SUCCESS-6G: EXTEND – DEVISE - VERIFY

WP1 Deliverable E4

Final Report

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Executive Summary

This document provides a comprehensive summary of the progress of tasks and activities in the coordinated SUCCESS-6G project (subprojects: EXTEND, DEVISE, VERIFY) from June 2024 until September 2025 (i.e., final reporting period). For each subproject, summary reports are organized per work package (WP) and associated consortium member. Besides reporting on the technical work, the Deliverable summarizes management-related aspects.

Table of Contents

List of Figures

List of Tables

1 Progress on technical work and achievements

This section provides a summary of the technical work performed by each partner in the corresponding Work Packages (WPs) of each subproject.

1.1 SUCCESS-6G-EXTEND: Summary and progress towards project objectives

1.1.1 WP2: Use cases, Requirements and Key Performance Indicators

	Partner	Progress
WP2: SUCCESS-6G-EXTEND	CTTC	CTTC has contributed to the refinement of the key performance indicators (KPIs) to be specifically measured in the proof-of-concepts of the two user stories in WP4 and WP5. This contribution involved identifying the most relevant metrics to accurately assess the performance of the SUCCESS-6G-EXTEND integrated solutions and the overall effectiveness in relation to the project objectives. By tailoring the KPIs to the specific technical and operational requirements of each user story, CTTC ensured that the evaluation framework provided meaningful insights into the feasibility and impact of the proposed SUCCESS-6G-EXTEND solutions.
	CELLNEX	CELLNEX has contributed to the refinement of the network KPIs to be specifically measured in the proof-of-concepts in WP4 (mainly related to the local cloud architecture and the network layer).
	IDNEO Technologies	Idneo has contributed to the refinement of the KPIs to be specifically measured in the proof-of-concepts in WP4 and WP5. The work has focused on the definition of KPIs related to the vehicular condition monitoring and FOTA software updates, as reported in Deliverable E11.
	Optare Solutions	Optare Solutions has contributed to the refinement of the KPIs to be specifically measured in the proof-of-concepts in WP4 (mainly related to the anomaly detection scenarios), as reported in Deliverable E11.
	Nearby Computing	Nearby Computing has contributed to the refinement of the KPIs to be specifically measured in the proof-of-concepts in WP4 (mainly related to the service migration assessment and the orchestration actions taken by NearbyOne, e.g., service migration delay). The additional KPIs were reported in Deliverable E11.

Table 1: WP2: SUCCESS-6G-EXTEND progress summary per partner.

1.1.2 WP3: Data-empowered Solutions for Robust V2X Connectivity

	Partner	Progress
WP3: SUCCESS-6G-EXTEND	CTTC	The problem of missing data in the vehicular measurement streams has been thoroughly studied. The mechanisms that causally induce occlusions have been identified. CTTC has further explored the ability of various imputation methods to fit the observed data at the aggregation point, and to impute missing values by extracting knowledge from the spatiotemporal synergy among the ambient vehicular measurement space. A rigorous assessment of various missing data configurations based on empirical evaluations has revealed meaningful performance trends for model fitting and recovery of incomplete information. All aforementioned progress has been reported in Deliverable E8, where

		CTTC has been the lead editor and contributor.
	Nearby Computing	Nearby Computing has designed and implemented a decision engine whose role is to subscribe to 5G core events, to process them, and if necessary, to inform NearbyOne to perform the migration actions. Subsequently, NearbyOne generates orchestration action requests and transmits them for execution on the underlying resource orchestration platforms, like Kubernetes, in which the applications will finally run. The progress has been reported in Deliverable E10.

Table 2: WP3: SUCCESS-6G-EXTEND progress summary per partner.

1.1.3 WP4: Real-time Supervision and Health Prediction for Vehicles

	Partner	Progress
WP4: SUCCESS-6G-EXTEND	CTTC	The CTTC monitoring software solution for automatic condition monitoring in on-board vehicular equipment was a key component of the data analytics in the proof-of-concept performed in WP4. Its integration with the rest of the SUCCESS-6G-EXTEND enablers was successfully performed with multiple tests executed to validate end-to-end system behavior, capturing performance metrics under varying mobility patterns, network loads, and environmental conditions. The progress and performance assessment of the condition monitoring service are reported in Deliverables E10 and E11, which describe the testing methodology followed at the two SUCCESS-6G testbeds (CELLNEX Mobility Lab and SUPERCOM platform), including details of the testbed configurations, tools, and metrics employed across different scenarios. The final list of the KPI values achieved is also reported.
	CELLNEX	CELLNEX has provided 5G connectivity services to test and grant interoperability between vehicles and the 5G-RAN. During the test performed in Castelloli, CELLNEX has provided the computing infrastructure to deploy the “local cloud” in the experimental facilities. CELLNEX collected the computational requirements requested by the applications to provide virtual resources for the critical ones. CELLNEX has properly configured the network infrastructure with a 5G Standalone mobile network utilizing the Raemis™ Druid software solution, a 3GPP-compliant 5G core with REST API and additional functionalities. The edge computing infrastructure comprised two servers, each associated with a radio node, hosting virtual machines for the dockerized services. All details are provided in Deliverables E10 and E11.
	IDNEO Technologies	Idneo has completed the connectivity tests and the transmission of information to the edge infrastructure with the aid of a properly configured vehicular on-board unit (OBU), which fuses aggregated information from the sensors. A SEAT Ateca R4 2.0 TDI vehicle was provided by Idneo for the Castelloli tests, and it was equipped with monitoring sensors, continuously transmitting operational status data via its C-V2X OBU to the edge monitoring infrastructure with the aid of two radio nodes providing connectivity. The vehicle’s trajectory involved multiple handovers between the radio nodes and their respective edge servers. All details are provided in Deliverables E10 and E11.
	Optare	Optare has contributed to the development of the condition monitoring service by introducing a Mediator microservice, which adapts the OBU

