municipality of Arta Chamber of Commerce local SME Local schools citizens Local associations <p>Links to strategy</p> <p>SO1: Digital Transformation of Public Services <ul style="list-style-type: none"> IA1.3 Digital Skills and capacity building for municipal staff </p> <p>SO3: Economic Revitalization and Tourism Development <ul style="list-style-type: none"> IA3.2 Support for Local Entrepreneurship and Digital Economy </p> <p>Risks</p> <ul style="list-style-type: none"> Limited citizen and staff participation in training programmes Shortage of qualified technical trainers and instructors Rapid evolution of technology platforms requiring continuous curriculum updates Potential funding shortfalls affecting programme scope and duration Competition with private sector for technical talent retention <p>Action Readiness</p> <p>The action remains at a preliminary conceptual stage. University of Ioannina possesses an established curricula for cybersecurity and digital skills training. At the current stage there are only discussions with the stakeholders that are in the ULG to create a detailed plan for the programme adaptation</p> <p>Finance & Resources</p> <p>Erasmus+ Interreg National Programme</p>		<p>What success looks like</p> <ul style="list-style-type: none"> More than 80% of the municipal staff participate in the digital literacy and cybersecurity training sessions More than 500 citizens upskilled through public workshops and open labs. Creation of an annual hackathon event to produce prototype civic apps. Public satisfaction with city digital services improves by 25%.



ACTIVITY	INPUTS	RELATED ACTIVITIES	OUTPUTS	CONCERNs
Digital Literacy Program	Literacy Training E-learning content, trainers, PCs	Cybersecurity Awareness Sessions; Community Digital Open Labs	Municipality staff and citizens certified in basic digital skills	Scheduling conflicts may arise due to competing work commitments, and varying baseline digital skills among participants may require differentiated training approaches.
Cybersecurity Awareness Sessions	Cyber-experts, phishing simulators	Digital Literacy Program	Municipality Staff and citizens participate and learn cyber-hygiene drills	Organisational resistance to new security protocols may emerge, particularly among staff members with limited technical backgrounds who may experience anxiety regarding cybersecurity requirements.
Advanced Technical Training	Data-analytics tools, digital-twin sandbox	Digital Literacy Program	Several Municipality staff with uptake and become technical specialists with the ability to run analytics and the digital twin	The primary challenge involves retaining trained technical personnel within the local employment market, given competitive private sector opportunities and limited municipal salary scales.
Community Digital Open Labs	IoT demo gear, mentors	Digital Literacy Program	Quarterly "open lab" afternoons with the citizens citizens experimenting with the sensors and the VR equipment	Logistical coordination of mobile equipment deployment presents operational challenges, while equipment maintenance and replacement costs may exceed initial projections due to intensive community usage.
Public Workshops	Printed guides, social-media promo	Cybersecurity Awareness Sessions	Yearly workshops with the citizens and municipality officials promoting the advancements in the city.	Reaching rural communities presents transportation and accessibility challenges requiring additional logistical planning.
Hackathon	Venue, APIs, mentors, prizes	Advanced Technical Training; Digital Twin Platform	Annually hackathons with citizens and university student with mentors from both private and public sectors to develop prototype apps for tourism, mobility and culture sectors	Intellectual property ownership agreements require careful legal framework development, while maintaining participant engagement throughout intensive development periods may prove challenging without adequate incentive structures.

