5G VICTORI

Vertical demos over Common large-scale field Trials fOr Rail, energy and media Industries

D5.3 Final Report on Standardisation, Dissemination, Communication and liaison Activities Report

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List of Acronyms

Acronym	Description
3GPP	3rd Generation Partnership Project
3GPP SA1	Service and System Aspects WG
3GPP SA6	Mission Critical Application WG
3GPP TSG	Technical Specification Groups
5G-IA	5G Infrastructure Association
5G-MAG	5G Media Action Group
5G-PPP	5 Generation Public-Private Partnership
5G-PPP TMV	Test, Measurement and KPIs Validation Working Group
5GMS	5G Media Streaming
6G-IA	6G Infrastructure Association
BoI	Bodies of Interest
CMS	Content Management System
CN	Core Network
EC	European Commission
ERJU	Europe's Rail Joint Undertaking
ETCS	European Train Control System
FRMCS	Future Railway Mobile Communication System
ETSI NFV	European Telecommunications Standards Institute – Network Functions Virtualization
ETSI MEC	European Telecommunications Standards Institute – Multi-Access Edge Computing
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
ISA	International Society of Automation
ISO	International Standard Organization
ITU	International Telecommunication Union
ITU-R	International Telecommunication Union- Radiocommunication Sector
KTA	Kontron Transportation Austria AG
LCM	Lifecycle Management
MANO	Network functions virtualization MANagement and Orchestration
MC / MCX	Mission Critical Services (in 3GPP)
MEC	Multi-access Edge Computing
mmWave	millimeter wave
NBI	Northbound Interface
NFV	Network Functions Virtualization
NPN	non-public network
O-RAN	Open Radio Access Network
OSM	Open Source Manual Orchestration
PLA	placement module (OSM)
POL	policy management module (OSM)
QoS	Quality of Service

QoE	Quality of Experience
RAN	Radio Access Network
RAN / RAN 1 / RAN 2, etc.	Radio Access Network (Layer1….)
SDN	Software Defined Networking
SDO	Standard Development Organization
SG	subgroup
SLA	Service Level Agreement
SSL	Secure Sockets Layer
UIC	International Union of Railway
UNISIG	UNion of SIGnalling Industry
vCDN	Virtual Content Delivery Network
VIM	Virtualized Infrastructure Manager
5G-VIOS	5G-VICTORI Infrastructure Operating System
W3C	World Wide Web Consortium
WG	Work Group

Executive Summary

From the onset, the 5G-VICTORI project has established a comprehensive strategy for standardisation, dissemination, communication, and liaison activities. Detailed activity plans were formulated during the initial six months of the project. Throughout the project's duration, this strategy was continuously monitored, maintained and adjusted as needed. These proactive activities have been directed towards fulfilling the project's commitment to share and promote its results not only to the international scientific community but also to the European industry, stakeholders of target vertical industries, and relevant policymakers.

This document represents the last report on **WP5** activities of 5G-VICTORI project. It briefly summarises the activities presented in deliverable **D5.2** [2] for the first half of the project duration based on the plan established in deliverable **D5.1** [1], and it presents in detail the progress on standardization, dissemination, communication and liaison activities during the last 18 months of the project (from January 2022 until July 2023).

In brief, the standardization activities of 5G-VICTORI focused on: (a) studying (at standardisation level) 5G network/ technologies deployment options (stemming from 5G-VICTORI) integrated with the digital railway infrastructure towards delivering an implementation of the Future Railway Mobile Communication System (FRMCS), as well as around normative work on the FRMCS Architecture, (b) monitoring of standardisation aspects of mission critical services (stemming from 5G-VICTORI findings) in the relevant 3GPP Work Groups (WGs), (c) contributing to ETSI NFV & ETSI MEC WGs and on participating to ETSI NFV&MEC Plugtests with the media and energy related vertical service implementations, (d) monitoring through participation in standardisation meetings of the IEEE 802.11 activities related to millimetre wave (mmWave)-related standards, wireless nodes' synchronisation, positioning and sensing as well as Broadcast Services, as well as (e) monitoring of standardisation activities related to mobility management of a network service in the relevant ETSI WGs.

Communication of the project and its results has been performed through the dedicated website that was continuously improved with regards to structure, design and content, and also via the social media platforms like LinkedIn, Twitter (now X) and YouTube. Information on project achievements was also shared through the websites of the beneficiaries of the project, through a large number of blogposts, online posts or press releases in important business publications. All communication activities are detailed in the document.

Considering the dissemination activities, the 5G-VICTORI Consortium has been present during the last reporting period of the project in 32 industry events (in the field of ICT, Media, Transportation/Rail, City-related) with booths and presentations, it has participated in additional 4 webinars/trainings and published 21 (+2 under submission) scientific papers at well recognized conferences and journals. Project participation to highly distinguished international conferences and symposiums are exemplified in the current document.

Furthermore, this deliverable serves the purpose of providing a concise overview of the 5G-PPP activities undertaken by the project, facilitating the collaboration with other peer projects that share similar interests in 5G and beyond 5G topics. The project has made significant contributions to and established strong representation within the most relevant WGs and subgroups (SGs) of the 5G-PPP and 5G-IA partnerships. As part of this engagement, project partners have actively contributed their technical expertise, taking on key responsibilities such as chapter editors in essential white papers produced by various groups, including the Architecture WG, the Software Networks WG, the Business Validation, Modelling

and Ecosystems (BVME) SG, and the KPIs SG. This participation showcases the project's commitment to collaborative efforts and its dedication to advancing the field of 5G technology.

As a final assessment of the WP5 tasks, the measured KPIs indicate that the targets presented in the Description of Work were met in all cases and some of them highly exceeded, despite the impact of COVID-19 during the first years of the project.

1 Introduction

Making research results and output public, sharing these with industry and the general public and capturing these in standardisation bodies is of critical importance for the H2020 and Horizon Europe Programmes. In this context, throughout its lifetime, the 5G-VICTORI Consortium has actively contributed to the 5G Public Private Partnership (5G-PPP) framework with the aim to create awareness of the 5G-VICTORI activities and outcomes and generate a framework of interaction with the 5G community in Europe.

In deliverable **D5.1** [1] the consortium reported the communication, dissemination and standardisation activities plan, while **D5.2** [2] provided an overview of the standardization, dissemination, communication and liaison – related activities performed from the beginning of the project until month 30 (M30). This document presents the project activities that have been performed during the remaining period of the project, i.e. from M31 until its end – M49.

Standardisation activities in 5G-VICTORI were performed through interaction between Standardisation Development Organisations (SDOs), but also other organisations, initiatives and partnerships important for the project work and partners. In this document, the standardization activities carried out especially over the latest project period are outlined and classified into "contributions" or "monitoring" activities. Contributions to SDOs are further detailed.

Communication and dissemination activities, carried out in the second half of the project, continuing to raise awareness on the project achievements and providing information on the project results, are listed and presented in detail. The activities are categorized according to the means of dissemination to social media, press releases, webinars, industry events, scientific publications and other communication activities. The activities are evaluated against the relevant dissemination and communication KPIs defined from the onset of the project.

Liaison activities build up mostly on the commitment of the project to support 5G-PPP work and to actively interact with peer projects. 5G-VICTORI concepts and results have been widely shared in many 5G-PPP WGs even spanning beyond 5GPPP & 5G IA – to 6G IA activities.

1.1 Objectives

The present deliverable details the activities performed between months 31 and 49 of the project in terms of standardisation, dissemination, communication, as well as participation to 5G-PPP activities and liaison with other projects. These activities were strictly correlated with the strategy, principles and high-level plans presented in deliverable **D5.1** [1] and also with the specific plan for the second half of the project contained in section 5 of deliverable **D5.2** [2].

Moreover, the document evaluates the project activities against the KPIs defined from the onset of the project.

1.2 Document Structure

Section 2 summarises the standardization activities performed from January 2022 until the end of the project as contributions to various standardisation bodies including 3GPP and UIC FRMCS, ETSI NFV & ETSI MEC working groups and ITU-R.

Section 3 details the communication and dissemination activities carried out starting with January 2022, including: 5G-VICTORI website, social network disseminations, press releases, participation in industry events, participation in and organization of conferences/ workshops/

summits and webinars, scientific dissemination. In the last sub-chapter, the achieved KPIs at month 49 were presented compared with the target.

Section 4 specifies the liaisons activities by describing the interaction with relevant 5G-PPP projects and WGs with focus on achievements and impact.

Finally, section 5 concludes the deliverable.

2 Standardisation Activities Report

2.1 Summary of standardisation activities until December 2021

The contributions of the project partners to standardisation continued unabated, revolving around how new deployments of 5G technologies could leverage and/or improve existing standards in close cooperation and collaboration with SDOs.

Within the project, research was conducted to explore the use of technologies bolstering 5G connectivity and/or advanced 5G solutions. The technical requirements and specifications needed for these solutions were also investigated. The findings of this research were published in various platforms, with primary focus on scholarly and/or professional journals. Beyond this effort, project partners with high involvement in SDOs collaborated with standardisation bodies to fuse this research and share their results. The focus of standardisation activities is presented in Table 2-1.

Table 2-1 SDOs to which significant contributions were made by 5G-VICTORI partners

Partner	Target Domain	Target SDOs
UNIVBRIS	Future Networks Vision	ITU, FG-NET2030 (monitoring & contribution during 1st period)
DBN	Railway related specifications & 5G-PPP Future Networks Vision	5G-PPP PreS WG, UIC, 5GRAIL & other SDOs (monitoring & contribution)
DCAT	Edge mobility & Orchestration	ETSI OSM / ZSM (monitoring)
FhG	Edge/ Cloud media rendering	W3C – Web & Networks Group (monitoring & contribution)
FhG	Broadcasting Services	IEEE 802.11 (monitoring)
FhG	Media Distribution	5G-MAG, DASH-IF(monitoring & contribution)
IHP	Synchronisation & Localisation	IEEE 802.11(monitoring)
ICOM	vCDN in NFV & MEC	ETSI NFV, ETSI MEC (monitoring & contribution to Plugfests)
Orange	Future Networks Vision	ITU-R (monitoring & contribution)
KCC	In general, the contributions by Kontron were focusing on introducing new and correcting service layer functionality (voice and data) functionality required by FRMCS within the context of the Mission Critical services already specified within 3GPP. Other aspects were contributions to better support low latency communication of the MC services. Other contributions were related to the problems detected during plugtest. And finally, some CRs were related to correcting specification related to encoding of specific messages used by the MC services.	
KCC	FRMCS Architecture	ETSI RT – (FRMCS) (monitoring & contribution)
KCC	Mission Critical Voice & Data Services	3GPP SA6 (Stage 2), 3GPP CT1 (Stage 3) (monitoring & contribution)

Activities related to monitoring and contributions made by **UNIVBRIS** to ITU-R, by **DCAT** and by **ICOM** to ETSI OSM, by **IHP** to IEEE 802.11, by **FhG** to W3C, 5G-MAG and IEEE 802.11, until January 2021 have been presented in more detail in 5G-VICTORI Deliverable **D5.2** [2], thus are not repeated in detail in this document.

A significant part of the project activities focused on the adoption of 5G technologies to support rail-related services. The deployment of FRMCS, based on 5G mobile radio technology, was studied, tested, and piloted in collaboration with various partners. The aim was to identify network configuration requirements and develop the first FRMCS/5G prototypes. In this regard, the project partners involved in rail-related activities monitored the standardization of FRMCS to identify specifications and requirements specific to railway functions. Specifically, **DBN** studied the deployment of FRMCS within digital railway infrastructures in collaboration with other partners to ascertain network configuration requirements and develop FRMCS/5G prototypes. Similarly, **KCC** conducted normative work on the FRMCS Architecture, mainly in the Core Network Architecture and Onboard Architecture. They also leveraged the findings of the 5G-VICTORI Critical Service Deployment Validation for both Lab and Live Systems for standardization in the relevant WGs.

Moreover, the project partners made contributions to standardization in various areas, with a focus on how new deployments of 5G technologies could leverage and/or improve existing standards. **UNIVBRIS** contributed to the Open Radio Access Network (O-RAN) alliance and ETSI Standardisations in areas such as zero-touch autonomous application or 5G-VIOS components. **ICOM**'s standardization activities focused on ETSI NFV & ETSI MEC working groups, where they worked on ICOM's vCDN deployment according to Open Source MANO (OSM) specs (Information Model), based on ETSI NFV standards. They also examined the creation of a proof-of-concept on the vCDN deployment. ICOM participated in events such as ETSI NFV&MEC Plugtests 2022 with the vCDN and uiTOP applications, extended with appropriate interfaces to be compatible with MEC standards and possibly NFV standards. **IHP** & **FhG** participated in IEEE 802.11 and monitored activities related to mmWave-related standards, Wi-Fi sensing, and Broadcast Services. Moreover, **IHP** conducted research on the synchronization of wireless nodes and thereby contributed to the positioning/sensing capabilities of these nodes. **DCAT** worked on the mobility management of network service, defining a workflow using current OSM APIs and investigating the use of new APIs in the Northbound Interface (NBI) of OSM. They explored functionalities mainly within the placement module (PLA), the policy management module (POL), and Lifecycle Management (LCM) components of OSM and investigated potential extensions to contribute to the OSM community.

Overall, within the coverage period of **D5.2** (i.e. until December 2021), the project partners engaged in various standardization activities related to 5G and FRMCS. They aimed to improve existing standards, leverage new technologies, and contribute to the development and deployment of these technologies and systems.

2.2 Standardisation activities from January 2021 onwards

By actively engaging with SDOs and WGs, the project partners have been driving the development and deployment of standardized solutions that will shape the future of communication systems. This section focuses on the achieved impact in 2022, and the first half of 2023.

One of the project partners, **KCC**, has actively engaged with the 3GPP TSG SA6 and TSG CT1 WGs. The contributions by KCC focus on introducing new and correcting service layer functionality (voice and data) functionality required by FRMCS within the context of the Mission

Critical services already specified within 3GPP. KCC has made significant contributions to better support low latency communication of the MC services. Other contributions have revolved around the problems detected during plugtest. And finally, some CRs pertain to correcting specification related to encoding of specific messages used by the MC services.

DBN, in collaboration with EECT Radio, ETSI, UIC, and ERJU, has been working on the standardization of the FRMCS. Their contributions include drafting system requirement specifications, functional requirement specifications, and interface specifications for FRMCS. DBN has played a crucial role in consolidating and adopting FRMCS documents, ensuring compatibility with ETCS specifications, and developing a unified concept and system for railway telecommunication.

ICOM has actively participated in standardization activities within ETSI NFV and ETSI MEC. They have focused on vCDN deployment according to OSM specifications, based on ETSI NFV standards. ICOM has also contributed to the development of proof-of-concept for vCDN deployment and participated in events such as ETSI NFV&MEC Plugfests. Their efforts have centred on improving the deployment and interoperability of virtualized network functions and multi-vendor MEC platforms.

Last but not the least, as a participant in the 5G PPP TMV group, **Orange** has played a crucial role in shaping the Key Performance Indicators (KPIs) and Target Values for Beyond 5G (B5G) and 6G technologies. The TMV white paper entitled "Beyond 5G/6G KPIs and Target Values" was presented by **Orange** to ITU-R WP5D meeting in order to be considered in the development of recommendations for the future of IMT, and its impact will be closely monitored within the working group. The white paper has been included in ITU-R Document 5D/1520-E and may influence future work related to IMT Vision 2030.