	Solutions	messages into the appropriate inference request format. Optare further managed the KServe inference service during the tests performed in Castelloli, enabling scalable and low-latency real-time inference directly from vehicle measurement streams. All details are provided in Deliverables E10 and E11.
	Nearby Computing	Nearby Computing has substantially contributed to the execution of the final tests in Castelloli, with NearbyOne providing lifecycle management functionalities to the vehicular condition monitoring service at the edge. In the case of handovers, the service orchestrator performs service migration across the available edge nodes based on events originating from the 5G core network. Based on the knowledge extracted and with the help of appropriate visualization tools, instructive and actionable insights can be derived, e.g., flag whether a fault has occurred and diagnose its type in event-detection operation. All details are provided in Deliverables E10 and E11.

Table 3: WP4: SUCCESS-6G-EXTEND progress summary per partner.

1.1.4 WP5: Seamless Connectivity for Vehicular Software Updates

	Partner	Progress
WP5: SUCCESS-6G-EXTEND	CTTC	CTTC has integrated advanced networking solutions such as Software-Defined Networking (SDN) and Multi-access Edge Computing (MEC) to optimize network performance and reduce latency. By leveraging real-time location-awareness, dynamic resource allocation, and AI-driven orchestration, the system ensures resilient update delivery even under varying network conditions. Performance assessment in the ADRENALINE testbed, as reported in Deliverable E14, showed significant improvements in update success rates, transmission reliability, and real-time network adaptation, demonstrating the potential of SUCCESS-6G-EXTEND in revolutionizing over-the-air (OTA) update methodologies for connected and autonomous vehicles.
	CELLNEX	For the proof-of-concept in use case 2, CELLNEX has provided the network infrastructure with a 5G Standalone mobile network utilizing the Raemis™ Druid software solution, a 3GPP-compliant 5G core with REST API and additional functionalities. The edge computing infrastructure comprised two servers, each associated with a radio node, hosting virtual machines for the dockerized services. Details are reported in Deliverable E14.
	IDNEO Technologies	For the proof-of-concept of OTA vehicular software updates at the Circuit Parcmotor Castellolí, all software, both server-side and on-board unit (OBU) software, has been migrated to their final locations: the Castellolí server and the IDNEO-developed OBU installed in the test vehicle. During the third round of tests, the focus was on evaluating network connectivity and performance in communications between the OBU and the Firmware Over-the-Air (FOTA) server. The assessment included analyzing persistent connections, reconnection processes, failure scenarios, download times, and network events that could potentially impact communication between the OBU application and the FOTA server. Additionally, the use case involving software updates from the management application was tested to ensure its functionality and reliability. All details are reported in Deliverable E14.

	Nearby Computing	Nearby Computing has provided an orchestration mechanism to automate the software updates of the orchestrated services, implementing dynamic upgrades with rollout and rollback strategies. This feature defines how to upgrade different versions of applications, minimizing the downtime and disruption of the service, while ensuring a smooth deployment process.

Table 4: WP5: SUCCESS-6G-EXTEND progress summary per partner.

1.2 SUCCESS-6G-DEVISE: Summary and progress towards project objectives

1.2.1 WP2: Use cases, Requirements and Key Performance Indicators

	Partner	Progress
WP2: SUCCESS-6G-DEVISE	CTTC	CTTC has contributed to the refinement of the KPIs to be specifically measured in the proof-of-concepts of the two user stories in WP4 and WP5. This contribution involved identifying the most relevant metrics to accurately assess the performance of the SUCCESS-6G-DEVISE integrated solutions and the overall effectiveness in relation to the project objectives. By tailoring the KPIs to the specific technical and operational requirements of each user story, CTTC ensured that the evaluation framework provided meaningful insights into the feasibility and impact of the proposed SUCCESS-6G-DEVISE solutions.
	CELLNEX	CELLNEX has contributed to the refinement of the network KPIs to be specifically measured in the proof-of-concepts in WP4 (mainly related to the local cloud architecture and the network layer).
	IDNEO Technologies	Idneo has contributed to the refinement of the KPIs to be specifically measured in the proof-of-concepts in WP4 and WP5. The work has focused on the definition of KPIs related to the vehicular condition monitoring and FOTA software updates, as reported in Deliverable E11.
	Optare Solutions	Optare Solutions has contributed to the refinement of the KPIs to be specifically measured in the proof-of-concepts in WP4 (mainly related to the anomaly detection scenarios), as reported in Deliverable E11.
	Nearby Computing	Nearby Computing has contributed to the refinement of the KPIs to be specifically measured in the proof-of-concepts in WP4 (mainly related to the service migration assessment and the orchestration actions taken by NearbyOne, e.g., service migration delay). The additional KPIs were reported in Deliverable E11.

