METACITIES Excellence Hub in South-Eastern Europe

Deliverable D6.2: Dissemination, Engagement and Knowledge Transfer

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Glossary of terms and abbreviations

Abbreviation / Term	Description
BG	Bulgaria
CSA	Coordination and Support Action
CY	Cyprus
D&C	Dissemination and Communication
DIH	Digital Innovation Hub
DT	Digital Twin
EE	Energy Efficiency
EU	European Union
FG	Focus Group
GA	Grant Agreement
GR	Greece
HEU	Horizon Europe
ICT	Information and Communication Technologies
IPR	Intellectual Property Rights
IPTO	Independent Power Transmission Operator
ITU-T	International Telecommunication Union, Telecommunication Standardization Sector
KPI	Key Performance Indicator
MV	Metaverse
ODTF	Open Digital Twin Framework
PPP	Public Private Partnership
QH	Quadruple Helix
R&I	Research and Innovation
RES	Renewable Energy Sources
SME	Small Medium Enterprise
WG	Working Group
WP	Work Package
XR	Extended Reality

1 Executive Summary

The deliverable on Dissemination, Engagement and Knowledge Transfer documents the METACITIES project activity and envisaged measures to strengthen and optimize the collaboration and maximize the project impact. They include knowledge and technology transfer, capacity building, engagement actions with all actors of the Quadruple Helix (QH) within and beyond the excellence hub, support for clustering activities with like-minded initiatives, staff exchanges, joint organization of events and an extensive spectrum of dissemination and communication activities.

The present document covers the first six months of the project activity during which only the Task on Dissemination and Communication has been active, with the rest of the Tasks starting in Month 7. A solid and ambitious action plan for the Dissemination and Communication activity has been devised and reported herewith along with a detailed account of activities already implemented and materials produced. For the activities related to: a./ Knowledge Transfer and Capacity Building; b./ Engagement and Clustering; and c./ Resource Sharing, Staff Mobility, Exchange of Best Practices only initial plans are presented, which will be further elaborated and implemented on course of the work within the relevant project tasks.

2 Introduction

2.1 Mapping METACITIES outputs

This section presents the METACITIES Grant Agreement (GA) commitments, as extracted from the formal deliverable and task description, in respect to their outputs and work to be performed. The purpose is to aid the reviewer in finding the specific sections of the document where the respective tasks' requirements are addressed but also to guide the author through and serve as a check list to address everything that is needed to be addressed.

TABLE 1: ADHERENCE TO METACITIES GA DELIVERABLE & TASKS DESCRIPTIONS.

METACITIES GA Component Title	METACITIES GA Component Outline	Respective Document Chapter(s)	Justification
DELIVERABLE			
Deliverable D6.2: Dissemination, Engagement and Knowledge Transfer	Plan for the dissemination and exploitation of results, engagement and knowledge transfer, with reports containing the dissemination, exploitation, communication, trainings, engagement, clustering and interconnection enforcing activities and results.	Chapter 3 is devoted to the dissemination & communication plans and an account of activities already performed. Chapter 4 provides initial exploitation plans of partners and of the project overall. To be continuously revised and enriched. Chapters 5, 6 and 7 introduce initial plans for capacity building, knowledge transfer, engagement, clustering, networking and standardisation, as well as collaboration enforcing activities	For the period covered by the deliverable, that is the first six months of the project, only Task 6.1 on Dissemination and Communication Activities was active. Therefore, an elaborate D&C plan is presented in Chapter 3 that includes Objectives, addressed Stakeholders and Tools. Furthermore, an account of activities already performed is being provided. Tasks 6.2, 6.3 and 6.4 start in M7. The initial plans presented in chapters 4 to 7 will be then further worked out and become more concrete and detailed. They will be documented in forthcoming deliverables of the work-package (WP), together with reports of implemented activities
TASKS			
Task 6.1 Dissemination and communication activities (EBOS)	This task will implement the dissemination and communication of the project goals, SW products, reports, results, achievements, and other outputs. The process of communication and dissemination of the results will be executed in a systematized way through the elaboration of a Plan according to article 17 of the model grant agreement of HEU. The dissemination and communication channels and actions as defined in Section 2.2 will serve as a baseline to	Chapter 3	Documentation of the project's robust dissemination and communication plan which includes objectives, targeted stakeholders, tools, activities and KPIs. The plan has been designed with the goal to ensure that the project's results, insights, and achievements are effectively communicated to a wide range of targeted stakeholders. A detailed account of activities already implemented is included and the current status of achieved KPIs is reported.

	achieve the goals in this task. Participants will ensure visibility of the project activities through several traditional and electronic dissemination and communication material sent out to a large pool of stakeholders.		
Task 6.2 Knowledge Transfer and Capacity Building (UoP)	This task will contribute to the development of new skills and competences for researchers and professionals in the R&I intensive domain of DT and metaverse cities. To that end, upskilling training programs will be developed. In addition, capacity building programs on business and entrepreneurship will aim to create an entrepreneurial culture and mind-set and empower future entrepreneurs. The task will also promote knowledge and technology transfer by establishing the relevant support environment and processes for innovation scouting, IPR protection, promotion and commercialization. The programs to be developed will be made available to the personnel of the involved innovation ecosystems as well as to their networks and collaborators.	Chapter 5	The Task will start in M7, that is on July 1st, 2023. Therefore, the current chapter provides an initial plan and high-level description of capacity building and knowledge transfer tools to be employed and activities to be implemented.
Task 6.3 Business, Civic Engagement and Clustering Activities (HAEC)	METACITIES will adopt the Public Good Model of Engagement which focuses on contributing to community development and revitalization activities, both from an economic and a non-economic perspective, with a strong 'place-based' emphasis on supporting local and regional priorities. The task will define and implement concrete and compelling 'engagement channels' with the business and civic worlds, and thus create a library of engagement capacities. Engagement channels will include strategies, processes, mechanisms, and	Chapter 6	The Task will start in M7, that is on July 1st, 2023. Therefore, the current chapter provides an overview of initial project plans concerning the activities of a./ community engagement following the Quadruple Helix and Public Good Models; b./ networking and clustering; and c./ standardization.

	tools that will be deployed to enable and facilitate systematic community engagement, in mutually beneficial ways. METACITIES will maximize its impact by leveraging on, engaging with, and contributing to networks, clusters, and associations. In particular, the clustering plan with associated activities will be defined and prepared in this task, aiming to advance the METACITIES vision, to promote the exchange of results, to share knowledge, experience and best practices.		
Task 6.4 Resource Sharing, Staff Mobility, Exchange of Best Practices (ICTC)	The task aims to reinforce the interconnection of the innovation ecosystems and to increase both the interoperability of the European ecosystems and the intra-operability within each territorial ecosystem, aiming to improve coordination, and foster excellence. To that end, it will develop mechanisms to spread the latest and most advanced knowledge to the involved ecosystems, and enable synergies and cross-fertilization among industry, academia, public authorities, and citizens. Mutual secondments and staff exchange within and between ecosystems, as well as exchange of best practices are such mechanisms that will help to build trust and long-term collaborative links. The task will orchestrate staff mobility and will facilitate resource sharing by organizing an inventory of assets to be shared and a repository of best practices to be exchanged.	Chapter 7	The Task will start in M7, that is on July 1st, 2023. Therefore, the current chapter provides an initial plan of envisaged activities that aim to strengthen and add value to the collaboration among the regional innovation ecosystems of the three involved countries.

2.2 Deliverable Overview and Report Structure

The present deliverable aims to capture the plans and activities of WP6 which focuses on the definition and implementation of a rich set of measures to ensure both maximization of the impact of project results and activities and empowered and sustainable collaborations among the involved regional innovation ecosystems of the three countries. The deliverable covers the first six months of the project's activity, during which only Task 6.1 on Dissemination and Communication Activities, out of the four tasks of the WP has been active. That is why the report is heavier and more detailed in chapter 3 which covers the activity of T6.1 for which both plan, activities and first outputs can be reported, while the rest of the chapters are lighter and report on initial plans of activities which will kick-start in M7.

The Report is organised as follows:

Chapter 1. Executive Summary - Provides a concise overview of the deliverable's contents.
Chapter 2. Introduction – Provides an organizational overview of the document and justifies the alignment of deliverable contents with the project's contractual obligations.
Chapter 3. Dissemination and Communication Plan - Provides a comprehensive description of the plans, activities, and outputs of Task 6.1.
Chapter 4. Exploitation Strategy and Plan - Presents the initial exploitation plan for the project as a whole, supplemented with individual partners' exploitation plans.
Chapter 5. Knowledge Transfer and Capacity Building - Reports on the objectives and initial planning of activities related to capacity building and knowledge transfer.
Chapter 6. Engagement, Clustering and Standardisation Activities - Describes the initial project plans for community engagement while following the Quadruple Helix and Public Good models, networking and clustering activities, and standardisation.
Chapter 7. Reinforcement of Sustainable Cross-Border Collaboration - Focuses on facilitating and strengthening cross-border collaboration among the involved innovation ecosystems and presenting the initial plans for this objective.
Chapter 8. Conclusions - Summarises the achievements to date and provides directions for future work.

3 Dissemination and Communication plan

As part of the METACITIES project, a robust dissemination and communication plan has been designed to ensure that the project's results, insights, and achievements are effectively communicated to a wide range of stakeholders, including policy makers, urban planners, researchers, industry professionals, and the general public.

3.1 Dissemination and Communication objectives

The dissemination and communication strategy to maximize the impact of the project, ensures that the knowledge generated is widely disseminated, and promotes active engagement with relevant stakeholders.

Steps and Phases:

1. The first step is to identify the target audiences, communication tools and channels. Based on this, an effective dissemination plan can be created to maximize the impact of the project results.
2. The second step is to design a comprehensive set of communication materials that facilitate easy recognition of the project and increase exposure to its goals, activities, and achievements.
3. The third step involves utilizing both internal and external dissemination channels, organizing project events, and participating in workshops, conferences, and international/EC meetings to ensure widespread knowledge of the project and its results.
4. The final step is to sustain the visibility of the project activities and outcomes over the long term, by continuously updating communication materials and engaging with stakeholders to maintain their interest and support.

The **main objectives** of the dissemination and communication plan are to:

1. **Raise Awareness:** The first objective is to increase awareness of the project among key stakeholders and the general public. By sharing information about the project's goals, activities, and outcomes, the project aims to create a better understanding of the challenges facing urban areas and the need for sustainable and innovative solutions.
2. **Disseminate Knowledge:** The second objective is to ensure that the knowledge generated by the project is widely disseminated to relevant stakeholders. This includes sharing research findings, insights, and best practices.
3. **Promote Collaboration:** The third objective is to foster collaboration among stakeholders. The project aims to create opportunities for networking, knowledge-sharing, and collaboration.
4. **Create Impact:** The final objective is to create a lasting impact on urban development practices. The project aims to promote the adoption of sustainable and innovative solutions in urban development, ultimately transforming cities into ideal smart cities that prioritize environmental sustainability, resilience, liveability, and inclusivity.

3.1.1 Dissemination and Communication Target Stakeholders

The METACITIES project consortium has agreed to adopt a unified approach for engaging with relevant stakeholders. Table 2 presents the main groups-audiences identified and being targeted by the consortium partners.

The METACITIES project aims to reach over 1000 stakeholders in Europe and beyond, informing them about its research and innovation strategies for the digital transition of smart cities. These strategies

include the Open Digital Twin Framework (ODTF) and reference architecture, results from small-scale pilots, the integrated business process framework, and associated business models. By the end of the project, the consortium plans to engage with more than 20 start-ups, SMEs, and mid-caps, as well as over 10 industrial actors, public authorities, and social actors in the three clusters, encouraging them to adopt the key results in their strategies and services. The consortium also aims to disseminate its results to over 20 international communities and associations, as well as over 20 Digital Innovation Hubs (DIHs) through its partners' memberships. Furthermore, we, as a cross-border excellence hub and/or regional innovation ecosystems, aim to mobilize at least five national, regional, and European funding opportunities to invest in R&I activities after the project's completion. This investment will enable further evolution and implementation of large-scale pilots to provide practical evidence of the benefits and ensure continuity of the project's outcomes.

TABLE 2: GROUPS TARGETED BY METACITIES

Target Group	Interest in the project
A – Telecom operators and solutions providers, service and content providers including their collaborators & vendors	Transfer of knowledge and the development of entrepreneurial skills, align with the latest technological advancements, provide training on the project's outcomes, and facilitate participation in project events to develop new competencies and skills. Additionally, there are plans to establish common investment strategies for R&I.
B – Innovative SMEs (ICT and application/service providers)	Similar interests as with Target Group A
C – Scientific community at universities & research centres	Further advancements in the project's research by extending or reusing its innovative technologies and key findings, providing training on the project's outcomes, and promoting participation in project events. Adoption of knowledge generated by the project for academic purposes such as PhD dissertations. Another objective is to strengthen the links between science and business.
D – Industrial associations, technology clusters, initiatives, other relevant projects	Dissemination of the project's outcomes to these groups and collaboration in joint events, activities and synergies (workshops, papers etc.).
E – Municipalities	New opportunities for the delivery of innovative smart city services and establishment of common investment strategies with Target Group A to support the implementation of these services.
F – Governmental bodies and policy makers (local & EU level)	The project's results will be taken into consideration for the development of joint long-term research and innovation (R&I) strategies and policies, which will be supported by concrete action plans with EU relevance.
G – Funding agencies and bodies	The project's results are expected to have significant value in attracting further funding to realize the implementation of the innovative pilot use cases proposed in METACITIES.
H – Standards bodies and open-source initiatives	Development of roadmaps for existing and/or new standards development. Participation and contribution to pre-standardisation Working Groups.
I – General public, smart city service consumers and prosumers, societal actors	New and improved user experiences with novel smart city products and services empowered by 5G and beyond. Understand how data services can be used to provide better service experiences with guaranteed quality of service. Active participation in defining priorities and co-creating solutions.

3.2 Dissemination Tools and Activities

This chapter aims to offer a detailed outline of the dissemination methods and strategies that the consortium has developed to achieve effective dissemination of the project's results and maximize their impact. The various tools and activities have been carefully planned to ensure the project's promotion to a wide range of stakeholders. The following section provides an overview of the methods and techniques that will be used to accomplish these objectives as well as the targeted Key Performance Indicators (KPIs) (Table 3).