5.3.4 Immersive Cultural Heritage Experience

Action Title: Immersive Cultural Heritage Experience		Owner of action: Skoufas Association		
Short Description	Stakeholders	Links to strategy	What success looks like	
This action transforms Arta into a pioneering digital cultural destination by creating immersive VR/AR experiences of historical monuments, virtual cultural exhibitions, AI-powered interactive tourist guides, and metaverse-ready cultural exploration platforms. The initiative digitally preserves Arta's rich archaeological heritage while positioning the city as Greece's first metaverse cultural tourism destination, supporting both physical and virtual visitors globally.	<ul style="list-style-type: none"> Skoufas Association Makriyannis Association Industrial Systems Institute Municipality of Arta University of Ioannina Association of Room & Hostel Owners Local museums Ephorate of Antiquities of Arta 	SO3: Economic Revitalization and Tourism Development <ul style="list-style-type: none"> IA3.1 Digital Tourism and Cultural Heritage Promotion 	<ul style="list-style-type: none"> 5 major historical monuments digitized in photorealistic VR/AR 3 virtual cultural exhibitions launched globally AI tourist guide operational with over 90% user satisfaction Digital twin cultural platform integrated with city's main digital twin At least 20% increase in cultural tourism inquiries Enhanced heritage preservation through digital documentation 	
Risks		Action Readiness		
		<p>This action is already underway. The University of Ioannina has participated in several European and national projects that lead to activities of digitalizing core monuments of the city. The Testing Action of ISI was also under this action, with the first Digital Shadow of the city. Additionally, the Skoufas Association has secured dedicated funding to digitize its library. These existing initiatives provide a strong basis for scaling up the immersive cultural heritage experience.</p>		
Finance & Resources				
Interreg Programme				
Greek National Strategic Reference Framework				
Epirus Regional Development Programme				

	Sectoral	Sustainability	Territorial	Governance
Current	The municipality has already started using digital and immersive technologies to promote cultural heritage. Stakeholders such as the University of Ioannina and the Skoufas Association have also implemented some actions in this field.	The contribution of these initiatives to economic sustainability remains very limited and segmented, without a consistent strategy to scale up their impact.	Cooperation with neighbouring municipalities on cultural heritage is very limited and usually takes place only within the framework of specific projects.	On the governance level, cooperation between the different bodies and levels happens only during project implementation.
Intervention	The action aims to expand digital heritage promotion by digitising monuments in rural areas of the municipality, developing cutting-edge immersive applications, and leveraging emerging technologies like Metaverse for remote promotion.	The action will strengthen the role of cultural heritage in the local economy by attracting more visitors, increasing visibility, and creating new opportunities for creative industries and tourism.	The initiative will introduce digital cultural routes in cooperation with neighbouring municipalities.	We don't expect any change in the Governance level
Future Impact	Arta will offer high-quality immersive heritage experiences across both urban and rural areas.	Digital cultural heritage will contribute more substantially to economic growth, supporting tourism SMEs and extending the tourism season through innovative digital products.	Joint digital cultural routes with neighbouring municipalities will increase regional attractiveness, encouraging visitors to explore heritage beyond Arta's borders.	We don't expect any change in the Governance level



ACTIVITY	INPUTS	RELATED ACTIVITIES	OUTPUTS	CONCERNs
VR/AR Tourism Experience Development	VR applications, 3D scanning equipment, historical documentation, mobile app development tools	Virtual Cultural Exhibitions Creation, Digital Twin Platform for Cultural Exploration	A fully functional, immersive VR experience featuring Arta's key monuments, compatible with both headsets and mobile platforms, offering users interactive and engaging narratives of local history and culture.	Technical integration challenges, maintaining accessibility across different devices, and ensuring that the final product meets user experience expectations for both tourists and local audiences.
Virtual Cultural Exhibitions Creation	Digital exhibition platform, multimedia content, museum partnerships	VR/AR Tourism Experience Development, Interactive Tourist Guide Implementation	Web-based exhibitions accessible globally, showcasing local arts, historical artifacts, and stories, and broadening access to Arta's cultural heritage through innovative digital presentation.	Need for careful content curation to maintain authenticity and the technical complexities involved in ensuring accessibility and seamless performance for international remote audiences.
Interactive Tourist Guide Implementation	AI development frameworks, multilingual databases, real-time information systems, mobile platforms	VR/AR Tourism Experience Development, Virtual Cultural Exhibitions Creation	The tourist guide will offer real-time, multilingual information on cultural sites and personalized recommendations, enhancing both in-person and virtual visitor engagement and satisfaction with Arta's cultural offerings.	Ensuring the accuracy and depth of information delivered by the AI, as well as maintaining consistently high performance in multiple languages and a variety of technical contexts.
Digital Twin Platform for Cultural Exploration	Digital twin software, metaverse platforms, cloud infrastructure	All previous activities, Digital Twin Platform for Urban Management	An interoperable, metaverse-ready platform that allows users worldwide to explore Arta's heritage sites digitally, connecting with the city's broader digital infrastructure for cohesive urban and tourism management.	Potential issues with the technical platform compatibility, seamless integration with the city's main digital twin, and potential difficulties in user adoption of advanced metaverse tools
Community Engagement	Event venues, presentation materials, stakeholder invitations	All previous activities	Engagement activities will foster stakeholder participation through workshops and public demonstrations, supporting greater cultural appreciation and strengthening links between the community and the project's digital outputs.	Limited public participation and challenges in tailoring event content to different age groups or communities; careful planning will be required to ensure broad and meaningful involvement.

