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**6G**SNS



**TrialsNet: TRials supported by Smart Networks beyond 5G**

## **Six Months Digest #5**

### **June 2025**

[www.trialsnet.eu](http://www.trialsnet.eu)

## TRIALSNET OPENCALL

Through its [Open Call](#), TrialsNet selected 24 Use Cases related to the project topics, in addition to the core ones, to participate in its large-scale trial activities, to diversify and enrich its trial portfolio, within the core verticals, i.e., Infrastructure, Transportation, Security & Safety, eHealth and Emergency, Culture, Tourism, and Entertainment. The selected subprojects received a total funding of 5.521.107,25€.



Figure 1. TrialsNet partners, together with the team members of the Open Call selected Subproject, in the Turin plenary meeting, to kick off the subprojects.

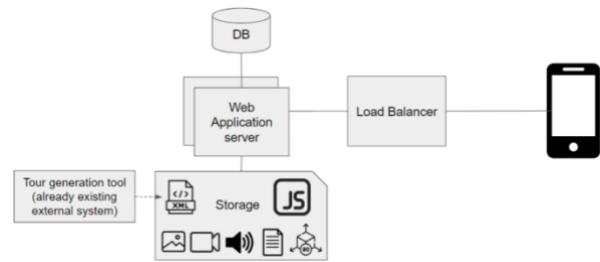
The selected third parties are mostly split between single applicants and consortia, while the vast majority of them are SMEs, being the rest of them academia, large companies, and research centers. Subproject developed their trials in 12 different sites across Europe, including the core sites (Pisa, Turin, Madrid, Athens, Iasi and Antwerp), but also new sites, i.e., Barcelona, Bucharest, Israel, and Istanbul. Each subproject developed and integrated its use case over 12 months, from May 2024 to April 2025.

All the subprojects concluded successfully their development, integration and trial activities. The remaining of this newsletter presents the different use cases, in alphabetical order, and their main characteristics, results, innovations, and trial activities.

# 1 - 5G AUGMENTED REALITY TOUR FOR THE UNESCO SITE “HISTORICAL CENTER OF NAPLES”

## OVERVIEW

The proposed use case is related to the conceptualization, the development and the trial of the tour for the UNESCO historic center of Naples using Augmented Reality (AR). Tourists will be able to access the tour directly from their mobile devices by scanning a QR Code and connecting to a WEB APP.



## INNOVATION

The sub-project introduces a scalable, data-driven model for mobile-based cultural engagement using AR and 5G connectivity. The innovation lies in combining real-time geolocated storytelling with high-performance streaming, accessible through a frictionless QR Code + Web App interface — no app installation required.

## TRIAL

The trial aimed to analyze the relationship between mobile network performance and perceived quality of the user experience, during an interactive tour based on augmented reality storytelling. Over the course of 73 test days across 11 different locations, 1,523 users were involved.

The trial was executed using AWS to host the application and contents, and the commercial network for the deployment of the experience.

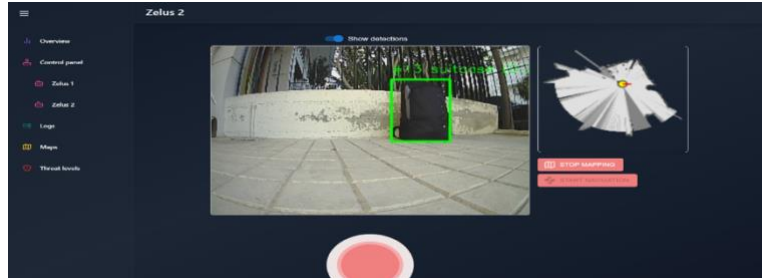
## RESULTS

The data collected during the trial reveals a strong correlation between data transmission speed, app responsiveness, and the users’ overall evaluation of content. Critical thresholds such as 25 Mb/s and 2 seconds of latency emerged as key benchmarks: below these values, the user experience was consistently rated poorly. Conversely, speeds above 50 Mb/s ensured fluidity, immersion, and highly positive perception. The findings suggest that, within the context of interactive tourism and outdoor AR-based experiences, 5G is not merely a technical upgrade, but a strategic enabler for delivering seamless, scalable mobile-based solutions.

## 2 - 5G-ENABLED SECURE SURVEILLANCE SYSTEM (5GS3)

### OVERVIEW

5GS3 is a 5G-enabled security solution designed to enhance surveillance operations in airport environments. The project leverages autonomous robots equipped with AI-based video analytics, IoT sensors, and experimental 5G/B5G infrastructure to detect and respond to potential safety threats in real-time. The system supports collaborative decision-making between the robots and airport personnel, aiming to improve situational awareness and reduce operational burden.



### INNOVATION

Innovation was introduced across three dimensions: 1) Integration of 5G/B5G with autonomous robotics; 2) Advanced collaborative patrolling; 3) Use of AI and sensors for real-time analysis. The system successfully integrated AI, robotics, and 5G during the trial activity.

Two trials have been conducted:

### TRIAL

- One at Patra, Greece, at the premises of the 5GS3 partner responsible for 5G infrastructure,
- And another in Athens, Greece, at the Athens International Airport (AIA) premises, with the participation of technical staff from the consortium and representatives of the airport's security team.

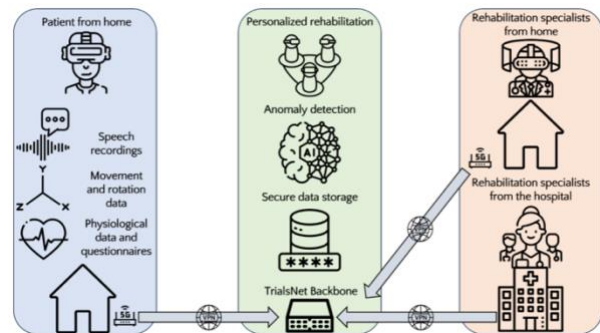
The trial included a robot instructed to autonomously patrol a designated zone, including automated intruder detection and threat classification, implemented using AI-based object detection (YOLOv8n).

### RESULTS

The 5GS3 project has successfully developed and validated the core components of its secure surveillance system (5GS3 smart IoT robots, 5G/B5G core management, 5G core network). The 5GS3 surveillance system demonstrated services are a) robot to robot collaboration, b) mapping and autonomous waypoint navigation, c) live real time monitoring, and d) object detection and data augmentation for Ai-assisted video analytics. The work lays the foundation for future integration into operational airport environments, with upcoming efforts focused on multi-robot coordination and enhanced AI-based threat detection leading to higher security enhancements and expert satisfaction.