1. **Scientific Publications:** The consortium plans to disseminate the project's findings through a variety of scientific publications that target both the scientific community and industry. These publications include scientific conferences such as the International Conference on Communications, Globecom, and the International Conference on Smart Cities and Sustainability, as well as peer-reviewed journals such as IEEE Proceedings, Pervasive Computing, and Transactions on Communications. By targeting these publications, the consortium aims to ensure that its research is widely recognized and adopted by relevant stakeholders.
2. **Technical Publications & white papers:** METACITIES will publish and contribute to technical blog posts, articles, position/white papers, catalogues, and books, among others. The consortium aims to provide high-quality contributions similar to those found in reputable publications such as the upcoming white papers from 5G PPP, Smart Cities World, muRata, Springer, ResearchGate, and ScienceDirect, among others.
3. **Workshops, webinars, hackathons, trainings, joint events with other projects/initiatives:** To facilitate knowledge transfer and promote sustainability, the scientific partners of METACITIES will organize technical workshops, training sessions, webinars, and summer schools both virtual and physical. These events will target audience groups A-F and provide a means of knowledge transfer. The consortium will also organize three Hackathons on Open Digital Twin Framework (ODTF) for each ecosystem (CY, GR, BG). Additionally, as part of clustering activities, joint events will be co-organized with existing 5G and beyond projects in which consortium members participate, including 5G-SOLUTIONS, 5G-VICTORI, 5GASP, 5G-ROUTES, 5GMediaHUB, VITAL-5G, 5G-ERA, 5G-EPICENTRE, MonB5G, MARSAL, as well as smart cities initiatives like the Intelligence Cities Challenge and the B40 network.
4. **Push results to communities, associations, DIH into joint activities & synergies:** The consortium will collaborate with relevant communities, associations, innovation hubs, and EU-funded projects in which consortium partners are active members to jointly disseminate METACITIES results.
5. **Industrial exhibitions, trade fairs:** The consortium partners will participate in various well-known symposia, events, industrial exhibitions, and trade fairs with the aim of actively engaging with multiple stakeholders and disseminating the outcomes of METACITIES through presentations, talks, brochures, and personal interactions.
6. **Standards & policy contributions:** To ensure that the impact of METACITIES is far-reaching and long-lasting, the project aims to influence policymaking and standards development. This involves obtaining recognition and approval for the project's proposed innovations and contributions, and subsequently integrating them into production environments. To achieve this, the consortium partners plan to provide recommendations for policymaking and standardisation in WP5 and WP6.

7. **Showcases & demos:** METACITIES will include in its dissemination plan, showcase activities to demonstrate the feasibility of its proposed capabilities and incentivise wide adoption.
8. **Private/public funding institutions and EU funding opportunities:** One of the keyways to drive the development and adoption of innovative technologies is through funding from both private and public sources. Therefore, it is essential to disseminate the project's results to these organizations to ensure the sustainability of METACITIES and identify further funding opportunities to advance its concept and bring the proposed pilots to fruition.

TABLE 3: DISSEMINATION ACTIVITIES AND TARGET KPIS

No	KPI Description	Target Value	Current values
1	Presentations in Scientific Conferences	>20	2
2	Industrial exhibitions	>10	1
3	Roll-up banners	3	2
4	Journal Publications	>15	1
5	Technical Publications	>15	-
6	White Papers/factsheets	> 10	-
7	Organization of technical workshops	6 in 3 countries	-
8	Average number of attendees per workshop	>100	-
9	Online Training Tutorials	4	-
10	Summer Schools	6	-
11	Webinars	10	1
12	Smart City Hackathons/pitching events organized	3	-
13	Total number of enrolled users	>1000	-
14	Communities/associations to push results	>20	-
15	Standards Contributions to different Organisations	>3	-
16	Policy Recommendations	>3	-
17	Showcasing events	4 in 3 countries	-
18	Funding Opportunities	>5	-

3.3 Communication Tools and Activities

Effective communication is a critical aspect of any successful project. A clear and strategic communication will maximize the impact and reach of the project's objectives, results, and achievements. With this in mind, the consortium has developed a comprehensive communication plan with clear objectives and strategies. The communication efforts will include providing accessible information about the project's objectives, expected outcomes, and important aspects, as well as providing regular updates on events and project outputs. Table 4 presents an initial plan for the communication tools that will be used to reach each of the identified target groups.

1. **Project Website:** A project website that serves as the primary source of information on the goals and activities of the project and enables quick retrieval of key action data with a few clicks. The website was developed in M01 and will be constantly updated and maintained for three years after the project is completed. EBOS is responsible for this activity in task T6.1.
2. **Social Media:** METACITIES has established and maintains its online presence across a number of social media platforms, using Twitter and LinkedIn to interact with research and innovation communities and disseminate new publications, and YouTube and Podcasts to engage a large audience. EBOS is in charge of this activity in task T6.1.
3. **e-Newsletters and email campaigns:** E-newsletters will use the associations and clusters that partners are a part of, to provide a snapshot of the main activities and successes of METACITIES, whereas emailing messages to target contact points in relevant and interested target pools is a highly effective way to gauge engagement, especially when promoting events and outcomes across different domains. To automate the distribution across contact points, expert marketing platforms (like Brevo and Mailchimp) will be employed. The structure, lay-out and visual presentation of the Newsletter have been defined and discussed among the partners. The first Newsletter will be circulated in July 2023. HAEC is the responsible partner.
4. **Online Publishing:** METACITIES will be able to reach a larger audience by utilizing online publishing platforms (like Medium, WIRED) and publications (like CORDIS Research EU Magazine). Additionally, all partners will make non-confidential project information available to local/regional newspapers, media, and press in their native tongues. Additionally, the impact of METACITIES will be heavily publicized in the participating countries as well as internationally.
5. **Blogs, fora:** In open communities, consumer blogs, non-profit organizations, and channels (such as SmartCitiesWorld, SmartCities Scheilder), METACITIES will connect and carry out periodic broad promotion activities. This is led by AU.
6. **Promotional material:** Flyers, catalogues, posters, and any other printed paper-based resources, are used when participating in events. The majority of the information will be accessible as electronic documents, with printing as needed. METACITIES will also investigate labelling options for products, which has been shown to be a successful strategy for promoting initiatives to a less specialized audience. EBOS is leading this effort under T6.1.
7. **Multimedia:** Utilizing the available distribution channels for promotion (such as YouTube and Vimeo), METACITIES will create multimedia content with a self-explanatory and appealing presentation of its scope and results. As part of task T6.1, CYENS, HAEC, and AU will collaborate to conduct a series of interviews with scientific partners and regular citizens to gather input. These interviews will take advantage of plenary sessions and other events.
8. **Public Talks:** Interact with the public to educate them about the impact of METACITIES results in their daily lives and to raise awareness of the advantages to society. Social media use, online

video clips, open-mic presentations at universities, involvement in community events, etc. are all part of this group of activities. These tasks will be carried out by UCM, BUR, MPAT, and CCA.

By employing these communication tools and activities, METACITIES aims to ensure effective dissemination and engagement with its target audiences.

TABLE 4: COMMUNICATION ACTIVITIES AND TARGET KPIS

No	KPI Description	Target Value	Current values
1	Website Visitors at M48	10.000	131
2	Social media followers	>2000	240
3	Social Media Impressions (monthly average)	>500	>900
4	e-Newsletters	>8	1 in progress
5	Mailing list	>1000	-
6	Press-releases	>12	1
7	Publications/Contributions to Blogs	>10	-
8	Different Blogs to Post	>4	-
9	Brochures, Flyers, posters	>3.000	200
10	Videoclips	3	-
11	Interviews	>6	-
12	Videoclips Views	10.000	-
13	Public events	6	-
14	Public events at universities	>5	-
15	Open days	5	-
16	Participation at events organised by local authorities and social actors	>5	-

3.4 Dissemination and Communication Activities Performed

This section outlines the D&C tasks that the Consortium partners have already completed up until June 2023. The following list of traditional and cutting-edge communication channels is part of the integrated D&C strategy used by METACITIES.

3.4.1 Logo and Templates

The project's identity/branding is supported by a logo (Figure 1), common presentation templates (Figure 2), and documents/public deliverables (Figure 3), all of which have been generated and will be utilized in all project outputs, presentations, and publications.

FIGURE 1:METACITIES LOGO.

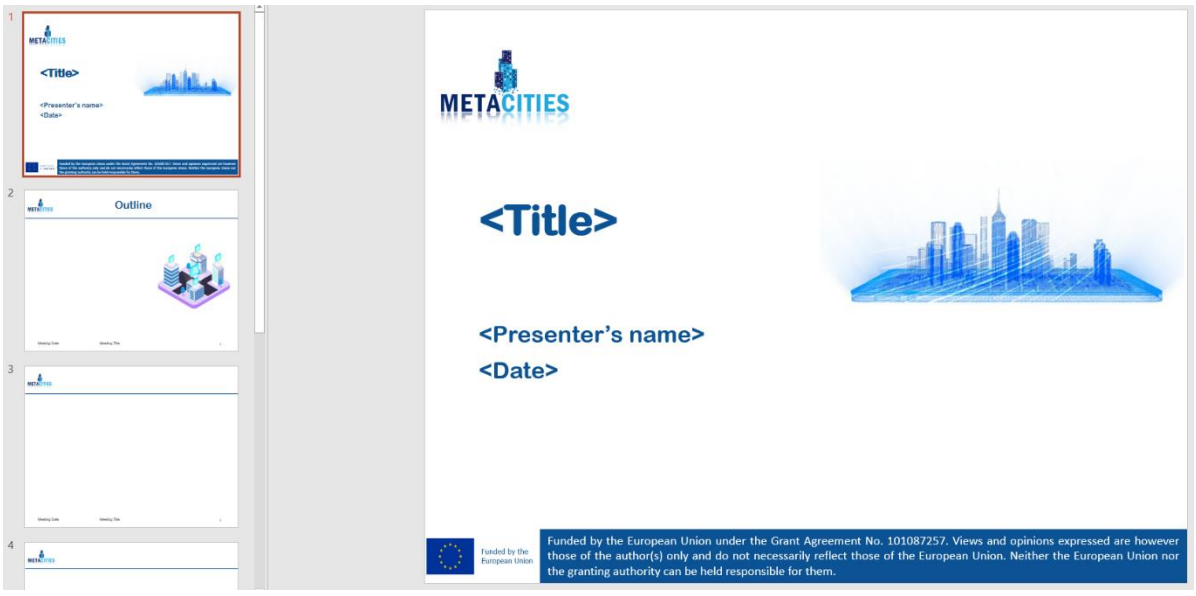

FIGURE 2: METACITIES PRESENTATION TEMPLATE.

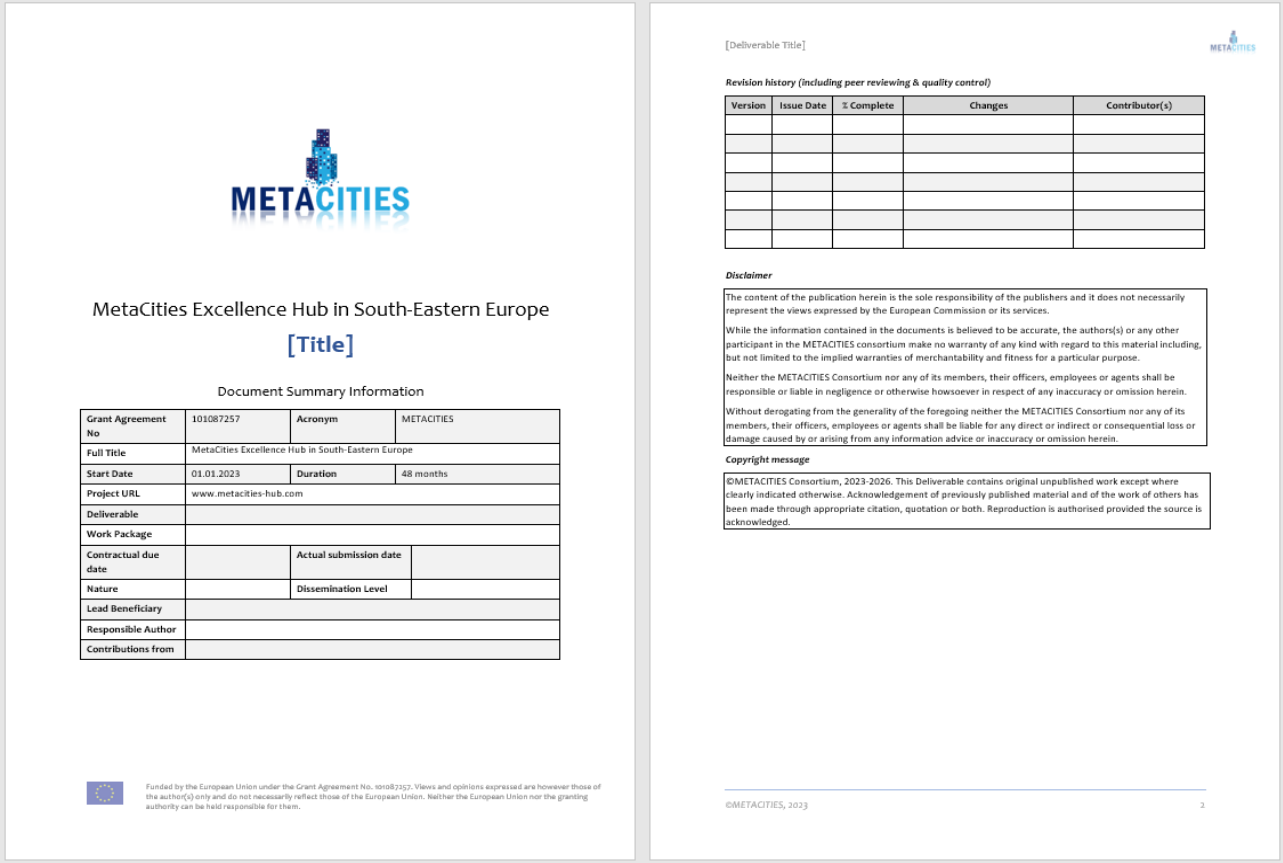

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FIGURE 3: METACITIES DELIVERABLE TEMPLATE.