In conclusion, the project partners of 5G-VICTORI have demonstrated their active involvement in standardization activities across various domains, driving the development and deployment of standardized solutions that will shape the future of communication systems. Their contributions spanned multiple organizations and working groups, focusing on areas such as service layer functionality, power optimization, autonomous applications, railway communication systems, virtualized network functions, and network slicing. Through their efforts, they have made notable progress in improving interoperability, defining requirements, and shaping the vision for future generations of mobile networks. With their ongoing contributions and monitoring, these project partners continue to play a crucial role in advancing the standardization landscape and paving the way for the next generation of communication technologies.

2.3 Achieved impact and planned activities

The table below concisely covers achieved impacts of the project partners on standardization within the period of 2022 and Q1, Q2 2023 as well as their planned activities for the remaining duration of the project. In line with the recommendations of the project reviewers, the nature of the activities (i.e. contribution or monitoring) is indicated along with the type/form of concrete contributions and the links leading to these, if publicly available. Furthermore, the inputs below were confined to those which had been facilitated, assisted or enabled by 5G VICTORI.

Table 2-2 Achieved impacts of the project partners on standardisation andir planned activities for the remaining duration of the project

Partner Name	Target SDO	Target WG Target Study Item	Achieved Impact within Q3, Q4 2022 und Q1, Q2 2023	Comments – Contribution Description
KCC	3GPP	TSG SA6	FS_IRail Rel-18 - Study of Interconnection and Migration Aspects for Railways	**Contribution** related to MC service layer functionality. This contribution to the study item is related to the voice service tests and covers enhancements required by FRMCS for calls between multiple MC service systems. Contributed a new Solution for call forwarding between MCPTT users in different MCPTT systems. Tdoc: https://www.3gpp.org/ftp/tsg_sa/WG6_MissionCritical/TSGS6_049-bis-e/Docs/S6-221847.zip got accepted
KCC	3GPP	TSG SA6	Irail Rel 18 – Interconnection and Migration Aspects for Railways	**Contribution** related to MC service layer functionality: This contribution to the technical specification is related to the voice service tests and covers enhancements required by FRMCS for calls between multiple MC service systems. Contributed a new Solution for call transfer between MCPTT users in different MCPTT systems. Tdoc https://www.3gpp.org/ftp/tsg_sa/WG6_MissionCritical/TSGS6_050-e/Docs/S6-222456.zip got accepted
KCC	3GPP	TSG CT1	MCProtoc18 -Protocol enhancements for Mission Critical Services	**Contribution**: This contribution to the technical specification is related to the data service tests and covers corrections in the 3GPP standards required for use of MCData IPconn instead of MCData SDS. Correcting MCData user profile MO below IPInformation. Tdoc: https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_137e/Docs/C1-225392.zip got accepted
KCC	3GPP	TSG CT1	eMONASTERY2 - Enhancements to Application Architecture for the Mobile Communication System for Railways Phase 2	**Contribution** related to MC service layer functionality: This contribution to the technical specification is related to the data service tests and covers enhancements in the 3GPP standards required for use of MCData IPconn instead of MCData SDS. Adding support for using a functional alias as target of an IP connectivity communication. Tdoc: https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_137e/Docs/C1-225329.zip got accepted

Partner Name	Target SDO	Target WG Target Study Item	Achieved Impact within Q3, Q4 2022 und Q1, Q2 2023	Comments – Contribution Description
KCC	3GPP	TSG CT1	eMONASTERY2 - Enhancements to Application Architecture for the Mobile Communication System for Railways Phase 2	**Contribution** related to MC service layer functionality: This contribution to the technical specification is related to the voice service tests and covers corrections required by FRMCS for private calls. Corrections for MCPTT private call forwarding. Tdoc https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_137e/Docs/C1-225328.zip got accepted
KCC	3GPP	TSG CT1	enhMCPTT-CT - Stage 3 of enhMCPTT	**Contributed** as co-signing company to a CR on errors detected during interoperability testing on Plugtest issue 10.1.1 of May 2022: This contribution to the technical specification is related to the voice services and covers corrections required by FRMCS for private calls to ensure they work in a multi-vendor environment. Fix for routing of remotely initiated private call response. Tdoc https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_137e/Docs/C1-225212.zip got accepted
KCC	3GPP	TSG CT1	MCProtoc18 -Protocol enhancements for Mission Critical Services	**Contributed** as co-signing company to a CR on errors detected during interoperability testing on Plugtest issue 10.1.9 from Nov 2021: This contribution to the technical specification is related to the voice services and covers corrections required by FRMCS for private calls to ensure they work in a multi-vendor environment. Inconsistency in specifying the length value of application specific data field. Tdoc https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_137e/Docs/C1-225207.zip got accepted
KCC	3GPP	TSG CT1	MCImp-eMCPTT-CT - Stage 3 of Enhancements for Mission Critical Push To Talk	**Contributed** as co-signing company to a CR on MC service layer protocol on Fix the inconsistency in specifying the TLV of the List of SSRCs field. This contribution to the technical specification is related to the voice services and covers corrections required by FRMCS for private calls to ensure they work in a multi-vendor environment. Tdoc https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_137e/Docs/C1-225203.zip got agreed
KCC	3GPP	TSG CT1	eMONASTERY2 - Enhancements to Application Architecture for the Mobile Communication System for Railways Phase 2	**Contribution** related to MC service layer functionality: This contribution to the technical specification is related to the voice service tests and covers corrections required by FRMCS for private calls. Rel-18 Corrections for MCPTT private call forwarding. Tdoc:

Partner Name	Target SDO	Target WG Target Study Item	Achieved Impact within Q3, Q4 2022 und Q1, Q2 2023	Comments – Contribution Description
				https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_138e/Docs/C1-226138.zip got accepted
KCC	3GPP	TSG CT1	eMONASTERY2 - Enhancements to Application Architecture for the Mobile Communication System for Railways Phase 2	**Contribution** related to MC service layer functionality: This contribution to the technical specification is related to the voice service tests and covers corrections required by FRMCS for private calls. Rel-17 Corrections for MCPTT private call forwarding. Tdoc: https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_138e/Docs/C1-226137.zip got accepted
KCC	3GPP	TSG CT1	MCProtoc18 -Protocol enhancements for Mission Critical Services	**Contribution** related to MC service layer functionality: This contribution to the technical specification is related to the voice service tests and covers enhancements required by FRMCS for private calls. Corrections of handling of called party in MCPTT first-to-answer calls: Tdoc:
KCC	3GPP	TSG SA6	MC_AHGC - Mission Critical ad hoc group Communications	**Contributed** as co-signing company to a CR on Introduction of the ad hoc group emergency alert. This contribution to the technical specification is related to the voice and data service and covers enhancements required by FRMCS for Railway Emergency Communication. Tdoc https://www.3gpp.org/ftp/tsg_sa/WG6_MissionCritical/TSGS6_053_Athens/Docs/S6-231054.zip got agreed
KCC	3GPP	TSG SA6	enh4MCPTT - Enhanced Mission Critical Push-to-talk architecture phase 4	**Contributed** as co-signing company to CR related to MC service layer functionality on Preconfigured regrouping support for MCPTT. This contribution to the technical specification is related to the voice service tests and covers enhancements required by FRMCS for group communication. Tdoc https://www.3gpp.org/ftp/tsg_sa/WG6_MissionCritical/TSGS6_053_Athens/Docs/S6-231012.zip got accepted
KCC	3GPP	TSG SA6	MC_AHGC - Mission Critical ad hoc group Communications	**Contributed** as co-signing company to CR related to MC service layer functionality on User profile configuration data to support MCData ad hoc group emergency alerts. This contribution to the technical specification is related to the data service tests and covers enhancements required by FRMCS for group data communication. Tdoc

Partner Name	Target SDO	Target WG / Target Study Item	Achieved Impact within Q3, Q4 2022 und Q1, Q2 2023	Comments – Contribution Description
				https://www.3gpp.org/ftp/tsg_sa/WG6_MissionCritical/TSGS6_053_Athens/Docs/S6-230925.zip got accepted
KCC	3GPP	TSG SA6	MC_AHGC - Mission Critical ad hoc group Communications	**Contributed** as co-signing company to CR related to MC service layer functionality on User profile configuration data to support MVVideo ad hoc group emergency alerts. This contribution to the technical specification is for group video communication and covers enhancements required by FRMCS for group video communication. MCVideo was not in scope of 5G-VICTORI. Tdoc https://www.3gpp.org/ftp/tsg_sa/WG6_MissionCritical/TSGS6_053_Athens/Docs/S6-230924.zip got accepted
KCC	3GPP	TSG SA6	MC_AHGC – Mission Critical ad hoc group Communications	**Contributed** as co-signing company to CR related to MC service layer functionality on User profile configuration data to support MCPTT ad hoc group emergency alerts. This contribution to the technical specification is related to the voice service tests and covers enhancements required by FRMCS for group communication. Tdoc https://www.3gpp.org/ftp/tsg_sa/WG6_MissionCritical/TSGS6_053_Athens/Docs/S6-230923.zip got accepted
KCC	3GPP	TSG CT1	MCProtoc17 -Protocol enhancements for Mission Critical Services	**Contribution** related to MC service layer functionality Rel 18 Corrections and enhancements for MCPTT private call forwarding. This contribution to the technical specification is related to the voice service tests and covers corrections required by FRMCS for private calls. Tdoc: https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_140_Athens/Docs/C1-231021.zip got accepted
KCC	3GPP	TSG CT1	MCProtoc17 -Protocol enhancements for Mission Critical Services	**Contribution** related to MC service layer functionality Rel 17 Corrections and enhancements for MCPTT private call forwarding. This contribution to the technical specification is related to the voice service tests and covers enhancements required by FRMCS for private calls. Tdoc: https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_140_Athens/Docs/C1-231020.zip got accepted

Partner Name	Target SDO	Target WG Target Study Item	Achieved Impact within Q3, Q4 2022 und Q1, Q2 2023	Comments – Contribution Description
KCC	3GPP	TSG CT1	MCProtoc17 -Protocol enhancements for Mission Critical Services	**Contribution** related to MC service layer functionality Rel 18 Corrections in MCPTT profile and in example signalling flows for MCPTT user profile operations. This contribution to the technical specification is related to the voice service tests and covers corrections required by FRMCS for voice communication. Tdoc: https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_140_Athens/Docs/C1-230855.zip got accepted
KCC	3GPP	TSG CT1	MCProtoc17 -Protocol enhancements for Mission Critical Services	**Contribution** related to MC service layer functionality Rel 17 Corrections in MCPTT profile and in example signalling flows for MCPTT user profile operations. This contribution to the technical specification is related to the voice service tests and covers corrections required by FRMCS for voice communication. Tdoc: https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_140_Athens/Docs/C1-230854.zip got accepted
KCC	3GPP	TSG CT1	MCProtoc18 -Protocol enhancements for Mission Critical Services	**Contribution** related to MC service layer functionality Discussion paper on Enhancements for functional alias. This contribution is a discussion paper that is related to the voice service tests and covers enhancements required by FRMCS for private calls. Tdoc https://www.3gpp.org/ftp/tsg_ct/WG1_mm-cc-sm_ex-CN1/TSGC1_140_Athens/Docs/C1-230562.zip got noted
Orange	ITU	ITU-R WP5D new Recommendation M.[IMT.VISION 2030 AND BEYOND]	Validating 5G Technlogy Performance – Assessing 5G architecture and Application Scenarios	**Contribution:** Orange contributed to 5G PPP TMV work on "Beyond 5G/6G KPIs and Target Values" (along with COSM, on behalf of 5G-VICTORI), and undertook the role to channel the white paper to ongoing work of WP5D on IMT-2030 Vision. WP5D is developing the draft new Recommendation M.[IMT.VISION 2030 AND BEYOND] - "Framework and overall objectives of the future development of IMT for 2030 and beyond". Orange presented the white paper to the ITU-R WP5D WG (oct. 2022), **Monitoring** the evolution of the abovementioned contribution. The white paper is included in the ITU-R Document 5D/1520-E, and considered an input contribution for future work in the production of IMT Vision 2030 recommendations.
DBN	ERA EECT	EECT Radio Review of FRMCS UIC Specification	**Contribution:** Consolidation and adoption of all FRMCS v1 documents	FRMCS v1 documents consolidated and passed EECT review for TSI 2022

Partner Name	Target SDO	Target WG Target Study Item	Achieved Impact within Q3, Q4 2022 und Q1, Q2 2023	Comments – Contribution Description
		v1.0 for annex in TSI 2022		
DBN	ETSI	TC-RT DTS/RT-0070	**Contribution:** Drafting of FRMCS/GSM-R interworking for TS 103 792 Contributions to: TS 103 764 Architecture TS 103 765-1 Transport Stratum TS 103 765-2 Service Stratum TR 103 768 Interworking	Finalization of TS 103 792 in Q2 2024 https://docbox.etsi.org/RT/RT/05-CONTRIBUTIONS/2023//RT(23)089055_Meeting_Minutes_of_Drafting_session_TS_103_765-1__16_16_03_2.docx
DBN	UIC	ATWG FRMCS SRS v2.0	**Contribution:** Drafting of FRMCS system requirement specification v2.0 AT-7800 - FRMCS System Requirement Spec (SRS) FU-7120 - FRMCS Functional Requirement Spec (FRS)	Finalization of FRMCS SRS v2.0 in Q1 2024 https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3776
DBN	UIC	FWG FRMCS FRS v2.0	**Contribution:** Drafting of FRMCS functional requirement specification v2.0	Finalization of FRMCS FRS v2.0 in Q1 2024
DBN	UIC	TOBA FRMCS TOBA FRS v2.0	**Contribution:** Drafting of FRMCS onboard functional requirement specification v2.0 TOBA-7530 - FRMCS TOBA SRS TOBA-7510 - FRMCS TOBA FRS	Finalization of FRMCS TOBA FRS v2.0 in Q1 2024 https://www.unife.org/wp-content/uploads/2021/09/UNIFE-Postion-Paper_Successful-Transition-to-FRMCS_v28092021Final.pdf
DBN	UIC	FFFIS FRMCS FFFIS v2.0	**Contribution:** Drafting of FRMCS Form Fit Function Interface Specification v2.0	Finalization of FRMCS FFFIS v2.0 in Q1 2024
DBN	UIC	FIS FRMCS FIS v2.0	**Contribution:** Drafting of FRMCS Function Interface Specification v2.0	Finalization of FRMCS FIS v2.0 in Q1 2024 https://portal.etsi.org/LoginRedirection.aspx?domain=docbox.etsi.org&ReturnUrl=/RT/RT/05-CONTRIBUTIONS/2022/RT(22)000091_Meeting_Report_-_RT-FRMCS_EISMEA_Proposal.docx

Partner Name	Target SDO	Target WG Target Study Item	Achieved Impact within Q3, Q4 2022 und Q1, Q2 2023	Comments – Contribution Description
DBN	ERJU	System Pillar Communication domain	**Contribution:** Drafting of plan of FRMCS standardization and TSI for FRMCS v2	Ensuring a correct compatibility with the ETCS specifications Ensuring, at Union level, a unified concept and system is developed for railway telecommunication. All in all, the 5G-VICTORI requirements collection that was channeled to SDOs and/or addressed in Berlin/Athens demonstrators was taken into account in some contributions by DBN. Apart from that, persistent follow-up by the 5G-VICTORI correspondent has induced and incentivized the DBN colleagues from the technical departments to focus more on standardization and increase their activities in various SDOs such as ERJU, UIC, and ETSI.
ICOM	ETSI	ETSI NFV ETSI MEC vCDN in NFV & MEC	**Interactions and monitoring:** ETSI NFV: Monitoring the development of standards for NFV transformation; Work performed in 2-year cycles, currently is in 4thcycle: Releases 1 (feasibility), 2 (interoperability), and 3 (operationalization) completed, starting Release 4 (orchestration & cloudification). ICOM's interaction with ETSI NFV-related events (e.g. OSM Hackfests) ETSI MEC: integration of applications across multi-vendor MEC platforms. Work performed in 2-year cycles, currently is in 3rd cycle. Essential concepts & architecture defined, focus on evolution towards cloud nativeness. ICOM participation in ETSI NFV & MEC Plugtests	ICOM plans to work on ICOM's vCDN deployment according to OSM specs (Information Model), based on ETSI NFV standards ICOM plans to examine the creation of a proof-of-concept on the vCDN deployment.