This project aims to demonstrate a 5G-enabled VR platform for post-operative tele-rehabilitation. Patients use a VR headset connected via a 5G router, while clinicians join remotely. The focus is on post-rotator cuff (RC) surgery rehabilitation, with VR exercises tailored to recovery phases, though the system is adaptable to other rehabilitation types.



One of the main objectives of the project was to drive innovation in the healthcare sector by addressing the shared need of patients and clinicians to make rehabilitation more accessible. Our final assessment is that VR holds strong potential as a tool for delivering effective rehabilitation. However, further improvements are needed to enhance both the user experience and technical reliability. The three most innovative points of the project have been: (i) the design of a model for personalized virtual rehabilitation, (ii) a method for real time anomaly detection specifically designed for the rehabilitation application, and (iii) a study of the impact of 5G public network impairments on the effectiveness of a health-related application.

Twenty patients undergoing arthroscopic rotator cuff repair were enrolled in the study, conducted at the Laboratory of Motion Analysis, FPUCBM. For the trial execution, connectivity was provided by commercial 5G NSA service in Rome, Italy. The architecture includes: (1) a STUN/TURN server for audio-video streaming, (2) AI processing devices, and (3) mobile users (patients and clinicians). 5G CPEs act as gateways; VR headsets worn by the patients connect via WiFi to the CPEs.

At the end of each rehabilitation session, patients completed questionnaires assessing Quality of Life (QoL)—focused on perceived usability, comfort, and acceptability of the VR-based rehabilitation procedure—and Quality of Experience (QoE)—focused on the technical performance of multimedia communication. Throughout the trial, network statistics from the WebRTC communication channel between clinicians and patients in the VR environment were continuously monitored. Collected metrics included packet loss rate, jitter, round-trip time (RTT), and available/used bandwidth. The results provide a foundation for understanding user needs and the network demands of VR tele-rehabilitation, which stands to benefit significantly from the ultra-reliable, low-latency communications enabled by B5G technologies.

## 4 - 6GVISION

### OVERVIEW

The 6GVision sub-project enhances TrialsNet use cases by integrating advanced Open RAN mmWave (3GPP FR2) capabilities and updating the existing OAI-based 3GPP FR1 gNB testbed for the 5GOpen indoor environment at imec. It also develops and evaluates in realistic indoor scenarios a vision-aided mmWave gNB with LOS blockage prediction and preventive beam switching.



### INNOVATION

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### TRIAL

Two trials were run at the imec testbed, in Antwerp, where the newly developed features and the control and monitoring interface OAIBOX Dashboard were evaluated by the trial users.

The trials involved various indoor scenarios and 5G FR2 network configurations and was structured into three main components: (i) Evaluation of 5G FR2 indoor coverage, (ii) Assessment of 5G FR2 coverage extension using mmWave reflectors, and (iii) Analysis of LOS blockage effects in FR2 and validation of the vision-aided gNB FR2 gNB.

### RESULTS

The Vision Aided Open RAN mmWave OAIBOX was introduced as a new product within the OAIBOX line, incorporating vision sensing capabilities for 5G Advanced mmWave communication. Several contributions were made to the OpenAirInterface (OAI) to enable FR2 operation, and trials were subsequently performed at the imec testbed to validate these developments in realistic indoor scenarios. The vision-aided Open RAN mmWave OAIBOX integrates Line-of-Sight (LOS) blockage prediction and preventive beam switching and also features 5G mmWave coverage extension when paired with mmWave reflectors to enhance connectivity.

## 5 - ADAPTOFLOW

### OVERVIEW

The AdaptoFlow project delivered a framework, offered as an open-source Python package, designed to support EdgeAI applications deployed in geo-distributed environments that use a Deep Learning (DL) model serving pipeline for video stream analytics. Extending DL model serving with AdaptoFlow introduces autonomous adaptation of the runtime inference process to reduce network traffic, application latency, and energy consumption, while still maintaining stringent QoS requirements within acceptable bounds defined by Service Operators. This is accomplished by introducing two new algorithmic mechanisms, namely Adaptive Stream Inference and Energy-aware Model Swapping. These mechanisms seamlessly monitor, at runtime, both the evolution of the video stream analytics and the availability of the underlying edge server's computational resources to adjust the intensity of the video stream inference process.



### INNOVATION

Energy-aware model swapping is an innovation that can be packaged to work with different EdgeAI solutions to lower latency and energy footprint while maintaining QoS guarantees. Feedback provided by the UC operators mention that ASI, in particular, exhibits a low learning curve and can be easily integrated to an EdgeAI service within minutes and no prior work required to prepare anything.

### TRIAL

Three different experiments were conducted. The first benchmarked the baseline UC vs the UC integrating the AdaptoFlow ASI optimization. The second benchmarked the baseline vs the UC integrating the AdaptoFlow EMS optimization. The third, again, benchmarked the UC vs AdaptoFlow optimizations but the purpose of the experiment was to examine the scalability of the testbed's DL model serving pipeline and the 5G network when adding multiple camera feeds. The result was a field trial executing 11 full experimental sessions, totaling 14+ hours of experimentation.

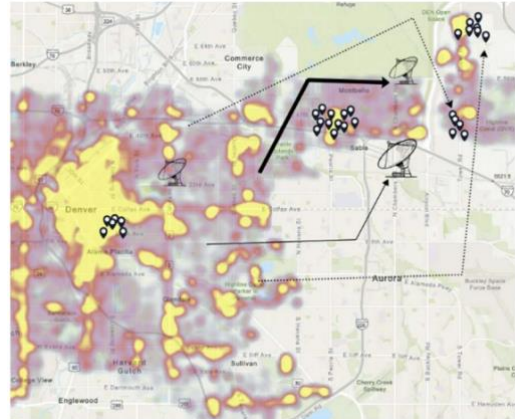
### RESULTS

Field trials showed a 78% reduction in data volume, 73% lower latency, 88% reduced GPU utilization, and improved scalability, enabling stable processing of up to eight video streams. KPIs and KVIs were successfully validated, demonstrating significant efficiency gains for smart city applications. The project's results were shared through scientific publications, demonstrations, and open-source software release, ensuring lasting impact.

## 6 - AI-PREMSET-MCX (AI/ML-BASED PREVENTIVE AND REACTIVE EMERGENCY HANDLING)

### OVERVIEW

AI-PREMSET-MCX aims to enhance 3GPP-compliant Mission Critical Services (MCX) over 5G by applying AI/ML techniques to support both preventive and reactive emergency response strategies. The project develops dynamic optimization mechanisms for MCX across the 5G RAN and Core, leveraging data sources such as crime hotspot heatmaps, gNodeB locations, first responder movement predictions, and traffic demand simulations. By integrating these inputs into control loops powered by AI/ML, AI-PREMSET-MCX supports more efficient, adaptive, and context-aware mission-critical communications for public safety, with real-world testing focused at the Romanian TrialsNet site.



