METACITIES Excellence Hub in South-Eastern Europe

Long Term Research and Innovation Vision and Strategy

White paper

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1 Executive Summary

The METACITIES project unites clusters from Cyprus, Greece, and Bulgaria to develop a joint Research and Innovation (R&I) strategy that aims to transform urban environments across Southeast Europe. This strategy focuses on leveraging Digital Twin and Metaverse technologies to enhance urban efficiency, improve citizens' quality of life, and promote sustainable development. Through cross-border collaboration, METACITIES fosters shared innovation, focusing on key areas such as smart mobility, digital connectivity, environmental sustainability, and education.

The project emphasises the importance of unifying diverse local smart city initiatives and overcoming regional fragmentation. By combining expertise and resources, METACITIES aims to build resilient, green, and inclusive urban spaces that are better equipped to address challenges such as climate change, energy efficiency, and digital inclusion. The Excellence Hub, a central pillar of the project, will coordinate these efforts to ensure equitable access to smart city innovations, especially for regions that are digitally lagging. This paper outlines the joint vision, priorities, and goals of the METACITIES project, setting the stage for creating a more interconnected, responsive, and technologically advanced urban future.

2 Introduction

The ongoing digital transformation of cities demands coordinated efforts to ensure that new technologies contribute to better urban living, sustainability, and societal well-being. Smart cities now face challenges around resource management, mobility, and inclusivity, and technology can play a critical role in addressing these issues. However, the real value of smart city technologies lies in their potential to enhance quality of life, drive economic growth, and promote stronger community connections. This cannot be achieved by individual cities acting in isolation but requires comprehensive frameworks that facilitate collaboration across regions.

The METACITIES project addresses this need by fostering cross-border collaboration among clusters in Cyprus, Greece, and Bulgaria, promoting a unified approach to smart city development. This initiative seeks to close the gap between advanced urban centres and regions with less developed digital infrastructure. Through the joint development of a comprehensive R&I strategy, METACITIES facilitates collaboration among local governments, academic institutions, and industry, aiming to solve urban challenges that transcend national borders.

This initiative is driven by advanced technologies such as Digital Twins and the Metaverse. Digital Twins enable cities to develop real-time, interactive digital models of their environments, allowing officials to better plan, monitor, and optimise urban systems. At the same time, the Metaverse enhances citizen engagement by providing immersive virtual platforms where residents can participate in urban planning and governance. By leveraging these technologies, METACITIES aims to build sustainable, inclusive, and efficient cities that improve quality of life for all citizens.

3 Joint R&I Strategy for the METACITIES Project

The development of a joint Research and Innovation (R&I) strategy for the METACITIES project is of paramount importance to ensure the alignment of local strategies, foster collaboration among participating clusters, and maximise the overall impact of the project. In the context of smart cities and smart regions, the joint R&I strategy serves as a guiding document that outlines the shared vision, objectives, and collaborative actions of the project partners. This strategy is vital in addressing the complex challenges and harnessing the opportunities presented by Digital Twins and Metaverse technologies for sustainable urban development.

The current section aims to provide a comprehensive overview of the joint R&I strategy for the METACITIES project, outlining key components, establishing a framework for cooperation and coordination, and identifying potential areas for cross-border collaboration and knowledge exchange.

3.1 Shared Vision, Objectives, Priorities and Goals

Based on the identification of the common goals and objectives among the clusters' R&I strategies already made, the shared vision for the future of smart cities and smart regions within the context of the METACITIES project has been defined.

The METACITIES Joint vision: To improve quality of life and experience of citizens, enhance urban efficiency and create a more connected, responsive, inclusive and environmentally conscious urban environment, through integration of innovative Smart city technologies, digital connectivity, data-driven solutions and sustainable practices, optimising the use of resources and services that foster economic growth.

