



5G LOGINNOV

D5.7

Clustering and Networking Results



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TABLE OF CONTENTS

LIST OF TABLES	8
EXECUTIVE SUMMARY	9
1 INTRODUCTION	10
1.1 Project introduction	10
1.2 Purpose of the deliverable	10
1.3 Structure of the Deliverable.....	10
1.4 Relation to other Tasks and Deliverables.....	11
2 COLLABORATION WITH EU PROJECTS – INITIATIVES AND MAIN ACHIEVEMENTS	11
2.1 Introduction.....	11
2.2 Methodology	12
2.3 Joint sessions in events.....	20
2.4 Joint Technical Workshops and publications.....	23
2.4.1 Contribution to ALICE position paper on the “FIT FOR 55” climate package	26
2.4.2 Joint position paper in cooperation with 5G META	26
3 NETWORKING WITH EUROPEAN-WIDE ASSOCIATIONS AND TRANS-NATIONAL INITIATIVES: ACTIVITIES AND IMPACTS	27
3.1 Introduction.....	27
3.2 Methodology	27
3.3 Networking and Clustering initiatives	29
3.3.1 5G-PPP.....	29
3.3.2 5G IA (5G Infrastructure Association).....	30
3.3.3 National standardisation body of Belgium.....	30
3.3.4 ISO.....	31
3.3.5 ALICE (Alliance for Logistics Innovation Through Collaboration in Europe).....	31
3.3.6 NETWORLD EUROPE.....	32
3.3.7 6G IA.....	32
3.3.8 DTLF (Digital Transport and Logistics Forum).....	33
3.3.9 5G AA (5G Automotive Association).....	33

3.3.10	CCAM Partnership	33
3.3.11	ETSI (European Telecommunications Standards Institute).....	34
3.3.12	Docks the Future Network of Excellence	34
4	CONCLUSIONS	35



LIST OF ABBREVIATIONS AND ACRONYMS

Abbreviation	Meaning
3G	Third Generation Wireless System
3G PP	3G Infrastructure Partnership Project
5G	Fifth Generation Wireless System
5G MOBIX	5G for cooperative & connected automated MOBility on X-border corridors
5G-PPP	5G Infrastructure Public Private Partnership
AKKA	AKKA High Tech
AOELIX	Architecture for EurOpean Logistics Information eXchange
API	Application Programming Interface
ARCADE	Aligning Research & Innovation for Connected and Automated Driving in Europe
AUTOPILOT	AUTOMated driving Progressed by Internet Of Things
CAD	Connected and Automated Driving
CAM	Connected and Automated Mobility
CCAM	Cooperative, Connected and Automated Mobility
CEN	European Committee for Standardization
CENELEC	European Committee for Electrotechnical Standardization
CIRCLE	Circle SpA
CLUSTERS 2.0	Open network of hyper connected logistics clusters towards Physical Internet
CONCORDA	Connected Corridor for Driving Automation
CONTI	Continental Automotive Romania SRL
COREALIS	Capacity with a pOsitive enviRonmEntal and societAL footprint: portS in the future era
DG	Directorate General
DM	Dissemination Manager
EC	European Commission
EMTEL	Special Committee on Emergency Telecommunications
ERT/ERTICO	European Road Transport Telematics Implementation Coordination Organisation

ETPs	European Technology Platforms
ETSI	European Telecommunications Standards Institute
EU	European Union
FENIX	Future business models for the Efficient recovery of Natural and Industrial secondary resources in eXtended supply chains contexts
GA	Grant Agreement
HW	Hardware
ICCS	Institute of Communication and Computer Systems
ICOOR	Consorzio Interuniversitario per l'Ottimizzazione e la Ricerca Operativa
ICT	Information and Communications Technology
ICT4CART	ICT infrastructure to enable the transition towards road transport automation
ININ	Internet Institute, Communications Solutions and Consulting LTD
IoT	Internet of Things
IT	Information Technology
ITS	Intelligent Transport Systems
KPI	Key Performance Indicator
LK	Luka Koper, Port and Logistic System, D.D.
LL	Living Laboratories
MS	Milestone
NEMO	Near-zero-waste recycling of low-grade sulphidic mining waste for critical-metal, mineral and construction raw-material production in a circular economy
PCT	Stathmos Emporevmatokivotion Peiraia AE
PO	Project officer
PR	Public Relations
QMR	Quarterly Management Report
R&I	Research and Innovation
RDI	Research Development and Innovation
SELIS	Towards a Shared European Logistics Intelligent Information Space
SME	Small and Medium Enterprises
SWARCO	SWARCO Traffic Systems GmbH
TEC4U	tec4U Ingenieurgesellschaft mbH

TSLO	Telekom Slovenije DD
TSYS	T-Systems International GMBH
VICOM	Fundación Centro de Tecnologías de Interacción Visual y Comunicaciones Vicomtech
VODAFONE	Vodafone Innovus Anonimi Etaireia Systimaton Epikoininias Aytomatismonkai Efarmagis Pliroforikis
WP	Work Package



LIST OF TABLES

Table 1: Identified Projects and Joint Initiatives by R&I Topic	12
Table 2: Joint events and meetings.....	21
Table 3: List of joint Webinars and Technical meetings.....	24



EXECUTIVE SUMMARY

Funded under the European Union's Horizon 2020 Framework Programme, the 5G-LOGINNOV project aims to design an innovative framework addressing integration and validation of CAD/CAM technologies related to the industry 4.0 and ports domains by creating new opportunities for LOGistics value chain INNOVation.

The current document under the title D 5.7 Clustering and Networking Results defines the clustering activities planned and implemented by the 5G-LOGINNOV consortium with EU funded projects in 5G and port and logistics domains and with European-wide associations and trans-national initiatives to ensure that the project and its results were effectively shared and capitalised throughout the project's lifecycle.

The deliverable includes a detailed description of methods and channels employed to create the network of initiatives with which 5G-LOGINNOV dealt with, leading to greater impact for projects results.

The report presents an overview of the synergies and collaborations established with similar EU funded projects. It also includes a mapping of the European-wide associations and trans-national initiatives and interactions set during the whole project duration. Furthermore, the document also provides a detailed assessment of the clustering and networking results.

Among them, we can mention the development of joint initiatives with 20 EU-funded projects focused on 5G-LOGINNOV R&D lines (i.e joint participation at EUCNC&6G Summit; ITS World Congress) as well as standalone joint technical workshops (i.e. with AFFORDABLE 5G, 5G META, FUDGE 5G, 5G-MOBIX); joint policy publications with ALICE and 5G META represent another meaningful result together with the recognition of a primary role for the project as a contributor to the world of standardization and associations (i.e. ISO, 5GPPP, ALICE, NETWORKORLD EUROPE, ETSI, CCAM, DTLF).

In Addition, D 5.7 is a public deliverable of the project, and as part of WP5 it is closely linked with Deliverable 5.2 Dissemination Plan, D5.3 Dissemination and Communication Report, D5.6 Spectrum Policy, D4.4 Lessons learned and Recommendations.



1 INTRODUCTION

1.1 Project introduction

5G-LOGINNOV will focus on seven 5G-PPP Thematics to support the emergence of a European offer for new 5G core technologies in 11 families of use cases. 5G-LOGINNOV's main aim is to design an innovative framework addressing integration and validation of Connected Automated Driving/Mobility (CAD/CAM) technologies related to the industry 4.0 and port domains by creating new opportunities for LOGistics value chain INNOVation. 5G-LOGINNOV is supported by 5G technological blocks, including new generation of 5G terminals notably for future Connected and Automated Mobility, new types of Industrial Internet of Things 5G devices, data analytics, next generation traffic management and emerging 5G network architectures, for city ports to handle upcoming and future capacity, traffic, efficiency, and environmental challenges. 5G-LOGINNOV will deploy and trial 11 families of use cases targeting beyond TRL7, including a GREEN TRUCK INITIATIVE using CAD/CAM & automatic trucks platooning based on 5G technological blocks. Thanks to the new advanced capabilities of 5G relating to wireless connectivity and core network agility, 5G-LOGINNOV ports will not only significantly optimise their operations but also minimise their environmental footprint to the city and the disturbance to the local population. 5G-LOGINNOV will be a catalyst for market opportunities build on 5G core technologies in the logistics and port operations domains, thus being a pillar of economic development and business innovation and promoting local innovative high-tech SMEs and start-ups. 5G-LOGINNOV will open SMEs' and start-ups' door to these new markets using its three Living Labs as facilitators and ambassadors for innovation in future European ports. 5G-LOGINNOV's promising innovations are key for the major deep-sea European ports in view of the mega-vessel era (Athens, Hamburg), and are also relevant for medium sized ports with limited investment funds (Koper) for 5G.

1.2 Purpose of the deliverable

The purpose of this deliverable is to provide a comprehensive mapping of the results coming from the informative, collaborative and awareness-raising initiatives developed during the project, both in relation to other projects working on related topics and for industry associations, policy makers and standardization bodies.