5.3.5 Digital Business Innovation Hub

Action Title: Digital Business Innovation Hub		Owner of action: Arta Chamber of Commerce	
Short Description	Stakeholders	Links to strategy:	What success looks like
This action aims to create a comprehensive hub for digital entrepreneurship in Arta, providing incubation, tailored business skills training, mentoring, networking events, and strategic partnerships that drive competitiveness, foster innovation, and empower local SMEs and startups to succeed in the digital economy.	<ul style="list-style-type: none"> Chamber of Commerce Municipality of Arta University of Ioannina Local SMEs and startups 	SO3: Economic Revitalization and Tourism Development <ul style="list-style-type: none"> IA3.2 Support for Local Entrepreneurship and Digital Economy 	<ul style="list-style-type: none"> Establishment of an operational business innovation hub At least 10 startups/incubatees supported over two years At least 20 entrepreneurs and SMEs complete digital business training Measurable increase in digital sector employment New partnerships formed with regional and European business networks
Risks			
<ul style="list-style-type: none"> Sustained demand may be uncertain due to the limited size of the local market. Difficulty attracting and retaining qualified trainers and mentors. Variability in entrepreneurial experience among participants. Potential funding shortfalls impacting the scope and continuity of the programme. Challenges in maintaining participant engagement and motivation. 			
Action Readiness			
The initiative remains at a conceptual stage, with initial efforts on collaboration between University of Ioannina and Chamber of Commerce under Interreg programme. Stakeholder mapping and potential facility locations are under review.			
Finance & Resources			
Regional/National Program			
Interreg			
Erasmus+			

	Sectoral	Sustainability	Territorial	Governance
Current	Arta Chamber of Commerce is the mainly responsible on supporting entrepreneurship and business growth by doing several initiatives on upskilling. There are no incubators in the municipality.	The local economy remains dominated by traditional sectors such as agriculture and small-scale services. Limited diversification and low levels of digital adoption constrain competitiveness and innovation.	Cooperation with neighbouring municipalities remains basic, driven mainly by geographical proximity and the ease of transporting goods by truck	Businesses operate under the national legal regulations.
Intervention	Actions of this activity will allow for the establishment of a Digital Business Innovation Hub to give start-ups and entrepreneurs a head start through affordable office space, mentoring, and acceleration services. Moreover initiatives of this action will also support local SMEs and integrate digital skills training to help citizens adapt to the new demands of society.	The hub will directly contribute to economic sustainability by strengthening competitiveness, diversifying economic activity, and creating opportunities for innovation-driven growth in the local economy.	The activities of this action will strengthen the collaboration with businesses from neighbouring municipalities, who will be invited to participate in mentoring and acceleration programmes.	We don't expect any change in the Governance level
Future Impact	The hub will provide Arta with a permanent space dedicated to innovation and entrepreneurship, filling the gap left by the absence of incubators and offering facilities where support programmes can be hosted.	Over time, the hub will contribute to diversifying the economy and creating a more resilient local ecosystem, while indirectly supporting knowledge-based employment and innovation-driven growth.	Regional cooperation will grow as the hub strengthens its role as a shared resource for entrepreneurs across Epirus	We don't expect any change in the Governance level