3.4.2 Project's Website

A website was developed in M01, and it is continuously maintained and enhanced by eBOS in order to:

- Promote the project's public image and act as the primary online access point for the many public groups.
- Act as a source of information by emphasizing the goals, processes, results, and pertinent updates of the project.
- Act as a database for information. The website will serve as an online repository for publicly available publications and deliverables that are available for free download.

The METACITIES website is a component of the dissemination activities carried out for this project and can be visited at https://metacities-hub.com/. Moreover, METACITIES website is registered in Google Analytics which can be used to effectively monitor the website's traffic and audience. Figure 4 presents a relevant report on the traffic overview information for the period 01/01/2023-02/05/2023.

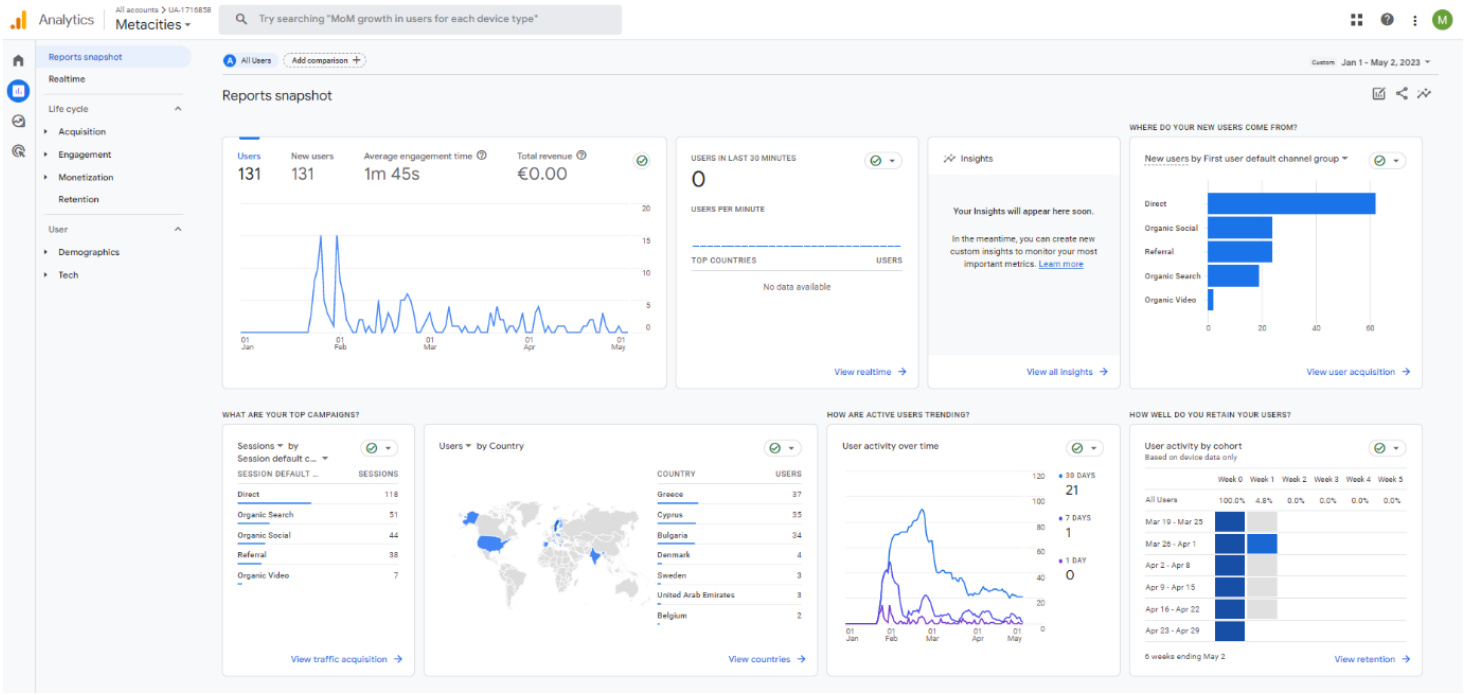

FIGURE 4: GOOGLE ANALYTICS SNAPSHOT (PERIOD: M01-M04) FOR THE METACITIES WEBSITE

3.4.3 Project's social media

Along with the website, the METACITIES social media accounts on LinkedIn, Twitter and YouTube are a part of the project's dissemination and communication efforts.

The METACITIES LinkedIn page (Figure 7) was created during the first month of the project and can be accessed at https://www.linkedin.com/company/metacities-hub/. The LinkedIn page currently has 177 followers and offers a significant channel for dissemination that will be utilized to widely communicate project information, findings, links to work, links to events, etc., including all significant project milestones, meetings, and important outcomes. Figure 5 shows the impressions generated on LinkedIn over the last 4 months from 14 different posts related to the project. The figure provides a snapshot of the engagement and reach of the project's LinkedIn presence, as well as the effectiveness of the content shared with the platform's users. The 14 posts covered various topics and aimed to raise awareness of the project among the LinkedIn audience. The insights captured in Figure 5 offer valuable feedback on the project's LinkedIn strategy, including the level of interest and response from the platform's users.

The METACITIES Twitter account (Figure 8) (https://twitter.com/MetacitiesH) has also been created since the beginning of the project and currently has 32 followers. Twitter increases visibility and reach to potential collaborators, funders, and participants. It also provides access to a new audience and allows for greater reach by employing relevant hashtags for topics of interest. Additionally, the METACITIES YouTube (Figure 6) channel (https://www.youtube.com/@metacitieshub/featured) which currently has 23 subscribers was created to host the upcoming videos, interviews etc. of the project.

As a result, all platforms will be used to the fullest extent possible to increase engagement and response to any prospective interest in all the topics that will be covered by the project activities, events and outcomes.

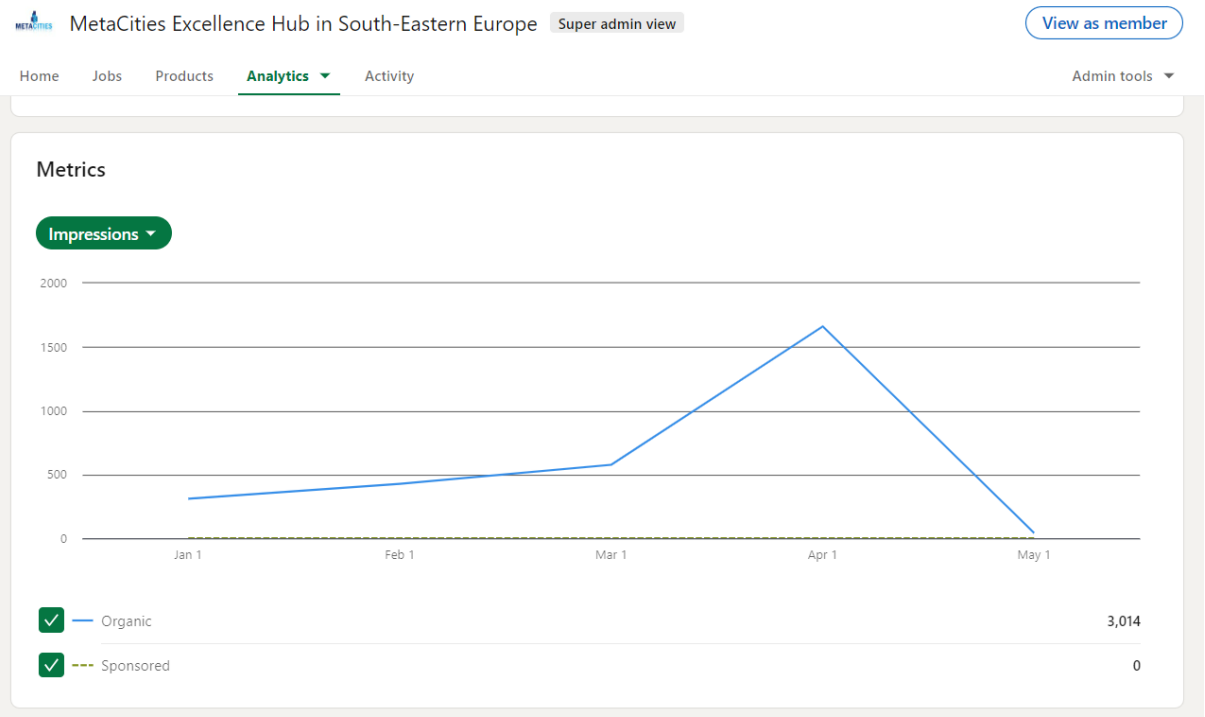

FIGURE 5: LINKEDIN IMPRESSIONS FOR THE METACITIES PAGE (FIRST 4 MONTHS).

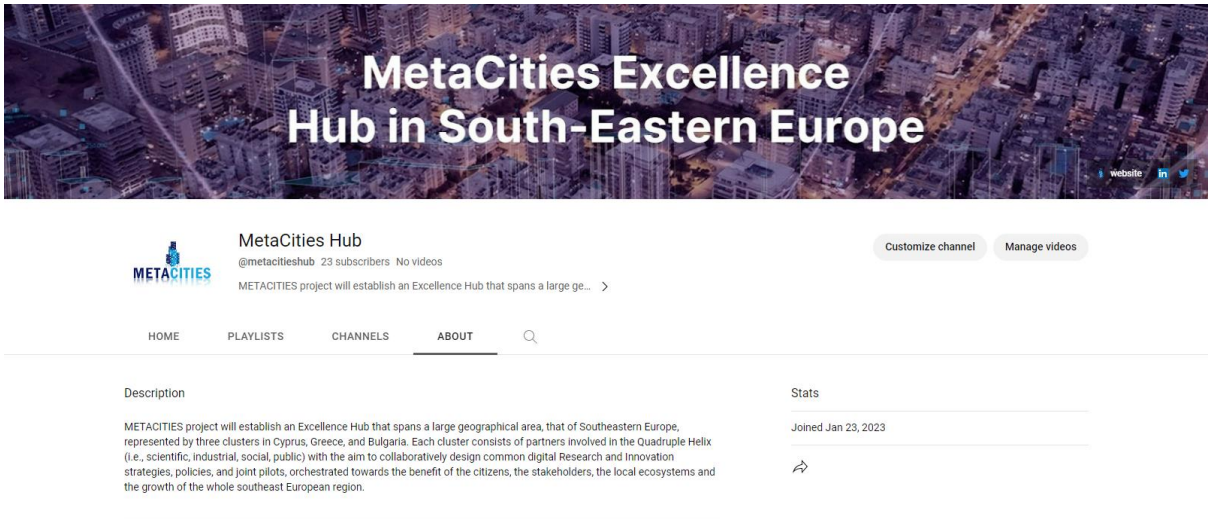

FIGURE 6: METACITIES YOUTUBE CHANNEL.

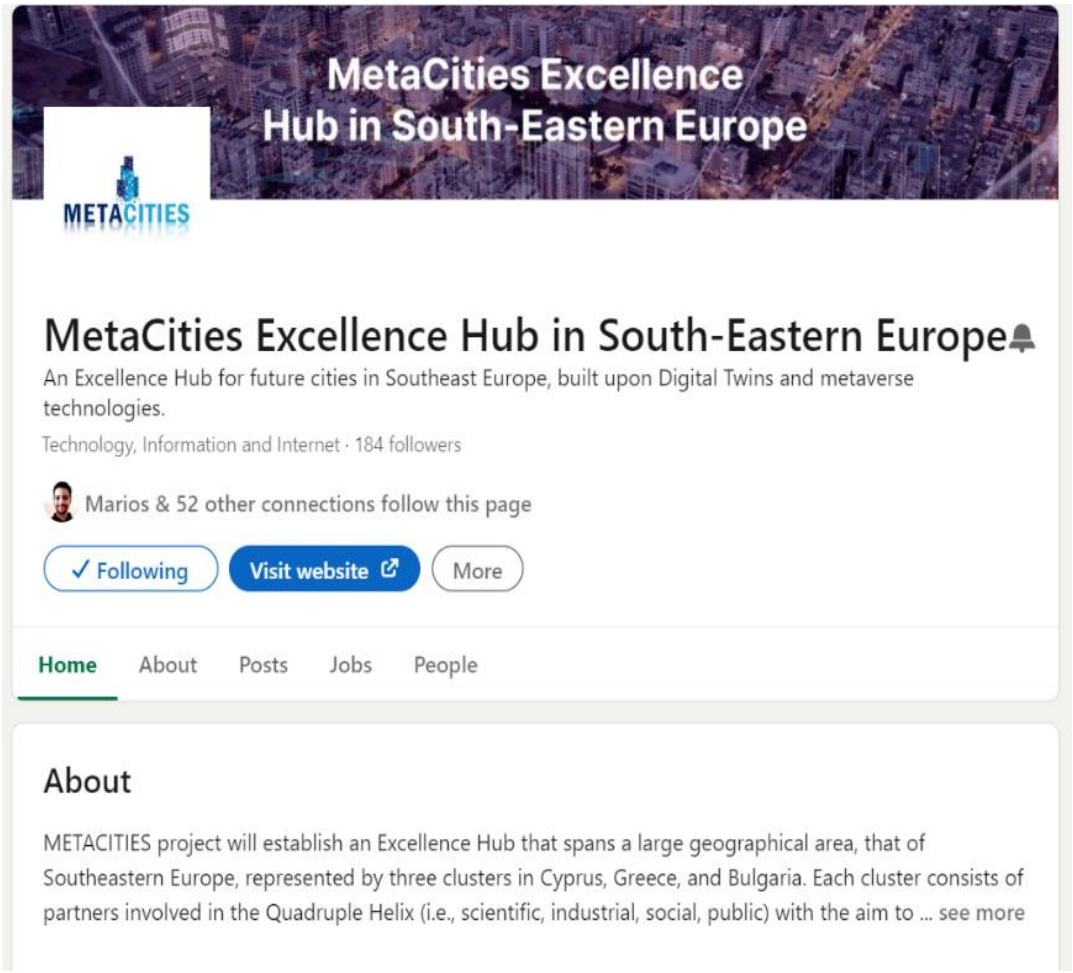

FIGURE 7:METACITIES LINKEDIN PAGE.