Clustering and networking initiatives were developed with the dual purpose of sharing technical and policy challenges and developing market update strategies. In this report the main achievements in both areas are presented, framing how the 5G-LOGINNOV project has contributed to the establishment of 5G (and beyond) as an enabler for the competitiveness of the port and logistics sector in Europe in several ways.

1.3 Structure of the Deliverable

This report firstly elaborates on how the Clustering and Networking initiatives taken along the whole duration of the project have addressed the strategic objectives of the project.

A comprehensive mapping of the activities carried out follows, divided into 2 subchapters: one related to the collaboration with other EU projects and another one related to European-wide associations and trans-national initiatives.

For each of the EU Project, the report presents a description of the occurrences in which the collaboration has been developed together with the main findings that, both from a technical and a market-uptake perspective, have been reached. Especially with EU projects the technological aspects were addressed, through several technical workshops for knowledge sharing.

For the European- wide associations and trans-national initiatives, the report presents a mapping of the interactions set during the whole project duration together with the main achievement resulting from the collaboration with each organization and body.

Finally, the conclusions are dedicated to the highlight of the “main takeaways” from the 5G-LOGINNOV Clustering and Networking Task, with the objectives of being further exploited by other EU funded projects on the same topic.

1.4 Relation to other Tasks and Deliverables

This deliverable has a relation with Deliverable 5.2 Dissemination Plan, especially concerning the identification of events and exhibitions to set up joint presence. Furthermore, it presents a link with D 5.3 Dissemination and Communication Report because the outreach of the project communication is enhanced thanks to the dissemination potentially arising from the networks of projects and associations involved.

The deliverable has a relation also to activities carried out in T 5.3 Exploitation, especially concerning the engagement and awareness-raising towards associations and related to market-uptake topics with the aim of maximizing the commercialization of 5G enabled solutions within the port environment.

Furthermore, there is a significant relation with Task 5.4 Standardisation and Spectrum, where networking activities are developed towards regulatory and standardisation bodies to ensure that the 5G solutions in ports comply with allocated spectrum bands and adhere to international standards, facilitating a harmonized and efficient 5G deployment for enhanced port communications.

2 COLLABORATION WITH EU PROJECTS – INITIATIVES AND MAIN ACHIEVEMENTS

2.1 Introduction

The 5G-LOGINNOV Project is a cutting-edge initiative that places a strong emphasis on harnessing the power of 5G technology to revolutionize the field of logistics and transport. With its focus on utilizing 5G capabilities to enhance supply chain efficiency, optimize logistics operations, and enable seamless communication between various stakeholders, the project holds immense significance in advancing the industry. In this context, joint activities such as workshops, events, and scientific publications play a crucial role. These collaborative endeavours provide platforms for experts, researchers, industry professionals, and stakeholders to exchange ideas, share insights, and foster innovation. Workshops and events facilitate the dissemination of knowledge, enable networking opportunities, and encourage the development of synergistic solutions. Scientific publications serve as a means to document research findings, disseminate best practices, and contribute to the collective knowledge base.

The collaboration with similar projects creates synergies, enabling the pooling of expertise, resources, and insights, leading to more impactful and comprehensive outcomes. By promoting collaboration and knowledge sharing, these joint activities amplify the impact of the 5G-LOGINNOV project, paving the way for transformative advancements in the logistics and transport domain.

2.2 Methodology

To approach this task a map of 5G-related EU funded projects was created since the very beginning, starting from the list of initiatives in the Grant Agreement and enlarged to the projects funded in the same Call of 5G-LOGINNOV (i.e., DRAGON, 5G-RECORDS, COREnect, Affordable5G, 5GMETA, FUDGE-5G, Int5Gent).

After the sharing of 5G-LOGINNOV official presentations materials, a round of online meetings was set to exchange the high-level objectives of the project and the dissemination plans, to exploit possible opportunities of joint presence.

During the whole duration of the project this map was constantly updated, integrating the contributions coming from partners especially as outcomes of the presence in exhibitions: a dissemination report when possible has been collected after the participation to events, with the evidence of interesting opportunities to be further exploited.

The presence of partners active in other projects in the same field (i.e., 5G, port, logistics) has been another relevant source to feed this clustering initiatives for 5G in ports, fostering the knowledge sharing.

Clustering activities were conducted with a proactive approach to disseminating project results and maximizing their impact, by organizing workshops and participating in international congresses.

Workshops were conducted in collaboration with sister projects, choosing the format in relation to the specific goals and context, and leveraging the strengths and expertise of the consortia involved.

During the clustering activities, the project's scientific and technical outputs have been presented including research findings, technological innovations, and any other relevant outcomes, exploiting the knowledge sharing opportunity for industry experts, policymakers, researchers, and potential end-users, facilitating active engagement and collaboration and the exchange of knowledge in the relevant field.

The target stakeholders can continue to leverage the benefit of these results and to ensure that they are effectively communicated and utilized.

The synergies established with the identified projects can be summarized by following the thematic and technological development evolutions identified in D5.3. Based on these considerations they can be clustered as follows keeping in mind the peculiarities and lines of research and development followed by 5GLOGINNOV.

Table 1 - Identified Projects and Joint Initiatives by R&I Topic

R&I TOPIC	PROJECTS AND JOINT INITIATIVES	RELEVANCE
Efficiency	FOR-FREIGHT (joint presence at EUCNC&6G Summit 2023)	The FOR-FREIGHT (Flexible, multi-mOdal and Robust FREIGHt Transport) project aims to maximize the utilization of multimodal freight transport capacity, achieve competitive sustainability with higher levels of efficiency, and reduce the average cost of freight transport through the development of novel solutions and their integration with legacy logistics systems. The FOR-FREIGHT solutions will target the end-to-end optimization of multimodal/multi-stakeholder logistics processes and improved access to transshipment services through the following Unique Value Propositions. FOR-FREIGHT took part with 5G-

		<p>LOGINNOV at the EUCNC&6G Summit 2023 in the joint session titled “Enabling Innovation in Transport and Logistics Operations: a 5G approach”, focusing on the diverse effects of 5G connectivity on enhancing Transport and Logistics operations and end-to-end processing. The cooperation among the two projects shed light on 5G-enabled synergies in terms of enhanced efficiency for ports and multimodal transport applications, highlighting the benefits of 5G adoption for the entire supply chain.</p>
	<p>BOOSTLOG (joint presence at Collaborative Innovation Day 2022)</p>	<p>BOOSTLOG Vision is transforming European freight transport and logistics R&I ecosystem to perform optimally boosting impact generation out of R&I investment contributing to EU policy objectives towards climate neutrality, pollution, congestion and noise reduction, free movement of goods, internal security, digital transformation of logistics chains and data sharing logistics ecosystems and supports companies’ sustainability and competitiveness generating value for society. During the Collaborative Innovation Day the BOOSTLOG vision encountered the 5G-LOGINNOV innovations, with the goal of bringing 5G-enabled innovations closer to concrete market applications and opportunities (i.e. matching demand and offer).</p>
<p>Innovative Concepts</p>	<p>ENSEMBLE (joint presence at ITS World Congress 2021)</p>	<p>The main goal of the ENSEMBLE project is to pave the way for the adoption of multi-brand truck platooning in Europe to improve fuel economy, traffic safety with the aim to realize pre-standards for interoperability between trucks, platoons and logistics solution providers, to speed up actual market pick-up of (sub)system development and implementation and to enable harmonization of legal frameworks in the member states. This forms a platoon with the trucks driven by smart technology, and mutually communicating. Truck platooning is innovative and full of promise and potential for the transport sector. During the joint participation in the ITS World Congress 2021 in the session titled “Autonomous Vehicle & Platooning, what next!?” the focus was indeed on capitalising the ENSEMBLE results for 5G-LOGINNOV goals, in a knowledge sharing approach for the improvement of efficiency and reduction of CO2 emissions in the traffic from and to the port premises.</p>
	<p>5G-BLUEPRINT (joint presence at Collaborative Innovation Day 2022)</p>	<p>5G-BLUEPRINT aims to design and validate technical architecture and business and governance models for uninterrupted cross-border teleoperated transport based on 5G connectivity. The project’s outcome will be the blueprint for operational pan-European deployment of teleoperated transport solutions in the logistics sector and beyond. The participation in the Collaborative Innovation Day organised by 5G LOGINNOV was in the frame of create a cooperation and a knowledge sharing approach among H2020 Projects at the forefront of 5G developments, exploiting the finding drivers for technology innovation in transport & logistics.</p>