3 Communication and Dissemination Activities Report

3.1 Overview

Given the fact that one of the main impact factors measuring success in innovation and research is the acceptance of the results and their further reference and exploitation by the academia and industry, the 5G-VICTORI Consortium has focused on raising awareness and intensively disseminating and communicating project activities and results throughout and beyond the project lifecycle. For this purpose, the project has developed even from its early stages (in deliverable **D5.1** [1]) a concrete communication and dissemination activities strategy, which has been maintained and updated accordingly throughout the project lifetime, as reported in deliverable **D5.2** [2].

3.1.1 General Overview

The main objectives of these activities and strategy have been:

- To raise awareness and attract attention at the local, national and international levels on the project targets and achievements,
- To inform specific target groups (especially industrial stakeholders) about the results and linking them to the line of work of each target group addressed, and
- To facilitate the alignment of the project results with similar academic and industrial research efforts (in both ways),

and, at more mature project stages, to:

- attract the interest of potential partners and open up opportunities for future collaboration, and
- pave the way towards the market demand of the project products as the first necessary stage of exploitation.

Presented in detail in [1], the 5G-VICTORI communication and dissemination activities strategy is illustrated in Figure 3-1:
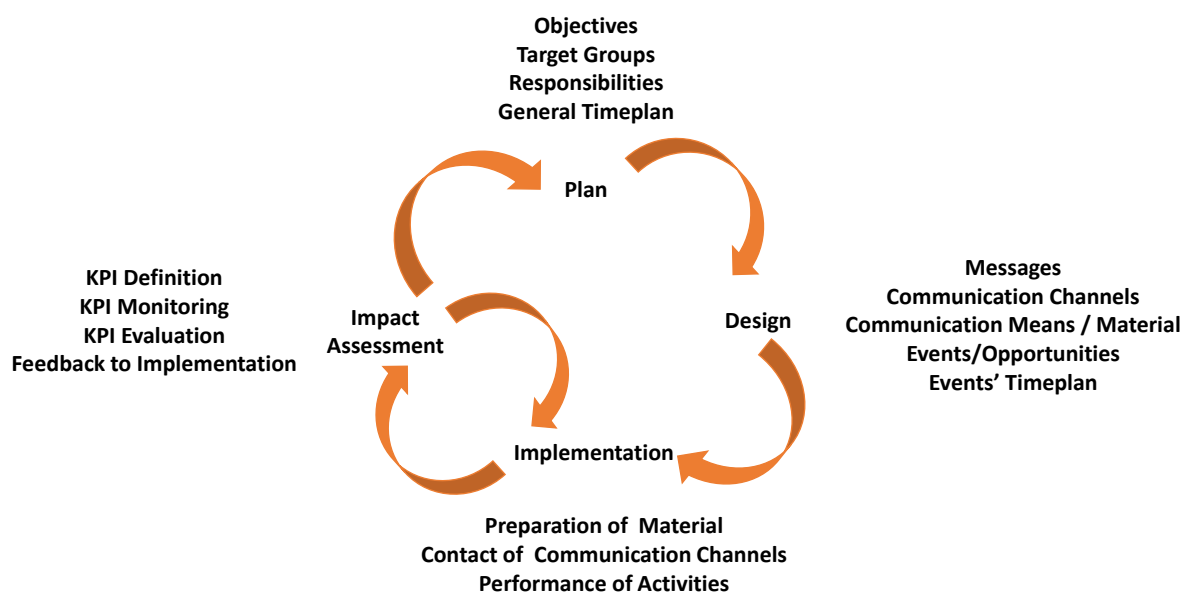

Figure 3-1 Communication and Dissemination Activities Strategy.

This high-level strategy evolved to a detailed activities plan. The plan was initially presented in [1], and further updated twice with the purpose to adjust and mitigate the impact of the COVID-19 pandemic (since March 2020) on the dissemination and communication activities of the project, and to address the assessment feedback received as the output of the project reviews. These revisions took into account the extension of the project duration by 13 months (up to M49). The revisions of the plan have been presented in [2], along with the activities performed during the period from the beginning of the project until December 2021. The time-plan was preserved for the remaining project period (with slight modifications related to monitoring / deliverable submission dates according to the project Amendment), while dissemination and communication activities were intensified (based also on feedback and adjustment cycles), in order to meet the relevant impact factors' KPIs. The slightly modified plan is presented in Table 3-1.

3.1.2 Overview of Activities until December 2021

Already from the first 6 months of the project, the most effective communication channels were identified along with the target audiences and the messages. These have been already used in a number of the project activities, with the ones performed until December 2021 having been reported in [2].

Considering the project communication activities by December 2021, addressing the general public and whoever is interested on the project activities, a 5G-VICTORI website was created at the early project stages and is continuously maintained and enriched with content, while at the same time information on the project is provided at a number of permanent partners' webpages (~16 webpages by December 2021). At the same time, a number of 5G-VICTORI social network accounts has been maintained, namely at LinkedIn, Twitter, YouTube (counting 8 5G-VICTORI videos by Dec. 2021), for the purpose of reaching out the general public and professional communities. Communication material was continuously generated and shared also in the form of bi-weekly (or even more frequent) blogposts (~ 32 by Dec. 2021), press releases (~11 by Dec. 2021), and presentations.

Regarding the dissemination activities, despite the impact of the COVID-19 pandemic period in the organisation of dissemination events, 5G-VICTORI had an active participation in industry events and in scientific conferences/ workshops/ summits. Until M30, the 5G-VICTORI consortium had been presented in more than 40 industry events, has organized more than 10 webinars and has published 30 scientific papers within well recognized (IEEE, etc.) conferences or journals. The project adopted the suitable open access practices to make the results more accessible, thus almost all publications are freely available in online repositories.

Last but not least, focusing on the communication activities, partners have participated in a number of webinars, in an attempt to reach out the industry and research communities. A total number of 12 webinars were delivered by **ORO**, **IHP**, **Orange**, **UNIVBRIS**, **IASA** and **ICOM**.

The following sections elaborate more on the additional dissemination and communication activities performed from January 2022 until the end of the project, adhering to the plan presented in Table 3-1.

Table 3-1 Communication and Dissemination Activities (updated) plan for the whole duration of the project

Activity	1st Year				2nd Year				3rd Year				4th Year				5th Year
	M1-M3	M4-M6	M7-M9	M10-M12	M13-M15	M16-M18	M19-M21	M22-M24	M25-M27	M28-M30	M31-M33	M34-M36	M37-M39	M40-M42	M43-M45	M46-M48	M49
Project Website (MS9)	Creation by M4			Maintenance													
Blogposts				Creation of Blogposts													
LinkedIn/ Twitter/ Youtube Accounts	Creation by M7		Maintenance														
Partner Permanents Webpages	Creation by M12			Maintenance & creation of new ones													
Press Releases	Initial Participation - related			Activities - related								Results - related					
EC Communication	Pages Creation			Participation in Networking Events				Participation in Networking Events				Participation in Networking Events					
Logo	Creation																
Presentation	1st Version M4			2nd version M18						Demonstrator - specific versions M36							
Brochure/ Leaflet (MS9)		1st Version															
Poster											1st Version				2nd Version		
Video													Official Videos (official videos per demo site ready by the completion of each demo)				
Participation in Industrial Events		Continuous															
Workshop (MS11)								Workshops Organisation									Project Workshop
Internal Communication								Continuous									
Publications in Journals/ Magazines		Continuous															
Participation in Conferences		Continuous															
Trainings/ Tutorials / Webinars								Continuous									
Monitoring					D5.2					D5.2					D5.3		

3.2 Project Website

The 5G-VICTORI project's public website, available at www.5g-victori-project.eu since November 2019, was developed by **I2CAT** with the support from **IHP**. The website has undergone improvements in its structure, content, and design to address recommendations from the European Commission (EC) and the Reviewers appointed by the EC. Project partners have contributed regularly to the website by publishing 51 articles in the 'News & events' section. These articles are listed in Table 3-2, showcasing the project's progress and achievements as it nears its completion.

Table 3-2 Articles published on 5G-VICTORI website

Publication date	Post
2019-07-30	European 5G-VICTORI Project kick-off in Berlin
2019-11-04	5G-VICTORI contributes to the Fraunhofer FOKUS FUSECO Forum 2019
2020-02-21	User survey – Use of Media in Public Transport
2020-04-23	Track-to-train communication for Enhanced Mobile Broadband under High-Speed Mobility
2020-05-22	Dr.Navid Nikaein (**EUR**) interviewed at I'MTech
2020-05-27	The University of Bristol contributes to 5G-VICTORI's UC #1.2 – Digital Mobility
2020-09-03	Digital Catapult develops a cross-testbed connectivity management platform
2020-09-11	5G-VICTORI at INFOCOM World Conference 2020
2020-09-29	Webinar on 5G Trials in Europe: 5G Experimentation Facilities and Vertical Trials
2020-10-29	ADMIE contribution to 5G-VICTORI's UC # 2: "Digitization of Power Plants"
2020-11-18	A10 Networks interviews Kostas Katsaros (**DCAT**) on Edge Computing, IIoT and Mobile Networks
2020-11-19	5G-VICTORI in Romania
2020-11-30	Orange Romania participates in the 2020 Mosaic5G Virtual Workshop
2020-11-30	Rail Signaling over 5G (**Alstom**)
2020-12-21	Media Services provisioning in Railway Environment
2020-12-28	5G – the internet of people, business and things
2021-02-03	Leveraging 5G at DB Netz
2021-03-24	5G For Optimizing Media Delivery in Mobile Environments by Fraunhofer FOKUS (**FhG**)
2021-03-10	Industry 4.0: Is 5G the right Networking Technology?
2021-04-20	5G Network slicing approach by **i2CAT**
2021-04-29	Media Services in Railway Environments for Onboard Infotainment and enhanced Safety and Security
2021-05-13	5G-VICTORI researchers receive Runners-up Award at IEEE 5G for CAM
2021-05-19	Assessing the services of 5G-VICTORI through a sustainability lens – **IZT** takes on an important green perspective in EU project
2021-05-28	Webinar on "Optical Networking an Enabler for 5G and Beyond" by Anna Tzanakaki
2021-06-04	5G-VICTORI activities at EuCNC & 6G Summit 2021
2021-06-07	Rail Critical Services on the way towards FRMCS
2021-06-17	Enabling virtually unlimited onboard Wi-Fi bandwidth for passengers to stream media, while preserving the vehicles' existing cellular network for other uses

2021-06-18	A closer look at the Digital Mobility Use Case
2021-06-25	5G-VICTORI dissemination activity at the 5G-PPP TB eWorkshop
2021-07-27	UHA's Polaron Engine approved for NVIDIA DLS
2021-11-04	UHA is driving the Future Mobility concept in 5G-VICTORI
2021-12-14	University of Patras (Patras5G) supports the 5G trials of Independent Power Transmission Operator (IPTO – **ADMIE**)
2022-01-31	Zeetta Networks demonstrates their cloud-native multi-domain orchestration solution
2022-02-16	Romania premiere in network infrastructure innovation: the first uRLLC data call on 5G SA
2022-02-25	6th 5G-VICTORI Plenary Meeting
2022-03-04	University of Thessaly Mobility Management Demo
2022-04-29	Fraunhofer FOKUS at NAB Show 2022
2022-05-23	IPTO-ADMIE's participation in the Greek ECESCON-13
2022-05-25	PaxLife presented 5G-VICTORI at IT-Trans 2022
2022-05-31	5G-VICTORI at the 2022 EuCNC & 6G Summit
2022-06-08	5G PPP Test, Measurement and KPIs Validation Working Group announces ICT-52 White Paper on Beyond 5G/6G KPIs and Target Values
2022-06-08	Eurecom and Orange Romania demonstrate an all-in-one 5G SA in a box solution at EuCNC 2022
2022-08-31	Demonstration of a Content Delivery Network (CDN) enabled by mmWave connectivity in a railway environment
2022-10-06	Successful field trial of the Digital Mobility Use Case in Bristol
2022-12-09	Presentation of 5G-VICTORI's Standardization Activities at the IEEE Standards Summit 2022
2023-01-09	5G-VICTORI contributes to 5GPPP's Software Networks WG White Paper on Network Applications
2023-03-27	5G-VICTORI to Showcase Demos at FOKUS Media Web Symposium in June
2023-05-03	5G-VICTORI Technical Meeting and Workshops
2023-06-02	5G-VICTORI participates in EuCNC & 6G Summit 2023
2023-06-14	5G-VICTORI Contribution to 5G PPP TMV White Paper
2023-06-21	Field Trials and Workshop in Greece mark the final milestone for the 5G-VICTORI Project
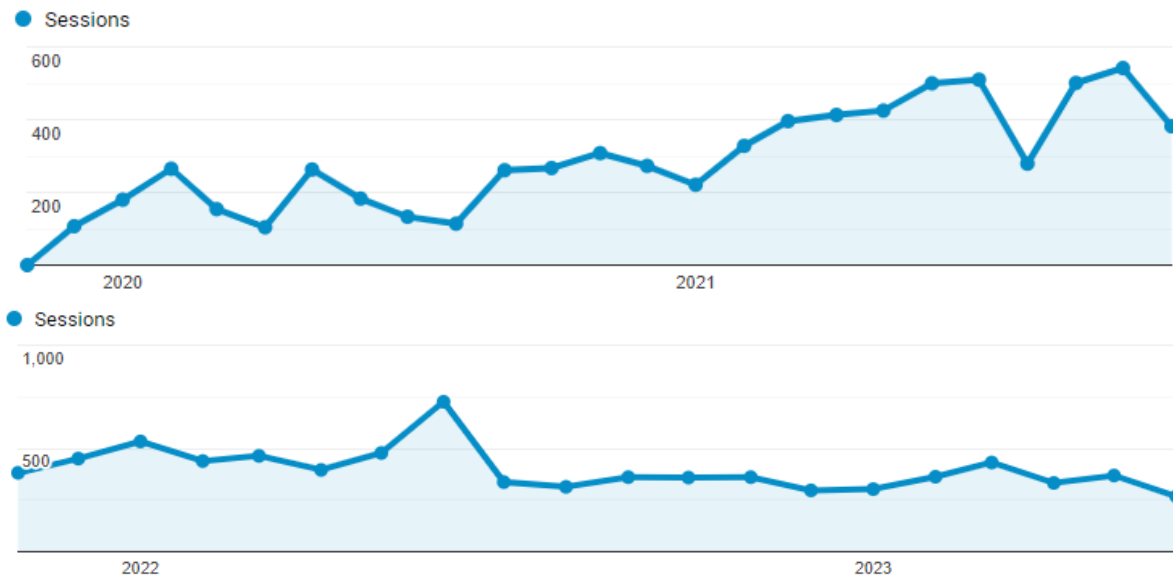
Figure 3-2 5G-VICTORI website monthly traffic (source: Google Analytics)

Figure 3-3 5G-VICTORI Website audience overview for M5-M30 (left) and M31-M49 (right) (source: Google Analytics)

The performance of the website is continuously monitored using Google Analytics, offering valuable metrics on usage, user engagement, and content performance. Based on these metrics, the website's traffic has consistently grown since the start of the project, averaging more than 4000 sessions per year (see Figure 3-2 and Figure 3-3).