### INNOVATION

The introduction of AI/ML mechanisms in Mission Critical Communications solutions drives the current effort of standards organizations and other providers towards more efficient and resilient ecosystems. This project introduces innovative mechanisms to deploy and operate adaptive services over dynamic environments and networks, ensuring their quality of service, vital for first responders and Public Safety, among many other critical services.

### TRIAL

During the trial execution, we tested group communications using MCPTT, including the use of supergroups (group regrouping) to coordinate communication across all participants. The system was deployed over a hybrid network infrastructure from Orange 5G Lab, in Stefan cel Mare Pedestrian Alley: a 5G SA private network and a 5G NSA commercial network (using 4G radio interface). The trial gathered data related to MCX performance, user location and system resources, and used it to assess system behavior in both coverage and resource-constrained situations.

### RESULTS

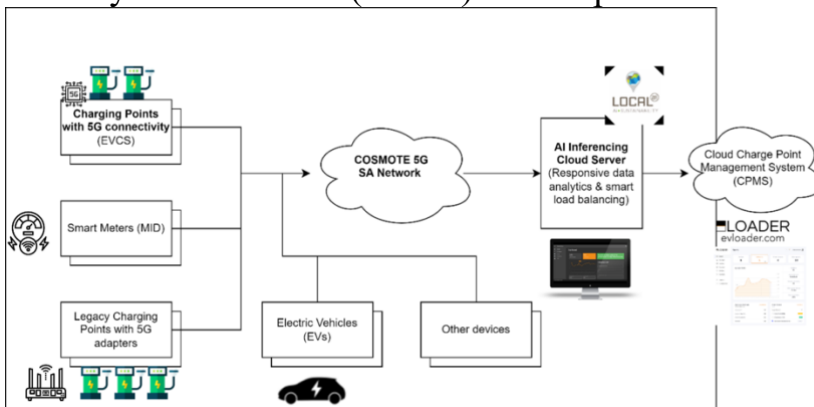
The AI-PREMSET-MCX project has advanced the optimization of Mission Critical Services (MCX) over 5G by integrating AI/ML techniques into both preventive and reactive emergency management strategies. Its innovation, grounded in open 3GPP-compliant architectures, offers a scalable, interoperable, and AI-enhanced framework poised to influence future deployments across public protection and disaster relief domains.



## 7 - AI4RTC (AI APPLICATIONS FOR REAL-TIME CHARGING LOAD MANAGEMENT)

### OVERVIEW

The AI4RTC project addresses the challenges of electric vehicle (EV) charging load management by integrating 5G Standalone (5G-SA) connectivity with AI-driven forecasting and decision-making tools. By enabling ultra-low-latency communications between EV charging stations and load management systems, the project ensures real-time responsiveness and avoids power grid overloads. The Charging Network Analytics Platform (CNAP) developed within the project leverages AI algorithms to predict energy demand and automatically adjust charging profiles, enhancing both performance and reliability.



### INNOVATION

This project introduced an AI timeseries forecasting for power levels in Charging Stations based on traditional ML and AI models. A new Deep Learning model that uses Transformers and TCN Layers to achieve higher levels of accuracy in the specific domain.

At the same time, 5G-SA connectivity was proven to be the technology of choice for the connectivity of Charging Stations, which were previously connected using WiFi and 3G.

### TRIAL

The AI4RTC trial was conducted across five EV charging station sites located in Athens, Greece. A total of 10 EV charging outlets were upgraded and monitored during the project. The pilot served approximately 200 unique end users, including hotel guests, fleet drivers, corporate employees, and public facility visitors. End users engaged naturally with the charging infrastructure during normal activities, without additional recruitment.

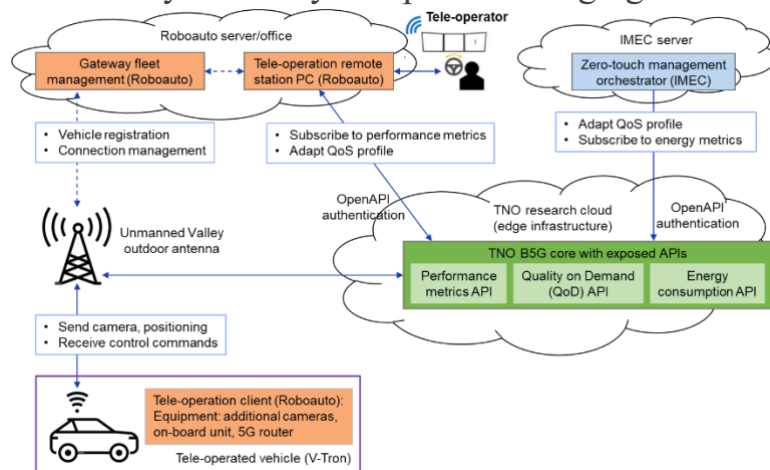
### RESULTS

AI4RTC has demonstrated a significant reduction in communication latency—down to 13–25 ms—across pilot sites by upgrading EV charging infrastructure with 5G-SA connectivity. This has enabled real-time command execution and improved energy distribution efficiency. The system showed zero load management failures in over 500 test runs, indicating high trustworthiness and system stability, while setting the groundwork for smarter, greener urban mobility ecosystems.

## 8 - AUTOMATED TELE-OPERATED SUSTAINABLE (ATOS) DRIVING

### OVERVIEW

The Automated Tele-operated Sustainable (ATOS) Driving project focuses on enabling safe and efficient vehicle teleoperation by leveraging Beyond 5G (B5G) network capabilities. It integrates teleoperation services with advanced orchestration and open APIs to dynamically adapt to changing network conditions in real-time. Through trials conducted at the DoIoT Fieldlab in the Netherlands, ATOS aims to validate reliable, low-latency communication and sustainable mobility solutions aligned with future 6G architectures.



### INNOVATION

Smarter, safer, and more sustainable transportation enabled by real-time teleoperation with programmable 5G/B5G infrastructures, with integrated energy-efficiency orchestration and dynamic service optimization through open APIs.

### TRIAL

The trial activity for the ATOS Driving project was conducted at the DoIoT Field Lab in the Unmanned Valley, Netherlands. The trial involved a DAF XF truck equipped with teleoperation hardware and a 5G network infrastructure. The trial was carried out in three phases over three separate weeks: (i) integration of the various systems and testing their individual functionalities, (ii) data collection and scenario testing, and (iii) extensive testing to enhance the robustness of the trial. The remote station was located both at Roboauto's office in the Czech Republic and at the test site itself. The trial involved multiple testing sessions, with approximately 25 hours of data recorded, averaging 104 gigabits of data per hour.