Table 5: WP2: SUCCESS-6G-DEVISE progress summary per partner.

1.2.2 WP3: Detection, Identification and Mitigation of Malicious V2X Attacks

	Partner	Progress
WP3: SUCCESS-6G-DEVISE	CTTC	CTTC has devised the final set of security enablers specifically designed to support intelligent, context-aware security enforcement in Vehicle-to-Everything (V2X) systems. These enablers form a foundational layer for enhancing trust and resilience, encompassing attack detection methods and trust-aware knowledge exchange in decentralized V2X environments. By integrating intelligence and context awareness into

		the security decision-making process, the CTTC security enablers in the context of SUCCESS-6G-DEVISE, facilitate security enforcement by enhancing responsiveness to emerging threats. The progress has been reported in Deliverable E8, where CTTC has been the main contributor.
	Nearby Computing	Nearby Computing has designed and implemented a decision engine that serves as a coordinator, mapping resources and processing events without direct infrastructure management. Instead, it works alongside both the 5G Core Network and NearbyOne to enable coordinated operation across these separate management domains. The progress has been reported in Deliverable E10.

Table 6: WP3: SUCCESS-6G-DEVISE progress summary per partner.

1.2.3 WP4: Secure Message Exchange for Condition Monitoring of Vehicles

	Partner	Progress
WP4: SUCCESS-6G-DEVISE	CTTC	For the evaluation of secure and trustworthy vehicle condition monitoring, the SUPERCOM platform has been utilized to collect KPIs relevant to the proposed edge-based security framework. CTTC's pre-trained deep reinforcement learning (DRL)-based misbehavior detection model was part of the data analytics components in the proof-of-concept performed in WP4. The progress and performance assessment of attack detection are reported in Deliverables E10 and E11, which describe the testing methodology followed, including details of the testbed configurations, tools, and metrics employed across different scenarios. The final list of the security-related KPI values achieved is also reported.
	CELLNEX	CELLNEX has provided 5G connectivity services to test and grant interoperability between vehicles and the 5G-RAN. During the test performed in Castelloli, CELLNEX has provided the computing infrastructure to deploy the "local cloud" in the experimental facilities. CELLNEX collected the computational requirements requested by the applications to provide virtual resources for the critical ones. CELLNEX has properly configured the network infrastructure with a 5G Standalone mobile network utilizing the Raemis™ Druid software solution, a 3GPP-compliant 5G core with REST API and additional functionalities. The edge computing infrastructure comprised two servers, each associated with a radio node, hosting virtual machines for the dockerized services. All details are provided in Deliverables E10 and E11.
	IDNEO Technologies	Idneo has completed the connectivity tests and the transmission of information to the edge infrastructure with the aid of a properly configured vehicular on-board unit (OBU), which fuses aggregated information from the sensors. A SEAT Ateca R4 2.0 TDI vehicle was provided by Idneo for the Castelloli tests, and it was equipped with monitoring sensors, continuously transmitting operational status data via its C-V2X OBU to the edge monitoring infrastructure with the aid of two radio nodes providing connectivity. The vehicle's trajectory involved multiple handovers between the radio nodes and their respective edge servers. All details are provided in Deliverables E10 and E11.
	Optare	Optare has contributed to the development of the condition monitoring service by introducing a Mediator microservice, which adapts the OBU

	Solutions	messages into the appropriate inference request format. Optare further managed the KServe inference service during the tests performed in Castelloli, enabling scalable and low-latency real-time inference directly from vehicle measurement streams. All details are provided in Deliverables E10 and E11. Finally, Optare developed a hybrid deep learning framework with security attack detection capabilities whose details and performance assessment have been reported in Deliverable E8.
	Nearby Computing	Nearby Computing has substantially contributed to the execution of the final tests in Castelloli, with NearbyOne providing lifecycle management functionalities to the vehicular condition monitoring service at the edge. In the case of handovers, the service orchestrator performs service migration across the available edge nodes based on events originating from the 5G core network. Based on the knowledge extracted and with the help of appropriate visualization tools, instructive and actionable insights can be derived, e.g., flag whether a fault has occurred and diagnose its type in event-detection operation. All details are provided in Deliverables E10 and E11.

Table 7: WP4: SUCCESS-6G-DEVISE progress summary per partner.