The website is planned to be maintained at least throughout the course of the project and for 3 years beyond that. A plan will be agreed as part of project exploitation activities in how to address interest in the website contents, and the maintenance of it beyond the project end.

3.3 Social Media

Throughout the course of the project, dedicated social media channels have played a crucial role in disseminating information about 5G-VICTORI to the target audiences. The project's website has served as the central hub for all communication activities, while social media platforms have been instrumental in maintaining a consistent presence and in fostering interactions with the 5G community. Over time, the enrichment of the material and the continuous presence with news and project updates, and as well as the uptake of platform specific engagement strategies have resulted in a significant increase in engagement and interactions.

LinkedIn (URL: https://www.linkedin.com/company/5gvictori/): To date, the 5G-VICTORI LinkedIn page has accumulated a total of 361 followers. The page remains consistently updated with the latest information regarding project activities, blog posts, and partner dissemination efforts. It serves as a reliable source for regular updates on the project's progress and engages the professional community by providing valuable insights and relevant content. At the same time partners are actively engaged in posting, re-posting and commenting on 5G-VICTORI achievements and news.

Twitter (URL: https://twitter.com/5gvictori): More than 700 users follow the project's Twitter account. The project drives engagement by regularly sharing updates and outcomes, as well as other relevant information for the project community and ecosystem. At the same time partners are actively engaged in posting, re-posting and commenting on 5G-VICTORI achievements and news.

i2CAT continues to maintain and oversee both the LinkedIn and Twitter (X) social media channels. By leveraging the Hootsuite social media management tool, comprehensive metrics have been obtained from these platforms, showcasing the project's remarkable achievement in establishing a loyal and engaged core audience (see Figure 3-4).
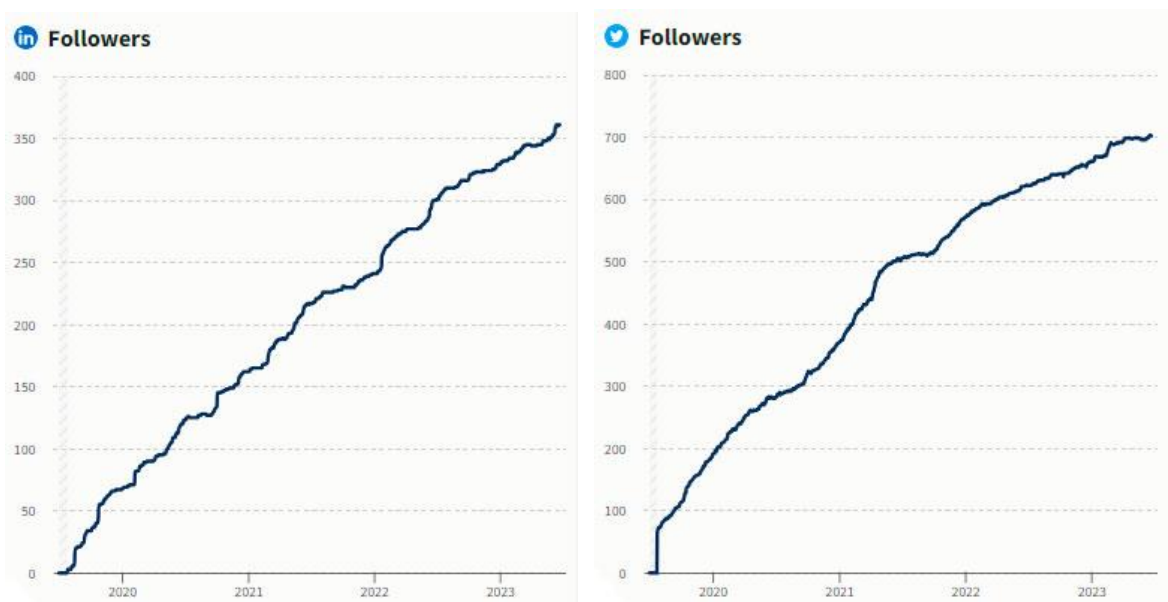
Figure 3-4 5G-VICTORI LinkedIn & Twitter followers

YouTube (https://www.youtube.com/channel/UCEck7riXv0UZm3xiwDhU7sA): **i2CAT** has established a dedicated account managed specifically for the publication of project-produced videos. This channel serves as a platform for hosting and sharing 14 videos created as part of the project's activities (listed in Table 3-3), while 5 additional 5G-VICTORI-produced videos are hosted in partners' YouTube channels. To facilitate accessibility, these videos are also accessible through a "Videos" page that has been added on the project's website. The project's YouTube channel has garnered a total of 572 views, with a cumulative watch time of 13.7 hours, and a community of 41 subscribers. Project partners have also contributed to disseminate the project on social media by sharing relevant information on their corporate channels (see Table 7-1).

Table 3-3 Available videos on 5G-VICTORI's YouTube channel

Title	Link
Youtube Videos in 5G-VICTORI channel	
[5G-VICTORI] Rail Critical Services	https://youtu.be/ZMiGYF9bIQY
[5G-VICTORI] The next level in multi-modal transport	https://youtu.be/GTM9WNhNCAU
5G-VICTORI Data Shower Application for Uninterrupted Video Streaming using Multi-Level vCDN Solution	https://youtu.be/Hq_AOWNek9Y
[5G-VICTORI] Passenger Safety	https://youtu.be/MrCT9bTDJ8M
[5G-VICTORI] P4 based handover management for session continuity in a heterogeneous environment	https://youtu.be/04IwUSOAq_0
5G Network E2E slice deployment using 5G open RAN and Core software components (OpenAirInterface)	https://youtu.be/AXtlFftepS8
[5G-VICTORI] Media streaming services enabled in trains - Concept and Lab test	https://youtu.be/g9MXfMp331g
[5G-VICTORI] 5G-VIOS Operations	https://youtu.be/sOFIt6fZ6hw
Field Trial: Content Delivery Network (CDN) enabled by mmWace connectivity in a railway environment	https://youtu.be/4DlOtnJqTT4
[5G-VICTORI] Future Mobility Demo – 5G Edge Rendering	https://youtu.be/Evb0k4SATgc
[5G-VICTORI] CDN aided-data shower application for uninterrupted video content streaming in railways	https://youtu.be/VeVzQv0JdQo
[5G-VICTORI] Smart Factories: Use Case Analysis & Demos	https://youtu.be/6VTIIAZ25qE
Digital Mobility UC MATI App2:Inter-cluster demo of a 360 live-video streaming (UNIVBRIS - Grenoble)	https://youtu.be/IIlqV6c7B1w
[5G-VICTORI] Greek cluster trials	https://www.youtube.com/watch?v=SsW4GVLdX2o
YouTube Videos in partner's YouTube channels	
5G-VICTORI Project - October 2022 Field Trial (3min video)	https://www.youtube.com/watch?v=aI-DO3Mr2wo
5G-VICTORI Trial October2022 Smart Internet Lab	https://www.youtube.com/watch?v=PCTpQsXjmxY
OpenAirInterface 5G Deployment with Commercial RU - 5G-VICTORI	https://www.youtube.com/watch?v=dLetUkUk5Sk
5G-VICTORI Project October 2022 Field Trial (8min) includes interviews from Bristol cluster partners	https://www.youtube.com/watch?v=S2r6Nzu4YoE
ZF Tech Day 18.07.2022 - Ziarul Financiar Official channel	https://www.youtube.com/watch?v=-nePoG9CbMk&list=PL6Fh7cOhNKpgGKk-PZKvO29LGvLZPy6WY&index=8

The project's social networks accounts will be maintained at least throughout the course of the project and for 3 years beyond that. A plan will be agreed as part of the project exploitation

activities on how to address interest in 5G-VICTORI exposed/expressed through these channels, as well as on how they will be maintained beyond the project end.

3.4 Partners' Permanent Webpages

Even from the very beginning of the project a number of partners' websites host – on a permanent basis – information on 5G-VICTORI along with links to the official channels. Until January 2022 we counted 13 partners' 5G-VICTORI dedicated webpages by (as in [2]):

1. IHP (https://www.ihp-microelectronics.com/research/communication-and-embedded-system-architectures/projects/5g-victori),

2. UNIVBRIS (http://www.bris.ac.uk/engineering/research/hpn/projects/5g-victori/),

3. FhG (https://www.fokus.fraunhofer.de/en/fame/projects/5g-victori and https://www.fokus.fraunhofer.de/en/ngni/projects/5gvictori),

4. COSM (https://www.cosmote.gr/cs/otegroup/en/5g_victori.html),

5. I2CAT (https://www.i2cat.net/projects/5g-victori/),

6. RBB (https://www.rbb-online.de/en/unternehmen/der_rbb/profil/innovationsprojekte/projekte/5g-victori/),

7. DCAT (https://www.digicatapult.org.uk/how-we-can-help/what-we-

8. ORO (https://5glab.orange.ro/en/5g-research-projects/),

9. offer/programme/5g-victori/),

10. ICOM (http://www.intracom-telecom.com/en/company/profile/rnd/5gNetworks.htm),

11. ADMIE (https://www.admie.gr/en/company/structure/general-department-activities/research-technology-and-development-department/5g-victori (EN & GR) and https://www.admie.gr/kainotomia/erga-ereunas-kai-anaptiksis/5g-victory (GR))

12. IZT (https://www.izt.de/themen/view/project/5g_victori/ (DE))

13. IRT (https://www.irt.de/en/research/media-services-and-application/5g-victori/ (online for as long as IRT maintained its business activities))

14. MATI (https://www.mativision.com/a-closer-look-to-mativisions-applications-in-5g-victori/)

15. Paxlife (In Paxlife's news & events webpage: https://www.paxlife.aero/news-events/ and also in Paxlife Brochure for 2021 https://www.paxlife.aero/wp-content/uploads/2021/10/Paxlife-Brochure-2021-low.pdf)

16. TRA (In Trainose's online reporting: https://www.trainose.gr/wp-content/uploads/2021/05/31_12_20_Trainose_FS_with_auditors_report.pdf)

The number kept growing and by the end of the project we count 22 partners' 5G-VICTORI dedicated websites (out of 26 partners in total), as well as additional webpages referencing 5G-VICTORI. A list with the additional web-pages (since January 2022) is included in Table 3-4.

Table 3-4 Permanent 5G-VICTORI webpages in partners' websites.

Partner Website	Website	Indicative preview
UTH	https://ee.uth.gr/en/project-detail/6121	
UoP	http://nam.ece.upatras.gr/	
ZN	https://zeetta.com/customers/enterprise/5g-victori/	
KCC	https://www.kontron.com/ktrdn/critical-communication	

UHA	https://urbanhawk.space/
UXBerlin	https://www.uxberlin.com/sustainable-5g-business-models/

3.5 Press Releases

Local press is another significant communication channel to disseminate the project work and outcomes. 5G-VICTORI communication activities plan foresees the issuing of a number of press releases by project partners (especially industrial ones) for communicating project activities especially to the demonstrations'-related countries/markets, namely – not restrictively though – to Germany, Greece, Romania and UK. Until January 2022, 11 press releases were issued (by **IHP**, 3 by **ORO**, 2 by **UHA**, **ZN**, **UoP**, 3 by **FhG**), as reported in [2], and channelled to appear in a number of local electronic and printed media. Adding the 6 press releases published during last project phases a total of 20 press releases have been issued (and two are planned for publication) as listed in Table 3-5.

Table 3-5 Press Releases issued by 5G-VICTORI Partners.

Partner	Press Release Title & URL	Issued on
IHP	IHP's essential participation in developing high performance 5G wireless technologies Third Horizon 2020 EU-project within the 5G-framework coordinated by IHP https://www.ihp-microelectronics.com/uploads/media/PM_2019-04-24_5G-Projects_eng.pdf	April, 24, 2019
ZN	Zeetta Networks Joins 5G-VICTORI Project https://zeetta.com/2019/05/01/zeetta-networks-joins-5g-victori-project/	May 1, 2019
IHP	High-speed connectivity everywhere: IHP coordinates project on large scale test of 5G mobile networks https://www.ihp-microelectronics.com/fileadmin/user_upload/PM_2019-07-02_5G-VICTORI_eng.pdf	July 2, 2019

FhG	European 5G-VICTORI Project kick-off in Berlin https://www.fokus.fraunhofer.de/en/ngni/news/5Gvictori_2019_07	July 30, 2019
UoP	European 5G-VICTORI Project kick-off in Berlin: Large scale trials for Railway, Energy, Media and Factories of the Future planned http://nam.ece.upatras.gr/index.php?q=node/71	July, 2019
FhG	New EU project on 5G started https://www.fokus.fraunhofer.de/en/fame/news/5gvictori	August 2, 2019
ORO	Orange's first commercial 5G network launched in Romania https://www.orange.com/en/Press-Room/press-releases/press-releases-2019/Orange-s-first-commercial-5G-network-launched-in-Romania (To appear also in UHA website in: https://urbanhawk.space/News/)	November 5, 2019
FhG	5G Media Streaming at FUSECO Forum https://www.fokus.fraunhofer.de/en/fame/news/5G-Fuseco	November 11, 2019
UHA	The University of Bristol contributes to 5G-VICTORI's Use Case #1.2 – Digital Mobility	5G-VICTORI https://urbanhawk.space/News/	May 27, 2020
UXBerlin	Sustainable 5G Business Models https://www.uxberlin.com/sustainable-5g-business-models-2/	October 10, 2020
UHA	5G-VICTORI Use Cases in Alba Iulia, Romania https://urbanhawk.space/News/	November 19, 2020
ORO	5G Victori extends smart city pilot project in Romanian city Alba Iulia https://www.telecompaper.com/news/5g-victori-extends-smart-city-pilot-project-in-romanian-city-alba-iulia--1362884	November 23, 2020
ORO	5G – internetul oamenilor, al afacerilor şi al lucrurilor https://www.zf.ro/info/p-5g-internetul-oamenilor-al-afacerilor-si-al-lucrurilor-19789910 (RO)	December 17, 2020
UXBerlin	5G Sustainable Business Modeling https://www.uxberlin.com/5g-sustainable-business-modeling/	April 23, 2021
UXBerlin	Process For Sustainable Business Modelling https://www.uxberlin.com/process_for_sustainable_business_modelling/	November 1, 2021
Paxlife	5G & Caching Technology in-Vehicle Will Enable Seamless Streaming Media On-board https://www.paxlife.aero/wp-content/uploads/2021/12/Railway-News-Magazine-Issue-5-2021-PAXLIFE-V2.pdf	December 2021
I2CAT	i2CAT Foundation strengthens its presence at the European Conference on Networks and Communications (EuCNC) and the 6G Summit https://i2cat.net/i2cat-foundation-strengthens-its-presence-at-the-european-conference-on-networks-and-communications-eucnc-and-the-6g-summit/	June 13, 2022
Train & Rail - Paxlife	5G Victori - Demonstration of a Content Delivery Network (CDN) enabled by mmWave connectivity in a railway environment https://www.trainrail.se/2023/digital-stands/paxlife-innovations/pressreleaselist/5g-victori-?sc_lang=en	August 31, 2022

UXBerlin	Modellierung Nachhaltiger 5G Ökosysteme (GE) https://www.uxberlin.com/de/sustainable-5g-ecosystem-modelling/ & Sustainable 5G Ecosystem Modelling (EN) https://www.uxberlin.com/sustainable-5g-ecosystem-modelling/	September 27, 2022
ORO	Rețeaua Orange 5G în intersecții inteligente, navigație portuară și în multiple utilizări de business https://www.agerpres.ro/ots/2023/05/11/reteaua-orange-5g-in-intersectii-inteligente-navigatie-portuara-si-in-multiple-utilizari-de-business--650387 & Orange 5G network in smart intersections, port navigation and other business applications https://newsroom.orange.ro/blog/reteaua-orange-5g-in-intersectii-inteligente-navigatie-portuara-si-in-multiple-utilizari-de-business/	May 11, 2023
Paxlife	Final Press Release for 5G-VICTORI Project end	Expected September 2023

It shall be noted that additional activities have been performed by the aforementioned and other partners towards spreading out news and information on the involvement of partners in 5G-VICTORI. These activities include: posting in the newsrooms, referring to 5G-VICTORI in partners' sustainability reports, cross-referencing 5G-VICTORI in public events and so on. Although these activities are not strictly classified as "Press Releases", they have an equally significant impact for two reasons: 1. they address the same target audiences and 2. nowadays, the main communication channels are the online websites. Among them we can highlight the following:

- The podcast by Prof. Henning Breuer (**UXBerlin**) Advancing Sustainable Solutions: "Sustainable Business Model Design – Patterns to Make Sustainability Work" (URL: https://soundcloud.com/iiieepodcast/sustainable-business-model-design-patterns) released on May 29, 2022.