### RESULTS

ATOS demonstrates the technical feasibility of B5G-enabled teleoperation through successful lab and field integration tests, meeting key latency and throughput targets. The project contributes to TrialsNet's innovation goals by introducing API-driven orchestration, energy-efficient service deployment, and showcasing teleoperation as a scalable, value-driven mobility solution.

## 9 - BEYOND 5G FOOTBALL STADIUM

### OVERVIEW

The B5GFS project intends to make available to the TrialsNet consortium team and the SNS community critical real time data sets related to the Stadium B5G network including Key Performance Indicators (KPIs) and Key Value Indicators (KVI) interrelated to large scale sports events (11,000 spectators) during the Israeli premier football league matches.



### INNOVATION

The project enables to measure the UE location in the Stadium during football match events with unprecedented accuracy results (better than 5cm location accuracy in different scenarios) and in addition the project provided several real time mass data sets to TrialsNet team of 27 different network parameters recorded during a football match in the stadium.

### TRIAL

The trial was performed in Petach-Tikva town in Israel. Thousands of spectators were present in the stadium and an average of a thousand of them were using 5G phones with SIM cards from the Cellcom Tier-1 operator and connected simultaneously to the installed RunEL B5G Private Network. The main activity included the addition of supplementary RUs and a Location server to perform measurements of the position of various specific phones in the stadium in several situations (steady and moving). In addition, a survey was performed by distributing a questionnaire to more than 100 spectators that have the stadium Stadicom Application installed in their phones to measure the value of the B5G Network and the Services provided to them by the Application. 26 questionnaires were returned to RunEL and were used to analyse the selected KVIs.

### RESULTS

In Phase-1 of the project, large data set of 32 real time parameters was recorded during a football match event with a large number of subscribers, and the data set was uploaded to the Trialsnet Data Lake for further analysis and training of AI modules using real time data from a large-scale entertainment event. In Phase-2 of the project, a novel algorithm to measure the location of 5G user equipment (UE) was tested in the football stadium. The test results show an outstanding cm level accuracy of locating the UE in the stadium which represent a two order of magnitude improvement compared to the current state of the art (a few meters)

## 10 - CITIES WITHOUT BARRIERS

### OVERVIEW

The project aims to improve urban accessibility in Turin for individuals with disabilities by leveraging 5G, AI, and data-driven mapping technologies. It uses RGB cameras and smartphones to collect data on architectural barriers and urban infrastructure, processes it using AI for semantic analysis, and publishes the results for public and scientific use. The goal is to enhance mobility, safety, and inclusion through real-time accessible navigation systems and open data platforms.



### INNOVATION

Leverage modern communication technologies and data processing methodologies to create an inclusive urban environment that fosters mobility and safety for disabled individuals. Technology is growing in a way that new solutions including GenAI can apply to the use case in the future

### TRIAL

The trial involved releasing two applications in phases: a “mapping” phase focused on data collection by operators in Turin, aiming to cover at least 500km of pedestrian pathways, and a “navigation” phase for end-users. The large-scale trial spanned 10 months, with the mapping phase emphasizing territory coverage (achieving 514.9 km of data gathered) and the navigation phase focusing on end-user engagement.

The trial began with an initial setup involving internal operators and experts, focused on evaluating application capabilities and data transfer between mapping devices (smartphones and custom edge devices) and the cloud infrastructure, using Turin’s 5G network. Subsequently, a data gathering phase involved deploying mapping devices to collect RGB imagery and 3D spatial data, with initial processing on the edge devices before transmission to the cloud for further analysis.

### RESULTS

Social: Mapping of 500 km of urban routes to document accessibility, publication of an app supporting real-time navigation for reduced mobility users, and strong focus on citizen science and inclusive data sharing.

Technological: Development of AI-driven semantic analysis of video data and integration with GIS platforms (ESRI, QGIS).

User Engagement: At least 80 user feedback questionnaires collected from volunteers and app users.

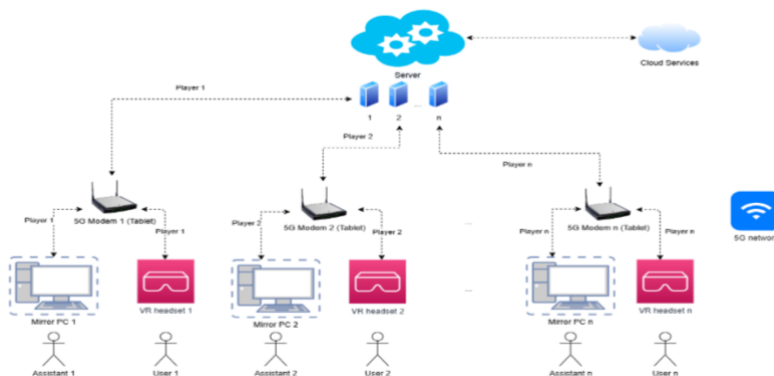
Policy alignment: Contributes to implementing the European Accessibility Act (Directive 2019/882) and smart inclusive urban mobility strategies.



## 11 - CITY4ALL

### OVERVIEW

CITY4ALL develops an immersive virtual reality (VR) experience to raise awareness among students and the general public about the daily challenges faced by individuals with disabilities. The VR game simulates scenarios involving visual, hearing, and mobility impairments, allowing users to experience and better understand the barriers faced in urban environments. Designed for deployment in schools, the game integrates AI tools and cloud-based services over 5G connectivity to deliver interactive, educational content tailored to promote inclusivity and social awareness.



### INNOVATION

The project is inherently innovative because of its use of cutting-edge technologies. In particular, cloud rendering is a technology that is thought to revolutionize the XR sector by allowing users to wear lightweight glasses and offload all the computational burden onto the cloud. The trial confirmed the very high disruptive potential of XR cloud rendering but also highlighted how it needs a proper infrastructure to work. The currently available commercial 5G infrastructure does not always guarantee the expected performances in terms of bandwidth and latency for applications combining VR and AI technologies requiring cloud rendering services for high-quality gaming.

### TRIAL

Two experimental trials were conducted in distinct educational settings. A total of 110 students and 7 teachers have been involved as users. Both trials followed a common structure, consisting of welcome moments, testimonials of people with disabilities, an immersive experience in VR, and reflection and feedback activities. The activities were adapted to the target audience, including also inclusive design workshop. In both cases, the initiative fostered emotional engagement and awareness of accessibility and inclusion issues.