1.2.4 WP5: Secure Service Development and Provisioning

	Partner	Progress
WP5: SUCCESS-6G-DEVISE	CTTC	CTTC has introduced a security-first approach by integrating Security as a Service (SECaaS), AI-enhanced threat detection, and blockchain-based integrity verification. These mechanisms ensure that software updates are authenticated, encrypted, and delivered securely, preventing unauthorized modifications and cyberattacks. Experimental results on the ADRENALINE testbed, as reported in Deliverable E14, demonstrate enhanced security enforcement, reduced threat detection times, and improved compliance with cybersecurity standards. The adoption of AI-driven security policies and network slicing for isolated update distribution solidifies SUCCESS-6G-DEVISE as a robust framework for secure vehicular software updates.
	CELLNEX	For the proof-of-concept in use case 2, CELLNEX has provided the network infrastructure with a 5G Standalone mobile network utilizing the Raemis™ Druid software solution, a 3GPP-compliant 5G core with REST API and additional functionalities. The edge computing infrastructure comprised two servers, each associated with a radio node, hosting virtual machines for the dockerized services. Details are reported in Deliverable E14.
	IDNEO Technologies	For the proof-of-concept of OTA vehicular software updates at the Circuit Parcmotor Castellolí, all software, both server-side and on-board unit (OBU) software, has been migrated to their final locations: the Castellolí server and the IDNEO-developed OBU installed in the test vehicle. During the third round of tests, the focus was on evaluating network connectivity and performance in communications between the OBU and the Firmware Over-the-Air (FOTA) server. The assessment included analyzing persistent connections, reconnection processes, failure scenarios, download times, and network events that could

		potentially impact communication between the OBU application and the FOTA server. Additionally, the use case involving software updates from the management application was tested to ensure its functionality and reliability. All details are reported in Deliverable E14.
	Nearby Computing	Nearby Computing has provided an orchestration mechanism to automate the software updates of the orchestrated services, implementing dynamic upgrades with rollout and rollback strategies. This feature defines how to upgrade different versions of applications, minimizing the downtime and disruption of the service, while ensuring a smooth deployment process.

Table 8: WP5: SUCCESS-6G-DEVISE progress summary per partner.

1.3 SUCCESS-6G-VERIFY: Summary and progress towards project objectives

1.3.1 WP2: Use cases, Requirements and Key Performance Indicators

	Partner	Progress
WP2: SUCCESS-6G-VERIFY	CTTC	CTTC has contributed to the refinement of the KPIs to be specifically measured in the proof-of-concepts of the two user stories in WP4 and WP5. This contribution involved identifying the most relevant metrics to accurately assess the performance of the SUCCESS-6G-VERIFY integrated solutions and the overall effectiveness in relation to the project objectives. By tailoring the KPIs to the specific technical and operational requirements of each user story, CTTC ensured that the evaluation framework provided meaningful insights into the feasibility and impact of the proposed SUCCESS-6G-VERIFY solutions.
	CELLNEX	CELLNEX has contributed to the refinement of the network KPIs to be specifically measured in the proof-of-concepts in WP4 (mainly related to the local cloud architecture and the network layer).
	IDNEO Technologies	Idneo has contributed to the refinement of the KPIs to be specifically measured in the proof-of-concepts in WP4 and WP5. The work has focused on the definition of KPIs related to the vehicular condition monitoring and FOTA software updates, as reported in Deliverable E11.
	Optare Solutions	Optare Solutions has contributed to the refinement of the KPIs to be specifically measured in the proof-of-concepts in WP4 (mainly related to the anomaly detection scenarios), as reported in Deliverable E11.
	Nearby Computing	Nearby Computing has contributed to the refinement of the KPIs to be specifically measured in the proof-of-concepts in WP4 (mainly related to the service migration assessment and the orchestration actions taken by NearbyOne, e.g., service migration delay). The additional KPIs were reported in Deliverable E11.

Table 9: WP2: SUCCESS-6G-VERIFY progress summary per partner.

1.3.2 WP3: Addressing V2X Channel Impairments with Over-the-air Computing

	Partner	Progress
WP3: SUCC ESS-	CTTC	CTTC has devised two advanced technological solutions to enhance

		computation efficiency in V2X systems: source-channel coding for resource-efficient wireless computation and coded computing for effective distributed computation under faulty conditions. For wireless computation, CTTC introduced over-the-air computation and compute-forward schemes, leveraging the superposition property of wireless channels for simultaneous transmission and computation of encoded signals. Practical challenges, such as synchronization, are addressed with lossy source coding, enabling the transmission of compressed measurements with reduced precision while still supporting accurate aggregation. In distributed coded computing, CTTC analyzed the trade-off between computation latency and communication/complexity overheads. The proposed multivariate polynomial coding schemes, supporting arbitrary matrix partitions, offer significant improvements over univariate polynomial codes, requiring lower upload communication overheads at the cost of increased computation complexity. Together, these contributions provide a comprehensive framework for efficient distributed computation in V2X systems, improving both scalability and performance in distributed environments. The progress has been reported in Deliverable E8, where CTTC has been the main contributor.
	Nearby Computing	Nearby Computing has completed the definition of the network-aware service migration flow in NearbyOne. In particular, the decision engine (DE) subscribes to 5G Core events and receives event notifications. Upon receiving an event, it checks which gNB the UE is connected to, using a Telco-Edge-Cloud Table that maps gNBs to Edge Nodes. If a handover occurs and the required Kserve service is not available at the new Edge Node, the DE triggers a migration request via its NBI client to the NBI server, which communicates with the Service Manager to perform the migration. Once complete, the Kserve service is successfully migrated to the new Edge Node. The progress has been reported in Deliverable E10, and the performance assessment in terms of service migration latency in Deliverable E11.