ACTIVITY	INPUTS	RELATED ACTIVITIES	OUTPUTS	CONCERNs
Digital Business Incubator Setup	Facility lease/renovation, IT infrastructure, operational staff, business registration materials	Digital Development Program	Skills	The business incubator will offer both physical and virtual workspaces, shared services, and administrative support for at least 10 startups or SMEs per year, providing a coordinated resource center for innovation.
Digital Skills Development Program	Training curriculum, professional trainers in digital business, collaboration with University of Ioannina	Digital Business Incubator Setup	Business	This program will deliver structured courses and workshops covering digital marketing, e-commerce, and project management, with a target of certifying 100 local entrepreneurs and SME staff annually.
Business Mentoring and Acceleration	Pool of expert digital mentors, resources, partnership agreements	Digital Incubator Setup, Digital Development Program	Business Skills	Personalized mentoring and growth support for at least 20 ventures will accelerate business modeling, scaling, and funding readiness, strengthening the city's entrepreneurial ecosystem.

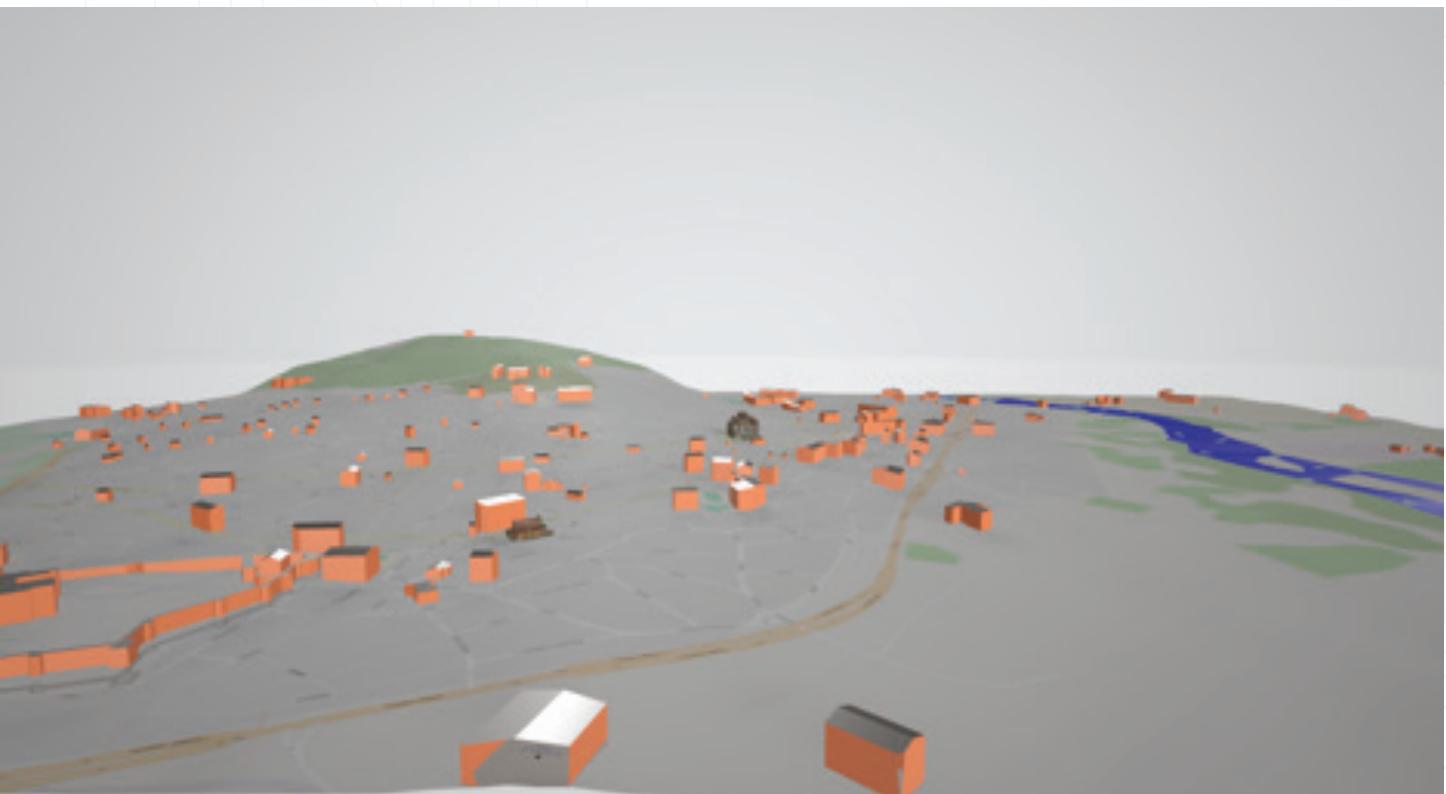
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First ideas for testing actions at local level