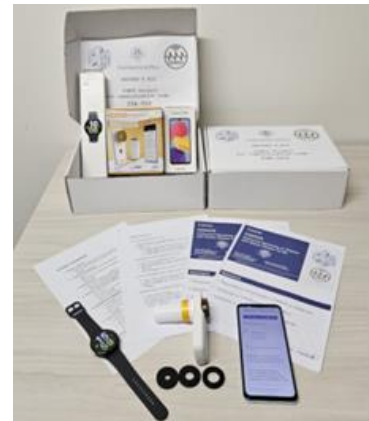
### RESULTS

CITY4ALL has demonstrated the feasibility of using VR and 5G networks to deliver impactful educational experiences on inclusivity and disability awareness. Despite challenges with 5G NSA performance, successful integration and field testing have validated the system's usability and educational value. Engaging over 80 students in schools in Turin, the project collects user feedback to refine game design and ensure a high level of acceptability, edutainment, and accessibility, contributing to broader societal impact and potential replication in educational and public outreach settings.

## 12 - COMO5 (CONTINUOUS MONITORING OF PATIENTS WITH CHRONIC DISEASE VIA 5G)

### OVERVIEW

COMO5 considers patients affected by chronic diseases, specifically patients affected by chronic obstructive pulmonary disease (COPD). Patients' conditions are monitored continuously via a kit of unintrusive devices. Such devices are connected to the internet via a 5G connection, which is exploited on one side for real-time data transmission, on the other, to allow patients for live interaction with healthcare professionals, whenever it is required by their conditions. Data collected from each patient is transmitted to a data collection platform that stores and analyses the data to automatically assess the evolution of the disease. The platform offers a web interface for healthcare providers that can be used to monitor the data received and the results of the data analysis. Two different modes of operations are defined: stable and deteriorating. Patients in stable conditions have a stable outlook and the disease currently under control, instead, patients with deteriorating conditions are worsening and that requires a fine-grained collection of data, supported by the 5G network via dynamic reconfiguration, and, if requested by the patient or by the clinician, a live consultation to assess the overall condition remotely.



### INNOVATION

An innovative system that exploits unintrusive personal devices to implement fine-grained monitoring of chronic patients. This comprises a pair of smartphone and smartwatch applications with a cloud service that can be developed as a product. The system could be offered as a product or as a service also for research projects.

This last point has been added considering the feedback obtained from experts in the field of trials in the medical area that highlighted how the market lacks tool for data collection and patient monitoring specifically designed for research projects.

### TRIAL

Trials have been executed at the CNR Pisa site where the healthy volunteers acting as patients operated the platform. In total 18 healthy volunteers with heterogeneous background and age have been involved.

### RESULTS

The project validated an implementation for a remote patient monitoring and assessed such novel approach and its potential value from the point of view of patients and clinicians.

## 13 - CONNECTED RAILS

### OVERVIEW

The project relied on the installation of a tram (1013 in the Florence tramway system) of equipment (HW and SW) to achieve the following objectives: (i) Evaluate the performances of commercial best effort 5G services along the tramway line (T1), and (ii) Determine the tram position along the railway using the 5G signals freely available in the urban environment. The position reference (Ground truth measurement) is provided by a Hitachi Positioning system called NGAP which is able to measure the tram position with an accuracy lower than 1 m.



### INNOVATION

Availability of a new sensor for measuring the tram position based on 5G signal sampling. In fact, NGAP system fuses the output of several onboard sensors (GNSS, RADAR, IMU) to accurately determine the tram position. Still, (i) 5G release available on the field is not the latest defined by the 5G standard, and (ii) Cost of HW is not negligible and it will be interesting analyzing the capabilities of the tested technologies to be implemented on low-cost systems.

### TRIAL

Trial activities lasted for 54 consecutive days. During this period, 5G network performance was monitored in terms of CONNECTED RAILS KPI and the 5G signal was stored in SYS-SDR. A total amount of 1.8 TB from two different network operator was collected and in the following days data were processed to validate the positioning algorithm.

### RESULTS

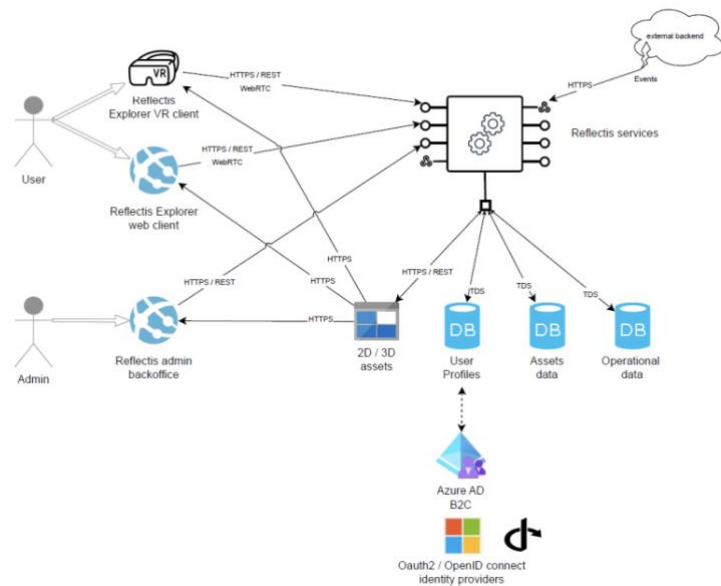
The planned tests (iperf, ping) are now running on the tram 1013. Data are collected on daily base. Also, we are collecting logs from the 5G router used on board covering the 5G signals, radio network cells and the positioning (as this router has its own GPS). Moreover, 5G signal acquisition for tram positioning has been collected by means of a software defined radio. This data is used to train an algorithm to predict tram position.

Besides, the project has developed a local sandbox to enable deepening into the mechanisms to manage critical and non-critical applications sharing a computing platform as is the case onboard the tram. Different policies have been analyzed based on Kubernetes, with the aid of Prometheus and Grafana.

## 14 - DREAMPARK

### OVERVIEW

The project aims to create an immersive and gamified experience of Valentino Park located in the city of Turin. The goal is to enable people who are not physically present in Valentino Park to enjoy, through various gamification elements, contents related to the physical places of the park.



### INNOVATION

The project has now reached its conclusion, successfully achieving its initial goal of delivering the XR experience. Through a combination of creative design, immersive storytelling, and advanced technical implementation, we managed to deliver a gamified experience that resonates with users across diverse contexts.

### TRIAL

The trial took place in selected locations in Turin using the 5G network exclusively. The goal of the trial was to organize the users into two groups of at least 40 people each, in separate locations, to access the experience and interact with each other. The project focused the trials on three different events.