	<p>FUDGE-5G</p> <p>(Joint workshop 5G LOGINNOV, FUDGE5G-AFFORDABLE5G 2022)</p>	<p>The main objective of FUDGE-5G is to devise, assess and demonstrate a conceptually novel and forward-looking cloud-native, unified and secured service-based 5G architecture, solutions and systems for private networks. FUDGE-5G will allow for extreme interoperability and customization for industry verticals among wired and wireless access infrastructure (“all-Ethernet” 5GLAN with 5G-Multicast and 5G-TSN support), mobile 5G service orchestration and vertical applications. The joint workshop was the opportunity to make a step further in the application of 5G-enabled innovation in industry verticals, taking into active consideration FUDGE 5G findings and challenges for the 5G-LOGINNOV LL test fields applications.</p>
	<p>5G-RECORDS</p> <p>(5G PPP Joint Workshop 2021)</p>	<p>The key challenge of 5G-RECORDS is to explore the possibilities that new hardware devices and technologies may bring to the 5G ecosystem. It also supports the emergence of new markets and new market actors in Europe, especially in the context of content production use cases. The main objective is to integrate 5G components into three use cases and evaluate their performance in the context of professional content production environments. 5G-RECORDS has considered 3 use cases to embrace some of the most challenging scenarios to be showcased in the framework of professional content production: Live audio production, Multiple camera wireless studio and Live immersive content production. The successful integration of the aforementioned use cases into the 5G ecosystem demands processing audio and/or video data sources with stringent requirements for KPIs such as data rate, latency, synchronicity, availability and reliability. The participation to the joint 5G PPP workshop was developed in the frame of a mutual knowledge sharing about common technical challenges to be faced (i.e. data latency and reliability) and about the methodology to analyse the emergence of new markets and new actors for the uptake of the new 5G-enabled solutions.</p>
	<p>COREnect</p> <p>(5G PPP joint workshop 2021)</p>	<p>During this action leaders from both the microelectronics and telecommunications sectors will jointly develop a high-level strategic roadmap of core technologies for future connectivity systems and components, targeting the next generation telecommunications networks and services. The project analysed the required R&I and investments for the expected core hardware components where Europe should seize opportunities and strengthen its capabilities to build European technological sovereignty in 5G and beyond. Advanced connectivity solutions from 5G (and evolved 5G) networks will be the fundamental building block in the digital transformation of both the public sector and industry. The participation to the joint 5G PPP workshop was developed in the frame of a mutual knowledge sharing about technological requirements and challenges of vertical applications, like the ones in 5G-LOGINNOV for ports & logistics, in order to design an EU 5G building block</p>

		<p>that actually meets the needs of the market.</p>
	<p>5G VICTORI (IPIC 2023)</p>	<p>5G solutions for verticals is a European objective aimed at developing flexible infrastructures for various applications. 5G-VICTORI will conduct large-scale trials for advanced vertical use case verification in Transportation, Energy, Media, and Factories of the Future. The project will use 5G network technologies from ICT-17 projects and existing facilities to integrate various vertical and cross-vertical use cases. The consortium includes major players from ICT, including operators, equipment vendors, academic organizations, and SMEs, as well as major players from vertical industries. The joint participation in the IPIC 2023 session titled “5G: revolutionising the logistics sector in Europe” represented the willingness to broaden the scope of the verticals considered in terms of governance issues, potential solutions, and business aspects to investigate the most reliable innovative technical requirements to make 5G a competitive advantage for business in the EU.</p>
<p>Disruptive 5G Technologies</p>	<p>INGENIOUS - Next-GENERation IoT sOlutions for the Universal Supply chain</p> <p>(joint presence at Collaborative Innovation Days 2022)</p>	<p>INGENIOUS aims to design and evaluate the Next-Generation IoT (NG-IoT) solution, with emphasis on 5G and the development of Edge and Cloud computing extensions for IoT, as well as providing smart networking and data management solutions with Artificial Intelligence and Machine Learning (AI/ML). The project embraces the 5G Infrastructure Association (5G IA) and Alliance for Internet of Things Innovation (AIOTI) vision for empowering smart manufacturing and smart mobility verticals. The Collaborative Innovation Day was the opportunity to give the public a glimpse of the many applications that are born from the use of 5G, translating technological innovation into concrete use cases in different verticals; furthermore, the event was a valuable opportunity for a discussion on key findings.</p>
	<p>5G PICTURE (IPIC 2023)</p>	<p>The rapid growth of mobile internet traffic necessitates the transformation of traditional network infrastructures into open, scalable, and elastic ecosystems. 5G-PICTURE aims to develop a converged fronthaul and backhaul infrastructure integrating advanced wireless and optical network solutions. This will shift from D-RAN and C-RAN to Dis-Aggregated RAN (DA-RAN), where hardware and software components are disaggregated across wireless, optical, and compute/storage domains. Key enablers for DA-RAN include network softwarization and HW programmability. The project will demonstrate these</p>

		<p>capabilities in smart cities, 5G railways, and stadiums. The joint participation in the IPIC 2023 session titled “5G: revolutionising the logistics sector in Europe” represented the opportunity to compare the technological and technical requirements found in the 5G LOGINNOV use cases with those developed within the 5G PICTURE project, identifying areas of overlap and divergence. This information can then be used to harmonize the characteristics of the networks needed to deliver 5G-based value-added services.</p>
Internet of Things (IoT) – Applications and Devices	<p>AFFORDABLE 5G (joint workshop FUDGE5G-5GLOGINNOV - AFFORDABLE 5G 2022)</p>	<p>Affordable 5G aims at creating a 5G network that will deliver a complete, disaggregated and affordable solution covering the needs of private and enterprise networks through technical innovation that span across all parts of 5G network, leveraging cell densification, RU/DU/CU split, hardware acceleration, edge computing and core network virtualisation, seamlessly combined with the adoption of open-source RAN, MEC and MANO solutions, for cloud-native, microservice based deployments. The joint workshop was the opportunity to make a step further in the requirements definition 5G applications for verticals, taking into active consideration AFFORDABLE 5G findings and challenges for the 5G-LOGINNOV LL test fields applications.</p>
	<p>DRAGON (5G PPP joint workshop 2021)</p>	<p>The DRAGON project, through the exploitation of the radio spectrum in D-band (130-174.8 GHz), will overcome the constraints of current E-band wireless backhaul solutions to achieve a small-form factor and high-capacity radio solution, suitable for massive deployment, that will enable bringing the speed of optical systems to backhaul systems in a cost-effective way. The project, opening to the introduction in 5G networks of frequencies beyond 100GHz towards 100Gbps capacity, supports the deployment of different applications and use cases for high-capacity x-haul systems having hop distances of up to 1km. DRAGON offers prospects for new semiconductor, antenna and packaging technologies and the consequent hardware devices to enter the market and to create the economic opportunities, for the involved consortium partners, to become the most innovative market players. The participation to the joint 5G PPP workshop was developed in the frame of a mutual knowledge sharing about technological requirements for vertical applications - also related to hardware components – and about challenges to foster new 5G-related market opportunities for emerging actors.</p>

Data Analytics	<p>5G-META</p> <p>(ITS World Congress 2021; 5G-LOGINNOV - 5G META- SHOW workshop 2021; joint policy recommendations workshop 2023)</p>	<p>The 5GMETA open platform aims to leverage car-captured data to stimulate, facilitate and feed innovative products and services. Cars capture and generate huge volumes of real-time data about the driving dynamics, the environment and the driver and passengers' activities. By expanding 5G network functions, 5GMETA will stimulate and facilitate innovative products and services whilst ensuring data Privacy-Interoperability-Security-Ownership. With the joint participation in several dissemination initiatives the projects aimed to join effort in paving the way to new 5G-based applications and innovative services for logistics and mobility, with a specific focus on Data Management. Both 5G-LOGINNOV and 5G-META deal with large amounts of data from IoT devices and sensor, with a consequent interest in the development of solutions as data architectures and data analytics platforms, data security and privacy methodologies.</p>
	<p>FEDERATED (ITS World Congress 2022)</p>	<p>The FEDeRATED Project has been co-founded by the European Commission through the Connecting Europe facility programme to deliver the foundation of a trustworthy and interoperable business and administrative data sharing infrastructure for freight transport and logistics. FEDeRATED will design and validate a federated network of platforms concept to enable data sharing in the logistics chain while providing interoperability and harmonization between individual platforms. This concept will allow for:</p> <ul style="list-style-type: none"> • Smooth interaction between and among the different logistic chain operators and public administrations involved; • Enterprises to optimize the use of supply chain dynamic planning to enable various ways of collaboration and optimize capacity utilization; • Recognizing existing (partial) systems; • Streamlining multimodal transport; • Decreasing or removing costs derived from lack of interoperability. Among the various stakeholders of a logistic chain (shipper, forwarders, transport operators, stevedore, etc.) data sharing is already existing, for instance Electronic Data Interchange (EDI) replaced paper-based business documents with electronic messages. <p>Enterprises are also already sharing booking and order data with their business partners to optimise their supervision of cargo flows. This data sharing is, to some extent, already supported by existing standards, platforms and IT solutions.</p> <p>The joint participation at the ITS World Congress was the opportunity to present the common research and development interests in the field of secure and interoperable data-sharing infrastructure for freight transport and logistics, optimization of supply chain planning and execution and costs reduction derived from lack of interoperability.</p>