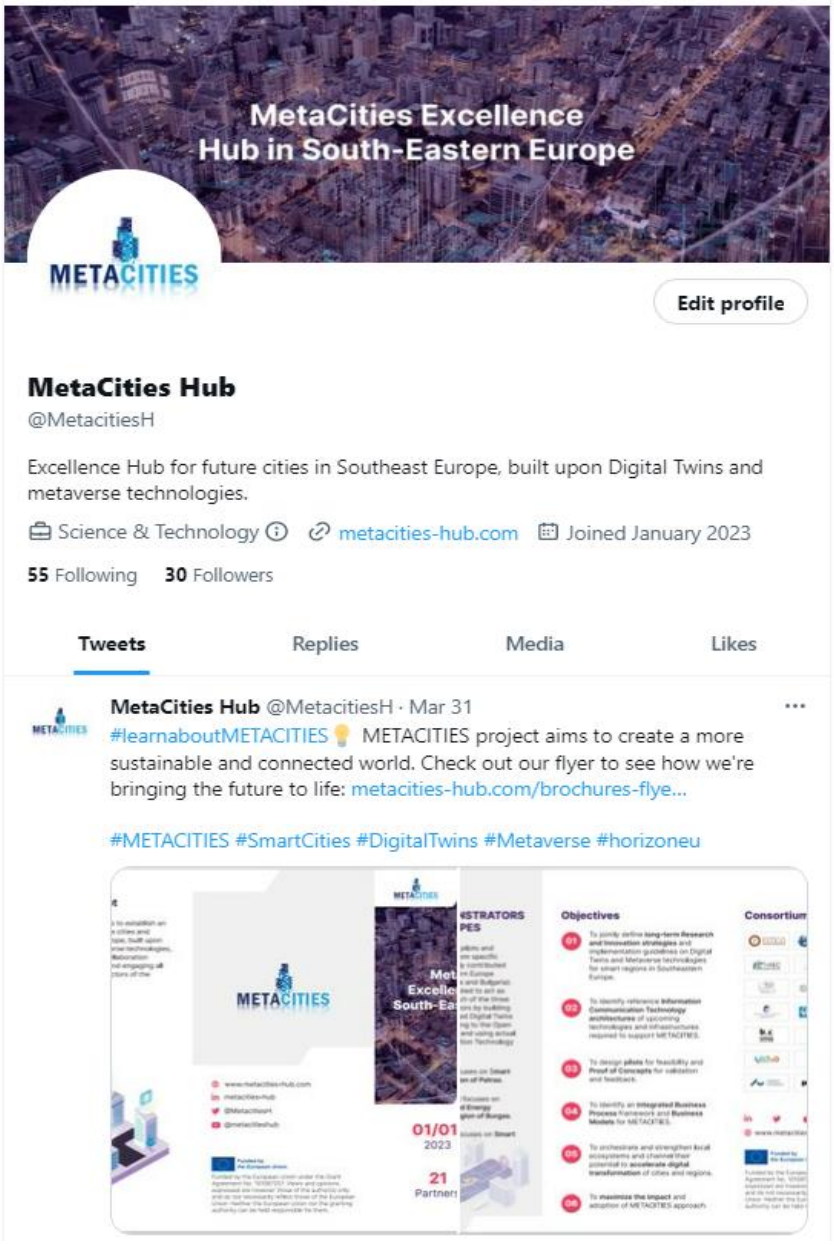

FIGURE 8: METACITIES TWITTER PAGE.

3.4.4 Brochures/Flyers

The METACITIES project has created several promotional materials, such as leaflets (Figure 9) and a roll-up banner (Figure 10) to promote awareness of the project. These materials have already been utilized and distributed at two recent events, namely the **Embedded World 2023**[1] exhibition and conference and the **5G and the Metaverse**[2] event organized by p-NET. The use of promotional material in international events and conferences contributes to increasing project visibility, attracting potential collaborators, funders, and participants.

FIGURE 9: METACITIES LEAFLET.

FIGURE 10: METACITIES ROLL-UP BANNER.

3.4.5 NewsLetter

The presentation, structure and organization of content of the project's NewsLetter have been discussed in the plenary meeting of June and the first issue of the NewsLetter will follow within July 2023.

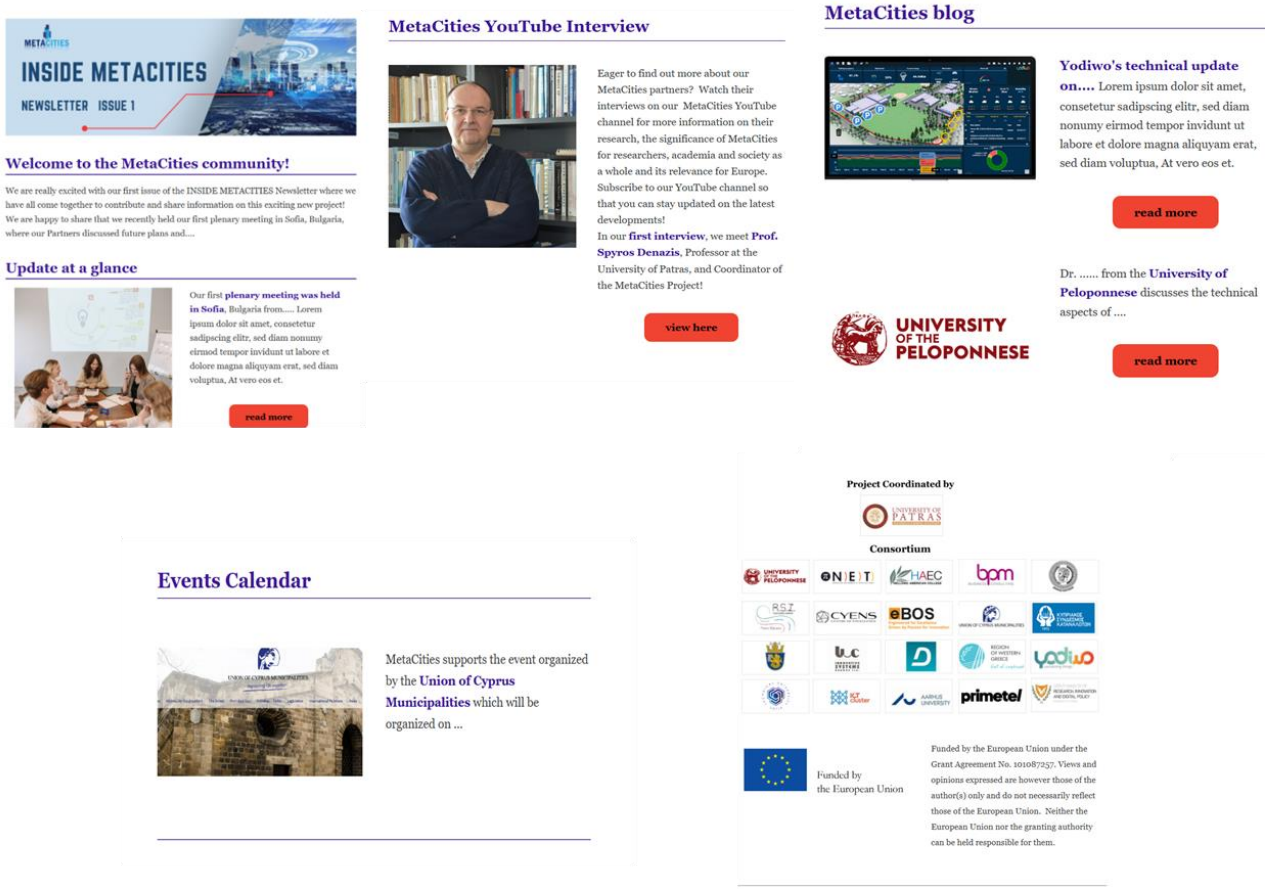

FIGURE 11: METACITIES NEWSLETTER.

3.4.6 Participation in Conferences and Events

Participation at conferences, seminars, and events was another aspect of the public dissemination efforts completed by the project's partners, even though the project is still at an early stage. The project's direct connection and distribution with the scientific and corporate communities were increased through the consortium partners participation in international organizations.

1. **Participation in the Webinar 'The Latest Metaverse Trends'**

The Webinar focused on the Latest Trends and the Future of the Metaverse and was intended to provide information and increase awareness on this topic to p-NET's partners. The METACITIES project (Figure) was presented by Prof. Spyros Denazis (UPAT) and presentations given by Zois Kokkonis, Future Programs Officer, European Space Agency on "Nextgen Networks for METACITIES", Marios Nicolaou, Business Development Director, p-NET on "Metaverse Future Trends" and Kostas Vakaros, Senior Product Manager - Digital Twin, Improbable UK on "Metaverse New Technologies". The Webinar was held on the 26th of January 2023 and was attended by 35 people.

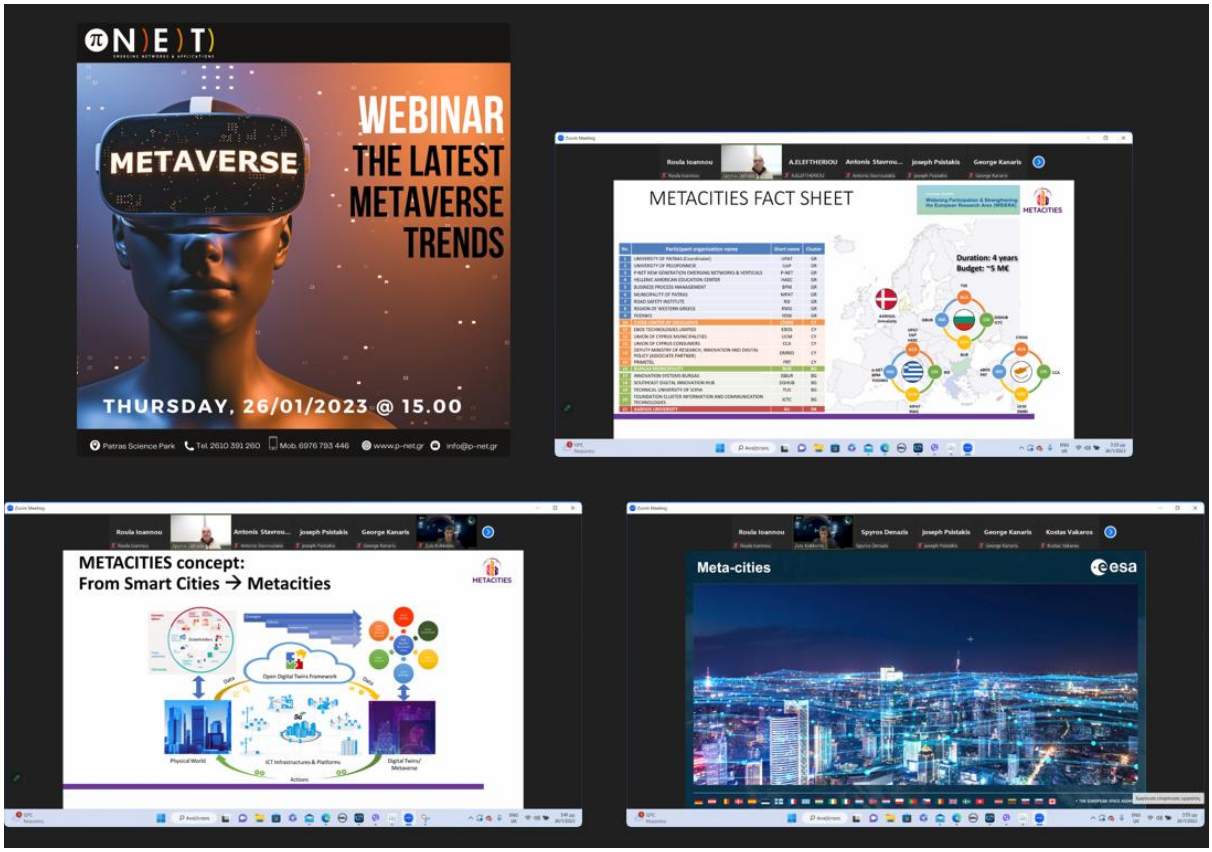

FIGURE 12: WEBINAR 'THE LATEST METAVERSE TRENDS'

2. Participation in the 'Embedded World Exhibition & Conference 2023'

UoP participated in the exhibition with a booth hosting METACITIES banner and flyers. Embedded World[1] is one of the biggest electronics shows in Europe. Over 950 exhibitors from 44 countries presented their product innovations and solutions at the Embedded World 2023, which was visited by almost 27.000 visitors. The conference took place in Nuremberg, Germany from the 14th until the 16th of March 2023 (Figure 11).

FIGURE 11: PARTICIPATION IN THE 'EMBEDDED EXHIBITION & CONFERENCE 2023'

3. Participation in the '5G and the Metaverse' Conference

The event was organized by p-NET and featured prominent and influential speakers from Greece and abroad, who highlighted the latest trends in the Metaverse and showcased technologies and use cases from all over the world. Relevant work from METACITIES was presented by UPAT and CYENS, and the project received strong support throughout the event (Figure 14). The METACITIES banner was positioned behind the podium and prominently featured in all presenter photos, as well as being promoted through the event's live streaming. Notably, the event generated international interest, leading to an interview with Dr. Christos Dimas, Deputy Minister for Development and Investments, and a subsequent article published in Forbes[3]. This event [2] took place in Patras, Greece on the 4th of April, 2023 and was attended by 130 people.