In alignment with the intervention area "IA3.1 Digital Tourism and Cultural Heritage Promotion" and "SO3: Economic Revitalization and Tourism Development", outlined in the IAP, the proposed small-scale testing action aims to enhance Arta's digital presence and tourism appeal through the use of immersive technologies. During small-scale testing a Virtual Reality (VR) experience was developed focused on cultural heritage presentation and tourism engagement. The VR used photorealistic 3D models of four core monuments in Arta, which were created by HERMES and SMARTiMONY project to create a digital shadow of the city as a first step towards the city vision of digital transformation and metaverse integration. The application will include:

- An **immersive VR environment** that offers an aerial exploration of **Arta's terrain**, including its topography and key cultural landmarks, serving as an early-stage digital shadow.

Figure 1
Early model of Arta's Digital Twin



- The VR application will enable users to **experience the city from an aerial perspective**. Through interactive elements, users can select specific landmarks and explore detailed, photorealistic 3D models of these sites.

- Using **photorealistic 3D modeling**, iconic monuments of Arta will be accurately depicted within the VR platform, providing users with a lifelike experience and the opportunity to learn about the history of each landmark.

The Virtual Reality application developed for the small-scale testing action will utilize OpenStreetMaps data and the Unity platform. Using these technologies, a simplified yet accurate VR representation of the town will be developed, and while most of the city's layout will remain in 2D for simplicity, key monuments will be rendered in high-detail 3D.

This testing action will help enhance tourism outreach by making Arta accessible to a global audience, targeting international visitors and tourism enthusiasts. By offering an immersive, educational tour

Figure 2
Final version of Arta's Digital Twin



of the city's most historically significant sites, the VR experience will help promote Arta as a culturally rich destination. As a digital tourism tool, this application will highlight Arta's unique architectural and cultural heritage, encouraging potential tourists to consider the city as a destination.

This initial VR application will act as a proof of concept for more extensive digital twin development. Future expansions may include additional monuments, real-time IoT data integration, and more detailed environmental data, enhancing both the tourism experience and the city's management capabilities.

In the long term, Arta's digital twin will facilitate broader metaverse integration, positioning the city as a forward-looking destination that leverages cutting-edge technology for tourism, cultural preservation, and sustainable urban planning.

The results of this small-scale action were presented to the Urban Local Group (ULG) and demonstrated the potential of ICT for enhancing tourism and to educate them on the effective use of these technologies.

The expected outcomes of this pilot include both technical and strategic insights that will inform the future development of Arta's full digital twin. On a technical level, the project will evaluate the feasibility of integrating photorealistic 3D models with geospatial data in a virtual reality environment. It will also test the accessibility, performance, and user experience of the platform, providing valuable feedback on the tools, workflows, and infrastructure required to scale the initiative. This will help define the technical specifications and data standards necessary for the transition from a static digital shadow to a responsive and interactive system.

Lessons Learned

The Digital Shadow testing action in the Municipality of Arta provided valuable insights into the practical applications of VR technologies for cultural heritage promotion and the digital transformation of munici-

palities. The SSA was well received by citizens and members of the ULG, reaffirming the proof of concept of immersive digital applications bridging physical and virtual cultural experiences. It should be noted it demonstrated that even medium-sized cities with limited digital infrastructure can take ambitious steps toward metaverse projects. In the course of implementation, a number of key learnings emerged regarding future digital transformation in Arta: developing infrastructure needs to be scalable and interoperable from day one, as the first VR application sets the stage for further, sophisticated creations of digital twins that integrate real-time IoT data and analytics. In addition, the action reinforced the importance of a functioning citizen engagement framework to help foster confidence and ease panic with new technology, particularly for older age groups that comprise a large part of Arta's population.