<p>Next Generation Traffic Management</p>	<p>FENIX</p> <p>(ITS European Congress 2023)</p>	<p>FENIX will develop the first European federated architecture for data sharing serving the European logistics community of shippers, logistics service providers, mobility infrastructure providers, cities, and authorities in order to offer interoperability between any individual existing and future platforms. FENIX main objectives:</p> <ul style="list-style-type: none"> • Establish a federated network of transport and logistics actors across Europe, enabling sharing of information and services needed to optimize TEN-T (A2&A3). • Demonstrate the operational feasibility and benefits through the organized national pilots –focus on testing the achieved interoperability capabilities (A4). • Set up the EU corridor community building programme and to promote the benefits to the participants in terms of reduced costs and GHG emissions (A5&A6). <p>The joint participation at the ITS EU Congress represented the opportunity to reinforce the common key messages related to the significance of collaboration and data sharing in the European logistics sector. Both projects indeed focused on innovative solutions for efficiency, safety, and sustainability, exploring the role of 5G technology and investigating collaborative business models for future initiatives.</p>
<p>CCAM (Cooperative, Connected, and Automated Mobility)</p>	<p>SHOW</p> <p>(ITS World Congress 2021 and 5G-LOGINNOV - 5G META- SHOW workshop 2021)</p>	<p>SHOW aims to support the deployment of shared, connected and electrified automation in urban transport, to advance sustainable urban mobility. During the project, real-life urban demonstrations taking place in 20 cities across Europe will see the integration of fleets of automated vehicles in public transport, demand-responsive transport (DRT), Mobility as a Service (MaaS) and Logistics as a Service (Laas) schemes. SHOW aims to be the biggest and most holistic ever initiative piloting automated vehicles in urban environments.</p> <p>The joint initiatives represented the opportunity to underline the common goal to assert the key role of 5G in the optimisation of logistics and urban mobility systems: through the integration of 5G networks into vehicles to enable cooperative, connected, and automated mobility (CCAM) both projects aimed at developing standardized 5G solutions to be widely adopted</p>
	<p>CONCORDA</p> <p>(ITS World Congress</p>	<p>The CONCORDA (Connected Corridor for Driving Automation) project contributes to the preparation of European motorways for automated driving and high-density truck platooning with adequate connected services and technologies.</p> <p>With regards to high density truck platooning, there is a need for ultra-reliable, low latency V2V safety-relevant</p>

	2021)	<p>communication between the platoon leader and the trucks following in the platoon. There is a need for critical adaptations on the side of the trucks, as well as for the establishment of close cooperation between mobile network operators and the truck industry, in order to guarantee that the requested minimum service level agreements for truck platooning are enacted. CONCORDA will combine 802.11p and LTE-V2X connectivity without affecting existing services in terms of interferences and interoperability to ensure backwards C-ITS service interoperability with the services harmonized by C-ROADS under real traffic situations.</p> <p>The potential of digital transformation to revolutionize the logistics was the joint key message developed during the intervention, with a particular focus on high-density truck platooning and the corresponding 5G network requirements, in order to achieve a more efficient, safe, and sustainable logistics sector in Europe.</p>
	<p>5G MOBIX</p> <p>(Joint session in 5G Techritory 2020; joint policy recommendations workshop 2023)</p>	<p>5G-MOBIX aims to develop and evaluate automated vehicle functionalities using 5G core technological innovations along two cross-border corridors and six urban trial sites. The trials allow assessment of the benefits of 5G for connected and automated mobility (CAM) applications such as cooperative overtake, highway lane merging, truck platooning, remote driving and vehicle Quality of Service support.</p> <p>The joint initiatives were taken with the main aim of contributing to the development of policy recommendations for 5G deployment for connected and automated mobility, paving the way for a future of zero-emission logistics by 2050. Coordination meetings and workshops represented the opportunity to share best practices to develop standardized solutions for CAM applications</p>
<p>5G Logistics Corridor</p>	<p>VITAL 5G</p> <p>(joint presence at Collaborative Innovation Day 2022)</p>	<p>The pan-European Transport & Logistics (T&L) ecosystem is considered one of the main adopters of 5G, and as such, the successful transfer of 5G-empowered services from trials/pilot stages to production depends highly on the availability of flexible and intuitive tools and APIs for design, management and orchestration of their services. VITAL-5G prioritizes this ambition and plans to overcome, through its intuitive and production-ready Network Applications orchestration platform with open repository, various limitations that exist today for industry verticals keen to design and deploy T&L virtualized services in a 5G network.</p> <p>The joint participation in the Collaborative Innovation Day with the related technical coordination preparatory meeting were the opportunity to explore the need for flexible and intuitive tools for the design, management, and orchestration of 5G-enabled T&L services, to overcome the limitations of deploying T&L virtualized services in a 5G network and to consequently enable the widespread adoption of 5G-enabled T&L services..</p>

	Int5Gent (5G PPP joint workshop 2021)	<p>Int5Gent targets the integration of innovative data plane technology building blocks under a flexible 5G network resource, slice, and application orchestration framework, providing a complete 5G system platform for the validation of advanced 5G services and IoT solutions. According to the Int5Gent vision the edge and fog computing nodes coexist in a 5G fronthaul-backhaul infrastructure and support the vertical services and IoT devices at the attached access networks. The edge/fog level is composed by a diverse type of nodes and infrastructures with different processing capabilities, split in general into pure edge nodes (e.g., industrial or enterprise nodes, smart city or smart home gateways, private Wi-Fi infrastructure servers) and fog-based service delivery nodes (e.g., mini-DCs, application servers, content delivery and data storage nodes).</p> <p>The participation in the joint event was the opportunity to reinforce the message related to the relevance of flexible and efficient 5G network architecture to enable the development of innovative 5G services and IoT solutions.</p>
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2.3 Joint sessions in events

Participating in joint sessions during industry and projects events was crucial for knowledge exchange, idea sharing, and networking. By engaging in joint event sessions, the project tapped into a diverse range of perspectives, expertise, and experiences from various projects and organizations working towards similar goals. This collaborative environment fostered cross-pollination of ideas, sparked innovation, and encouraged the exploration of new possibilities. It enabled the 5G-LOGINNOV project to learn from the successes and challenges of others, identify potential synergies, and forge partnerships that could accelerate progress and enhance the project's impact.

Multiplying the impact of the project by forming or joining a thematic community has meant providing a better collaboration and management across associated projects, structured knowledge sharing and benchmarking of project outcomes. This way, the identified projects provided technical, organizational, and operational knowledge to each other, maximized synergies and complementarities between them and facilitated the achievement of their key impacts.

A coherent alliance of EU-funded projects focusing on the research, demonstration and deployment of innovative means and methods delivered an added value to the project and ensured and promoted collaboration with other relevant actions multiplying their overall impact. A comprehensive, integrated approach to cross-dissemination, shared communications and synergies for the exploitation of results increased the research, innovation and the exploitation's dimensions.

Considering the nature of the scientific fields and project targets, joint sessions fulfilled different roles, always contributing to the achievement of structured knowledge-sharing. This allows for in-depth exploration of particular topics, benefiting from the collective knowledge and experience of participants who specialize in those areas. For those projects where different groups of stakeholders were present, the sessions also reinforced the interactions between:

- Research and industry;
- End-users and standardization bodies;
- Industry and policy makers on local and regional levels;

The joint sessions (cfr. D 5.3, paragraph 3.7.3), represented dynamic and informative moments in which industry leaders and stakeholders gathered to delve into the advancements of 5G technology.

The strategic development topics discussed and promoted were:

- The 5G's capabilities in the mobility landscape to pave the way for safer, more efficient transportation systems in logistics and maritime sectors, with the potential to enhance business operations and competitiveness;
- How to accelerate innovation in the development and take up of 5G system in transport and logistics applications;
- The leading-edge concepts, methodologies for current and future Physical Internet implementation;
- Cooperative, Connected and Automated Mobility (CCAM), next generation traffic management and emerging 5G networks for city ports to handle upcoming and future capacity, traffic, efficiency and environmental challenges;
- Cutting-edge prototypes in port ecosystems;
- Implications for the future of Intelligent Transportation Systems at European and global level;
- Business Models Platform development;
- Effects of 5G connectivity on enhancing Transport and Logistics operations and end-to-end processes;
- 5G application in multimodal rail and road transport management;
- Data exchange framework platforms;
- The transformative potential of 5G technology in the logistics industry.