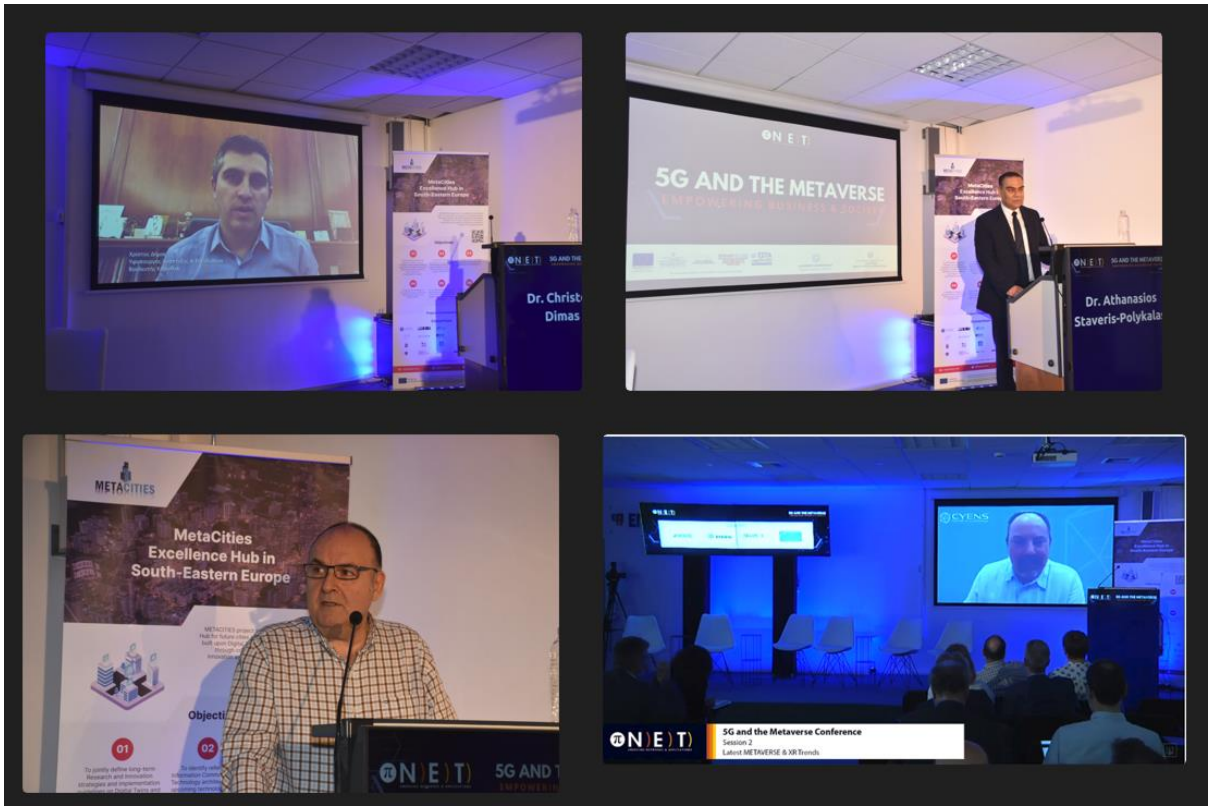

FIGURE 12: '5G AND THE METAVERSE' CONFERENCE.

4. University of Peloponesse attended the DIH² Network Convention

Senior researcher Dr. Evi Faliagka from the University of Peloponnese (UoP) participated on a brokerage pitch by DIH and regional agencies, presenting, among else the METACITIES Excellence Hub (Figure 13). The Convention took place in Brussels on May 10th, 2023.

FIGURE 13: PARTICIPATION IN THE DIH² NETWORK CONVENTION

3.4.7 Scientific Publications

Scientific journals have a high impact and engagement among the scientific community. Thus far, the METACITIES project has published its current findings in one International Conference to maximize reach within the scientific community. Table 5 will be continuously updated with new publications presenting the research outcomes of METACITIES.

TABLE 5: METACITIES SCIENTIFIC PUBLICATIONS.

No	Journal/Conference	Title	Partners	Authors
1	International Conference on Wireless Communications Signal Processing and Networking (WiSPNET 2023)	ML-Aided Dynamic Clustering and Classification of UEs as VBs in D2D Communication Networks[4]	CYENS	Iacovos Ioannou, Prabagarane Nagaradjane, Ala' Khalifeh, Christophoros Christophorou, Vasos Vassiliou Gundepudi V. Surya Sashank, Charu Jain, Andreas Pitsillides

4 Exploitation Strategy and Plan

4.1 METACITIES Excellence Hub's Exploitation Strategy and Plans

METACITIES is a Coordination and Support Action (CSA), but with a high potential for exploitation of its results, jointly or separately by the partners, but also by other players in the GR-CY-BG regional innovation ecosystems and beyond. In close coordination with METACITIES' dissemination strategy and activities (WP6) but also Business Modelling and Business and Sustainability Planning activities (WP5), METACITIES will define and implement an effective, solid and dynamic sustainability and exploitation strategy that will be regularly reviewed, tuned to address potential threats, and expanded as the project proceeds and new opportunities arise.

To this end, the METACITIES exploitation team (led by BPM and supported primarily by AU and HAEC) will deal with sustainability and long-term exploitation, business modelling, business and investment planning (based on the funding opportunities identified during the project) of the Excellence Hub, with a view to secure the sustainability of the project's operation, service, impact generation, and cross-border collaboration.

The exploitation team will continuously try to engage with the addressed stakeholders' communities and valorise all foreseen events and engagement activities to promote the project within an active network aiming at establishing strong working relationships with key individuals and organisations involved in or having an interest in the METACITIES domain of relevance.

Exploitation activities will be thoroughly planned as the project unfolds and reveals its value and will continue throughout the entire lifecycle of METACITIES. The exploitation strategy will be developed in detail within the scope of WP5 and will unfold along the following axes:

- Definition of exploitation objectives, target audience and project results to be exploited.
- Presentation of the overall exploitation strategy based on the project's principles and business models.
- Identification of exploitation acceleration measures to be adopted by the METACITIES Excellence Hub.
- Definition of the exploitation roadmap, following the project's time plan.

At the time of preparation and submission of the present deliverable only the first items of the exploitation plan have been established and are briefly presented in the following.

4.1.1 Target audience

Several categories of stakeholders are actively involved in the context of Smart and Metaverse Cities and constitute the targeted audiences of the METACITIES Excellence Hub. The project is focusing on the Quadruple Helix Model of collaboration (WP2) in the context of which targeted stakeholders are analysed and the value flows among them are identified and elaborated. It is the mandate of Task 6.3, the initial plan of which is presented in chapter 6 below, to devise and implement the appropriate channels (methods and tools) to engage with each stakeholder type.

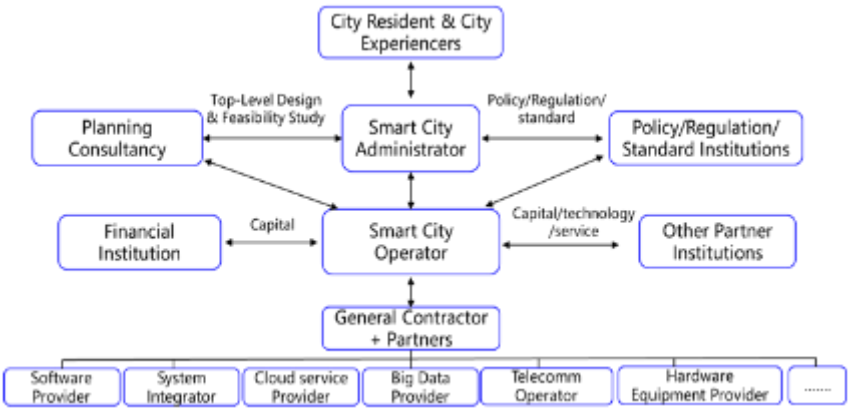

FIGURE 14: QUADRUPLE HELIX MODEL FOR SMART CITIES.

As illustrated in the Figure 14 above, addressed stakeholder types include:

- Local and Regional Authorities
- National Authorities
- Business owners and professionals such as
  - Transport and modelling professionals for the GR cluster
  - Urban Planning and Transport professionals for the CY cluster
  - Energy and Independent Power Transmission Operator (IPTOs) for the BG cluster
- Citizens
- Groups representing pedestrians, cyclists, public transport, motor vehicles
- Technology providers.

4.1.2 Project key exploitable results

Developing a strategy to exploit the results of METACITIES requires knowledge of the results that the project will offer as a whole, but also to each target group. Project workpackage leaders and Innovation Managers will scout for project results across all workpackages, profile and tailor them to the interests and needs of each target group. Key project exploitable results will be elaborated in the next versions of the exploitation plan.

A brief outline for the technologies to be developed per cluster is presented in the following. In METACITIES, the main focus from a scientific / technological perspective is on Digital Twins (DTs) as they apply in the context of smart cities/regions collectively and provide tangible digital replicas of several aspects of a city (from social, business, cultural dynamics to actual infrastructure) and allow various parties, policymakers, urban planners, engineers, developers, entrepreneurs, citizens etc., to assess the effects of any changes before investments and implementations of strategic plans occur.

METACITIES will ensure that DTs are interconnected with the actual physical environment through a substrate of digital infrastructures comprised of sensors, wireless and optical networks, and cloud computing facilities, that are capable of transferring, filtering and processing huge volumes of information and react accordingly. These flows of information are used by sophisticated computer models to validate specific choices, play different city scenarios and discover strengths and weaknesses of solutions and interventions before their actual deployment. Digital twins may also interact real time with users, allowing the latter to directly control the city operations through them.

Accordingly, the next generation of city/region development and digital transformation must adhere to the mode of simultaneous planning, construction, and operation of the digital and the physical city. The METACITIES strategic vision is to create a hub of excellence underpinned by a new framework and

a new digital agenda that exploit the new enabling technologies and features thereof, while empowering the various stakeholders, namely, interconnected companies, research institutions, governmental bodies, and societal actors, to mutually reinforce each other and synergistically raise the level of smart city/region innovation.

Guided by this understanding, METACITIES proposes to create an Excellence Hub that spans a large geographical area, that of Southeast Europe (SEE), represented by three location-based innovation ecosystems in Cyprus, Greece, and Bulgaria. Each regional innovation ecosystem consists of partners involved in the QH (i.e., scientific, industrial, social, public), strong within their territorial context, with a proven track record and expertise in the technologies under consideration and long experience in using them. By mobilizing the forces of these three ecosystems, we look forward to the collaborative design of common digital R&I strategies, policies, and joint pilots orchestrated towards the benefit of the citizens, the stakeholders, the local ecosystems and the growth of the whole southeast European region at large. Innovation excellence will be strengthened in the involved place-based ecosystems through cross-border collaboration in the selected domain of cutting-edge science and innovation. The collaboration will be founded upon an elaborate R&I strategy, a nexus of collaborative links across sectors, joint research, innovation, and outreach activities as well as business and sustainability plans, and will demonstrate win-win effects of the partnership.

To that respect METACITIES' purpose is to provide support to cities, regions, and infrastructure providers regarding the implementation of DTs and metaverse as means for evaluating specific policies and decisions in the various aspects of the city. Hence this DT and metaverse associated tool will enable policymakers to manage the introduction of various ICT systems in order to maximize the benefits and utilize the technologies to achieve societal objectives.

4.2 Individual Partners' Exploitation Strategy and Plans

All METACITIES partners will participate in joint exploitation, business, and sustainability tasks of WPs 5 and 6. Individually, academic partners are committed to exploit the key results of the projects by incorporating them in their postgraduate curricula; research organisations will attract new research talents for conducting further research activities in DT and metaverse technologies; industrial actors will exploit the knowledge gained in the project for the provision of new services and products for smart-cities based on 5G and beyond technologies; public authorities will exploit the results towards the development of joined R&I strategies for meta-cities; SMEs will exploit the knowledge and the experience from the small-scale pilots towards the development of new novel applications for meta-cities thus expanding their product/service portfolio and market share within the 3 clusters and beyond.

In more specific terms individual partners' initial exploitations plans are presented in subsequent paragraphs. They are organized in regional innovation ecosystems.

REGIONAL INNOVATION ECOSYSTEM OF GREECE

UNIVERSITY OF PATRAS

UPAT (NAM group) main expertise lies with the lifecycle management of experiments over digital infrastructures as well as the deployment and operation of experimental facilities. UPAT will exploit the results of METACITIES in various ways. The methodology and the pilots performed will increase the usage of the 5G facility across different domains. This will leverage the investment and make it a reference architecture for various vertical industries.

UNIVERSITY OF PELOPONNESE

UOP participates in the project with the Embedded System Design and Applications Lab (ESDA Lab). The lab is specialized in embedded and cyber-physical system design and is a validated Digital Innovation Hub of EC and will exploit METACITIES results through its ecosystem and networks, which count more than 1000 members all over Europe and not only. In the context of the DIH, ESDA LAB has created the "Marketplace as a Service (MaaS)", a one-stop-smart-shop, which offers, among others, a Repository of artifacts from its members (open courses, tools, web services, code, application notes and getting-started guides), AI-based matchmaking services and a showroom for success stories from digital transformation experiments.

METACITIES developments and outcomes will be exploited by ESDA LAB/UOP for further enhancing Marketplace services on the field of smart/metaverse cities and digital twins. More artifacts provided by project partners and the new members of METACITIES network will be added to the Repository and will be made available to Marketplace users, while more collaboration opportunities will be provided through the Matchmaking tool. Moreover, events and funding opportunities in the field of smart cities will be added on a Marketplace special section. Therefore, project achievements will be exploited for opening up new directions and opportunities accessible by a constantly expanding network, while offering a first-class showroom for members' achievement that will not only enrich the content of the Marketplace Innovation Space but will also attract more users wishing to showcase their products and processes.

p-NET NEW GENERATION EMERGING NETWORKS & VERTICALS

p-NET is a R&I Competence Centre for Emerging Smart Networks and Services with a strong network of 22 shareholders representing large established companies, SMEs, public and private higher and lifelong education institutions, research organizations, consulting, and entrepreneurship support companies.

p-NET plans to communicate, disseminate, and promote the METACITIES Project outcomes to its shareholders. It will also build on its existing contacts and strong working relationship with local and regional public authorities on setting a framework for sustainable practices, thereby contributing to sustainability and promotion of the Project outcomes.

Exploitation of research conducted, know-how and experimental use of the digital twin, the metaverse, 5G and beyond technologies, will be used in proposing concrete and innovative solutions and recommendations to local and regional authorities thereby providing a positive impact on the public's quality of life. The foundation for further R&I activities will be laid and additional funding resources will be sought.

Capacity building programs will be delivered and created, and awareness building activities implemented through events, conferences, and workshops to inform stakeholders of the Project's outcomes and relevance.

Based on the new knowledge and know-how gained through the METACITIES Project, training and webinars will be developed and offered to relevant stakeholders, opening up opportunities for novel products and services.

HELLENIC AMERICAN EDUCATION CENTER

HAEC, as a higher and lifelong education institution in Greece, will exploit and make use of the new knowledge gained through the METACITIES Project by feeding and bringing up to date its

undergraduate, postgraduate, and professional educational programs. The new knowledge and results of the Project will furthermore provide the basis for new research projects and initiatives. Scientific publications in collaboration with like-minded hubs and networks working on similar thematic areas will be published.
HAEC will organize events, workshops and webinars relevant to the Project, which will be open to the scientific community, industry, policymakers and public in general. It will, through these events, build collaborations and support for future research and funding, ensuring that the results are taken up by the scientific community.