- **ORO** and **AIM** partners and the Project Coordinator Teran Jesus Gutierrez participated in an online discussion co-organised by **ORO** and Ziarul Financiar (ZF Tech Day 18.07.2022). Ziarul Financiar is a daily financial newspaper published in Bucharest, Romania.

- **DCAT** published two blogposts in a broadly-read technology blog –medium.com-: one on October 10th, 2022 entitled « DevOps-ing (or Automating) the mobile network management» (URL: https://medium.com/@DigiCatapult/devops-ing-or-automating-the-mobile-network-management-ffea73a730fe), and one December 7th, 2022 entitled «Tackling the challenges of inter-domain orchestration of 5G network slices» (URL: https://medium.com/@DigiCatapult/tackling-the-challenges-of-inter-domain-orchestration-of-5g-network-slices-b7969f6d12e8).

3.6   EC Communication

For the purposes of maximising visibility in EC's research community as well as the whole European research and market segments, the EC supported communication mechanisms

have been utilized since the early stages of the project. In particular, project information is available on the official EC sites such as the collective 5G-PPP projects' site under https://5g-ppp.eu/5g-victori/, and CORDIS under https://cordis.europa.eu/project/rcn/223637/en.

Such communication activities are also linked to the 5G-PPP liaison activities of Task 5.4, which are presented in detail in Section 4.

3.7 Participation in Industry Events

The participation to targeted industry events was put on the focus of 5G-VICTORI communication activities. It should be stressed that usually industry events are Exhibitions requiring on-site participations, thus they have been highly affected by the pandemic situation during the project lifetime. However, the project partners have sought opportunities to participate in virtual events, on-line talks and hybrid events, and have seized the opportunities to participate in on-site events during the last project period. The activities performed until January 2022 have been reported in [2] as: participation in 17 events in 2019, in 18 events in 2020, and in 12 events in 2021. The project activities of the latest period are listed in Table 3-6.

Table 3-6 Participation in Industry Events by 5G-VICTORI Partners.

#	Partner	Communication Event – Title of presentation	Date of Event	Location	Type of action (e.g. presentation, talk, exhibition, etc.)
2022					
1	FhG	Mobile World Congress 2022	Feb. 28- Mar.3, 2022	Barcelona, Spain	Booth
2	ADMIE	"5G Integration in the Future Power Systems" workshop at the 13th Greek Electrical and Computer Engineering Students Conference (ECESCON 13)	April, 2022	Patras, Greece	Presentation
3	PXI	IT-Trans 2022	May 10-12, 2022	Karlsruhe, Germany	Booth and one Presentation
4	FhG	National Broadcasters Show, NAB 2022	April 24-27, 2022	Las Vegas, USA	Booth
5	Alstom	UITP SUG - The International Association of Public Transport, Spectrum User Group, "5G-VICTORI 5G clusters and demos"	June 6-10, 2022	Periodic Online Meetings	Talk
6	Alstom	European Conference on Networks and Communications – EUCNC 2022, "Rail Signaling with QoS and potentially Network Slicing"	June 6-10, 2022	Grenoble, France	Poster, presentation
7	UTH	EuCNC 2022 (European Conference on Networks and Communications), Demonstration of Mobility Management for the rail use case	June 6-10, 2022	Grenoble, France	Poster, presentation
8	Project	European Conference on Networks and Communications – EUCNC 2022	June 6-10, 2022	Grenoble, France	Booth, videos, demos
9	KCC	IoT Week 2022 Dublin, "5G-VICTORI and Cross-Border Corridors: 5G for Connected and Autom. Mobility 3"	June 20-23, 2022	Dublin, Ireland	Presentation/talk
10	FhG	9th FOKUS Media Web Symposium 2022	June 20-24, 2022	Berlin, Germany	Workshop & Special Session & demos- Workshop entitled: 5G Media - Best Practice, Standards, Technologies
11	RBB	9th FOKUS Media Web Symposium 2022, "5G Media - Best Practice, Standards, Technology"	June 20-24, 2022	Berlin, Germany	Presentation/ talk/ demo
12	PXI	9th FOKUS Media Web Symposium 2022, "" CDN enabled by mmWave connectivity in a railway environment, Stefan Schinkel, Paxlife Innovations""	June 20-24, 2022	Berlin, Germany	Presentation
13	FhG	International Broadcasting Convention 2022	September 9-12, 2022	Amsterdam, Netherlands	Booth

#	Partner	Communication Event – Title of presentation	Date of Event	Location	Type of action (e.g. presentation, talk, exhibition, etc.)
14	PXI	Innotrans 2022	September 20-23 2022	Berlin, Germany	Booth and one Presentation
15	KCC	Innotrans 2022, "MCx and FRMCS"	September 20-23 2022	Berlin, Germany	Presentation
16	UXBERLIN	Panel by Bits und Bäume: "Transformative Business Models and the Socio-Ecological Transformation" (URL: https://media.ccc.de/v/bitsundbaeume-22420--b-b-panel-transformative-business-models-and-the-socio-ecological-transformation-en-)	October 2, 2022	Germany	Talk
17	KCC	Railway User Group, "Kontron & research projects"	October 19-21 2022	Venna, Austria	Presentation
18	PXI	World Passenger Festival 2022	November 2022	Amsterdam, The Netherlands	Booth
19	ADMIE	Infocom World 2022, "5G-VICTORI: Transforming Power Utilities into Smart Factories"	November 29, 2022	Athens, Greece	Presentation
20	DCAT	IEEE Conference on Standards for Communications and Networking	November 30, 2022	Thessloniki, Greece	Presentation
2023					
21	FhG	Mobile World Congress 2023	Feb. 27- Mar.2, 2023	Barcelona, Spain	Booth
22	PXI	Train and Rail 2023	April 25-27, 2023	Stockholm, Sweden	Booth
23	FhG	National Broadcasters Show, NAB 2022	April 24-27, 2022	Las Vegas, USA	Booth
24	ICOM	SIRESP TechDays 2023, "Surveillance and Protection of Critical Infrastructures"	May 31- June 2, 2023	Amadora, Lisbon, Portugal	Presentation / Talk
25	PXI	UITP Global Public Transport Summit 2023	June 4-7, 2023	Barcelona, Spain	Booth
26	Project	European Conference on Networks and Communications – EuCNC 2023	June 6-9, 2023	Gothenburg, Sweden	Booth, videos, demos
27	KCC	UIC global FRMCS conference 2023, "FRMCS & Kontron"	June 7-8 2023	Paris, France	Presentation
28	FhG	10th FOKUS Media Web Symposium 2023	June 13-14, 2023	Berlin, Germany	Organisation of Conference & Workshop entitled: 5G Media - Best Practice, Standards, Technologies
29	KCC	Rail State Authority Presentation Cycle, "MCx communication system for railways"	June 20, 2023	Karlstadt, Germany	Presentation/ Talk

#	Partner	Communication Event – Title of presentation	Date of Event	Location	Type of action *(e.g. presentation, talk, exhibition, etc.)*
30	PXI	World Passenger Festival 2023	(planned) October 2023	Vienna, Austria	Booth
31	PXI	National Public Transport Meeting 2023	(planned) October 2023	Clermont-Ferrand, France	Booth
32	UoP	EEE IoT World Forum, 5G for CAM Industry Forum, "The Final 5G-VICTORI Rail Field Trial in Patras Greece"	(planned) October 2023	Aveiro, Portugal	Presentation

3.8 Scientific Dissemination

Even from the early stages of the project partners have seized opportunities to reach out the research community with early results of their work performed in the context of 5G-VICTORI. Until present a significant number of publications focusing on 5G-VICTORI work have been presented at Conferences and published at Journals. Until January 2022 30 papers were published either in Conferences or in Journals as reported in [2]. The additional scientific publications reported in the last project period are summarised in Table 3-7.

5G-VICTORI is making use of the Zenodo platform developed by the OpenAIRE project (https://zenodo.org/communities/5g-victori) to keep track of the scientific papers.

In addition, in the list of 12 webinars performed until December 2021, two more were added as follows:

- A. Tzanakaki participated in 5G-SOLUTIONS Seminar with a presentation entitled "Co-creation for 5G solutions in Industry and Media", on November 15, 2022.

- Anna Tzanakaki participated in a the 5G Blitz Week online webinar, with a presentation entitled "Connecting the 5G Ecosystem: Xhaul Innovations & Technology", on March 23, 2023.

Moreover, **FhG** organised two trainings in the context of 9th FOKUS Media Web Symposium (MWS) 2022 and 10th FOKUS MWS 2023, both years entitled 5G Media – Standards and Technologies. More information on the contents and thematic of the trainings can be found under: https://www.fokus.fraunhofer.de/go/mws/tutorials#Content-19f83a86.

Table 3-7 Scientific Paper Publications in Scientific Conferences and Journals.

#	Authors	Title	Conference/Journal	Date	DOI & Relevant Links
1	Julia Kenyon, Thomas Stockhammer, Ali C. Begen, Ofer Shem Tov, Louay Bassbouss, and Daniel Silhavy	Marrying WebRTC and DASH for interactive streaming	MHV '22: Proceedings of the 1st Mile-High Video Conference	March 2022	https://doi.org/10.1145/3510450.3517296
2	Christoph Mueller; Louay Bassbouss; Stefan Pham; Stephan Steglich; Sven Wischnowsky; Peter Pogrzeba; Thomas Buchholz;	Context-aware video encoding as a network-based media processing (NBMP) workflow	MMSys 2022 - Proceedings of the 13th ACM Multimedia Systems Conference	June 2022	https://doi.org/10.1145/3524273.3533250
3	A. Tzanakaki, M. Anastasopoulos	Combining Edge and Central Cloud Compute: An Enabler for 6G Services	Workshop on "The role of optical network for split computing between edge and cloud in support of ultra low latency services", European Conference on Optical Communications (ECOC)	September 18, 2022	
4	Louay Bassbouss; Ali C Begen; Daniel Silhavy; Omar Sherif Gamal Atti; Julia Kenyon; Ofer Shem Tov; Jonas Birmé	Streamlining WebRTC and DASH for near-real-time media delivery	SMPTE 2022 Media Technology Summi	October 2022	https://doi.org/10.5594/M001961
5	Ilias Syrigos; Nikolaos Angelopoulos; Thanasis Korakis	Optimization of Execution for Machine Learning Applications in the Computing Continuum	2022 IEEE Conference on Standards for Communications and Networking (CSCN)	28-30 November 2022	10.1109/CSCN57023.2022.10051070
6	Ilias Syrigos; Dimitris Syrivelis; Thanasis Korakis	On the Implementation of a Software-Defined Memory Control Plane for Disaggregated Datacenters	2022 IEEE 11th International Conference on Cloud Networking (CloudNet)	07-10 November 2022	https://ieeexplore.ieee.org/abstract/document/9978885
7	P. Georgiadis, M. Anastasopoulos, A.-I. Manolopoulos, V.-M. Alevizaki, N. Nikaein, A. Tzanakaki	Demonstration of Energy Efficient Optimization in Beyond 5G Systems supported by Optical Transport Networks	Optical Fiber Communications (OFC) 2023	March 2023	Not available yet
8	Marius Corici; Fabian Eichhorn; Eric Troudt; Florian Schreiner; Thomas Magedanz	A 6G RAN-Core Control Plane Convergence Framework	2023 26th Conference on Innovation in Clouds, Internet and Networks and Workshops (ICIN)	March 2023	10.1109/icin56760.2023.10073488
9	Pratchaya Jaisudthi, Shadi Moazzeni, Xenofon Vasilakos, Reza Nejabati, and Dimitra Simeonidou	i-profiler: Towards multi-objective autonomous vnf profiling with reinforcement learning	Proc. IEEE INFOCOM 2023 - IEEE Conference on Computer Communications Workshops (The Fifth International Workshop on Intelligent Cloud Computing and Networking (ICCN)), 2023	17-20 May 2023	https://research-information.bris.ac.uk/en/publications/i-profiler-towards-multi-objective-autonomous-vnf-profiling-with-
10	Juan M. Parra-Ullauri, Luis F. Gonzalez, Anderson Bravalheri, Rasheed Hussain, Xenofon Vasilakos, Ivan Vidal, Francisco Valera, Reza Nejabati, and Dimitra Simeonidou	Privacy Preservation in Kubernetes-based Federated Learning: A Networking Approach	To appear in Proc. IEEE INFOCOM 2023 - IEEE Conference on Computer Communications Workshops (The 2023 International Workshop on AI-Driven Trustworthy, Secure, and Privacy-Preserving Computing (AidTSP 2023)), Accepted Manuscript.	17-20 May 2023	https://research-information.bris.ac.uk/en/publications/privacy-preservation-in-kubernetes-based-federated-learning-a-net
11	Dynamic CDN Switching - DASH-IF Content Steering in dash.js	Daniel Silhavy; Will Law; Stefan Pham; Ali C. Begen; Alex Giladi; Alex Balk	MHV '23: Proceedings of the 2nd Mile-High Video Conference	May 2023	10.1145/3588444.3591027