In the table below there is a summary of the events in which 5G-LOGINNOV took part jointly with sister projects:

Table 2 - Joint events and meetings

EVENT	DATE & TYPE	PARTNERS INVOLVED	NOTES
5G TECTRITY 2020	11-12 November 2020 - Online	ERTICO	800 registrants to the event
5G PPP Webinar: New 5G Core Technologies Innovation Projects	16 February 2021 - Online	ERTICO	75
Joint Workshop 5G LOGINNOV, 5G-META, SHOW	23 June 2021 - Online	ERTICO, VICOMTECH	79
ITS World Congress	11-15 October 2021 - Hamburg	ERTICO- T-SYSTEMS, VICOMTECH, ININ, ICCS	More than 15,000 participants to the overall congress
ITS European Congress	30 May -1 June 2022 - Toulouse	ERTICO	1936 participants; 2602 registrations; 62 individual exhibitors; 17 media partners; 51 countries; 102 sessions 8 demonstrations; 3806 contacts made; 2651 messages exchanged; Top Countries: France, Germany, Belgium

Joint workshop 5G LOGINNOV, FUDGE5G-AFFORDABLE5G	June 2022	Joint workshop 5G LOGINNOV, FUDGE5G-AFFORDABLE5G	40
ITS World Congress	18-22 September 2022 - Los Angeles	ERTICO	Number of overall attendees: 20,000; Size of audience addressed by the performed activity (participants): 100; Number of visitors at the booth: 50
Collaborative Innovation Day with Alice and Athens LL local stakeholder workshop	4 October 2022 – Online	ERTICO, CIRCLE, ICOOR, ICCS	144 registrants
ITS European Congress	22-24 May 2023 - Lisbon	ERTICO, ICOOR, CIRCLE	2568 participants from 59 countries
IPIC 2023	13-15 June 2023 - Athens	ICCS, CIRCLE, ICOOR	Overall attendees (registrants): +250. Size of audience addressed by the performed activity: 50 Number of distributed promotional materials: 30 Number of visitors at the booth: 50
EU CNC & 6G Summit 2023	6-9 June 2023 - Gothenburg	ICCS, ININ	About 50 people participated in the special session where several 5G and logistics-oriented projects were presented. Summit: 894 Registrations 251 papers in regular sessions were submitted.
Joint webinar with 5G MOBIX and 5GMETA “Policy recommendations for 5G deployment”	27 October 2023 - Online	5G LOGINNOV, 5G META, 5G MOBIX	90 registrants

2.4 Joint Technical Workshops and publications

Joint technical workshops represented an essential platform for collaboration, knowledge sharing, and innovation. Their interactive nature encouraged active participation, leveraged collective expertise, generated novel insights, and boosted transformative advancements in the logistics and transport domain using 5G technology.

Workshops allowed in-depth discussions on specific technical challenges and potential solutions favouring the exchange of concepts and approaches and provided a platform for experts to delve into complex problems, share their expertise, and collectively develop solutions. This collaborative approach often leads to innovative solutions and synergistic outcomes that can have a lasting impact on the stakeholders' projects.

The events encouraged an active participation driving to contribute to the presentation of real-world case studies offering concrete examples of how 5G technology has been applied successfully in specific logistics and transport scenarios, offering inspiration and guidance to others.

Workshops also included discussions on regulatory and policy considerations related to 5G technology in logistics and transport, in particular about compliance requirements, spectrum allocation, and other legal aspects that impact the sister's projects and specific regional/national applications.

Joint collaborations allowed a cross-pollination of contents that lead to the development of hybrid solutions and novel approaches that might not have been explored otherwise and offered an opportunity to identify synergies between the 5G-LOGINNOV project and other initiatives, collaborative projects, resource sharing, and mutual support enhancing the effectiveness of all involved parties.

They also represented tailored communication initiatives to give visibility to selected SMEs helping these businesses thrive, attracting potential customers and partners, and contributing to their growth and success within their respective industries.

They were an invaluable platform for experts and stakeholders to engage in profound discussions and explore the limitless potential of 5G in revolutionizing the automotive, transport, logistics, and urban mobility sectors. These collaborations covered topics from the integration of 5G networks into vehicles to the optimization of logistics and urban mobility systems using cutting-edge connectivity solutions for the transformative potential of 5G technology across various industries and urban planning.

At strategic level, joint sessions involved target network as 5G PPP, ALICE, Docks the Future Network of Excellence, NetworkEurope and projects as 5GMETA, SHOW, 5G-MOBIX, FUDGE5G, AFFORDABLE5G and INGENIOUS.

Technical meetings and workshops also served as preparatory phase to participate effectively in important European and world events offering a structured approach to planning, collaboration, and knowledge exchange, which can significantly enhance the chances of success and made the most of the opportunities presented by these events such as the ITS European and World Congress 2021/2023 and the EU CNC&6G SUMMIT 2021/2023.

In the table below some examples of joint Webinars and Technical Meetings developed during the project can be found:

Table 3 - List of joint Webinars and Technical meetings

EVENT	DATE	PARTNERS INVOLVED	PARTICIPANTS
Technical Webinar jointly with 5G META in preparation for EU CNC&6G Summit 2021	April 2021	ERTICO, LUKA KOPER, TELEKOM SLOVENIJE, ININ, ICCS, T-SYSTEMS, VODAFONE INNOVUS, ICOOR	9
Technical Webinar in preparation to 5G LOGINNOV - 5G META and SHOW joint workshop	May 2021	ERTICO, VICOMTECH	4
Joint Workshop 5G LOGINNOV, 5G-META, SHOW	23 June 2021	ERTICO, VICOMTECH	79
Technical Webinar with 5GMETA and SHOW in preparation to ITS World Congress 2021	October 2021	ERTICO- T-SYSTEMS, VICOMTECH, ININ, ICCS	4
Technical Workshop with 5GMETA and 5G MOBIX in preparation to 5G-TECHRITORY	October 2021	ERTICO, ININ, T-SYSTEMS, VICOMTECH	4
Technical meeting with sister project AFFORDABLE5G	February 2022	ERTICO, CIRCLE	4
Technical meeting with sister project INGENIOUS	February 2022	ERTICO, CIRCLE	4
Joint workshop 5G LOGINNOV, FUDGE5G-AFFORDABLE5G	June 2022	Joint workshop 5G-LOGINNOV, FUDGE5G-AFFORDABLE5G	40
Technical Workshop in preparation of EU CNC&6G SUMMIT 2023	March 2023	CERTH, ICCS, eBOS, MARTEL, IMEC, ININ, ERTICO, WINGSICT SOLUTIONS, ZSI	15
Technical Workshop in preparation of 5G-LOGINNOV ITS European Congress 2023	May 2023	ICOOR, ERTICO, eBOS, INLECOM, ALICE, Ministerie van Infrastructuur en Waterstaat	7
Workshop Future 6G Technologies for Cooperative ITS Standards and Vertical Implementation in Cities and Port Cities	June 2023	ERTICO, ISO WG 17, ETSI technical Committee on	

		ITS	
Joint webinar with 5G MOBIX and 5G META “Policy recommendations for 5G deployment”	27th October 2023	5G LOGINNOV 5G MOBIX 5G META	85

Due to its relevance, as they brought together joint considerations and outcomes concerning 5G as an enabler for verticals, two joint workshops in collaboration with sister projects organized and led directly by 5G-LOGINNOV are highlighted:

Below more details are available regarding the promotion of the events.

- **Focus on joint workshop 5G-LOGINNOV, 5G-META, SHOW “5G: challenges and opportunities for CAD, transport & logistics and big data”**

On June 23, 2021, a joint workshop brought together three European projects with a common vision—to propel the future of smart mobility through the transformative power of 5G technology. The workshop, co-organized by the European-funded projects [5GMETA](#), 5G-LOGINNOV, and [SHOW](#), served as an invaluable platform for experts and stakeholders to engage in profound discussions and explore the limitless potential of 5G in revolutionizing the automotive, transport, logistics, and urban mobility sectors. The collaborative efforts of these projects aimed to foster synergy and knowledge exchange among participants, with the ultimate goal of unlocking new dimensions in mobility solutions. By combining their expertise and unique insights, the projects sought to inspire innovative approaches and discover best practices in harnessing 5G technology for the advancement of their respective domains as well as investigate the impact on Standardization processes.

Throughout the event, participants delved into a wide array of topics, ranging from the integration of 5G networks into vehicles to the optimization of logistics and urban mobility systems using cutting-edge connectivity solutions. The workshop provided a fertile ground for sharing experiences, challenges, and success stories, promoting a holistic understanding of the immense impact 5G can have on transforming the future of transportation. ([Agenda](#))

As follow up of the workshop a joint session at ITS World Congress was proposed and accepted “SIS 96 CAD, Safe Platooning and 5G Eco-Systems for verticals” ([Agenda](#))

- **Focus on Joint workshop 5G-LOGINNOV, FUDGE5G, AFFORDABLE5G “Accelerating 5G Innovation in Europe. Challenges and Opportunities for Private Networks focusing on CAD, Transport & Logistics, Smart City, Manufacturing”**

The 5G-LOGINNOV project, FUDGE-5G, and Affordable 5G held an online workshop on June 16th 2022, discussing 5G innovation in Europe, focusing on CAD, transport, logistics, smart cities, and manufacturing. The event aimed to optimize traffic operations, deliver solutions for private and enterprise networks, and define 5G architectures for industry verticals. The three projects indeed matured their 5G expertise in relation to the optimisation of traffic operations at ports and logistics, the delivery of a solution covering the needs of private and enterprise networks and the definition of a 5G architecture for private networks allowing interoperability and customization for industry verticals ([Agenda](#))

Furthermore, the collaboration of 5G LOGINNOV with EU sister projects and industry-related existing networks led to joint publications, valuable avenues for disseminating research findings, sharing

insights, and contributing to the collective knowledge base. By publishing jointly with other projects and initiatives, the 5G-LOGINNOV Project can leverage diverse perspectives, expertise, and methodologies to present comprehensive and impactful research outcomes. They also provide opportunities for collaboration, facilitate further research, and stimulate innovation by inspiring others in the field.