BUSINESS PROCESS MANAGEMENT

BPM SA is a management consulting firm and its main role in the project is to define and propose Green Business Models and Operating Models of the Excellence Hub. BPM has an extensive network of clients and partners, in all 4 areas of the QH, and is a member of the Association of Management Consulting Companies in Greece.

As a result, BPM will:

- Disseminate the results of the project through its networks and social media.
- Explore business consulting opportunities linked to the new business models and practices resulting from the project, and their application in other areas as well, apart from the areas covered by the project.
- Use project results for promotion of the company to new market sectors.
- Promote the project results to the Association of Management Consulting Companies in Greece.
- Utilize the new knowledge and results of the Project, as a basis for new research projects and initiatives.

MUNICIPALITY OF PATRAS

MPAT is a local authority organization of the third biggest city in Greece and its main role as Policy Maker in the City Patras will be to get involved mainly in the development of the Strategies and policies. Municipality of Patras is currently implementing the Smart Mobility Project with smart solutions for the collection, processing and distribution of traffic through multiple channels of communication in real time.
MPAT will exploit and research the METACITIES project results in various ways. METACITIES developments and outcomes will be exploited to improve the living conditions of the city's citizens and visitors. The cooperation of the Municipality with other local authorities of Greece will help to spread the results of the project to the rest of Greece. Moreover, it will get advantaged by its participation in the project to build new partnerships and collaborations, enhancing its position as a Smart City and promote future participation in related EU funded projects.

ROAD SAFETY INSTITUTE

The Road Safety Institute (R.S.I) ”Panos Mylonas” brings to the METACITIES project its exceptional expertise in training and awareness campaigns on road safety, targeting various groups of road users. Building upon this experience, RSI will develop comprehensive programs aimed at improving road user behavior, taking into account the specific needs of each road user group. These programs will be informed by the research conducted within METACITIES and will adhere to best practices in the field.

RSI recognizes the value of the digital twin (DT) technology developed within the project and will utilize it to evaluate various scenarios related to road user behavior. By leveraging the capabilities of the DT, RSI will be able to design programs that address the specific challenges and requirements of different road user groups. This data-driven approach will enhance the effectiveness of the training programs, ensuring they are tailored to the needs of each target audience.

RSI's exploitation strategy focuses on developing comprehensive programs that go beyond traditional road safety initiatives. By integrating the insights gained from the METACITIES research and the use of the DT, RSI aims to create impactful training and awareness campaigns that bring about tangible improvements in road user behavior. Through these programs, RSI seeks to empower individuals and equip them with the knowledge and skills needed to navigate the road safely.

RSI's dedication to improving road user behavior extends to collaboration with national and EU-level stakeholders. By actively engaging with ministries of education, transport, and environment, as well as national EU parliament members involved in road safety and educational issues, RSI aims to promote the project's findings and advocate for policy changes that support the needs identified through METACITIES. RSI as a civil society organisation, in Metacities project will strengthen the collaboration between the authorities, the citizens, the research institutions and the stakeholders are involved, through awareness raising campaigns, and also delivering trainings on road safety (to children, youngsters, adults).

REGION OF WESTERN GREECE

The plan of RWG to exploit the outcomes of METACITIES project includes the following considerations:

Plan for Emergency Management: During emergencies such as accidents, natural disasters, or major events, digital twins can be crucial for emergency response and management. RWG and its civil protection unit, can leverage these twins to model and predict traffic impacts, plan evacuation routes, and coordinate emergency services efficiently. By having a real-time representation of the road network, they can optimize emergency response strategies and minimize disruptions.

Infrastructure Maintenance and Management: Digital twins will enable RWG to monitor the condition of roads and infrastructure in real-time. By integrating sensor data, maintenance records, and historical information, they can identify maintenance needs, predict asset deterioration, and schedule repairs or replacements proactively. This proactive approach can help optimize maintenance operations, reduce costs, and improve the overall quality of the road network.

Public Engagement and Communication: Digital twins can be valuable tools for public engagement and communication. RWG could provide access to the digital twin platform, allowing citizens to explore and visualize traffic information, proposed road projects, and future developments. This transparency fosters public participation, helps gather feedback, and improves overall decision-making processes.

YODIWO

The first step in our exploitation plan is to focus on the integration and development of digital twin, metaverse, 5G, and beyond technologies. We will invest in research and development activities to enhance these technologies and ensure their seamless interoperability.

With the foundational technologies in place, we will focus on developing innovative applications specifically tailored for smart cities. These applications will leverage digital twin, metaverse, and 5G technologies to address key challenges and enhance the quality of life for citizens.

To ensure successful exploitation of our technologies and applications, we will focus on market penetration and establishing strategic partnerships. We will identify target markets and key

stakeholders within the smart city ecosystem, including city governments, urban developers, technology providers, and infrastructure operators.
This approach will drive market penetration, establish strategic partnerships and foster continuous research and development, positioning us as a leading player in the smart city ecosystem.
In order to accomplish this, Yodiwo is striving to gain fresh insights through the METACITIES project, which will be utilized to develop the specified framework in our smart city platform (YodiCity), as part of our roadmap towards "YodiCity Metaverse". Moreover, Yodiwo has plans to leverage the outcomes of the METACITIES project through multiple avenues. We will work on Smart City Pilot project for traffic and energy management, and we will collaborate with our partners to disseminate METACITIES outcomes.

CYENS CENTER OF EXCELLENCE

CYENS is a Centre of Excellence that focuses on Interactive media, Smart systems and Emerging Technologies and with current research and innovation activities in 5G, 6G, IoT, Smart Cities, DTs and eXtended Reality (AR/VR). Visual Sciences, Human Factors and Design, and Communications along with the Artificial Intelligence with Machine Learning are the three Research Pillars integrated in a tight synergy that provides a unique interdisciplinary research perspective. CYENS will exploit and research the METACITIES project results in various ways. It will create demos and applications for metaverse environments that will showcase the real-world potential of digital twins in city planning (for e.g., smart parking), smart systems, and other related fields, aiming to engage key stakeholders and promote the adoption of these technologies. It will also leverage the results from the METACITIES project to open new research directions and opportunities in the domain of digital twins and metaverse cities targeting the satisfaction of the cities citizens. This involves expanding existing research programs and initiating new ones that explore the challenges and possibilities these cutting-edge technologies offer. Finally, it will establish and foster research collaborations and partnerships with other research institutions, tech companies, urban planners, etc., to collectively advance the field of digital twins and metaverse cities. This potentially will enhance CYENS prospects in securing additional funding for continued research and development in this domain.

EBOS TECHNOLOGIES LIMITED

eBOS, as an innovative ICT SME, has an exploitation strategy that focuses on the long-term use of digital twin, metaverse, 5G, and beyond technologies to enable the deployment of future innovative applications for smart cities. To achieve this, eBOS aims to acquire new knowledge through the METACITIES project, which it will use to enhance its WiseBOS product portfolio and plans to exploit the results of the METACITIES project in several ways. Moreover, it will leverage its participation in the project to build new partnerships and collaborations, enhancing its position as a leading player in the smart city market. Thirdly, eBOS will engage with relevant standardization bodies to ensure that the project's results are incorporated into emerging standards, thereby promoting the widespread adoption of the project's innovations. Finally, the company will actively seek out new funding opportunities to support the further development and evolution of its concept, ensuring the long-term sustainability of the company's activities.

UNION OF CYPRUS MUNICIPALITIES

The Union of Cyprus Municipalities (UCM) is the national association of Local Authorities in Cyprus. Its core functions are to contribute to the development of local government autonomy, as well as to act as spokesman of local government's interests to the central government and other national institutions. Among others, UCM aims at providing the appropriate support services to the municipalities (research, studies, advice, training etc) for their sustainable development. In this framework, UCM will exploit the project's results to offer the opportunity to the Cypriot municipalities in setting up different elements, practices, projects or even utilize new methods in the sector of smart cities aiming at improving the citizens daily life. Specifically, UCM will promote and exploit the conducted research's outcomes, know-how and experimental use of the digital twin, the metaverse, 5G and beyond technologies towards proposing concrete and innovative solutions to the municipalities in Cyprus.

UNION OF CYPRUS CONSUMERS

CCA is a non-governmental, non-profitmaking organization, with more than 500 members and is mainly supported by subscription fees and a small governmental grant. Its policy areas include legal, economic, financial, health, food, environment, safety and consumers education. Among others, through its call center and the website provides information, guidance and mediation for consumers' complaints. CCA is a member in various International and European organizations (Consumers International, BEUC, ANEC, ICRT, Eurochambers) and participates in different European projects about consumer protection. It has so far organized more than 100 educational workshops on consumers' rights, educating both consumers and SME's.

Regarding the METACITIES project, CCA is expected to offer unique insights into the needs of citizens, consumers and users of the different services which will be designed for deployment within the project. Issues that have to do with privacy, ethics, usability and other user-centric and user-facing components will be taken into consideration. Besides the participation in designing strategies, the organization has a major role to play in the dissemination of the project's results.

PRIMETEL

Primetel is a major Telecommunications Provider in Cyprus and a successful company traditionally involved in EU R&D. Aiming to play a significant role in understanding EU and regional trends in services for DT and Smart Cities as well as to influence the design of offered services, Primetel will exploit and disseminate the METACITIES project outcomes in various ways.

More specifically, Primetel will disseminate the METACITIES Project outcomes to its stakeholders and industry professionals. Having strong collaborations with academia and local municipalities as well as with p-NET, which includes major research and innovation players from Greece, Primetel will provide valuable opportunities for knowledge exchange, research partnerships, and joint projects. By leveraging the expertise of these partners, Primetel can significantly maximize the project's impact on Digital Twins and smart cities, creating new applications and services.

At the same time, by participating in project activities such as meetings, conferences and trainings events, Primetel members will enhance their competences and entrepreneurial capabilities, and the company will be able to tailor its services to meet specific demands, ensuring relevance and value to its customers.

DEPUTY MINISTRY OF RESEARCH, INNOVATION AND DIGITAL POLICY

The Deputy Ministry of Research, Innovation and Digital Policy (DMRID) is the government body responsible for the implementation of the Smart Cities Strategy in Cyprus.

The development of a national framework strategy and the promotion of Smart Cities was approved by the Council of Ministers in November 2020, following a proposal by the DMRID, which since then took the coordination role. This initiative is part of the Government's broader planning to achieve the digital and green transition as well as to promote innovation, as tools for social welfare and sustainable economic development.

The DMRID, in collaboration with all partners (competent Ministries, local government, etc.), will provide for the definition and adoption of the necessary reforms, policies and infrastructures that allow the effective creation of smart cities throughout Cyprus, in a uniform manner, taking into consideration economies of scale in the implementation of the various actions. Through the utilization of smart networks and digital applications, solutions will be offered to modern urban challenges, such as traffic management, availability of parking spaces, provision of e-government services, security (emergency management), and environmental protection (saving resources, reducing pollution), etc.

DMRID's exploitation strategy will thus focus on embedding the digital twin, metaverse and 5G technologies to the Cyprus Smart Cities project initiative, which is currently in progress, and in enabling further applications for smart cities.

REGIONAL INNOVATION ECOSYSTEM OF BULGARIA

BURGAS MUNICIPALITY

For Burgas Municipality the project is of major importance as it will identify additional actions that will help strengthen the local ecosystem and channel its potential to accelerate the digital transformation of the city through the implementation of digital twin solutions. In addition, the project will define possibilities for attraction of new business ventures and investments. The pilot activities in Burgas will contribute to the achievement of the following goals of the city:

- systemic implementation of energy efficiency (EE) measures in the city in order for it to support the economic development of the local ecosystem and curb the climate impact of the city;
- raising the awareness level and capacity building among municipal experts and local citizens regarding the benefits of EE measures, RES installations;
- stimulate investments in EE and RES implementation;
- creating the necessary conditions for effective planning, application and monitoring of policies to foster the uptake of RES installations.

The Municipality will engage with the general public and stakeholders from all four strands of the QH at all stages of the project - from co-creation and co-designing of a Smart City Strategy through implementation of the pilot activities to dissemination of achieved results.

Additionally, Burgas Municipality will leverage its membership in local, regional and international networks and initiatives to disseminate the results and encourage their replication. For example, it is a member of Eurocities group of cities and it has signed the *Join!Boost!Sustain!* declaration from the living-in.eu initiative related to the promotion of smart cities and bringing digitalization solution to local stakeholders. Additionally, it is a member of ICLEI, and the CRAFT family of cities (https://craft-cities.eu) in support of the 100 Climate Neutral and Smart Cities Mission. At the regional level the city is also part of the B40 Network of Balkan Cities (https://b40network.org), which aims to strengthen cooperation among cities on the Balkans.

INNOVATION SYSTEMS BURGAS

ISBUR /Innovative Systems - Burgas EOOD/ as a technological partner of the Municipality of Burgas for the maintenance of and upgrades to the city's integrated SmartBurgas platform as well as its GIS platform will participate in the development of the roadmap for the implementation of the digital twins. The company provides testbeds for the smart pilots and will host the data processing for the METACITIES' pilot as well.

The company is working in the long run to create and offer software products and applications which serve the local administration and citizens, as well as services related to the integrated use of the databases generated in connection with the development of individual systems and applications for particular inhabited areas which may be used by the target groups: Burgas Municipality and other public bodies, municipal enterprises, state institutions, business and citizens.

ISBUR plans to communicate, disseminate, and promote the METACITIES Project outcomes to its clients. It will also build on its existing contacts and strong working relationship with local and regional public authorities on setting a framework for sustainable practices, thereby contributing to sustainability and promotion of the Project outcomes.

The main projects of the company strengthen digital transformation actions, and prove capacity for offering specific information services as: management of information system for optical infrastructure; analysis of big data from information systems to serve for investment decisions; 3D-visualizations of urban environment objects for the purposes of urban development planning and advertising and promotion of touristic and historical sites of the city; introducing infrastructure and visualization for resource-providing systems, GIS - based city systems, mobile-mapping – data collection, processing and exchange of collected data; operation of the SmartBurgas city data shared platform; urban surveillance, assessment of urban data, consultancy services related to smart city issues.

The project results, know-how and experimental data of the digital twin, the metaverse, 5G and beyond technologies, will be used in proposing concrete and innovative solutions and recommendations to local and regional authorities thereby providing a positive impact on the public's quality of life. The solutions will be used for building-up new concepts and further R&I activities with which additional funding resources will be planned by Burgas Municipality.