12	Common Media Server Data (CMSD) – Update on Implementations and Validation of Key Use Cases	Stefan Pham; Will Law; Ali C. Begen; Daniel Silhavy; Bertrand Berthelot; Stefan Arbanowski; Stephan Steglich;	MHV '23: Proceedings of the 2nd Mile-High Video Conference	May 2023	https://doi.org/10.1145/3588444.3591031
13	Markos Anastasopoulos, Anna Tzanakaki, Alexandros Dalkalitsis, Petros Arvanitis, Panagiotis Tsiakas, Zacharias Paterakis and Georgios Roumeliotis	Design, development and field trial evaluation of an Intelligent Asset Management System for Railway Networks	AI2023 - 7th International Congress and Workshop on Industrial AI and eMaintenance	13-15, June, 2023	Not available yet
14	A. Tzanakaki, M. Anastasopoulos	AI-assisted 5G systems supporting rail services	IPIC 2023 - 9th International Physical Internet Conference Expanding the Logistics Scope	13-15, June, 2023	Not available yet
15	Ioanna Mesogiti, Eleni Theodoropoulou, Fotini Setaki & George Lyberopoulos, Konstantinos Stamatis, Panteleimon Konstantinos Chartsias, Nikos Makris, Paris Flegkas, Jesús Gutiérrez, Christina Politi, Christos Tranoris, Christina Politi, Christos Tranoris	Techno-economic Analysis Highlighting Aspects of 5G Network Deployments at Railway Environments	AIAI 2023 IFIP WG 12.5 International Workshop, Proceedings by Springer, Part of the IFIP Advances in Information and Communication Technology book series (IFIPAICT,volume 677)	14-17 June, 2023	https://doi.org/10.1007/978-3-031-34171-7_11,
16	Maria-Evgenia Xezonaki, N. Psaromanolakis, P. Konstantinos Chartsias, Konstantinos Stamatis, Dimitrios Kritharidis, Vasileios Theodorou, Christina Politi, Panagiotis Papaioannou, Christos Tranoris, Spyros Denazis, Ioanna Mesogiti, Eleni Theodoropoulou, Fotini Setaki, George Lyberopoulos, Nikos Makris, Paris Flegkas, Jesus Gutierrez Teran, Markos Anastassopoulos & Anna Tzanakaki	Media Services in Dense, Static and Mobile Environments Leveraging Edge Deployments	AIAI 2023 IFIP WG 12.5 International Workshop, Proceedings by Springer, Part of the IFIP Advances in Information and Communication Technology book series (IFIPAICT,volume 677)	14-17 June, 2023	https://doi.org/10.1007/978-3-031-34171-7_5
17	Miguel Catalan-Cid, Adriana Fernández-Fernández, Daniel Camps-Mur, Shuaib Siddiqui	i2Slicer: Enabling Flexible and Automated Orchestration of 5G SA End-to-End Network Slices	2023 IEEE Conference on Network Function Virtualization and Software Defined Networks (NFV-SDN)	2023	Under review
18-J	Alexandros-Ioannis Manolopoulos, Markos P. Anastasopoulos, Victoria-Maria Alevizaki, Anna Tzanakaki	Optimal Service Provisioning in Mobile 5G and Beyond Systems	IEEE Transactions on Services Computing	2023	https://doi.org/10.1109/TSC.2022.3225011
19-J	Viktoria-Maria Alevizaki, Markos Anastasopoulos, Alexandros-Ioannis Manolopoulos, Anna Tzanakaki	Distributed Service Provisioning for Disaggregated 6G Network Infrastructures	IEEE Transactions on Network and Service Management	2023	https://doi.org/10.1109/TNSM.2022.3211097
20-J	Daniel Silhavy; Klaus Kühnhammer; Johann Mika; Thomas Stockhammer; Jordi J. Gimenez	5G-MAG (Media Action Group) Reference Tools: Putting 5G in Action for Media	SMPTE Motion Imaging Journal	2023	https://doi.org/10.5594/JMI.2022.3220794
21-J	Nasim Ferdosian, Shadi Moazzeni, Pratchaya Jaisudthi, Yifei Ren, Himanshu Agrawl, Dimitra Simeonidou, Reza Nejabati	Autonomous Intelligent VNF Profiling for Future Intelligent Network Orchestration	IEEE Transactions on Machine Learning in Communications and Networking	2023	Not available yet, status: accepted, under proof-reading stage
22-J	P. Papaioannou, N. Tzanis, CT Politi, C Tranoris, A Birbas, S Denazis	5G private networks enabling vertical industries	IEEE Network Journal	2023	Under submission

23-J	Representatives from UNIVBRIS, DCAT, i2CAT, MATI	On 4G-VIOS & MATI's application Deployment	IEEE Computer Networks Journal	2023	Under preparation
18	A. Tzanakaki, A. Manolopoulos, M. Anastasopoulos and V. Alevizaki	Optimized and dynamic resource provisioning in AI assisted 6G networks	IEEE Future Networks World Forum, SYMPOSIUM ON FUTURE OPTICAL NETWORKS AND COMMUNICATIONS	November 2023	Submitted
19	A. Tzanakaki and M. Anastasopoulos	An Advanced Railway Management System Supported by 5G and Artificial Intelligence Technologies	IEEE Future Networks World Forum, SYMPOSIUM ON FUTURE OPTICAL NETWORKS AND COMMUNICATIONS	November 2023	Submitted

3.9 Participation on Key Events and Organisation of Workshops

The 5G-VICTORI dissemination activities plan outlined that at least one 5G-VICTORI Workshop and/or educational exhibitions open to various stakeholders/vertical industries' representatives would be organised. Going beyond this minimum project obligation, 5G-VICTORI partners seized opportunities and organised of a number of workshops and participated in exhibitions and events with booths throughout the project lifetime.

More specifically, in 2021 (as reported in [2]) the project organized two workshops: namely the Workshop "Large scale 5G Trials in support of high-performance vertical industries" in IEEE MeditCom 2021, by **IASA**, **IHP** and **UoP**, and the "6th Workshop on 5G – Putting Intelligence to the Network Edge (5G-PINE 2021)" (co-organised with along with other EU funded projects), AIAI 2021 17th International Conference on Artificial Intelligence Applications and Innovations (along with 5G-DRIVE, MOTOR5G and Smart5Grid projects), by **COSM**, **IASA**, **IHP**.

In 2022, 5G-VICTORI participated to EuCNC 2022 & 6G Summit with a booth, where a number of demos was shown, such as:

- 5G SA OAI implementation, where 5G SA RAN and Core implementation and performance was presented by **ORO** / **Orange** & **EUR**. The setup presented was highlighted as 1st 5G SA implementation of 5G OAI software tools in real live environment, evaluated within the media UC.

- 5G-VIOS was demonstrated by **DCAT**, and

- A live demonstration of Bristol cluster with **MATI** Apps 1 and 2 supported by **UNIVBRIS**.

- A video presentation of the Energy & Factories of the Future use case by **ADMIE**, showcasing also the **ICOM** backhaul network deployment.

Figure 3-5 5G-VICTORI booth at EuCNC 2022

Regarding 5G-VICTORI dissemination in Media-domain events, one of the most important activities has been **FhG** (on behalf of 5G-VICTORI) participation in the 9th FOKUS MWS. MWS is an event of high impact in the media domain, with over 200 participants (on site), 60 speakers, 26 countries, 4 tutorials, 4 workshops and, 4 conference sessions. 5G-VICTORI participated with a 5G Tutorial, a Workshop (with 5GV Talk) as well as with a Conference Session. Moreover, three demos where shown at **FhG** booth:

- The 5G-VICTORI CDN enabled by 5G mmWave connectivity in a railway environment.

- The Berlin cluster 5G Media Testbed was presented as a playground for media services over 5G.

- 5G-MAG Reference Tools: Building the 5G Media Distribution Platform.

Figure 3-6 5G-VICTORI presence at 9ᵗʰ FOCUS Media Web Symposium MWS

Figure 3-7 5G-VICTORI demos at 9ᵗʰ FOCUS Media Web Symposium MWS

Similarly, the 10ᵗʰ FOKUS Media Web Symposium (MWS) 2023 was organized by 5G-VICTORI project partner FhG in June 2023, Berlin. As one of the partners of the 5G-VICTORI project, FhG showcased project demos during the symposium, including the 5G Edge Rendering and Streaming Demo. The demos revealed how the project combines the power of edge computing and 5G networks to render and stream high-quality videos in real-time.
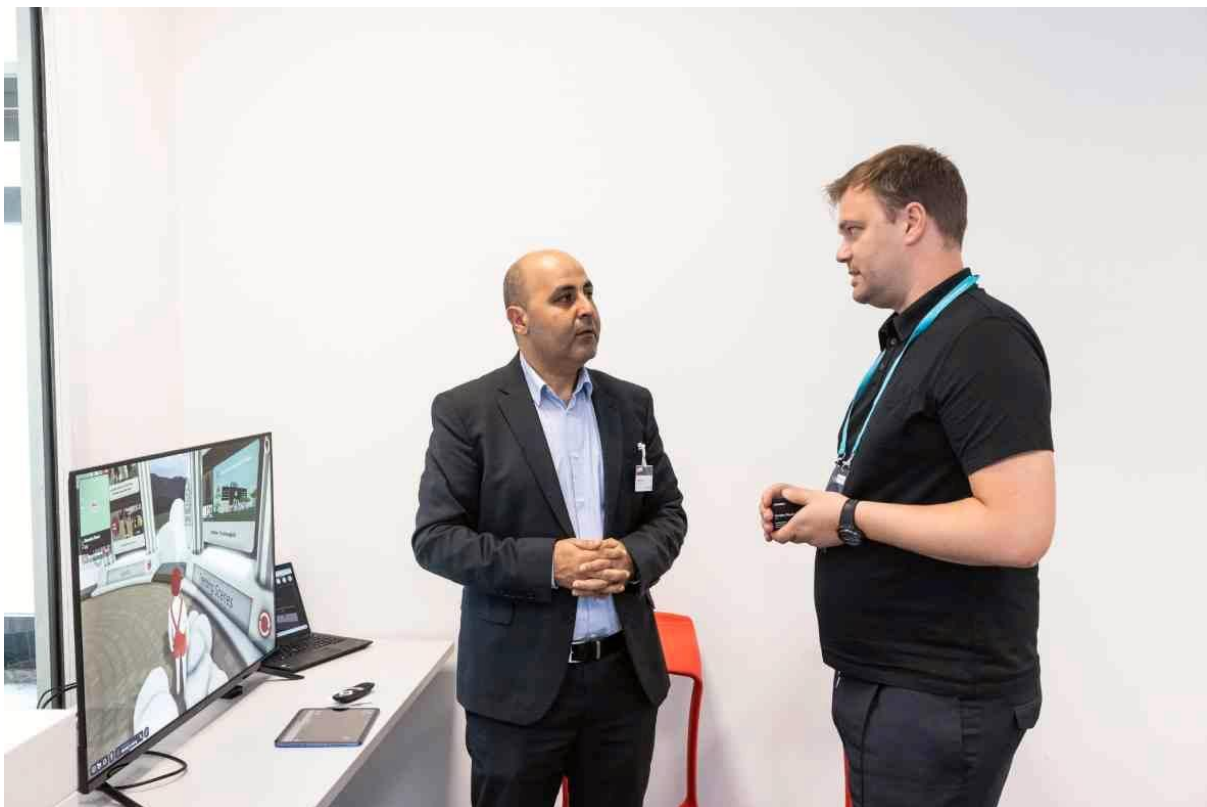
Figure 3-8 5G-VICTORI demos at 10ᵗʰ FOCUS Media Web Symposium MWS | © Fraunhofer FOKUS / Paul Hahn

Considering dissemination in transportation related events, among the project activities we distinguish the participation of PaxLife Innovations (**PXI**) in:

- the International conference and exhibition on IT solutions for Public Transport (May 2022 in Karlsruhe, Germany), where **PXI** maintained a booth and Ralf Cabos, PXI CEO, had a presentation slot at the Conference Workshop Session focusing on "Building future mobility with 5G and Telecommunications" on how to meet the demand for streaming media apps onboard rail

- in InnoTrans 2022 with a booth and a presentation during a business session on EU research rail projects organised by the Berlin-Brandenburg joint booth: "how to leverage on 5G & CDN architecture to meet the demand for streaming media apps onboard rail"

- in the World Passenger Festival 2022 with a booth, and, finally

- in TR – Train & Rail 2023 in Stockholm with a booth.

Figure 3-9 5G-VICTORI presence at International conference and exhibition on IT solutions for Public Transport 2022

Figure 3-10 5G-VICTORI presence at InnoTrans 2022

Figure 3-11 5G-VICTORI presence at World Passenger Festival 2022

Considering the Factories of the Future domain, **DCAT** participated – on behalf of 5G-VICTORI- in the 5G Factory of the Future (5GFoF) final event, where the company maintained a booth, focusing on 5G-VIOS.

Figure 3-12 5G-VICTORI presence at 5G Factory of the Future (5GFoF) final event

5G-VICTORI also had significant presence at EuCNC & 6G Summit 2023, taking place in Gothenburg, Sweden. The project had a dedicated booth in the exhibition area where a series of demos was showcased, demonstrating how open and multi-technology 5G infrastructures can be exploited in support of vertical industry requirements and services. Visitors to 5G-VICTORI's booth had the opportunity to get informed on the capabilities and the demo

activities performed in the four different 5G-VICTORI experimental 5G infrastructures distributed across Europe (Greece, Germany, Romania and the United Kingdom). In particular, the following demos were presented at the booth (see the booth in the following photos):

- A CDN demo enabled by mmWave connectivity in a railway environment– involving tests in a Deutsche Bahn depot in Berlin where "data showers" with large sets of media assets, enabled by mmWave comms (60 GHz), are synchronized to the train @ 50 km/h.

- Immersive media and VR services and VR Multicamera Live Streaming of a tour in Bristol city centre using 5G.

- The 5G-VICTORI Operation System with focus on visualising the monitoring metrics through the VIOS monitoring and the alerting system, provided by the VIOS Profiling.

- Mission-Critical services over a 5G cellular network, emulating rail signaling, CCTV, sensor data and telephony.

- 5G Network-in-Box solution and its use-cases such as standalone private 5G network or 5G coverage extension.

- 5G Edge Rendering enabling Digital Mobility, showcasing a digital mobility application utilising 5G Edge Computing and ultra-low latency capabilities to render complex 3D applications developed in graphics engines like Unity in headless mode on 5G Edges and stream the graphical output to 5G UEs using open standards such as WebRTC. The digital mobility application integrated a high-fidelity 3D scan of Berlin central station taken by UHA.

Figure 3-13 5G-VICTORI presence at EuCNC 2023

Last but not least, on June 28th, 2023, the final 5G-VICTORI workshop dedicated to 5G and vertical industries took place the National and Kapodistrian University of Athens, in Athens, Greece. The workshop was organised by the 5G-VICTORI TM, Prof. Anna Tzanakaki, and it was entitled "5G adoption: an enabler for vertical industries". The agenda covered a broad range of topics, from vertical industries-specific 5G deployments and outlook, to industry activities on services in the 5G era, from techno-economic evaluation practices for 5G, to significant actions turning 5G into business. The agenda is presented in Figure 3-14. Attendance exceeded 60 participants on site and more attending remotely, from the academia and the industry.