Within the METACITIES project, an Excellence Hub is being established by mobilising the forces of the partners of the three clusters. Formulating the “unified” METACITIES **Joint R&I strategy for adoption of Digital Twins and Metaverse technologies** for smart cities and smart regions aims to define a framework to join the efforts of the different clusters for speeding up the process of smart city development, addressing the challenges, seizing the cross-border collaboration opportunities, and ultimately contributing to the vision for the development of more sustainable, efficient, and resilient urban systems in the region.

In the scope of the METACITIES project, the Cyprus Cluster will take a leading role in advancing two key priority areas: 'Smart Urban Planning,' focusing on innovative strategies for city development. Similarly, the Greek Cluster will lead efforts in 'Smart Mobility' and 'Smart Environment,' driving advancements in sustainable transportation and ecological urban solutions. Meanwhile, the Bulgarian Cluster is dedicated to upscaling knowledge and expertise in the priority area of 'Green and Climate-Adaptive Resource Management,' emphasising the importance of sustainability and resilience in urban resource management.

The collaborative setting of goals and the priority areas through showcasing by implementing the pilots will prove the common digital R&I strategic approach.

Goals of the Excellence Hub:

The Local R&I Strategies developed by the three clusters contain objectives that are common to the countries of South East Europe. After discussion among the project partners, commonalities and objectives have been identified as the basis for building a Joint R&I Strategy.

- **Digital Transformation and Innovation** - Improve research and innovation capacity and foster a culture of innovation and technological development, focusing on the development of digital infrastructure, skills and a competitive digital economy, as well as modernising public administration, promoting the uptake of digital technologies in business and improving the digitalisation of services for citizens.
- **Connectivity and Infrastructure Development for Digital Transformation -** Developing and deploying secure digital infrastructure, providing access to digital skills and knowledge and strengthening digital connectivity and thereby achieving high-speed connectivity and improving digital competitiveness, digital infrastructure and technology deployment.
- **Sustainable Economic Growth and Social Inclusion** - Reducing social and territorial inequalities and promoting shared prosperity to achieve sustainable economic growth by diversifying the economies of the three countries and fostering competitiveness.
- **Environmental Sustainability, Low-Carbon Economy and Green Transition** - Promoting the use of clean energy, mitigating climate change and transitioning to a low-carbon economy. This highlights the importance of clean air, biodiversity and resource efficiency, as well as the importance of climate change mitigation and environmental protection.
- **Transport and Digital Connectivity -** Improve transport connectivity by strengthening smart urban mobility and digital connectivity, including high-speed road and digital connections**.**
- **Enhancing Education, Digital Skills and Human Resources** - A shared commitment to improving education and skills development to better adapt people to technological change and participate in the digital economy. Develop skills in high-tech areas related to Smart Specialisation and Industry 4.0, promote a culture of innovation and technological transformation development. Strengthen the link between science and business, support research and innovation ecosystems, and promote public and private investment in research and development.
- **Entrepreneurship regarding Research Innovation -** Strengthening research and innovation ecosystems, encouraging public and private investment in Research and Development and supporting the science-business nexus.
- **Research, Innovation, and Education** - Strengthen research and innovation capacities, enhance skills development, and improve human resources in the fields of new technologies and innovation.

In Table 1 the priority areas of the clusters are consolidated and related to the goals of the excellence hub. The table frames the scope of activity of the METACITIES Excellence Hub and drives the definition of the Implementation Plan.

Table 1: Relation of priority areas to the goals of METACITIES excellence hub

Goals	Priority Areas			
	Smart and Safe Mobility	Smart environment	Smart urban planning	Green and climate adaptive resource management
	Objectives			
Digital Transformation and Innovation	• Create user-friendly and interoperable digital platforms for access to real-time traffic and incident information for citizens.	• Implement digitisation of citizen services to provide real-time information on air pollution and weather conditions within the city.	• Develop a competitive digital economy by providing a digital platform showing existing and future municipality topography (iNicosia).	• Improve research and innovation capacity; • Improve the digitalisation of services for citizens.
Connectivity and Infrastructure Development for Digital Transformation	• Implement a digital infrastructure and network system, based on open data and technologies, to monitor and traffic flow and manage incidents.	• Develop connectivity and infrastructure for digital transformation, including the implementation of smart energy metering, consumption, and saving systems for public buildings.	• Deploy digital infrastructure and technology such as IoT sensors and IoT gateways.	• Development of the digital infrastructure.
Sustainable Economic Growth and Social Inclusion	• Promote smart mobility initiatives to enhance social inclusion for socially sensitive groups (e.g. smart parking) and foster sustainable economic growth.	• Promote smart environment initiatives for social inclusion and sustainable economic growth.	• Achieve sustainable economic growth by promoting smart parking.	• Achieve sustainable economic growth.