- [5G Experimentation for Public Safety: Technologies, Facilities and Use Cases](#); M. Volk (University of Ljubljana), J. Sterle (INTERNET INSTITUTE); IEEE Access - joint with Int5Gent 5G-INDUCE 5GASP MATILDA.
- [KPIs Measurement Tools from KPI definition to KPI validation enablement](#); 5G PPP White Paper; developed jointly with 5G-PPP Test, Measurement and KPI Validation Working Group and 5G EVE, 5G-VINNI, 5GENESIS, 5G-TOURS, 5G-HEART, Int5Gent, 5GASP and 5Growth
- [Enabling innovation in Transport & Logistics A 5G approach](#); Georgia Ayfantopoulou, Sofoklis Dais, Katerina Batzou, Ioannis Anagiannis, Sokratis Barmounakis, Eleni Giannopoulou, Panagiotis Demestichas, Andreas Gavrielides. Giota Lilli, Pavlos Basaras, Giada Landi, Nina Slamnik – Kriještorac, Johann M. Marquez – Barja, Janez Sterle, EUCNC & 6G summit 2023 - jointly with 5G-LOGINNOV, 5G-BLUEPRINT, VITAL 5G, FOR-FREIGHT, FENIX.

5G LOGINNOV has been also active in joint publications related to regulatory and policy aspects, resulting in 2 joint position papers containing business-driven feedback and recommendations for 5G-PPP initiative and EU bodies.

2.4.1 Contribution to ALICE position paper on the “FIT FOR 55” climate package

5G-LOGINNOV actively contributed to the development of ALICE position paper on the “Fit for 55” climate package that aims at addressing the freight and logistics aspects of the ‘FIT for 55’ package with a focus on the intra-European flows transition.

According to the position paper “To ensure a fair and an affordable transition, more focus should be given to support the demand of those companies investing in new technologies (transportation companies) and their customers asking for those services (cargo owners).

The main focus:

- Increasing the utilization of vehicles and infrastructures
- Supporting fleet owners and logistics users to cope with the gap between what is technologically possible and economically feasible
- Enabling transportation modes are smartly used and combined with a focus of end users’ requirements”.

[Here more information](#)

2.4.2 Joint position paper in cooperation with 5G META

The position paper titled “Actions to enhance research, development and deployment of AI applications” jointly outlines a series of actions to tackle the roadblocks or gaps detected during 5G-LOGINNOV and 5GMETA project’s deployment.

5G-LOGINNOV comprises of a range of port-driven technological and societal innovations, tailored to realize the objectives including automation for ports; generation of data on floating trucks and emission; automated truck platooning and involvement of high-tech SMEs. The innovations have been implemented and tested in real operating conditions in three Living Lab environments, associated with the three 5G-LOGINNOV ports, namely Athens (Greece), Hamburg (Germany) and Luka Koper (Slovenia) Living Labs.

5GMETA developed and integrated a set of 5G network functions by applying service slicing for data delivery based on IoT architectures and technologies. It also involved the development, integration, training, and testing of a range of exploitable demonstrators. These demonstrators implemented innovative Cooperative, Connected, and Automated Mobility (CCAM) use cases, covering diverse datasets, business models, and industry segments. This comprehensive approach aimed to accurately represent the anticipated features, APIs, and pricing structures.

3 NETWORKING WITH EUROPEAN-WIDE ASSOCIATIONS AND TRANS-NATIONAL INITIATIVES: ACTIVITIES AND IMPACTS

3.1 Introduction

5G is a crucial technological innovation that has the potential to transform the European economy by enabling the digitization of transport and logistics having a profound impact on this sector in terms of real-time connectivity, fleet management, autonomous vehicles, smart ports and warehouses, supply chain optimization, and environmental benefits.

To address potential challenges and considerations, such as data privacy and security, infrastructure investment and regulatory frameworks it's essential to ensure the smooth integration of 5G applications in adopting these innovative technologies, driving economic growth, and enhancing efficiency. For those reasons, clustering initiatives with EU associations and trans-national initiatives represented a strategic project activity to enhance the interactions and collaboration among various stakeholders fostering a dynamic ecosystem of innovation sharing and transferring knowledge and diverse perspectives, catalysing innovation, accessing the market, engaging stakeholders, and analysing sustainable growth.

The involvement of public-private partnerships, industry-academia collaborations, and cross-sector interactions have played a significant role in driving innovation and in enhancing the dialogue.

In this section a detailed analysis of the results of technical working groups, conferences contributions, policy papers, common events and the related synergies established is provided.

3.2 Methodology

There are several considerations relevant to the businesses seeking to harness 5G connectivity. These include their understanding of the availability of the different solutions, the capabilities and cost of each solution and how these will meet the needs of their core business.

Access to 5G connectivity and solutions will also largely depend on the policy approach to 5G, in particular how spectrum is licensed and the tangible benefits for economies through the development of digital skills, digital transformation of business, sustainable digital infrastructures and the digitisation of public services.

Following the roadmaps process's identification described in D 4.4 the project provided recommendations to key stakeholders, including public authorities and policymakers, to support the emergence of a European offer for new 5G core technologies enhancing next generation logistics hubs and ports in Europe and beyond considering the roadmaps for sustainable logistics and proposes a complementary focus on the potential of 5G core technologies innovations.

Considering also the spectrum policy recommendations in D 5.6 identifying the gap analysis and technical requirements, a comprehensive analysis of the 5G Ecosystem and discussion in the fields of technological, application, regulatory aspects and policy recommendation enlarged to thematic associations working groups allowed an in-depth comparison across various dimensions helping stakeholders to gain a holistic understanding of the challenges and opportunities of the sector.

The methodology followed with the Association, Regulatory and Standardisation bodies played a crucial role and consisted mainly into the following strategies:

- Participation to Assemblies and Events, in which the project was presented
- Participation to joint communication initiatives as booths, brochures, journals
- Participation of 5G-LOGINNOV partners to Working Groups, sharing project results and outcomes
- Presentation of Position Papers
- Conference contributions

These interactions have proven instrumental in accelerating the project's success and in fostering a dynamic ecosystem of innovation.

Through numerous events, workshops, and conferences, 5G-LOGINNOV has brought together researchers, industry experts, and stakeholders from various domains, all united by the shared vision of leveraging 5G technology. These gatherings have become vital platforms for exchanging ideas, experiences, and best practices, catalysing collective efforts towards pushing the boundaries of 5G's capabilities.

The clustering strategy has magnified the project's impact, creating an ecosystem where innovative ideas intertwine, and progress is accelerated. By pooling resources, expertise, and innovative solutions, these collaborative clusters have unlocked potential for driving 5G innovation across diverse sectors. Networking has also played a pivotal role in the project's trajectory. 5G-LOGINNOV has actively sought connections with influential organizations, institutions, and industry leaders. Through these networks, the project has gained access to a wealth of knowledge, expertise, and resources, propelling its progress and fostering a spirit of shared learning.

In conclusion, through joint activities, shared publications, and strategic partnerships 5G-LOGINNOV adopted a holistic approach to 5G applications, fostering the exchange of findings and solutions among entities involved in the same technology or in similar application domains.



3.3 Networking and Clustering initiatives

The 5G-LOGINNOV project employed a multifaceted approach to engage with key stakeholders and initiatives in the 5G ecosystem. This strategy encompassed active participation in relevant working groups, presentation of project findings at plenary sessions, collaboration with national standardization bodies, and fostering partnerships with prominent organizations. Through these engagements, the project successfully disseminated its research outcomes, attracted new partners and investors, and contributed to shaping the future of 5G technology.

3.3.1 5G-PPP

The 5G Infrastructure Public Private Partnership (5G PPP) stands as a collaborative effort between the European Commission and the European ICT industry, encompassing ICT manufacturers, telecommunications operators, service providers, SMEs, and research institutions. Currently in its third phase with various new projects initiated in Brussels during June 2018, the 5G PPP is geared to deliver cutting-edge solutions, architectures, technologies, and standards, revolutionizing the communication infrastructures of the next decade.