### RESULTS

During the trial events, we collected data and questionnaires so that the application could be improved over various iterations. During the closing event, users were able to test the final version of the experience, which included the integration of feedback received from the previous trials.

The collected data in relation to the collected questionnaires reveals how the users really enjoyed the experience and that a low latency experience is key for enabling immersive technologies such as XR experiences.



## 15 - INTELLIGENT CONTROL OF INTERCONNECTED MANUFACTURING INFRASTRUCTURES (I-CNC)

# OVERVIEW

The i-CNC project utilizes a commercial 5G infrastructure to deploy and test a cloud-based, and AI-enabled system that improves power efficiency and reduces scrap rate in a CNC machine shop. The system focuses on detecting the chattering phenomenon, a very unpredicted and challenging issue that occurs during the milling process.



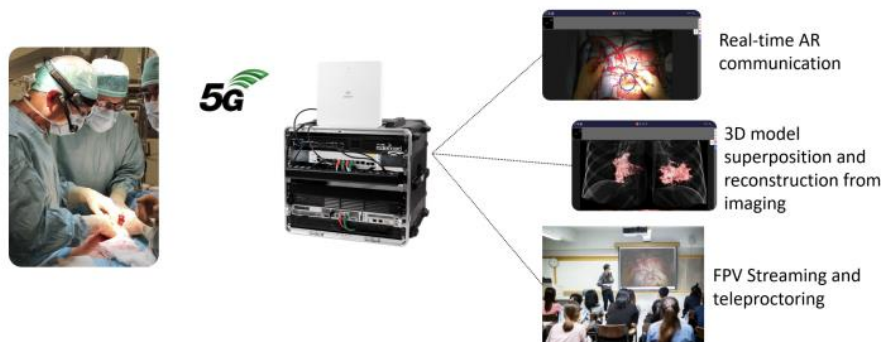
The key innovation that can emerge from the project is a plug and play and modular system for a chatter detector that assists the CNC machine operator to perform more efficiently the job. However, it became clear that pushing towards a higher TRL requires advanced and cloud native development as well as network failover mechanisms.

From a societal and environmental standpoint, the system reduced material and energy waste by detecting inefficient cutting early, thanks to 95% accuracy and 90% precision in chatter detection. Economically, the solution improved resource efficiency, cut operational costs by 4–6% per machine, and minimized downtime through fast, low-latency communication (50- 100 ms).

## 16 - MEDIVISION-5G

### OVERVIEW

MediVision5G aims to bring advanced connectivity and digital tools to the healthcare sector by deploying a private 5G-enabled platform tailored for clinical and engineering applications. The project focuses on five use cases, including teleproctoring, 3D image consultation, and real-time metrics for clinical engineering. It integrates edge computing and AR technologies to support surgeons and medical professionals with hands-free, high-performance tools in surgical environments, supported by automation, real-time data, and enhanced network performance.



### INNOVATION

Development of certified medical applications, a portable connectivity solution, integration of these components to enable advanced, hands-free, real-time, remote collaboration, training, and information access. Furthermore, it has been demonstrated the adaptability of the system to promote remote maintenance operations and support of organ preservation machines, highlighting the potential for applying the same concept to domains beyond the surgery room

### TRIAL

The trials culminated in 8 hospital trials conducted in Italy and Spain, for a total of 10 trials involving physiologists (including the 2 in the lab). Hospitals included those in Pisa (Cisanello), Turin (Città della Salute e della Scienza), Arezzo (San Donato), Ancona (Ospedali Riuniti), Mis Tres Torres Clinic in Barcelona, and MD Anderson Cancer Center in Madrid. The trials tested the 5 defined use cases and validated KPIs and KVIs.

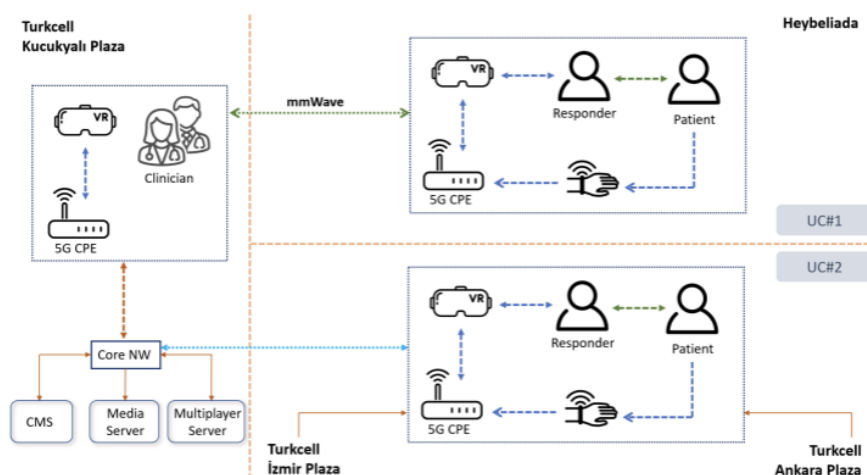
### RESULTS

Initial lab trials have demonstrated successful deployment automation, reliable connectivity, and the feasibility of integrating AR applications into a 5G-enabled hospital setup. The system showed promising results in improving workflow efficiency and data-driven decision-making for clinical engineers. Several leading hospitals in Italy and Spain have shown formal interest in piloting the solution, underlining its potential to enhance surgical precision, operational efficiency, and future adoption of advanced medical devices across Europe.

## 17 - METACLINIC

### OVERVIEW

The MetaClinic project is developing a VR-enabled telemedicine platform that leverages 5G networks to enable immersive remote consultations and emergency support. It features clinician and patient VR clients, a real-time cloud-based backend, and a content management system for secure data exchange. The project emphasizes low-latency, high-throughput performance, and user-centric design to enhance healthcare accessibility and inclusivity.



### INNOVATION

By the end of the activity, it was clear that combining VR and 5G greatly improves healthcare accessibility, responsiveness, and collaboration. The project proved that these tools can make both routine and emergency care more effective and interactive.

### TRIAL

The METACLINIC trial activities were conducted across multiple Turkcell sites, including İstanbul (Küçükalyı Plaza), İzmir Plaza, and a remote mmWave deployment targeting Kınalıada island. The trials involved simulated clinicians and patients using Meta Quest 3 headsets, with supporting applications for video streaming and data management. In the first scenario, a 5G mmWave link spanning approximately 7.5 km was established from Küçükalyı Plaza to Kınalıada to test long-range emergency support. In the second scenario, a remote consultation was conducted between sites in İstanbul and İzmir, approximately 450 km apart, using Turkcell's 5G standalone (SA) core network. A total of 6 trials were conducted.