SOUTHEAST DIGITAL INNOVATION HUB

The Southeastern Digital Innovation Hub (DigIhub) is a joint initiative of NGOs from the public, private, NGO and education sectors in Burgas. DigIhub's mission is to facilitate the effective transition to digitalization of work processes, to support business representatives in the region in the introduction and/or implementation of digital technologies and intelligent systems, as well as to offer higher quality services.

DigIhub enables cross-sectoral collaborative initiatives, workshops and innovative start-ups. It contributes to the implementation of collaborative digital business transformation projects, which enhances the region's technological and innovation potential to deliver a wide range of services in tourism, cultural identity, logistics and mobility.

Digihub is part of the team working on the InnoForward project, which proposes that the Enterprise Europe Network in Bulgaria becomes an indispensable "European arm" of regional and national support systems, leveraging their work and impact on local SMEs. The long-term goal is to improve the performance of Bulgarian SMEs in the single European market and beyond, to enhance scalable innovation, to support SMEs in their transition to sustainable and resilient business models and to stimulate cross-border partnerships. The expected impact of InnoForward translates into around 380 tangible and measurable achievements with SMEs as a result of the advisory and peer support

provided, as well as synergies with regional policies and Structural Funds to the benefit of both micro-level SMEs and macro-level regions.
Digihub is part of the DBAN project team. The idea of the project is based on the concept of creating a regional blue economy and innovation acceleration network - based on an ecosystem that supports existing and emerging enterprises and business initiatives in the blue economy sectors, building on their potential for innovation, circular and organic solutions, as well as their capacity to contribute to local/regional sustainable development indicators. The project aims to create a regional digital network to accelerate blue innovation for the Black Sea region, to be implemented first between the partner cities of Burgas, Batumi and Odessa. DBAN should become an umbrella of actions that will include blue economy activities from the regions of the partner countries, focusing and implementing actions to promote and accelerate innovative business ideas for blue growth and innovation through a combined environmental, social and economic approach.

TECHNICAL UNIVERSITY OF SOFIA

The major contribution of TUS, with its expertise in ICT, CAD and green technologies, will be the development and implementation for the pilot of 3D digital twins of one or more public buildings in the Municipality of Burgas with the goal of an improvement in their energy efficiency. TUS will research and implement appropriate AI and machine learning algorithms that can be used to detect patterns and to solve problems regarding energy efficiency and implement relevant tools for performance analysis. For TUS the project will help to popularize the university as an attractive destination for engineering studies and will help the modernization of the multilingual PhD programmes. The project will give the opportunity to young researchers to increase their competences and to build up their capacity for cross-border cooperation. It will also serve as a basis for future applications in different EU research programs. TUS plans to use the results of the project in existing and future projects, aiming to achieve optimal synergies between different projects. The know-how which will be developed within the project will be promoted and offered to the students at TUS. TUS will also exploit and disseminate the results of the projects through publications in peer-reviewed academic journals, workshops in conferences, and collaboration with other academic institutions.

FOUNDATION CLUSTER INFORMATION AND COMMUNICATION TECHNOLOGIES

The ICT Cluster Sofia is an important participant in the digital ecosystem of Sofia with more than 100 members directly involved in the ICT and other key enabling technologies from across the country that will directly exploit their involvement with the ODTF.

AARHUS UNIVERSITY

AU has strong activities in both 6G and green business modelling. AU already has an established long-term cooperation with TUS and HAEC in the area of 6G and business model innovation and will seek to strengthen this collaboration further into new research ideas and projects.

5 Knowledge Transfer and Capacity Building

5.1 Goals and Objectives

The main goal of Task 6.2 on Knowledge Transfer and Capacity Building is to promote, facilitate and enhance researchers' and professionals' capacity and skillset to develop innovative methods, solutions and entrepreneurial initiatives in the context of the smart/metaverse cities networks and ecosystems. The task aims to build the capacity of the target audience, through activities such as upskilling training programs and programs on business and entrepreneurship, as well as through keeping track of the technology and innovation assets that target groups can bring to the table, after intensive scouting. The specific objectives of this task include but are not restricted to:

- Contribution to the development of new skills and competences for researchers and professionals in the R&I intensive domain of Digital Twins and metaverse technologies as applied to cities (metaverse cities). Such skills include technical & business skills, creativity, problem-solving etc.
- Creation of an entrepreneurial culture and mind-set, so that future entrepreneurs are empowered and encouraged to produce new ideas and products, while leveraging the training opportunities and partnering with mentors.
- Promotion of knowledge and technology transfer by establishing the relevant support environment and processes for innovation scouting, IPR protection, promotion and commercialization.

In order to ensure the successful accomplishment of the above-mentioned objectives and impact of the suggested activities, that are extensively presented in sections 5.2 and 5.3 below, the programs that will be developed by project partners will be made available to the personnel of the involved innovation ecosystems as well as to their networks and collaborators.

5.2 Processes

The initial plans for successfully reaching the objectives and delivering the results of T6.2 which officially starts in M7 of the project have already been designed and discussed among consortium partners, putting emphasis on specific procedures, some of which have already started being implemented. More precisely, the main pillars of knowledge and technology transfer activities are:

- Organization and delivery of different types of training programs on a regular basis in each regional innovation ecosystem of the project
- Preparing and providing training material online on channels and platforms accessible by all interested parties that are interested in joining the METACITIES community, either individually or as entities involved in the smart cities sector
- Participation of project partners in high-profile events (conferences and exhibitions) with the purpose of promoting project achievements and networking with stakeholders and target groups (More details on this are provided in section 5.3)
- Organization of project events for metaverse cities and DTs as well as for innovation scouting;
- Establishment of a task force / committee consisting of consortium members for producing written material accompanying the training programs and discussing on strategies and lessons learned (read more about the role of the task force regarding IPR protection in 5.3)
- Creation of a maturity assessment tool that will be utilized for innovation scouting, detection of the maturity level of the research teams and SMEs before and after attending the training

programs and for designing a roadmap for their future steps.

Elaborating on the above-mentioned procedures, all partners involved in this task have, in principle agreed, to carry out capacity building and technology transfer activities coordinated per regional innovation ecosystem. While the plan of activities and procedures will be regularly evaluated and, if necessary, adapted to the needs of meeting the objectives, the following activities lie at the core of the knowledge transfer strategy:

- Training videos that will be made available on the project's YouTube channel and on the Marketplace, which is an one-stop-smart-shop hosted by the ESDA LAB DIH of UOP
- Organization of webinars and workshops, either on a project basis (1 event per year per each partner involved in the task) or in the context of other events related to smart cities
- Considering the target group of students and researchers, summer schools are a good opportunity to outreach many of them, which is why organizing one summer school per year with project-relevant topics is considered a good practice. Participation in other summer schools is also considered as an alternative or supplementary process
- With the purpose of innovation scouting, it is planned that each cluster will undertake the organization of one hackathon or innovation competition.

It is worth mentioning that the first hackathon event has already been organized, on behalf of the Greek regional innovation ecosystem by the project leader UPAT on May 23-24, 2023. It was a two-day IoT hackathon, with the participation of 30 students. On the first day, an introductory speech was made regarding the role of the IoT engineer and a workshop followed including presentations and practice on: cloud engineering, data ingestion/standardisation/exposure, relevant protocols under and over the IP layer (MQTT, LoRa κ.α.), edge AI. The workshop focused on the path of IoT data from production to consumption and offered experience on the respective technologies. On the second day, participants were asked to prepare and design an IoT project related to smart cities.
For the monitoring of results and an evaluation of the impact of the activities specific KPIs have been suggested (number of stakeholders informed about METACITIES key results, number of designed and provided training courses, participation in conferences and other events, number of organized webinars/summer schools/innovation competition/hackathons, number of SMEs examined through the Maturity Assessment Tool). The target value for each KPI will be presented in the next deliverable.

5.3 IPR Protection, Promotion, and Commercialization

In this section the plan of activities related to the IPR protection services, and the overall promotion and commercialization strategy are presented. Some of the activities are closely connected with the processes presented in 5.2 falling under the general objectives of promoting the project, networking with stakeholders and creating a support environment for researchers and professionals in the R&I domain of DT and metaverse cities, who may be future entrepreneurs. For example, partners' participation in conference and other events is both a process and a project promotion activity. For this reason, this section briefly presents the activities and processes that are related to the establishment of a support environment for the target groups in terms of the promotion and commercialization of their innovative developments and advances as well as for the IPR protection that is necessary for both project partners' and the ecosystem's achievements.
As previously mentioned, participation in high-profile events is a considerable part of the promotion and knowledge transfer strategy, while it does not only provide opportunities for disseminating the

project results, but it is a means of networking with research teams working on relevant fields and attracting target groups that could benefit from the capacity building activities led by project partners. Therefore, all partners involved in METACITIES will represent the project in major events at regional, European or international level. Such events may be the HiPEAC Conference, the Embedded World Exhibition and Conference etc.

Creating a network of stakeholders related to smart cities and relevant projects/experiments lies at the core of the strategy of creating the appropriate environment for researchers and professionals to grow, to find partnerships and training opportunities, search for and establish partnerships, synergies and other collaboration opportunities, in a wider context of technology transfer. To this end, METACITIES will exploit ESDA LAB's DIH network, inviting hubs with members active on the smart cities sector to join the DIH, participating as a hub with a recognized identity. This option is provided by the already existing network of the ESDA LAB's DIH and it is called "hub-in-a-hub". That means that UOP, leading this task, will reach out to smart city hubs in order to integrate them to a wide network of DIH and entities from the industrial and academic sector in order to both provide them with training opportunities and foster technology and knowledge transfer amongst network members. Considering the success stories arising from European funded projects/experiments for digital transformation, an additional practice will be the fostering of synergies with entities that have led successful experiments on the smart cities sector that could advance further by utilizing DT and metaverse cities developments offered by the METACITIES project.

The protection of intellectual property rights (IPR) is a major issue indispensable of the inventions, products, and innovative technological advancements with which METACITIES is related. Offering knowledge and advice on this issue is one of the project's objectives. To this end, a task force or committee consisting of selected project partners according to their expertise will work on editing a whitepaper which will be made available to all members of the project beneficiaries. This white paper will serve as a valuable resource and guide on IPR-related matters for all consortium members and stakeholders. It will provide knowledge, advice, and best practices to ensure the protection and management of intellectual property within the context of METACITIES. The Technology Transfer Offices of the academic partners will contribute their knowledge and expertise to support the development of this white paper.

As far as the commercialization of research ideas and developments is concerned, the Maturity Assessment Tool introduced in 5.2 will be a valuable tool, along with the training materials on entrepreneurship, for designing the appropriate roadmap for each SME or research team towards their growth and their strategy to reach wider markets.

6 Engagement, Clustering and Standardisation Activities

The present chapter is intended to report on plans and activities of Task 6.3 "Business, Civic Engagement and Clustering Activities". The Task has not been active in the first 6 months of the project, therefore the material provided aims to set the scene for the addressed activities and report on initial planning.

6.1 Goals and Objectives

The objectives of Task 6.3 are twofold:

The first relates to supporting the METACITIES project in applying and valorising the Quadruple Helix Model of Collaboration by defining and implementing specific and compelling engagement channels tailored to the profiles of addressed categories of stakeholders. The ultimate goal is to create and sustain a wide and engaged community of all possible types of stakeholders. METACITIES will adopt the Public Good Model of Engagement which focuses on contributing to community development and revitalization activities, both from an economic and a non-economic perspective, with a strong 'place-based' emphasis on supporting local and regional priorities. The task will define and implement concrete and compelling 'engagement channels' with the business and civic communities, and thus create a library of engagement capacities. Engagement channels will include strategies, processes, mechanisms, and tools that will be deployed to enable and facilitate systematic community engagement, in mutually beneficial ways. Initial plans on the engagement activity are presented in Section 6.2.

The second relates to contributing to the project efforts to maximize its impact. The task aims to contribute to that by streamlining the networking and clustering activities of the project as well as its standardisation efforts. Initial clustering and standardization plans are presented in sections 6.3 and 6.4 and aim to advance and promote the METACITIES vision, to support the exchange of results, and to share knowledge, experience, and best practices.

6.2 Engagement Channels and Capacities

Engagement is an important activity that in the case of METACITIES relates to both the project implementation and its impact maximization. The integration of the engagement activities, and their outcomes within the project design, should aim to ensure that outcomes are actually put into use (i.e., they are not unimportant side-activities), and that appropriate feedback and acknowledgement is provided by the project to all engaged. Engagement can range from the identification and conceptualisation of R&I priorities (e.g., through deliberative or other participatory processes), to the implementation, utilisation and assessment of R&I results (e.g., through data collection, data analysis, discussion and publication or presenting scientific results, working in fab-labs to develop new innovations, testing innovations and solutions, and evidence-based advocacy). To that end, concrete and effective engagement channels will be defined and tailored to the different types of stakeholders addressed and the project will aim to come up with a library of engagement channels. Indicative elements of such a library include: workshops, focus groups or other means to develop R&I agendas, roadmaps or policies, deep discussions moderated by relevant experts, observing, gathering and processing data, engaging in advocacy or policy activities.

The project's engagement strategy and plan are driven by the goal to contribute to community development and revitalization activities, both from an economic and a non-economic perspective,

with a strong 'place-based' emphasis on supporting local and regional priorities (Public Good engagement model). Different definitions of engagement's objectives will result in different communities being identified and addressed at the other end of the engagement channel. This in turn leads to employing different engagement strategies, methods, mechanisms, approaches to achieve the defined objectives. For example, engagement that focuses on economic development will address business and entrepreneurial communities; engagement with an explicit social justice agenda will create partnerships with social groups, such as disadvantaged communities. Authentic community engagement should involve engaging in a balanced way with a wide range of communities, especially with groups that do not have the resources to engage easily, such as NGOs, social enterprises, cultural organizations, schools, local governments, and disadvantaged groups.

The Public Good Model of engagement [6] adopted by the METACITIES project will involve all categories of stakeholders and build different communities. Mainstreaming and sustaining active community engagement is challenging for a number of reasons:

1. Community engagement has a broad range of activities and stakeholders
2. Community engagement activities are not all equal: they can be implemented in superficial or authentic ways, in terms of the mutual benefits that they bring
3. Community engagement activities are strongly place-based and context-specific in nature. Community engagement is not only 'supply-driven' by the project; it also depends on community 'demand'.
4. Case studies and surveys have indicated that civil society participation in the context of RIS3 continues to be low, and the regions are experiencing difficulties in getting civil society groups involved.