5G-VICTORI Workshop

"5G adoption: an enabler for vertical industries"

Wednesday, June 28th 2023

Amphitheatre "Aristotle", aka Aristotelis Congress Center,

National and Kapodistrian University of Athens, Zografou 157 72, Athens, Greece

09:00 – 09:30	**Arrival of Attendees and Coffee Break**	Welcome by IASA, IHP
09:30 – 09:45	Overview of 5G-VICTORI	Anna Tzanakaki, IASA, GR
09:45 – 10:45	5G-VICTORI Field Trials - Berlin - Bristol - Patras - FR/RO	Jesús Gutiérrez IHP, DE Constantinos Vrontos, University of Bristol, UK Tanya Politi, University of Patras, GR Cătălin Brezeanu, ORANGE, RO
10:45 – 11:00	**Coffee Break**	
11:00 – 11:20	Field Evaluation of MCx Implementations for the Future Railway Mobile Communication System (remote)	Friederike Maier, Deutsche Bahn, DE
11:20 – 11:40	5G in support of Future Rail Mission Critical Services (FRMCS)	Kevin Wriston Kontron Transportation Austria, AT
11:40 – 12:00	5G for the automotive and logistics sectors: results and lessons learned	Dinos Katsaros, ICCS, GR
12:00 – 12:20	5G in support of the Energy industry	Nikos Tzanis, ADMIE, GR
12:20 – 12:40	Transforming Vertical Industries: Unleashing the Power of 5G through the 5G-EPICENTRE Project (remote)	Giannis Markopoulos – Nova, GR
12:40 – 13:00	5G in support of the Media industry (CDN)	Marievi Xezonaki, INTRACOM, GR
13:00 – 14:00	**Lunch Break**	
14:00 – 14:20	Techno-economic Analysis Highlighting Aspects of 5G Network Deployments at Railway Environments	Ioanna Mesogiti, COSMOTE, GR
14:20 – 14:40	Private 5G Adoption: Why not Wi-Fi?	Navid Nikaein, EURECOM/BubbleRAN, FR
14:40 – 15:00	π-NET - Transforming 5G experimentation into a Competence Centre	Spyros Denazis, π-Net / University of Patras, GR
15:00 – 15:10	Wrap-up and Closure	Jesús Gutiérrez, IHP, DE Anna Tzanakaki, IASA, GR
15:10 – 15:30	**Coffee Break**	

1

Figure 3-14 5G-VICTORI Final Workshop Agenda

Figure 3-15 5G-VICTORI Final Workshop 2023

3.10 5G-VICTORI Dissemination and Communication Activities KPIs achievement

The communication and dissemination activities progress was continually being monitored throughout the course of the project, and evaluated against the initial planning, in order to be able to adjust the communication strategy, uptake corrective actions, towards maximising project visibility and impact. As a result, all KPI targets were met while the KPIs, that were reflecting the uptake of activities with high impact on the project visibility, were greatly exceeded. The results are summarised in Table 3-8.

Table 3-8 5G-VICTORI Dissemination and Communication Activities KPIs Evaluation.

Communication Means	KPI Description	KPI Target	Achievement at M49
Publications in Scientific Conferences	Publications in ICT Conferences	30	37 in total: 31 with papers + 5 with papers & presentations + 1 submitted (under review)
	Participation in Media related Conferences	5	7
	City Related Conferences	3	1 *The reason for this target not being reached is that most scientific conferences related to "Cities" are under the umbrella of ICT conferences. The relevant target for ICT conferences is well achieved.
Exhibitions / Industry Events	Participation in ICT Industry exhibitions	7	38 in total: 31 presenting + 7 exhibiting
	Participation in Transportation/ Mobility Industry exhibitions	2	17 in total: 8 presenting + 6 exhibiting + 3 planned beyond project end
	Participation in Media related exhibitions	3	14 in total: 8 presenting + Workshop + Special Session + 6 demo booths
	Participation in City-related Industry Exhibitions	2	6 presenting
	Other		4
Journals Magazines	Publications in Scientific Journals/ Magazines	12	12 + 2 to be submitted
Training sessions	Tutorials/ Summer Schools/ other Training Sessions	>2	>16 webinars and training sessions
Workshop	Organisation of Workshops	1	1 project final workshop, 3 more workshops organised, 1 co-organised
Websites	Official Website	1	1
	User sessions per year	1500-2000	4000
	Partners' Webpages	>5	22 (plus two referencing partners' webpages)
Online publishing	Press Releases	>20	20 (+2 under publication) + 4 activities addressing general public
	Online magazines, newspapers, blogs (not counting press releases copied retransmissions)	>20	>51 blogposts, 3 ICOM internal newsletters, 1 online announcement

Social media accounts		3	3
LinkedIn page	Number of followers	≥ 300	361
Twitter followers	Number of followers	≥ 200	700
5G-VICTORI YouTube views	Number of Videos	≥ 3	19
	Number of views	≥300	>572
Project Videos		>1	18
Leaflets/ Brochures		>2	1 project brochure, 1 partner (RBB) brochure
Posters		>3	>5 (1 official brochure, 1 from PXI, 1 from FhG, 2 from IHP & I2CAT for EUCNC 2022, 2023, etc.)

4 Liaison Activities

This section refers to the liaison activities focusing on the establishment of many links to other partners/projects and initiatives that allow 5G-VICTORI:

- to achieve the maximum project visibility, and
- to raise awareness regarding the project objectives/activities/results/products among the full range of potential stakeholders.

One important aspect of the projects participating in ICT-19, as 5G-VICTORI, is the need to interact with projects that participate in the same 5G-PPP framework. Many of the project 26 partners are heavily involved in 5G-PPP actions, which in various ways serve to link the activities and may be complementary or resulting in joint work that can be disseminated.

In this section, we have also identified a set of 5G-PPP projects whose outcomes may directly or indirectly have some impact on 5G-VICTORI. For the projects here listed there is one or more 5G-VICTORI partners involved, thus we can use the presence of this partner(s) in the other consortium to keep an ongoing cooperation between projects.

4.1 Interaction with 5G-PPP Work Structures

5G-VICTORI is fostering the cooperation and commitment to joint activities/Working Groups/etc. towards maximizing the impact of 5G-VICTORI and the 5G-PPP projects as a whole, as well as providing/obtaining support on technology, market, etc., issues that are common to the different stakeholders participating in the 5G-PPP framework.

4.2 Interaction with 5G-PPP projects – status at M49

One of the main purposes of the 5G-PPP framework is to foster interaction and joint activities among 5G-PPP actions. We present in Table 4-3 the involvement of the 5G-VICTORI partners in running 5G-PPP projects.

Most of the joint work that has taken place until Month 30 has been related to the participation together with these other projects in 5G-PPP activities: Technical Meetings, WG discussions, preparation of White Papers, etc.

Besides these activities, 5G-VICTORI pursued direct interaction with a number of specific 5G-PPP activities, through the joint organisation or events with projects, and through the participation in meetings and events organised by other projects. A short list of these activities is provided in Table 4-1.

Table 4-1 5G-VICTORI Liaison Events with other projects

#	Partner	Events	Date of event	Location	Type of action *(e.g. presentation, talk, exhibition, etc.)*
1	IHP	5G TRIALS Workshop	2020-10-14	Online	Presentation of 5G-VICTORI to the 5G TRIALS Workshop organised by 5GENESIS project.
2	ORO	Orange Group SWI Webinar/5G-VICTORI FR/RO cluster	2020-11-20	Online Webinar	Webinar Presentation
3	ORO	Mosaic 5G Workshop	2020-12-03	Workshop	Presentation - 5G-VICTORI verticals experimented in

					Romania on top of open-source 5G platforms
4	**Orange**	Final 5G EVE Webinar	2021-05-26	Online Webinar	Webinar Presentation/talk
5	**COSM**, **IASA**, **IHP**	5G-PINE Workshop	2021-06-(25-27)	Online Workshop	Co-organisation of the 5G-PINE workshop with 5G-DRIVE, MOTOR5G and Smart5Grid projects

In the following subsections, we briefly explain the interaction between 5G-VICTORI and selected 5G-PPP projects.

4.2.1 5GENESIS

The 5GENESIS project brought to **FhG** the framework to significantly upgrade the existing 5G playground towards an advanced 5G experimental platform incorporating – at a small scale – operator graded network and RAN infrastructure. **IHP** partnered with **FhG** in the 5GENESIS project to also gain experience in building up 5G experimental testbeds and has made a significant invest to its premises to host a 5G SA system at the end of 2021. These two sites comprised the 5GENESIS Platform and were upgraded to host vertical industries for the upcoming 5G-VICTORI trials. Two main trials were conducted in the framework of 5GENESIS, which involved the deployment of a 360º video service on top of a nomadic 5G infrastructure that could be installed anywhere. This nomadic 5G infrastructure was upgraded towards its use at Berlin Central Station for hosting the three Berlin UCs. Outcomes of 5GENESIS, such as the Open 5GENESIS Suite, will be used in 5G-VICTORI.

4.2.2 5G-EVE

Orange has collaborated with the 5G-EVE project for the extension of the 5G-EVE infrastructure between the 5G-EVE node in Châtillon (France) and the 5G-VICTORI node in Bucharest (Romania). The collaboration has led to the creation of a VPN between these two infrastructure nodes to establish and bridge between 5G-EVE and 5G-VICTORI. We have plans to use this VPN to access the 5G-EVE/ONAP orchestrator, for the deployment of parts of 5G-RAN software developed within 5G-EVE, and for the execution and trials of use cases investigated by ORO.

4.2.3 5G-VINNI

Greek cluster work in 5G-VICTORI is building upon the 5G-VINNI technological achievements to ensure that vertical industries will test the 5G related technologies at large scale. Specifically, Patras5G the University of Patras 5G facility in one of the main 5G-VINNI facilities and all technological components that have been developed therein are being extended and expanded for the Greek cluster use case deployments in 5G-VICTORI. Patras5G facility adopts the Network Slice as a Service (NSaaS) delivery model, whereby the Patras5G facility provisions tailored network slices to verticals upon request. Each vertical uses the slice that has been provided to meet their requirements for trialling activities, setting up different use cases and assessing their KPIs under different network conditions. 5G-VICTORI is expanding the 5G architectures developed in 5G VINNI to adapt the disaggregated architectural concepts and also is extending the transport network deployments in 5G-VINNI to all vertical facilities in 5G-VICTORI.

4.2.4 5GRAIL

In the 5GRAIL (5G for future RAILway mobile communication system) project, funded by the EU under the Horizon 2020 programme, 18 European partners are working together to

validate the first FRMCS/5G specifications. The focus is on developing and testing prototypes of the future railway radio standard, both on the train and along the track.

The infrastructure at the Digital Rail Test Field in the Ore Mountains, that involves a mobile radio base infrastructure, is intended to be a key part of this project. In that regard, a federal funding has been allocated to upgrade a line section of approximately 24 km length between *Annaberg-Buchholz* and the town of *Schwarzenberg* in the Ore Mountains for the purpose of establishing a digital rail test field.

Under the framework of 5GRAIL, **DBN** envisions to contribute to the development and specification of the first FRMCS/5G prototypes.

4.2.5   5GZORRO

ICOM has a leading role in the design and development of the 5GZORRO architecture, with a particular focus on the support of network slicing extension towards third party edge computing infrastructure. This includes the MANO related primitive operations for the discovery of third party resources and the subsequent dynamic update of the corresponding network services. Particular emphasis is given on the automation of this process, further also including the establishment of Service Level Agreement (SLA) monitoring mechanisms and the corresponding establishment of Smart Contracts. ICOM investigates and integrates cloud interoperability and portability solutions in the 5GZORRO architecture, enabling the seamless migration or footprint extension of vertical services. Moreover, ICOM leads the 5GZORRO use case on Pervasive vCDN services, setting up application components for the validation and evaluation of 5GZORRO solutions in realistic conditions. ICOM also contributes to standardization activities, mainly in the context of ETSI MEC ISG, and also targets to maximize the impact of the 5GZORRO project, with dissemination activities in larger events, publications, but also internally, communicating the experiences and the results of the trials to related business units.

4.2.6   5G-COMPLETE

IASA, **COSM** and **IHP** are members of both the 5G-COMPLETE and 5G-VICTORI consortia and are all involved in the relevant architectural work focusing on the development of a flexible 5G infrastructure able to support a variety of vertical industries defined use cases and services. Particularly, COSM is contributing in both projects with the definition of the services and the associated requirements that the proposed architecture needs to support bringing in interaction and knowledge transfer across the two consortia and use cases under consideration. On the other hand, IASA is leading the architectural work in both 5G-VICTORI and 5G-COMPLETE projects with the aim to define a flexible 5G structure that integrates seamlessly the most advanced heterogeneous network and compute technologies, adopts innovative technology developments and relies on a versatile orchestration framework for both intra and inter-domain services. The architectural activities in both projects examine and propose a set of deployment options that can support of a variety of vertical related services facilitated through end-to-end slicing and the capability to assign different QoS levels to different slices in support of the service requirements. Finally, some demonstration related work on showcasing specific vertical services (such as energy metering) over the developed 5G infrastructures provides common ground for interaction and knowledge transfer for the two consortia.

4.2.7   5G-CLARITY

The 5G-VICTORI partners **I2CAT**, **IHP**, **IASA**, and **UNIVBRIS** are taking part in the ICT-20 beyond 5G 5G-CLARITY project. IASA is leading the architectural evaluation work in both 5G-VICTORI and 5G-CLARITY projects. For the latter, the work revolves around the integration

of different wireless access technologies, as well as transport and compute solutions taking into consideration technology/protocol constraints as well as service related KPIs including machine learning and artificial intelligence solutions. IASA focuses on the development of mathematical modelling and simulation frameworks of the overall 5G-CLARITY architecture with the aim to assess the enhanced beyond 5G features, that could be of interest for 5G-VICTORI. IHP is contributing to 5G-CLARITY with work on localisation and synchronization and, particularly on the latter, the work focuses on providing a reliable distribution of synchronisation references throughout the network with the goal of having wireless clock distribution to achieve ns-level synchronisation. This provides a common ground to the work on the provision of synchronisation network functions to vertical applications and services. **UNIVBRIS** in 5G-CLARITY keeps strengthening their beyond 5G testbed with the design, deployment, validation, and demonstration of a B5G non-public network (NPN) in public venues (such as museums) with capability to enable intelligent, pervasive, and robust interactions between a robot – as a tour guide – and humans. Work on this UC will be relevant to those involving digital mobility in 5G-VICTORI and synergies and potential joint work will be fostered.

Table 4-2 Mapping of 5G-VICTORI contributing people/partners to the 5G IA/5G-PPP Work Groups

WGs	Origin	5G-VICTORI Contributors			
Pre-Standardization WG Ricardo Trivisonno, Huawei, Stephanie Parker, Trust-IT Services	5G IA	Yasir Gökce (**DBN**)		Ioanna Mesogiti (**COSM**)	
Spectrum WG Giovanna d'Aria, TIM	5G IA	Eckhard Grass (**IHP**)			
5G Architecture WG Simone Redana, Nokia, Ömer Bulakci, Nokia	5G-PPP Projects	Anna Tzanakaki (**IASA**)	Jesús Gutiérrez (**IHP**)	Marius Iordache (**ORO**)	Manfred Taferner (**KCC**)
Software Networks WG Bessem Sayadi, Nokia, Marius Iordache, Orange	5G-PPP Projects	Marius Iordache (**ORO**)	Paris Flegkas (**UTH**)	Kostas Katsaros (**DCAT**)	
Vision and Societal Challenges WG Artur Hecker, Huawei, Håkon Lønsethagen, Telenor	5G IA	Anna Tzanakaki (**IASA**)		Jesús Gutiérrez (**IHP**)	
Security WG Jean-Philippe Wary, Orange, Pascal Bisson, Thales	5G IA	Ioan Constantin (**ORO**)		Victor Cranz (**DBH**)	
SME WG Jacques Magen, AUSTRALO	Networld2020	**UHA**, **IRT**, **ZN**, **MATI**			
Trials WG Carles Antón-Haro, CTTC	5G IA	Jesús Gutiérrez (**IHP**)		Spyros Denazis (**UoP**)	
Test, Measurement and KPIs Validation Evangelos Kosmatos, WINGS ICT Michael Dieudonné, Keysight Technologies	5G-PPP Projects	Ioanna Mesogiti (**COSM**)	Katrin Ludwig (**IZT**)	Drissa Houatra (**Orange**)	
WG Vision Business – BVME SG - Business Validation, Models, Ecosystems	5G IA	Ioanna Mesogiti (**COSM**)		Nona Bledow (**IZT**)	

Table 4-3 Involvement of the 5G-VICTORI Partners in running 5G-PPP projects.