Goals	Priority Areas			
	Smart and Safe Mobility	Smart environment	Smart urban planning	Green and climate adaptive resource management
	Objectives			
Environmental Sustainability, Low-Carbon Economy and Green Transition	• Encourage the adoption of eco-friendly transportation options and promote the use of public transit systems for all.	• Implement innovative environmental solutions, such as smart recycling systems, to facilitate the shift towards a more eco-friendly and environmentally conscious economy.	• Enable a green digital transition through smart transportation and smart city development. • Transition to a low-carbon economy through eco-friendly transportation using smart parking.	• Promote the use of clean energy, mitigating climate change. • Transition to a low-carbon economy. • Resource efficiency. • Environmental protection.
Transport and Digital Connectivity	• Enhance and advocate for digital connectivity to provide real-time mobility information and data.	• Enhance and advocate for digital connectivity to provide real-time environmental information.	• Improve transport connectivity and digital connections by providing real-time data, such as traffic, regarding the municipality.	• Improve digital connectivity.
Enhancing Education, and Digital Skills and Human Resources	• Strengthen education and digital skills development initiatives to build a skilled human resource base supporting smart mobility solutions.	• Enhance education, digital skills, and human resources development to support and advance smart environment initiatives.	• Improve education and skills deployment to better adapt people to technological and environmental change.	• Skills development to better adapt people to technological and environmental changes. • Promote a culture for innovation.

Goals	Priority Areas			
	Smart and Safe Mobility	Smart environment	Smart urban planning	Green and climate adaptive resource management
	Objectives			
Entrepreneurship regarding Research Innovation	• Foster entrepreneurship in research and innovation to drive advancements in smart mobility solutions.	• Promote entrepreneurship in research and innovation to drive sustainable solutions for a smart environment.	• Promote innovation regarding city development. • Support science and business cooperation for the city development.	• Support research and innovation ecosystems. • Promote investments and links between science and business.
Research, Innovation, and Education	• Promote research, innovation, and education to drive progress and excellence in these fields.	• Promote research, innovation, and education to drive progress and excellence in these fields.	• Enhance skills development • Improve human resources in the fields of new technologies and innovation.	• Improve human resources in the fields of new technologies and innovation

4 Conclusion

The establishment of the METACITIES Excellence Hub represents a critical step toward achieving the long-term goals of sustainable and inclusive smart city development across Southeast Europe. By fostering collaboration between Cyprus, Greece, and Bulgaria, the hub serves as a central mechanism for aligning regional efforts and ensuring that innovations in Digital Twins and Metaverse technologies are applied equitably across urban regions.

The emphasis on cross-border cooperation is essential for creating resilient urban environments capable of adapting to future challenges, including climate change, economic shifts, and societal transformations. This collaboration allows METACITIES to leverage regional strengths, facilitating knowledge exchange and enhancing competitiveness while ensuring that no city is left behind in the digital transformation process.

Through the strategic integration of innovative digital technologies, METACITIES promotes smarter, greener, and more responsive cities. These cities will benefit from enhanced decision-making, improved resource allocation, and increased citizen participation. Ultimately, METACITIES seeks to create urban environments that are not only technologically advanced but also inclusive and resilient, offering a higher quality of life for all citizens. This project sets a model for other regions by demonstrating how collaborative governance and digital innovation can drive the development of the sustainable cities of tomorrow.