The project will place emphasis on citizen, civil society and end-user engagement, as they are the ultimate benefactors of smart city interventions. To that end different kinds of engagement activities will be planned and implemented. They may include: co-design activities (such as workshops, focus groups or other means to develop R&I agendas, roadmaps and policies) often including deep discussion on the implications, the ethics, the benefits and the challenges related to R&I courses of action or technology development; co-creation activities (involving citizens and/or end-users directly in the development of new knowledge or innovation, for instance through citizen science and user-led innovation); and co-assessment activities (such as assisting in the monitoring, evaluation and feedback on the governance of a project, projects, processes, policies or programmes on an iterative or even continual basis).

Opening up the R&I system towards society and supporting citizens, civil society and end-users to participate in R&I – as sources of ideas, knowledge and/or data, as data collectors and/or analysers, and/or as testers and/or end users – enlarges the collective intelligence, capabilities and scope of the R&I and is likely to lead to greater creativity and robustness of the outcomes and reduced time-to-market of the innovative products and services. It also increases the relevance and responsiveness of R&I, ensuring that its outcomes align with the needs, expectations and values of society. Moreover, it is a key element for improving the transparency, co-ownership and trust of society in the process and outcomes of R&I. Conducting R&I openly, responsibly, transparently, and in adherence to the highest standards of research integrity and ethics is also important for responding to increased science denial. An important aspect to consider is the inclusivity of the engagement and ensuring diversity of participation. The challenge of sustaining engagement should not be underestimated, and different forms of rewards could be considered, as well as measures for two-way learning between scientists or innovators and the co-creators.

6.3 Clustering Plan and Activities

The project will aim to liaise, debate, and put to test its findings with existing projects and initiatives in its domain of relevance. It plans to network with and establish knowledge exchange and other types of collaboration channels with other EU funded partnerships under Horizon Europe and other relevant knowledge and innovation initiatives. The task will identify and select such projects and initiatives as soon as it becomes active, and a continuous monitoring process will be identifying other projects as they get funded and launched on course of the METACITIES project. The task will continuously update and maintain a catalogue of relevant projects and initiatives and the associated contact details. Subsequently, proper contacts will be established with the selected projects and initiatives with the aim to establish efficient collaboration mechanisms and set-up concrete work-plans that will allow effective and substantial collaboration. Example mechanisms include the set-up of joint technical and business committees and advisory boards, as well as the organization of thematic workshops in joint areas of interest. For instance, joint thematic workshops may be organized on i) Digital twins; ii) Business models of cross-border excellence hubs; iii) Digitalisation of cities and regions; iv) Metaverse Cities. Joint events and workshops can be planned with collaborating projects alternating as hosts.

Collaborating projects will also focus their joint efforts on identifying results that can be exploitable or/and tested and advanced by other projects in the group. With good intentions and collaborative spirit, collaborating projects will establish the terms of win-win collaborations including proper management of Intellectual Property. The aim will be to avoid duplication of effort across relevant initiatives, make optimum use of the EU funding and share excellence. The task will aim to produce: 1) a catalogue of METACITIES results to be tested and/or exploited by other collaborating projects, and associated terms for accessing and making use of METACITIES results; 2) a catalogue of other projects' results that can be tested/advanced/exploited by METACITIES and associated terms of use. Projects may also actively collaborate towards producing joint results for joint benefit.

Extensive networking and communication activity will ensure wide awareness creation and dissemination of METACITIES efforts and results.

6.4 Standardisation Plan and Activities

This task will identify standardisation bodies and initiatives to be followed and applicable to the project standards and will create a strategy for applying them. Work in this task will also focus on preparing and providing the project's contributions to relevant standardization bodies and fora, wherever applicable. As part of the task, the project will be regularly presented in the meetings of these organizations, where the project's results will be presented with particular emphasis on how the project has adopted and implemented existing standards, but also on the METACITIES-based extensions and enhancements of these standards. Partners will present the project's contributions, as well as contribute to documents and deliverables of the various associations and standardization bodies. Subject to continuous refinement and expansion, the following standardization efforts and initiatives are considered relevant and will be followed by the METACITIES project:

- ITU-T Focus Group on Metaverse [5]

The ITU-T Focus Group on metaverse (FG-MV) was established under TSAG on 16 December 2022. The group will analyse the technical requirements of the metaverse to identify fundamental enabling technologies in areas ranging from multimedia and network optimization to digital currencies, Internet of Things, digital twins, and environmental sustainability. Several Working Groups (WGs) have been identified to analyse key metaverse technologies and enablers, investigate current technologies,

trends, challenges, and requirements, providing input for stakeholder dialogue and serving as a collaboration platform for identifying stakeholders with whom ITU-T could collaborate, and for enabling the inclusion of non-members to contribute to the technical pre-standardization work. The work aims also to identify relevant use cases.

- IEEE Metaverse Standards Committee (CTS/MSC) [6]

The scope of the Standards Committee is to develop and maintain standards, recommended practices, and guides for metaverse, virtual reality and augmented reality, using an open and accredited process, and to advocate them on a global basis. Its technical scope is intended to be flexible and is ultimately determined by the sum of its approved Project Authorization Requests (PARs). The Standards Committee understands that Metaverse refers to a kind of experience, in which the outside world is perceived by the users (human or non-human) as being a universe that is built upon digital technologies as a different universe ("Virtual Reality"), a digital extension of our current universe ("Augmented Reality"), or a digital counterpart of our current universe ("Digital Twin"). Two Working Groups are active, the IEEE Metaverse Working Group (MWG) and the IEEE Augmented Reality on Mobile Devices Working Group (ARMDWG).

MWG develops the *IEEE P2048: Standard for Metaverse: Terminology, Definitions, and Taxonomy*. This standard specifies the terminology, definitions, and taxonomy for metaverse and related terms. This standard defines categories and levels of metaverse to provide clarification for metaverse users and a roadmap for metaverse developers. The purpose of this standard is to provide a consensus on the terminology, definitions, and taxonomy for metaverse, facilitate the sustainable development of the metaverse industry, and promote the healthy growth of the metaverse market.

AEMDWG develops *the P2048.101 Standard for Augmented Reality on Mobile Devices*: *General Requirements for Software Framework, Components, and Integration.* This standard specifies the general technical framework, components, integration, and main business processes of augmented reality systems applied to mobile devices, and defines its technical requirements, including functional requirements, performance requirements, safety requirements and corresponding test methods. This standard is applicable to the design, development, and management of augmented reality enabled applications or features of applications on mobile devices.

- 3GPP [7]

3GPP in Rel-17 through Rel-18 described potential enhancements that are expected to optimize XR support including XR awareness, power optimizations, and capacity enhancements in evolving 5G systems. 3GPP is currently drafting TR 22.856: Study on Localized Mobile Metaverse Services in relation to 3GPP-Rel 19 and Rel-20, which are expected to add advanced features into the 5G system and are called as 5G-Advanced and may provide a glimpse of what future 6G systems will look like. Use of the Metaverse tools in diverse sectors evokes several new experiences, products and services, based on AR and VR frameworks. As services based on Metaverse concepts received a lot of attention, 3GPP Working Group on Systems Aspects (SA1) decided to perform a study on this topic to derive requirements of 3GPP system. From 3GPP's point of view, the Metaverse refers to a persistent, shared, perceived set of interactive perceived space, both locally and remotely.

The SA1 study investigates specific use cases associated with a user presenting himself or herself remotely by means of a representation: *an avatar*. These use cases provide users with immersive and interactive media representing the remote location in which the avatar is present. The focus of 3GPP is on the local representation of and interaction with a remote user. Though there were previous works on Extended Reality (XR) media in 3GPP and support for enhanced Mobile Broadband services,

more improvement is required. For example, for shared interactive services in an environment in which activity is rapid, it may be challenging to provide timely, synchronized and highly available delivery of low latency media to enable interaction which in the area of games perform comparable to existing sports in terms of responsiveness.
The following are study areas:

- Performance (KPI) aspects; e.g., latency, throughput, connection density.
- Efficiency and scalability aspects, for large numbers of users in a single location.
- Identification of users and other digital representations of entities interacting within the metaverse service.
- Acquisition, use and exposure of local (physical and digital) information to enable metaverse services. Acquiring local spatial/environmental information and user/UE(s) information.
- Exposing local acquired spatial, environmental and user/UE information to 3rd parties to enable metaverse services.

➢ European Commission Rolling Plan 2023 [8]

The Rolling Plan for ICT Standardisation provides a unique bridge between EU policies and standardisation activities concerning information and communication technologies (ICT). This helps to increase convergence of standards makers' efforts towards achieving EU policy goals. The Rolling Plan focuses on actions that can support EU policies and does not claim to be as complete as the work programmes of the different standardisation bodies. The 2023 edition includes two new chapters focused on novel technologies where standardisation is increasingly important, namely *Metaverse* and *Quantum Technologies*. A new chapter on Pandemic preparedness is also included, building on the former Covid-19 chapter and extending its scope. Additionally, the former chapter on education, digital skills and digital learning has been split into two, one focusing on digital skills and the other on digital learning.
There are also chapters that have undergone substantial modifications, highlighting among others the new section "Local Digital Twins" on the Smart and Sustainable Cities and Communities chapter, the updates on the Cybersecurity chapter, or the updated actions in the Digitalising European Industry chapter. The chapter on 5G now explicitly looks forward to the transition towards 6G and references the European partnership on 'Smart Networks and Services beyond 5G and towards 6G' under the new Horizon Europe Framework Programme started in 2021. Moreover, new legislative acts and proposals such as the Data Act, Digital Services Act (DSA), Digital Markets Act (DMA) or the Cyber Resilience Act (CRA) have been referenced in the Rolling Plan.

➢ Digital Twin Standards

Article [9] overviews the recent progress of digital twin standards, the progress of digital twin network, and the challenges for successfully deploying digital twins.

7 Reinforcement of Sustainable Cross-border Collaboration

For regional innovation systems to enable regional transformation and attain a globally sustainable cross-regional transformation, they need to focus on a place-based approach and at the same time work together across borders to create an inter-related vision of what a sustainable society could be. International collaboration is needed for sufficient human capital in R&I to foster economic transformation. The METACITIES Excellence Hub as a Network of cross-border, interconnected, place-based innovation ecosystems, will develop a common platform for collaboration and best practice sharing and implement strategies underpinned by concrete action plans and an investment strategy to bring cities, industries, SMEs, investors, researchers as well as private venture capitalists and many other smart city actors together. This will enable the METACITIES Excellence Hub to mobilize the communities of the three innovation ecosystems to collaborate and therefore to progress faster in joined efforts rather than working in silos.

7.1 Goals and Objectives

With the ultimate goal of establishing the METACITIES Excellence Hub as a common resource and shared facility offering access to the latest and most advanced knowledge to the involved regional innovation ecosystems, the main objectives of task 6.4 are the following:

- To reinforce the interconnection of the innovation ecosystems and to increase both the interoperability of the European ecosystems and the intra-operability within each territorial ecosystem, aiming to improve coordination, and foster excellence.
- To identify, orchestrate and implement effective cross-border collaboration support strategies and means, such as joint organization of events, staff mobility, shared educational and laboratory resources; and
- To facilitate resource sharing by creating and organizing an inventory of assets to be shared and a repository of best practices to be exchanged among the three collaborating regional innovation ecosystems.

7.2 Plans and Mechanisms for Knowledge Sharing and Synergies

The above-mentioned goals will be achieved by fostering the interconnection and collaboration on two pillars:

1. Fostering the cross-border collaboration among 3 clusters (BG, GR, CYP) by performing the following types of activities: development of joint publications, organization of joint technical online webinars, organization of common workshops for SMEs, start-ups and policy makers, organization of study visits for demonstration of small scale pilots, organization of common events for exchange of experience and best practices related to digital twins and smart cities, development of a common database with resources/assets and best practices that could be shared and promoted.
2. Fostering the collaboration between members of each cluster by organization of local roundtables/workshops with municipalities and public authorities, organization of local webinars/workshops to engage SMEs and start-ups, organization of 3 Hackathons, organization of study visits related to demonstration of small-scale pilots.

The activities proposed will start in M7 and all partners will participate and contribute. A working meeting on this topic will be organized to set the activities and time schedule for implementation and

reporting. By promoting cross-border collaboration and facilitating collaboration within location-based innovation ecosystems, METACITIES aims to create a collaborative ecosystem that drives innovation, knowledge sharing, and the development of sustainable solutions for smart cities. Through these efforts, the project strives to make a lasting impact on urban development practices and contribute to the advancement of the participating regions and their innovation ecosystems.

With the successful implementation of the planned activities and the ongoing commitment of all project partners, METACITIES is poised to pave the way for a future of smart, sustainable, and interconnected cities.

8 Conclusions

The present document outlines the project plans and efforts towards maximizing the project impact and strengthening the teaming and collaboration of the three participating regional innovation ecosystems towards cross-border innovation excellence in the widening area.

The main directions of work are:

a) Dissemination and Communication, as planned and implemented in Task 6.1. The task has been running for 6 months and relevant plans and activities are presented in chapter 3. The activity runs throughout the project lifetime and all subsequent actions will be reported in deliverables D6.3 and D6.4.
b) Knowledge Transfer and Capacity Building, as planned in Task 6.2. The Task will start in M7, therefore initial plans are presented in chapter 5 herewith, to be refined and implemented in the following months. A detailed account of the final plan and relevant implemented activities will be reported in deliverables D6.3 and D6.4.
c) Engagement, Clustering and Standardisation activities, as planned in Task 6.3. The Task will start in M7, therefore initial plans are presented in chapter 6 herewith, to be refined and implemented in the following months. A detailed account of the final plan and relevant implemented activities will be reported in deliverables D6.3 and D6.4.
d) Sustainable cross-border collaboration reinforcing activities, as planned in Task 6.3. The Task will start in M7, therefore initial plans are presented in chapter 6 herewith, to be refined and implemented in the following months. A detailed account of the final plan and relevant implemented activities will be reported in deliverables D6.3 and D6.4.

Chapter 4 of the deliverable includes initial exploitation and sustainability plans to be further refined and solidified within the scope of WP5, which has not yet begun. Partners' individual exploitation plans are also documented.

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