Table 10: WP3: SUCCESS-6G-VERIFY progress summary per partner.

1.3.3 WP4: Predictive Vehicle Diagnostics with Distributed Learning

	Partner	Progress
WP4: SUCCESS-6G- VERIFY	CTTC, Optare Solutions	CTTC, together with Optare, has focused on the development of decentralized learning methods, particularly federated learning (FL), for vehicle condition monitoring within an edge-based monitoring infrastructure. In Deliverable E9, CTTC and Optare have investigated the application of FL in a distributed system where multiple edge nodes, serving as clients, collaboratively train an autoencoder model without sharing raw data. The deployment of this system leverages Kubernetes, offering scalability, fault tolerance, and efficient resource management. The decentralized components ensuring the orchestration process of the vehicle condition monitoring service are also explained.
	CELLNEX	CELLNEX has provided 5G connectivity services to test and grant interoperability between vehicles and the 5G-RAN. During the test performed in Castelloli, CELLNEX has provided the computing infrastructure to deploy the “local cloud” in the experimental facilities.

		CELLNEX collected the computational requirements requested by the applications to provide virtual resources for the critical ones. CELLNEX has properly configured the network infrastructure with a 5G Standalone mobile network utilizing the Raemis™ Druid software solution, a 3GPP-compliant 5G core with REST API and additional functionalities. The edge computing infrastructure comprised two servers, each associated with a radio node, hosting virtual machines for the dockerized services. All details are provided in Deliverables E10 and E11.
	IDNEO Technologies	Idneo has completed the connectivity tests and the transmission of information to the edge infrastructure with the aid of a properly configured vehicular on-board unit (OBU), which fuses aggregated information from the sensors. A SEAT Ateca R4 2.0 TDI vehicle was provided by Idneo for the Castelloli tests, and it was equipped with monitoring sensors, continuously transmitting operational status data via its C-V2X OBU to the edge monitoring infrastructure with the aid of two radio nodes providing connectivity. The vehicle's trajectory involved multiple handovers between the radio nodes and their respective edge servers. All details are provided in Deliverables E10 and E11.
	Nearby Computing	Since the decentralized implementation of the vehicular condition monitoring service relies on the advanced capabilities of the service orchestrator, NearbyOne has been properly extended to manage the lifecycle of the vehicular condition monitoring service at the edge. It can observe vehicle mobility, initiating and performing service migrations accordingly. More specifically, during handovers, the NearbyOne orchestrator facilitates seamless service migration between available edge nodes, guided by event triggers from the 5G core network.

Table 11: WP4: SUCCESS-6G-VERIFY progress summary per partner.

1.3.4 WP5: Automated Software Updates for Vehicles

	Partner	Progress
WP5: SUCCESS-6G- VERIFY	CTTC	The computational overhead of over-the-air (OTA) software updates presents challenges in optimizing resource utilization and minimizing network congestion. CTTC has addressed these challenges by leveraging MEC-based workload distribution, AI-driven computation management, and predictive resource allocation. By intelligently offloading processing tasks to edge nodes and optimizing data caching strategies, the system significantly reduces update latency and improves overall network efficiency. Experimental validations in the ADRENALINE testbed, as reported in Deliverable E14, highlight improvements in processing time, bandwidth allocation efficiency, and energy consumption, demonstrating that the SUCCESS-6G-VERIFY framework is well-equipped to support scalable and computationally optimized OTA software update mechanisms in connected vehicle ecosystems.
	Cellnex	For the proof-of-concept in use case 2, CELLNEX has provided the network infrastructure with a 5G Standalone mobile network utilizing the Raemis™ Druid software solution, a 3GPP-compliant 5G core with REST API and additional functionalities. The edge computing

		infrastructure comprised two servers, each associated with a radio node, hosting virtual machines for the dockerized services. Details are reported in Deliverable E14.
	IDNEO Technologies	For the proof-of-concept of OTA vehicular software updates at the Circuit Parcmotor Castellolí, all software, both server-side and on-board unit (OBU) software, has been migrated to their final locations: the Castellolí server and the IDNEO-developed OBU installed in the test vehicle. During the third round of tests, the focus was on evaluating network connectivity and performance in communications between the OBU and the Firmware Over-the-Air (FOTA) server. The assessment included analyzing persistent connections, reconnection processes, failure scenarios, download times, and network events that could potentially impact communication between the OBU application and the FOTA server. Additionally, the use case involving software updates from the management application was tested to ensure its functionality and reliability. All details are reported in Deliverable E14.
	Nearby Computing	Nearby Computing has provided an orchestration mechanism to automate the software updates of the orchestrated services, implementing dynamic upgrades with rollout and rollback strategies. This feature defines how to upgrade different versions of applications, minimizing the downtime and disruption of the service, while ensuring a smooth deployment process.

Table 12: WP5: SUCCESS-6G-VERIFY progress summary per partner.