For 5G-LOGINNOV, active participation in the activities of the 5G PPP holds immense significance. The 5G PPP's primary challenge is to consolidate Europe's leadership in strategic domains where the continent exhibits strength, while also exploring untapped markets like smart cities, e-health, intelligent transport, education, and entertainment & media. By aligning with the 5G PPP, the project gained a unique opportunity to contribute to shaping Europe's technological forefront and played an integral role in creating novel innovation prospects.

Through its involvement in the partnership, 5G-LOGINNOV benefited from an inclusive platform that facilitates reinforcing the European industry's global competitiveness. Collaborating with diverse stakeholders, 5G-LOGINNOV could leverage expertise, resources, and collective efforts to address the intricate challenges of the future. Such engagement empowered the project to position itself at the forefront of technological advancements and market development, capitalizing on the potential to maintain and strengthen Europe's global technological lead.

Specifically, 5G-LOGINNOV has been involved several times in 5G PPP activities and publications, among them:

- [The European 5G Annual Journal 2021](#)
- [5G PPP Projects Brochure 2021](#)
- [The European 5G Annual Journal 2023](#)
- [5G policies consultation workshop – 29 March 2023](#), dedicated to the collection of additional inputs on the policies that have been developed through the project.

Furthermore, 5G-LOGINNOV has an active presence via project partners in the following Working Groups, contributing actively to meetings and outcomes:

- Trials (ININ)
- SME (ININ)
- 5G Automotive (VICOMTECH)

- Test, Measurement and KPIs Validation (ININ, ICCS) – see white paper [KPIs Measurement Tools From KPI definition to KPI validation enablement](#)
- Communication (CIRCLE)
- 5G Architecture (T-SYSTEMS)
- Security (VICOMTECH)
- Pre-Standardization (ERTICO)

With specific reference to the white paper [KPIs Measurement Tools From KPI definition to KPI validation enablement](#), it summarizes the 5G Key Performance Indicators (KPIs) and the tools that have been identified and utilized in several ICT-17, ICT-19, and ICT-52 projects. In particular, the document lists the identified 5G KPIs, with a brief and unified description, mapping them also to the measurement operations. Then, the tools recognized in the different projects are presented, including open-source, ad-hoc developed and proprietary tools. Each tool is presented, highlighting the main functionalities and the list of KPIs that can be measured. Finally, the platforms for data collection and the tools for visualization are reported, highlighting their features and the availability of plugins/APIs to connect other tools/frameworks.

In addition, 5G-LOGINNOV gives a specific contribution to the Measurement and KPI Validation Working Group to the definition of Key Performance Indicators (KPIs) of 5G networks. The high-level architecture devised from the project was investigated to collect a rich dataset tailored to the project evaluation needs.

3.3.2 5G IA (5G Infrastructure Association)

5G IA brings together a global community of telecoms & digital actors, operators, research institutes, verticals, SMEs and ICT associations. Therefore, it is a relevant interlocutor for 5G-LOGINNOV to raise awareness of the potential of 5G to transform the logistics industry, attract new partners and investors, share the project's findings and progress with the wider industry as well as getting feedback on the project's direction and approach.

The project was officially presented to the 5GIA plenary in May 2022, with highlights on the importance of ports and supply chains for the European economy and on the progress in the three trial sites of Koper (Slovenia), Athens (Greece) and Hamburg (Germany): 5G technologies applications to optimize intelligent hubs and logistics were presented, aiming to ensure port areas and city-ports can handle upcoming and future capacity, cope with traffic congestion and environmental challenges.

[More information here](#)

3.3.3 National standardisation body of Belgium

[NBN "Bureau voor Normalisatie/Bureau de Normalisation"](#) is the Belgian national standards body, responsible for the drafting and publication of standards in Belgium.

The Belgian Standards Body was created by the Standardization Act of 3 April 2003 (published in the Belgian Official Gazette of 27 May 2003). It is a public organization with a legal personality, that has taken the place of the former Institut belge de normalization (IBN/BIN).

ERTICO, as member of NBN, pursues its standardization activities at ISO TC204 and CEN TC278 through this membership, bringing the findings achieved in the project into the discussion.

3.3.4 ISO

[ISO](#) is the world's leading developer of international standards, helping to ensure the quality, safety, and efficiency of products and services. In this respect ISO standards can help to accelerate the development and deployment of 5G technologies, making easier for businesses to adopt and use them. Cooperation among 5G-LOGINNOV and ISO is crucial to assure the interoperability and compatibility with standards.

ERTICO led the work on ISO 23795-1 “Intelligent transport systems — Extracting trip data using nomadic and mobile devices for estimating CO2 emissions — Part 1: Fuel consumption determination for fleet management”, which describes the procedure to extract speed profiles from mobile devices and compares them to established Driving Cycles such as the Worldwide Harmonized Light Vehicles Test Procedure (WLTP). This methodology has been extensively used in the Hamburg living lab. After publication of ISO 23795-1 in March 2022, this methodology used and developed within 5G-LOGINNOV is now available for adoption worldwide.

ERTICO, the project's coordinator, was appointed in 2022 as the new ISO TW 204 SWG 17.2 convenor due to ERTICO's achievements in the standards development. This ISO new working group is up “to save the planet” by standardizing energy based green ITS services.

SWG17.2 is developing a series of international standards which define energy based green ITS services providing urban transport management and smart city mobility applications on nomadic & mobile devices by means of not only measuring energy consumption and CO2 emissions but also providing information to users on energy capacity in transportation sectors in the smart city.

As the first output from SWG17.2, ISO/PWI TR 17748-1 “Energy-based green ITS services on nomadic & mobile devices for smart city mobility applications – Part 1: General information and use cases definition” has been officially added to the ISO work programme by ISO/TC 204. A call for contributions to collect use cases on a global basis was launched and 5G-LOGINNOV has contributed with several use case descriptions. Further parts of the ISO 17748 series will cover the functional requirements of data platform (part2) and the data exchange requirements for electric vehicles (EV)-based demand response charging services (part 3).

The work of SWG17.2 started during the ISO TC204 plenary meeting held in Tampere 2 - 6 October 2022. The scope of the SWG was exactly defined and presented to the TC204 plenary in a workshop.

ERTICO hosted the following ISO TC204 WG17 meeting in its office in Brussels on 8 and 9 December 2022. 5G-LOGINNOV use cases were presented as candidates for inclusion in TR 17748-1.

During the following ISO TC204 plenary meeting in San Antonio on 15 – 19 May 2023 the 5G-LOGINNOV use cases were accepted as integral part of TR 17748. The work on this technical report continued during the next plenary meeting scheduled for 23-27 October 2023 in Singapore.

On 23-24 November 2023, the technical meeting of ISO TW 204 WG 17 took place in Brussels hosted by ERTICO-ITS Europe. The work consisted in resolving the comments made on TR17748-1 during a TC internal ballot. Furthermore, work on part 2 and 3 continued with valuable inputs from the 5G-LOGINNOV project.

3.3.5 ALICE (Alliance for Logistics Innovation Through Collaboration in Europe)

The European Technology Platform [ALICE](#) aims to develop and implement a comprehensive industry lead strategy for research, innovation and market deployment in the field of logistics and supply chain management in Europe.

Leading experts and companies in implementing supply chain and logistics innovation from ALICE with the aim to accelerate the transition to net zero emissions transport & logistics operations. To that end, interdisciplinary and multi-stakeholder collaborative innovation is needed.

ALICE supports, assists and advise the European Commission in the implementation of the EU Programs for research: Horizon 2020 and Horizon Europe.

5G LOGINNOV cooperates with ALICE in several initiatives, including for example the co-organisation of the Collaborative Innovation Day (October 2022), the joint participation in the booth for TRA Lisbon 2022, the involvement in the 5G-LOGINNOV external workshop with stakeholders held in May 2023. Additionally, an interview was organized with a member of ALICE for policy input on 5G core technology in logistics. The goal was to gather insights to support the adoption of 5G in logistics. The collaboration resulted in policies prioritizing 5G in EU hinterland networks and ports and advancing AI for logistics efficiency.

Furthermore 5G LOGINNOV's project coordinator, Dr. Eusebiu Catana, was appointed as Vice-chair of the ALICE Systems & Technologies for Interconnected Logistics thematic group ([web site announcement](#)), which is working to define research and innovation paths to achieve real-time supply chains with available and affordable ICT solutions for all types of companies and participants, including safety and security of supply chains, emphasizing 5G-LOGINNOV's voice in demonstrating the potential of 5G to improve the safety and sustainability of supply chains.

3.3.6 NETWORKL EUROPE

[NetworkEurope](#) is the new incorporation of the European Technology Platform (ETP) for communications networks and services, the follow-up of NetWorld2020 to follow the European changing policies as stated in Horizon Europe. Communications networks and services enable interaction between users of various types of equipment, either mobile or fixed, to fulfil society's requirements for interconnection. NetworkEurope ETP gathers players in the communications systems sector: industry leaders, innovative SMEs, and leading academic institutions, thus reaching out to a significant part of the European ICT community.