### RESULTS

MetaClinic has successfully achieved key milestones, including stable VR interaction under lab conditions and seamless integration of VR elements with backend systems. The field trials will assessed user satisfaction, system scalability, and performance under real-world conditions. The project contributes to TrialsNet's goals by demonstrating how 5G can enable advanced telemedicine services and improve healthcare delivery through innovative, immersive technologies.

## 18 - MILESTONE - A REAL-TIME AI-ENABLED WORKER SAFETY PRESERVATION SYSTEM

### OVERVIEW

Worker safety is critical within public infrastructure sites such as public buildings, where workers are required to use Personal Protective Equipment (PPE) to protect themselves. Consequently, real-time safety monitoring and assessment is important in public infrastructure environments to preserve worker safety at all times. The integration of 5G solutions can be crucial towards this goal by enhancing real-time data transmission regarding multiple surveillance data sources such as cameras, leading to prompt detection and response to potential safety issues. MILESTONE combines 5G technology with computer vision AI models and secure access control and authorization mechanisms to offer a real-time safety monitoring and assessment solution specifically designed for public infrastructure environments.



### INNOVATION

MILESTONE delivered a fully functional solution that expands and secures data spaces while supporting advanced AI-powered safety applications over 5G. A robust architecture was developed, integrating edge and cloud components, enabling seamless video streaming and real-time AI analysis. The security solution proved effective in supporting access management. The deployed system demonstrated the practical value of secure, multi-party data exchange in safety-critical use cases, confirming the project's intended innovation outcomes.

### TRIAL

The trial was carried out at the Technopolis, City of Athens venue, a dynamic environment, representative of public infrastructure industrial working activities. The trial involved workers participating in public infrastructure industrial activities, needing to comply with safety rules. A set of cameras was installed to monitor the public infrastructure working activities, utilizing the 5G network and the MILESTONE modules to conduct AI-driven incident detection in real-time, while preserving security, privacy, and robust access control. A total of 32 individuals participated in the trial activities, including both public infrastructure safety supervisors/managers and workers.

### RESULTS

The trial demonstration showcased the system's capabilities in terms of (i) real-time processing of large volumes of data for AI model inference through 5G, (ii) Data authenticity assurance, and (iii) Fine-grained, scalable access control, validating all the respective KPIs, such as round-trip latency, throughput, precision, and recall, achieving significant impact in terms of real-time public infrastructure monitoring and security.



## 19 - MOBILE AUGMENTED REALITY FOR OUTDOOR POI ENRICHMENT

### OVERVIEW

This project integrates 5G/B5G, augmented reality, federated learning, and edge computing into a mobile Android app designed to enhance tourism experiences. By pointing a smartphone at a landmark, users receive real-time AR overlays with relevant information. Federated learning ensures privacy by keeping user data on the device while enabling personalization. The project showcases how 5G/B5G can support immersive, educational, and secure tourism applications.



### INNOVATION

The project validated the practical integration of FL, 5G, and edge computing, in a mobile AR app, confirming operational efficiency and privacy preservation. Trials showed that model improvement through FL is feasible in real-world conditions. User feedback highlighted clear directions for enhancements. The innovation outlook strengthened through scalability, adaptability, and relevance for smart tourism, education, and cultural heritage.

### TRIAL

The trial was conducted over a two-week period, within the campus of POLITEHNICA University of Bucharest. Ten structured sessions were organized, with a total of 66 participants taking part, including students, academic staff, and external guests. The tested areas focused on three landmarks: the Rectorate building, the Aula Magna, and the Time Column sculpture. Data was collected for KPIs covering ML inference latency, application round-trip time, detection precision, segmentation alignment, and edge offloading efficiency. Participant feedback consistently rated the app as intuitive, responsive, and useful, validating both its design and deployment approach.

### RESULTS

The project has demonstrated the potential of integrating 5G/B5G connectivity, edge computing, augmented reality, and federated learning into a mobile application aimed at enhancing the tourism experience. Trials confirmed the app's ability to deliver personalized, location-aware experiences with strong privacy guarantees. The federated learning component validated the viability of decentralized AI in mobile environments. Network testing showed low latency and high throughput, confirming the benefit of 5G/B5G in supporting advanced mobile services. The use case ultimately serves as a PoC for future AI-powered apps that combine privacy, personalization, and cutting-edge connectivity to deliver transformative user experiences.

## 20 - BLACK CATS AND CHEQUERED FLAGS. FORMER “REMEMBERING ASCARI”

### OVERVIEW

Black Cats & Chequered Flags is an immersive, interactive VR and multiplayer Mixed Reality experience that brings to life the story of Italy’s only two-time Formula 1 World Champion, Alberto Ascari. Through storyliving and MR pit stop action for four players, audiences relive his rise, his bond with his father, and the superstitions that shaped his fate—as if part of his team, and his destiny.



### INNOVATION

The Use Case achieved elevated visitor engagement, potential for future exhibitions, and resulted in a rigorous 5G Network stress test.

### TRIAL

The Remember Ascari: MR in MAUTO – Immersive MR Experience in F1 trial was held at MAUTO, involving over 105 participants in multiplayer Mixed Reality sessions powered by WINDTRE’s 5G network. On-site, participants were welcomed, equipped, and guided through a structured experience combining immersive VR storytelling and a collaborative MR pit stop. Feedback was collected via tablets post-session.

### RESULTS

The trial aimed to evaluate the relationship between 5G network performance and the quality of user experience in a multiplayer Mixed Reality environment. The experience required low data exchange but consistent low latency, which was achieved with average values under 25ms. During the entire trial period WINDTRE monitored the download and upload values, detecting a maximum usage of 32.77Mbps in download and 8.19Mbps in upload. The experience received highly positive feedback regarding engagement, technical quality, and storytelling. The audience appreciated the historical accuracy and emotional immersion provided by the combination of advanced technologies and interactive storytelling. The collected data confirm the initiative’s success in several key areas, including user engagement, accessibility and usability, and educational and cultural value. 96% of users are willing to repeat the experience.

A [video](#) of the sub-project is available.

## 21 - REMOTE COORDINATION AND INTERWORKING OF FIRST RESPONDERS IN EMERGENCY SITUATIONS

### OVERVIEW

The project is focused on enabling the remote coordination and interworking of different groups of first-responders (firefighters from the Community of Madrid along with the 5TONIC caretaker) by providing a complete 5G MCx solution, which will integrate a 5G-Advanced interworking function (IWF) designed to support the delivery of MCx over 5G and the interworking with legacy critical communication systems like PBX.



### INNOVATION

The main innovation of the sub-project was the integration of the 5G-Advanced IWF with 5G and PBX technologies, leading to develop a complete MCx solution, where the MCx dispatcher can coordinate different groups of first responders using different technologies in emergency situations.