2 Progress on Dissemination, Standardization and Exploitation

2.1 Summary

During the reporting period, the following SUCCESS-6G-related papers have been accepted:

- F. Famá, R. Pereira, C. Kalalas, P. Dini, L. Qendro, F. Kawsar, M. Malekzadeh, ``Contrastive Self-Supervised Learning at the Edge: An Energy Perspective," in Proc. of 2025 IEEE Annual Congress on Artificial Intelligence of Things (AIoT '25), Osaka, Japan, December 2025.
- C. Kalalas, P. Mulinka, G. Candela Belmonte, M. Fornell, M. Dalgitsis, F. Paredes Vera, J. Santaella Sánchez, C. Vicente Villares, R. Sedar, E. Datsika, A. Antonopoulos, A. Fernández Ojea, M. Payaro, ``AI-Driven Vehicle Condition Monitoring with Cell-Aware Edge Service Migration," accepted in the 2025 8th International Balkan Conference on Communications and Networking (BalkanCom '25), Piraeus, Greece, June 2025
- G. Kibalya et al., "Joint UPF and Application Placement in Multi-Slice Edge Networks: A Reinforcement Learning Strategy," 2025 IEEE Wireless Communications and Networking Conference (WCNC), Milan, Italy, pp. 1-6, March 2025.
- D. Gutierrez-Rojas, C. Kalalas, I. Christou, G. Almeida, E. Eldeeb, S. Bakri, N. Marchetti, J. M. S. Sant'Ana, O. L. Alcaraz López, H. Alves, C. Papadias, M. Haroon Tariq, and P. Nardelli, "Detection and Classification of Anomalies in WSN-enabled Cyber-physical Systems," in IEEE Sensors Journal, vol. 25, no. 4, pp. 7193-7204, February 2025
- R. Sedar, C. Kalalas, P. Dini, F. Vazquez-Gallego, J. Alonso-Zarate, L. Alonso, "Knowledge Transfer for Collaborative Misbehavior Detection in Untrusted Vehicular Environments", IEEE Transactions on Vehicular Technology, vol. 74, no. 1, pp. 425-440, January 2025
- B. J. D. Gort, G. M. Kibalya, M. A. Serrano and A. Antonopoulos, "Forecasting Trends in Cloud-Edge Computing: Unleashing the Power of Attention Mechanisms," in IEEE Communications Magazine, vol. 63, no. 1, pp. 108-114, January 2025
- J. Gómez-Vilardebó, B. Hasırcıoğlu and D. Gündüz, "Generalized Multivariate Polynomial Codes for Distributed Matrix-Matrix Multiplication," 2024 IEEE Information Theory Workshop (ITW), Shenzhen, China, pp. 723-728, November 2024
- M. Dalgitsis, N. Cadenelli, M. A. Serrano, N. Bartzoudis, L. Alonso and A. Antonopoulos, "Cloud-Native Orchestration Framework for Network Slice Federation Across Administrative Domains in 5G/6G Mobile Networks," in IEEE Transactions on Vehicular Technology, vol. 73, no. 7, pp. 9306-9319, July 2024.

Besides the accepted journal and conference papers, several outreach activities have been performed by SUCCESS-6G partners. We provide the details in the following.

2.1.1 Mobile World Congress

Mobile World Congress 2025 welcomed 109.000 attendees from 205 countries and territories for a week of AI, innovation, and industry-defining debate. Over 56% of attendees represented industries adjacent to the core mobile ecosystem, which is the scope of the SUCCESS-6G project. The project has been presented by Cellnex Telecom and Nearby Computing in their booths.

For Cellnex, Mobile World Congress 2025 was a unique platform for showcasing innovations and engaging in pivotal discussions about the future of mobile technology. Over 600 visits have been registered in the Cellnex stand.