5G LOGINNOV was presented in January 2023 at NetworkEurope SME working group, showcasing the available opportunities for SMEs in the 5G market, with specific reference to the sectors of logistics, and maritime ports ; in September 2022 the projects' findings were showcased during the event « [Webinar on Smart Ports](#) », with a specific contribution in the session « Future enablers for ports » and in 2022 the Internet Institute Ltd. (ININ), leader of the Koper Living Lab, has been included in the NetworkEurope's Success Stories of 2022.

3.3.7 6G IA

5G-LOGINNOV project partners actively took part in the 6G IA, contributing their expertise to shape the next generation of mobile communications. Specifically, ERTICO, VICOMTECH, T-SYSTEMS and CIRCLE as Members were actively involved in working groups and workshops, providing valuable insights into the development of 6G standards, architectures, and use cases.

The participation of project partners in 6G IA is instrumental in ensuring that the next generation of mobile communications meets the needs of European citizens and businesses. By working together, partners are helping to create a future where 6G technologies empower new industries and transform economies. In this frame the workshop "5G goes 6G: New Opportunities of Mobile Communication for Better City and Better Life" represented an opportunity to discuss about technical aspects and attractive use cases including user requirements for existing and future projects together with by presentations on 5G/6G enabled business opportunities for Smart Cities, CCAM and future Port Eco-Systems.

3.3.8 DTLF (Digital Transport and Logistics Forum)

The [Digital Transport and Logistics Forum](#), DTLF, is an expert group of the European Commission bringing together public and private stakeholders from various transport and logistics communities to support the European Commission in promoting the digital transformation of the transport and logistics sector.

DTLF was invited by the project to the second consultation Workshop with external stakeholders “[5G policies consultation workshop #2](#)” that was held in May 2023. The aim was to gather inputs for policy recommendations regarding the implementation of 5G core technology within the logistics sector. More specifically, to collect valuable insights that would bolster the integration of 5G technology in European hinterland networks and ports, while also promoting the use of AI to enhance efficiency in logistics.

3.3.9 5G AA (5G Automotive Association)

Future mobility and transportation services requires end-to-end solutions, and [5G AA](#) is a global, cross-industry organization comprising businesses from the automotive, technology, and telecommunications industries (ICT).

The cross fertilisation with 5G-LOGGINNOV is therefore relevant for the development and implementation of 5G-based solutions for the transportation and logistics industry, helping the acceleration of the adoption of 5G through the sharing of knowledge and expertise, and to collaborate on the development of cross-industry solutions.

Specifically, 5G AA took active part in the Collaborative Innovation Day organised by 5G-LOGGINNOV in October 2022 and in the workshop « 5G goes 6G: New Opportunities of Mobile Communication for Better City and Better Life » held on February 2023, with a presentation by 5GAA Exec. Committee member focused on 5G for Port Logistics. The events were the opportunity to learn about the project developments in Living Labs and to debate about 5G new market opportunities and actors, since both events had a specific session dedicated to this topic.

3.3.10 CCAM Partnership

The [Cooperative, Connected and Automated Mobility \(CCAM\) Partnership](#) aims to establish a user-centric and inclusive mobility system, enhancing road safety, reducing congestion, and minimizing environmental impact. It focuses on fostering collaborative research, testing, and demonstration initiatives to expedite the adoption of automated mobility solutions. Additionally, CCAM collaborates at the European level to eliminate obstacles and promote the smooth adoption of automation technologies and services, facilitating their efficient deployment.

5G-LOGGINNOV, in collaboration with CCAM, organized the second consultation workshop on policy recommendations for 5G core technologies in logistics; on Wednesday, May 31, 2023. The purpose of this workshop was to collect additional inputs on the policies that have been developed through the project and that could support the advancement in the adoption of 5G technologies in the logistics sector. The main outcomes include the development of policies to prioritize 5G network rollout in EU hinterland networks and port areas and the advancement of AI applications to enhance logistic supply chain efficiency. Additionally, a member of the partnership was interviewed to collect further inputs.

Furthermore the 5G-LOGGINNOV was active in March 2023 taking part to the [FAME-CCAM workshop](#) showcasing the project's lessons learnt, trials and ongoing demonstrations, with the aim of contributing to the coordination of CCAM R&I and testing activities in Europe, collaborating with other R&I projects in support of the Strategic Research and Innovation Agenda (SRIA) update of the CCAM Partnership and providing feedbacks on the Knowledge base and Taxonomy that are being developed as part of the European Framework for Testing.

3.3.11 ETSI (European Telecommunications Standards Institute)

[European Telecommunications Standards Institute \(ETSI\)](#) is a recognized authority in telecommunications standards, with a strong track record of working with industry and academia to develop standards that meet the needs of the telecommunications market with a global reach, with members from over 70 countries.

The interaction with 5G-LOGINNOV can help the project develop standards that are widely adopted by the telecommunications industry, raising at the same time awareness of the benefits of 5G technology for logistics.

In June 2023 a technical workshop in Brussels was organized by 5G LOGINNOV with the objective of evaluating potential technologies for future 6G networks in cities and port cities. It was the opportunity for experts to discuss innovative technologies that can contribute to the improvement of safety and well-being of VRUs, such as pedestrians and cyclists. The results aimed at supporting the ETSI Technical Committee on ITS WG in the efforts to establish cooperative Intelligent Transportation Systems (ITS) robust standards for enhancing the awareness and protection of Vulnerable Road Users (VRUs) on the roads.

3.3.12 Docks the Future Network of Excellence

Born as an outcome of the H2020 project "Docks the Future", the [Docks the Future Network of Excellence](#) is a voluntary cooperative network that brings together the most innovative ports, aiming to support the maritime community in achieving the UN 2030 Sustainable Development Goals (SDGs). This Network of Excellence aims to assist ports in developing innovative projects to reach their sustainability targets, leveraging funding opportunities offered by programs such as the ones promoted by the Green Deal. The network organizes monthly meetings for its members, featuring external presentations designed to showcase new business opportunities and industry trends to the NOE Ports. The 5G-LOGINNOV project was presented in several publications and meetings of the Docks the Future Network of Excellence.

Specifically, the Network of Excellence members gathering of December 13th was titled **5G enabled innovation for ports: 5G-LOGINNOV SMEs**, and featured the participation of the 5 winning start-ups and SMEs which excelled in the development of 5G-based solutions in the framework of activities carried out at the three Living Labs – LL:

- **auTonomous dRones for marITime OperatiONs (TRITON)** – [Hellenic Drones](#) - Speaker: Christos Skliros, Head of Engineering
- **Real timE drowSiness detectiON, AlerTing and rEporting (RESONATE)** – [Libra AI](#) -. Speaker: Yannis Kopsinis, Co-Founder and CEO.
- **5G-Loginnov-4-Amazon (5G4A)** – [eShuttle](#) - Speaker: Bastian Pschunder
- **TAXi-AD Data (TAADD)** – [uze! Mobility GmbH](#) - Speaker: Alexander Jablovski, CEO.
- **Intelligent Traffic Guidance System (ITGS)** – [Roads.AI](#) - Speaker: Tamir Epstein, RoadsAI CTO.

Furthermore, the NoE Members were constantly kept in the loop with news and updates from 5G-LOGINNOV project, specifically with social media post on the LinkedIn page and email campaigns covering the SMEs Open Call to boost new market opportunities and invitation to 5G LOGINNOV branded events (see D 5.3).

4 CONCLUSIONS

This deliverable has presented the results of the common action plan on clustering activities for the project, describing the needed activities and how the project consortium implemented them.

The document provided a detailed photograph of the collaborations, addressing matters such as, but not limited to, the integrated communication and dissemination strategy, social media and cross-promotion, scientific publications, policy papers, participation in events and technical webinars, interaction with European Technology Platforms, Associations, and related EU projects.

The clustering activities created a parallel opportunity for direct dissemination: by collecting a significant list of projects and initiatives, the best platforms and actions has been selected and analysed, further exploiting potential synergies as well as lessons learnt.

The 5G-LOGINNOV Consortium has then collected a big number of joint initiatives with sister's projects, aiming to cooperate and exchange ideas and experiences to enhance projects' impact. The participation of the project partners in EU teams/conferences/external events produced an enhancement from the imported knowledge and feedback passed in all project phases as a continuous 'review' process, paving the way also to new possible further collaborations.

The report described various activities undertaken by the consortium members to make relevant liaisons with RDI projects and well-established European-wide associations and trans-national initiatives (i.e., governmental and non-governmental organizations, research institutions, industry associations), deepening the series of concrete actions that result from these liaison initiatives (i.e., technical meetings, joint sessions and workshops, joint publications), and meeting the Milestone related to the successful completion of the 5G-LOGINNOV clustering strategy.