### TRIAL

The large-scale trial was conducted at the 5Tonic tested within the Imdea Networks Institute, located in Leganés, Madrid, Spain. The demonstration involved firefighters from the Community of Madrid (three on-site and one from the remote coordination center), along with the 5Tonic caretaker. Additionally, around 30 attendees observed the demonstration, with some actively participating as a rescued people. The trial successfully enabled intercommunication and remote coordination among first responders to address a simulated emergency—a fire incident at 5Tonic.

### RESULTS

The project has successfully validated the MCx developments made by Eviden, enabling seamless communication between 5G and PBX technologies in an emergency situation, leading to achieve the targeted Key Performance Indicators (KPIs) in terms of throughput, latency and jitter. With respect to KVI, Eviden distributed a questionnaire to participants involved in the demonstration, receiving an overall average rating of 4.5 out of 5. The subproject effectively confirmed that the entire solution offered an added value to first-responders by enhancing the technological capabilities (interworking, geolocation, video calls, group calls) for easing their actuation in emergency situation.

## 22 - SKYLINK VISION

### OVERVIEW

SkyLink Vision integrates 5G-enabled UAVs and AI-based video analysis to deliver real-time, high-precision aerial surveillance for applications such as public safety, emergency response, and law enforcement. The system offloads intensive computation from UAVs to ground/cloud-based platforms, preserving drone mobility while enabling license plate detection and target localization through real-time video feeds. It utilizes a Non-Public 5G Network (NPN) to ensure secure, low-latency, high-throughput communication among UAVs, ground control, and end-user systems.



### INNOVATION

Real-time, 5G-based video processing for UAVs, distributed to remote systems and enabling remote control of drones via the internet, with real-time response capabilities. The data clearly indicate tangible advantages when leveraging remote processing over on-board solutions.

### TRIAL

The trial included a replica of the UAV helicopter's entire hardware, including camera, autopilot simulator, SBC, and 5G data link. The bench streams synchronized video and telemetry to a ground server over 5G, where vehicles were detected and license plates read in real-time. The large-scale trial was conducted at the 5Tonic tested within the Imdea Networks Institute, located in Leganés, Madrid, Spain. 16 UAV pilots of varying background tested the system remotely, providing feedback on reliability, low-latency performance, and usability. The bench proved its effectiveness for real-time analytics, demonstrating readiness for scaled-up trials in traffic safety, security, or other domains.

### RESULTS

SkyLink Vision has successfully completed its trial activities, including video broadcasting, sensor data synchronization, and AI-based detection algorithms. The project lays a foundation for reliable UAV surveillance over 5G, demonstrating reduced environmental impact compared to manned alternatives and promising enhanced trustworthiness through secure, fast deployment.



## 23 - TORINO4U: 10 THINGS TO SEE AROUND YOU (AKA T4U)

### OVERVIEW

T4U builds upon the experience gained by Stendhapp in promoting Italian cultural heritage through a proprietary app dedicated to cultural tourism. The free, user-friendly mobile application, available on both the App Store and Play Store, provides access to over 71,000 points of interest across the entire national territory and suggests AI generated cultural itinerary based on user profile. T4U's vertical use case is developed in Turin, a UNESCO Creative City for Design, with the aim of engaging citizens and tourists through digital augmented reality content available at various locations throughout the city. Leveraging 5G technology, T4U offers an immersive experience, allowing users to discover, along the streets of the historic city center, eight digital twins of the eight design icons that have made Turin renowned on the international design scene.



### INNOVATION

Digital storytelling powered by Augmented and Virtual reality allows to bring to life the intangible cultural heritage, in a unique manner thanks to Stendhapp ability to recommend tailor made cultural itineraries.

### TRIAL

From 6th of December 2024 to 31st of March 2025 Stendhapp performed A large-scale testing was performed in Turin city center, for a duration of more than 100 days. During the period Stendhapp collected 44507 transactions (server interrogations) from 374 users. In the trial period Stendhapp collected 329 valid questionnaires that have been analyzed and generated a comprehensive set of KVI's, including application responsiveness, user experience and engagement, economic, environmental and societal sustainability and edutainment impact.

### RESULTS

During the trials conducted in Turin, hundreds of individuals successfully downloaded and utilized the Stendhapp mobile application to view the digital twins of the eight design icons, thereby initiating a new, more engaging, and impactful method of accessing cultural content.

Looking ahead, this project paves the way for extending the approach to additional territories across Italy, as well as expanding the range of AR models within Turin to encompass topics beyond design. More broadly, it contributes to making augmented reality content for cultural tourism accessible to anyone with a smartphone, offering an engaging and user-friendly experience.

## 24 - TURIN5GAMES

### OVERVIEW

Turin5Games assesses user and technology related aspects of 5G Cloud Gaming, an innovative Gaming service where users can play games and immersive experiences including advanced edutainment scenarios running in the cloud infrastructure. Video and haptic feedback actuator controls are streamed in real time to the 5G user device. Interaction between player and game are managed over 5G networks with overall user experience broadly independent on user device processing power.



### INNOVATION

Identification of opportunities and options for standardization to improve cloud gaming technology-based application support and integration over 5G and 6G networks. Controller and device SW stack optimization for cloud gaming without changing the standard radios (BT, WiFi, etc.). Low latency controller solutions, reusable in different contexts, such as virtual training, education, medical applications (e.g. rehabilitation).

### TRIAL

Different trials have been carried out: public event at Le Gru Shopping mall; 5G load test with up to 25 parallel gaming sessions in the same indoor room; and training session at driving school. The aim was to verify the capacity of the 5G network to support the solution and to collect user experience and KVIs. The trials were executed over a 5G NSA commercial broadband service, and included about 800 trial sessions, involving over 250 individual users.

### RESULTS

More than 900 questionnaires collected, allowing a large base to evaluate KVIs. Main KPIs are latency and streaming performance measured with throughput. KPIs show good results in all main areas including the overall experience. In the “hot spot” indoor load stress test the 5G microcell network supported up to 27 concurrent sessions with progressive service degradation starting at 20 sessions. The experiment at the driving school demonstrated the potential high interest of students to learn from realistic game-based simulators, to support class lessons prior to practical driving lessons. Same high interest was demonstrated by schoolteachers.

A [video](#) of the sub-project is available. The project was also featured in the [SNS T&P Brochure n. 1](#).

## TRIALSNET INFORMATION

If you are looking for further info about the project structure, consortium, the different use cases, as well as news and contacts, the [project website](#) is the place to go. The project deliverables, publications, together with other dissemination and communication material, are available on the corresponding [website section](#).


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