Figure 1: SUCCESS-6G project showcased at the Nearby Computing booth at MWC 2025

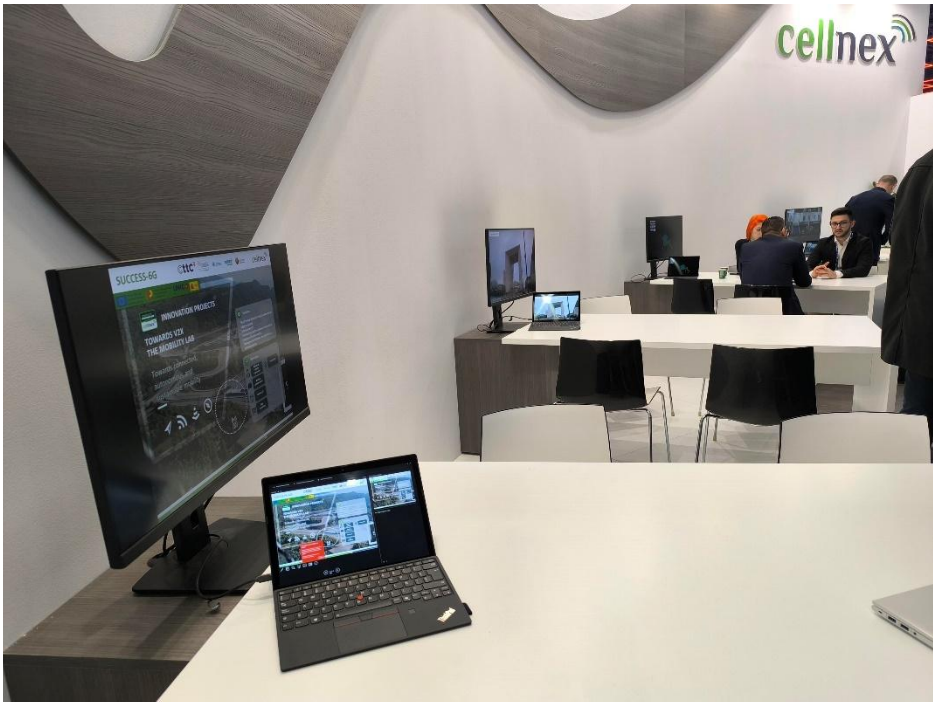

Figure 2: SUCCESS-6G project showcased at the Cellnex Telecom booth at MWC 2025

2.1.2 IEEE ICMLCN 2025

SUCCESS-6G project was also showcased in the booth of Nearby Computing during the IEEE International Conference on Machine Learning for Communication and Networking (IEEE ICMLCN), held between 26-29 May 2025, in Barcelona.


NearbyOne
Transforming
innovative ideas
to tangible benefits
unity-6G
VERGE
CloudSkin
ETHOR
CLOUD STARS
ELIXIRION
FREE6G
6GOASIS
ADV 5G TWN
AROMA
UNICO

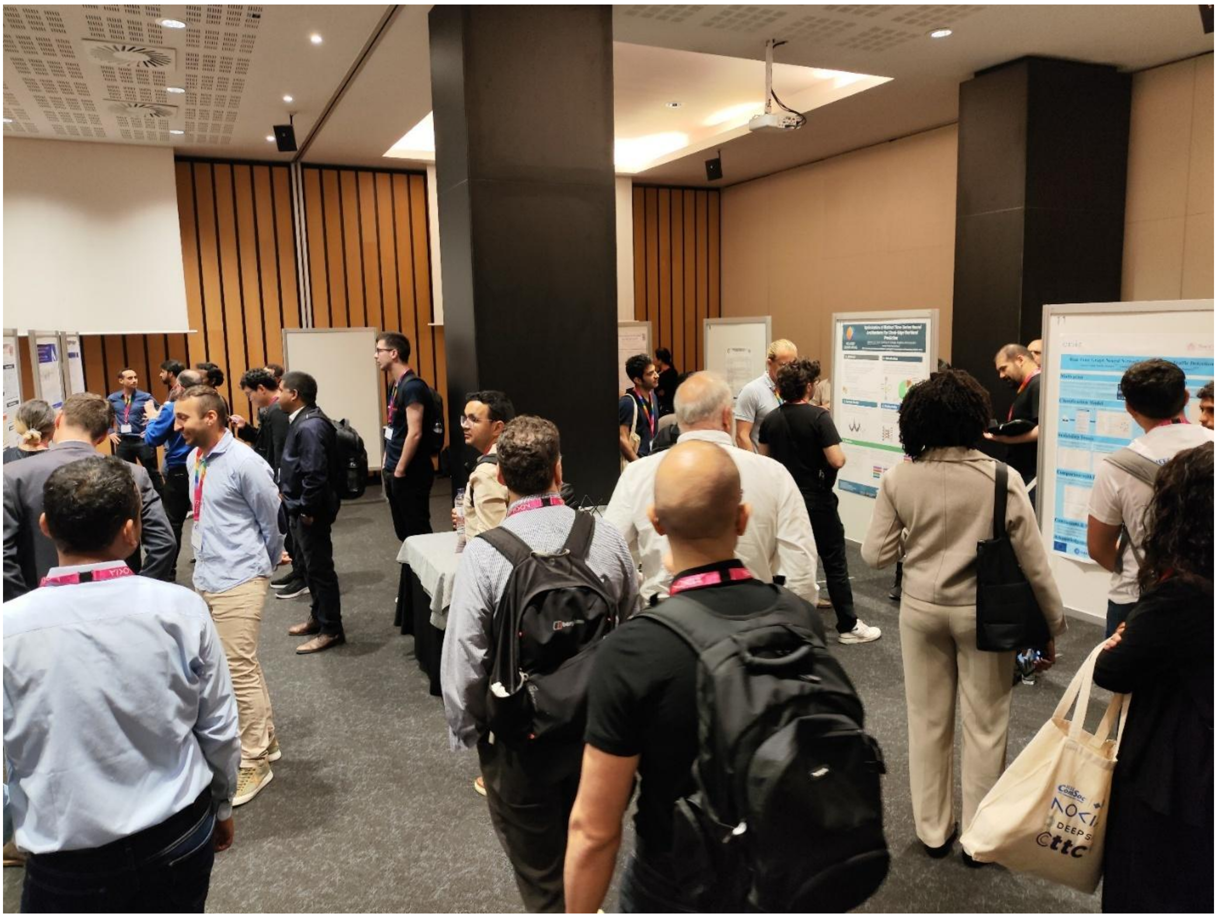

Figure 3: SUCCESS-6G project showcased at the Nearby Computing booth at ICMLCN 2025

3 Project management and administrative issues

3.1 Summary

In all three subprojects, Project Management (WP1) has taken care of the administrative tasks, quality assurance, management of risks, technical management of each subproject, and organization of technical activities. The smooth advancement of project activities and their overall coordination, ensuring participation from all project partners, contractual matters, and the provision of collaborative tools are examples of that.

Figure 4: SUCCESS-6G team members during the Castelloli trials

Regular plenary conference calls have been performed to exchange technical status updates and administrative news, facilitate coordination on deliverable contributions, discuss the technical activities, and also to identify any potential issue or risk materializing early. Ad-hoc meetings have also been scheduled by particular SUCCESS-6G teams to advance on enablers' integration tasks and solve technical issues and doubts.

4 Status of deliverables and milestones

4.1 Deliverables

The preparation of deliverables has been monitored, and quality checks have been performed. Details on their status are given in the table below.

Subproject	Deliverable No.	Deliverable Title	Lead Beneficiary	Planned due date	Submitted
EXTEND/DEVISE /VERIFY	E4	Final report	CTTC	30/09/2025	13/10/2025
EXTEND	E8	V2X radio interface enhancements	CTTC	31/03/2025	30/09/2025
	E10	Initial testing and preliminary validation of service KPIs	IDNEO	30/09/2024	14/03/2025
	E11	Final testing and validation of service KPIs	IDNEO	31/03/2025	30/04/2025
	E13	Initial testing and preliminary validation of service KPIs	CTTC	30/09/2024	18/02/2025
	E14	Final testing and validation of service KPIs	CTTC	31/03/2025	30/04/2025
	E16	Final report on dissemination, standardization, and exploitation activities	Cellnex	31/03/2025	30/09/2025
DEVISE	E8	Enablers for intelligent security enforcement in V2X systems	CTTC	31/03/2025	31/03/2025
	E10	Initial testing and preliminary validation of service KPIs	IDNEO	30/09/2024	14/03/2025
	E11	Final testing and validation of service KPIs	IDNEO	31/03/2025	30/04/2025
	E13	Initial testing and preliminary validation of service KPIs	CTTC	30/09/2024	18/02/2025
	E14	Final testing and	CTTC	31/03/2025	30/04/2025

		validation of service KPIs			
	E16	Final report on dissemination, standardization, and exploitation activities	Cellnex	31/03/2025	30/09/2025
VERIFY	E8	Joint source-channel coding for efficient computation in V2X systems	CTTC	31/03/2025	31/03/2025
	E9	Decentralized methods for predictive diagnosis of vehicle condition	CTTC	31/07/2024	17/03/2025
	E10	Initial testing and preliminary validation of service KPIs	IDNEO	30/09/2024	14/03/2025
	E11	Final testing and validation of service KPIs	IDNEO	31/03/2025	30/04/2025
	E13	Initial testing and preliminary validation of service KPIs	CTTC	30/09/2024	18/02/2025
	E14	Final testing and validation of service KPIs	CTTC	31/03/2025	30/04/2025
	E16	Final report on dissemination, standardization, and exploitation activities	Cellnex	31/03/2025	30/09/2025

Table 13: Deliverable status - due in the reporting period

4.2 Milestones

The table below provides an overview of the status of milestones during the reporting period.

Subproject	Milestone No.	Milestone Title	Lead Beneficiary	Planned due date	Achieved
EXTEND	H5	Enhancements in the V2X radio interface	CTTC	31/08/2024	30/09/2025
	H7	Proof-of-concept	Optare	31/07/2024	18/02/2025

		description for seamless updates of vehicular software			
	H8	Preliminary validation of KPIs	IDNEO	30/09/2024	14/03/2025
	H9	Final testing and validation	IDNEO	31/03/2025	30/04/2025
	H11	End of the project	CTTC	30/09/2025	30/09/2025
DEVISE	H5	Secure service provisioning methods in untrusted V2X environments	CTTC	31/08/2024	31/03/2025
	H7	Proof-of-concept description for seamless updates of vehicular software	Optare	31/07/2024	18/02/2025
	H8	Preliminary validation of KPIs	IDNEO	30/09/2024	14/03/2025
	H9	Final testing and validation	IDNEO	31/03/2025	30/04/2025
	H11	End of the project	CTTC	30/09/2025	30/09/2025
VERIFY	H5	Over-the-air computing to mitigate V2X channel impairments	CTTC	31/08/2024	31/03/2025
	H7	Proof-of-concept description for seamless updates of vehicular software	Optare	31/07/2024	18/02/2025
	H8	Preliminary validation of KPIs	IDNEO	30/09/2024	14/03/2025
	H9	Final testing and validation	IDNEO	31/03/2025	30/04/2025
	H11	End of the project	CTTC	30/09/2025	30/09/2025

Table 14: Milestone achievement - due in the reporting period