Partner/Project	5G-VINNI	5G-EVE	5GENESIS	ARIADNE	5G-CLARITY	5G-COMPLETE	INSPIRE-5Gplus	LOCUS	MonB5G	TERAWAY	5G ZORRO	5GSolutions	5G-TOURS	5G!Drones	5G-HEART	5Growth	5G SMART	Full5G	5G-MOBIX	5GCroCo	5G CARMEN	5GLOGINNOV	5GMETA	5GRECORDS	AFFORDABLE5G	COREnect	dragon	FUDGE-5G	Int5Gent	5G BLUEPRINT	5GMED	5Groutes	5GRail
IHP			√		√ (PC)	√																											
UNIVBRIS					√	√																											
COSM			√			√						√							√										√				√
DBN																																	
EUR		√	√						√			√								√					√								
FhG	√		√																									√					
I2CAT					√						√ (PC)									√					√							√	
IASA				√																													
ICOM	√			√						√	√	√						√															
IRT												√																					
KCC																																	√
Orange		√					√	√	√				√	√					√	√			√										
ORO		√																															
UoP	√											√																					

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4.3 Achievements and impact

5G-VICTORI has declared from the project starting date its degree of involvement in most WGs that are currently running, either triggered by the 5G IA or 5G-PPP.

We list in the following tables the activities that have taken place in the WGs and the future plans that are of interest for the project. As mentioned in [1], the criteria for choosing these responsible people stem from their general expertise working at their organisations, together with previous expertise in driving and contributing to the mentioned WGs.

4.3.1 Vision and Societal Challenges

Association:	5G-IA (6G-IA)
Work Group:	Vision and Societal Challenges WG
Representatives on behalf of 5G-VICTORI:	Anna Tzanakaki (IASA), Jesús Gutiérrez (IHP)
Activities and Achievements:	

Activities
- Work on a 6G Vision white paper of the 6GIA.
- Work on a business ecosystem analysis.
- Discussions about promotion activities around the produced documents.
- Discussions with the relevant stakeholders about the requirements from and expectations towards novel SGs (e.g. 6G SIG).

Achievements
- A comprehensive and consensual 6G Vision white paper of the 6GIA has been produced, accepted by the Board and published on June 7, 2021.
- A comprehensive and consensual business ecosystem analysis has been produced and sent for review to the 6GIA Board.

A new subgroup "Societal Needs and Value Creation" has been created. Ioanna Mesogiti (COSM), Prof. Henning Breuer (UXBerlin), and Nona Bledow (IZT) follow up the activities of the WG and are currently contributing to a paper on the identification of Key Values that 6G will address and their evaluation on the basis of Key Value Indicators.

4.3.2 WG Vision Business (sub-group of that in 4.3.1)

Association:	5G Infrastructure Association
Work Group:	WG Vision Business – BVME SG - Business Validation, Models, Ecosystems
Representatives on behalf of 5G-VICTORI:	Ioanna Mesogiti (COSM), Nona Bledow & Katrin Ludwig (IZT), Henning Breuer (UXBerlin)
Activities and Achievements:	

Since the establishment of the SG in April 2020, 5G-VICTORI follows up the BVME activities, and has actively contributed in all its activities (i.e. the SG's 1st White Paper: "Business Validation in 5G PPP vertical use cases", June 2020 URL: http://doi.org/10.5281/zenodo.3775405; in the 2nd BVME "5G Ecosystems" white paper September 2021 available under URL: http://doi.org/10.5281/zenodo.5094340; and in the SG's e-workshops with presentations.) (as reported in [2]). Considering the activities from January 2022 until present, 5G-VICTORI partners COSM and IZT as well as Prof. Henning

Breuer from **UXBerlin** followed up the BVME activities, and contributed to the 3rd BVME White paper entitled "5G and Beyond 5G Ecosystem Business Modelling" in the following ways:

- **COSM** (Ioanna Mesogiti) held the role of Leading Editor, in particular formulating the 5-step methodology, bringing significant contribution and incorporating input from other WG members (in chapters 2 and 3), as well as reviewing various sections of the White Paper.
- **IZT** (Nona Bledow) and **UXBerlin** (Prof. Henning Breuer) held the role of Leading Editors to the Sustainability-oriented business modeling Section of the White paper, and along with Katrin Ludwig contributed the 5G-VICTORI methodology to the "Business Modelling insights from 5G PPP Projects" chapter. They also provided significant review input various sections.
- **COSM** (Ioanna Mesogiti) contributed to the creation of the WG dissemination material for EuCNC 2023.

The 3rd BVME white paper "5G and Beyond 5G Ecosystem Business Modelling" was published in June 2023 is available under URL: https://doi.org/10.5281/zenodo.7640478.

4.3.3 5G Architecture WG

Association:	5G-PPP
Work Group:	5G Architecture WG – common platform to facilitate the discussion between 5G-PPP projects developing architectural concepts and components and foster the discussions on the basis of the KPI's described in the 5G-PPP contract
Representatives on behalf of 5G-VICTORI:	Anna Tzanakaki (IASA), Jesús Gutiérrez (IHP), Marius Iordache (ORO), Manfred Taferner (KCC)
Activities and Achievements:	

5G-VICTORI follows up the activities of the 5G Architecture WG since they started. Two of the representatives have been engaged in the WG discussions since its conception in 2015.

The initial trigger of the activities took place in November 2020 and the WG involved bi-weekly meetings where (mainly) ICT-19, and ICT-20 projects were presenting to the audience their architectural approaches. The 5G-VICTORI Technical Manager, Dr. Anna Tzanakaki (IASA), presented the 5G-VICTORI architectural view at the beginning of 2021.

Once all presentations were given, and as carried out in previous years, there was the plan of preparing a new release of the 5G Architecture WG White Paper (v4.0) "View on 5G Architecture" White Paper v4.0 (link). The 5G-VICTORI representatives took a leading role in the preparation of the White Paper, leading the following chapters:

- Chapter 2 "Overall Architecture", co-leaded by Marius Iordache (ORO).
- Chapter 4 "Core & Transport Architecture", co-leaded by Anna Tzanakaki (IASA), Dan Warren (**Samsung**) and Jesús Gutiérrez (IHP).
- Chapter 6 "Cross-Domain Aspects", co-leaded by Anna Tzanakaki (IASA), Valerio Frascolla (**Intel**) and Jesús Gutiérrez (IHP).

Additionally, 5G-VICTORI was contributing to the following sections:

- Chapter 2, with "Cluster/Vertical-specific architecture extensions", "Private networking for Industry 4.0/Smart Energy facilities", and ""E2E network architecture to support Digital Mobility services and the required KPIs", Architectural extension baseline to release 16, "Private networking for Industry 4.0/Smart Energy Facilities" "Extended layered network architectures for high-speed rail transportation facilities", "Slices for rail specific service delivery in transportation environments" and "E2E network architecture to support Digital Mobility services and the required KPIs"
- Chapter 5, with "Autonomous profiling and E2E service provisioning and monitoring using AI/ML", and
- Chapter 6 on "Cross-Facility Orchestration", "Network Service Life Cycle Management across domains"

Future Plans:

5G-VICTORI will release deliverable D2.4 "5G-VICTORI end-to-end reference architecture" with a detailed review of all architectural concepts and new potential contributions for the next release of the White Paper. During 2022 5G-VICTORI will mainly present its views as soon as the bi-weekly calls restart again.

4.3.4 Test, Measurement and KPIs Validation

Association:	5G-PPP
Work Group:	WG Test, Measurement and Validation – KPIs Task Force
Representatives on behalf of 5G-VICTORI:	Ioanna Mesogiti (**COSM**), Manfred Taferner (**KCC**), Peter Lundh (**Alstom**), Drissa Houatra (**Orange**)
Activities and Achievements:	

5G-VICTORI follows up the TMV WG activities continuously from the beginning of the project, and has actively contributed in all its activities. During the first project period, 5G-VICTORI contributed to the KPIs TF White Paper: "Service performance measurement methods over 5G experimental networks", May 2021 under URL: https://doi.org/10.5281/zenodo.4748385 (long version), as well as URL: https://doi.org/10.5281/zenodo.4748482 (short version), reviewed the TMV Whitepaper "Understanding the Numbers Contextualization and Impact Factors of 5G Performance Results", July 2021, URL: https://doi.org/10.5281/zenodo.5094973), participated in the 5G-PPP TB eWorkshop (Working on Validation and KPIs) with a presentation May 2020, and in the "5G-PPP Webinar on practical insights from 5G Test, Measurement and KPI Validation with vertical applications" with the presentation entitled "Application of the methodology on the transport vertical", June 2021 (as reported in [2]).

During the period from January 2022 until the end of the project, the following activities were also performed:

- Drissa Huatra (**Orange**) contributed to and channeled the work of the TMV WG on "Beyond 5G/6G KPIs and Target Values" (June 2022) (https://5g-ppp.eu/5g-ppp-white-paper-beyond-5g-6g-kpis-and-target-values/, DOI:10.5281/zenodo.6577506) to the ongoing work of WP5D on IMT-2030 Vision on the draft new Recommendation M.[IMT.VISION 2030 AND BEYOND] - "Framework and overall objectives of the future development of IMT for 2030 and

beyond". **Orange** presented the TMV white paper to the ITU-R WP5D working group (oct. 2022). Ioanna Mesogiti (**COSM**) also contributed to the document sent by TMV WG.

- Jesús Gutiérrez (IHP) held the role of key contributor on behalf of 5G-VICTORI (collecting and organising input from **UNIVBRIS**, UoP, UTH, **ORO** and FhG, and **COSM** (Ioanna Mesogiti) held the role of editor in the WGs White Paper entitled "5G PPP Trials Results 2022 - Key Performance Indicators measured in advanced 5G Trial Sites", June 2023 URL https://doi.org/10.5281/zenodo.7961946.
- **COSM** (Ioanna Mesogiti) contributed to the creation of the WG dissemination material for EuCNC 2023.

4.3.5 Software Networks WG

Association:	5G-PPP
Work Group:	Software Networks WG
Representatives on behalf of 5G-VICTORI:	Paris Flegkas (**UTH**), Kostas Katsaros (**DCAT**), Cristian Patachia (**ORO**), Marius Iordache (**ORO**)
Activities and Achievements:	

From the beginning of 5G-VICTORI, selected partners have been actively involved and contributing to the 5G-PPP Software Networks WG. More specifically, they have been actively participating in the SN WG periodic calls, representing 5G-VICTORI by exposing and presenting the project's technical approach. The major contribution to the WG, is the participation as co-authors in the White Papers that the WG has produced as a result of its work. More specifically until now, we have contributed to the Edge Computing for 5G Networks White paper where we described the 5G-VICTORI approach regarding the type of Edge infrastructure deployed, the location of the Edge used in the project, the main technologies used for these deployments, the Use Cases and Vertical Applications deployed at the Edge, and what drivers were used to select those.

The SN WG has been represented during EuCNC, in 2019 and in 2020, contributing with papers, WS and key-note speeches. Also, several white papers have been released from the WG: 5G-PPP Software Network White Paper:

- 'From Webscale to Telco, the Cloud Native Journey,
- "Cloud-Native and Verticals' services – 5G-PPP projects analysis"
- "Cloud-Native and 5G Verticals' services"

5G-VICTORI project has been presented, including technical points for Orchestrators, ONAP and OSM.

Future Plans:

Currently, the WG is preparing another white paper on APIs called "From VNF to API: Opening up 5G and beyond networks" where 5G-VICTORI is contributing with information about the 5G-VIOS architecture and its APIs.

4.3.6 Trials Working Group

Association:	5G-IA
Work Group:	Trials WG

Representatives on behalf of 5G-VICTORI:	Spyros Denazis (**UoP**), Jesús Gutiérrez (**IHP**)
Activities and Achievements:	
Focus on the Trials and pilots Brochure Nr.3, where 5G-VICTORI had a contribution accepted on "Digital mobility: Public safety, security and infotainment". The trial system enabled two 5G services: 1) Infotainment in public buses (top), containing municipality services media streaming and social networking; and 2) for public safety, a high-resolution video streaming (bottom) is delivered over 5G to AIM C&C server, allowing through AI automated and real time threats identification using a 5G network that is allocating the appropriate QoS for emergency services. There has been a webinar held in November with TSDSI 5GIA-TSDSI Online webinar on 5G Tests and Pilots https://5g-ppp.eu/event/5gia-tsdsi-online-webinar-on-5g-tests-and-pilots/	
Future Plans:	
5G-VICTORI will opt to be present in the next release of the Trials and pilots Brochure with the outcome from the different trials to be conducted in 2022.	

The 5G-PPP Technology Board has released a White Paper on Edge Computing for 5G, the technology and security landscape and the options for building an Ecosystem around Edge Computing for mobile networks, named Edge Computing for 5G Networks. The White Paper focuses on the Edge Computing definition and edge cloud ecosystem, key technology for 5G on Edge computing, resources virtualization framework, orchestration framework and SDN for Edge computing. It has been described also the network programmability in the 5G/Edge Computing framework, data plane programmability and the need for edge performance, including the DevOps concept and operation within the Edge Computing a security and Approaches to Edge Computing in 5G-PPP projects.

5G-VICTORI has been described as the project following the ETSI NFV standards that focuses on ETSI MEC principles, Edge Computing functionalities involving virtualized MEC computing within all the four facilities. The main White paper contribution from the 5G-VICTORI project is based on the project outputs from 5G-VICTORI Use case and requirements definition and reference architecture for vertical services and the individual site facility planning, identifying the main drivers of choosing the ETSI MEC type of Edge architecture are: (a) compliance with the ETSI standards, (b) provision of compute as well as networking VNFs. A relevant contribution from 5G-VICTORI was focused on 5G resources virtualization, Virtual Machines adoption and Microservices/Containerization activities identifying the Unikernel implementation as an alternative for VMs or CNFs for the resources optimization within the EDGE. It has been described the Orchestration framework for containers, K8s, and main 5G-VICTORI orchestration tools, OSM and ONAP, as implemented in the facilities.

4.3.7 5G-PPP Pres-standardisation WG

Association:	5G-PPP
Work Group:	5G-PPP Pre-standardisation WG – common platform aiming at • identifying standardization and regulatory bodies to align with e.g. ETSI, 3GPP, IEEE and other relevant standards bodies, & ITU-R (incl. WPs) and WRC (including e.g. ECC PT1),

	- developing a roadmap of relevant standardization and regulatory topics for 5G, - evaluating existing roadmaps at international level, - proposing own roadmap for 5G being aligned at international level, - influencing pre-standardization on 5G and related R&D: potentially proposing where topics should be standardized, and - Influencing the timing on R&D work programs (e.g. EC WPs).
Representatives on behalf of 5G-VICTORI:	Yasir Gökçe (**DBN**), Ioanna Mesogiti (**COSM**)

Activities and Achievements:

5G-VICTORI follows up the activities of the 5G-PPP Pres-standardisation WG since they started. At least one representative has been engaged in the WG discussions since its conception.

5G-VICTORI contributed to a [survey](#) conducted by 5G-PPP Pres-standardisation WG to identify the potential to impact standardisation from the expected timeline, phases, and key areas of work for B5G (Beyond 5G) and 6G research towards 2030. The idea was to collect feedback, which would be suitably anonymised, to help consolidating a B5G and 6G research with standardisation potential roadmap. Such a roadmap was expected to support activities related to the EU research ecosystem with the final aim of maximising impact on standardisation.

DBN urged the participants of 5G-VICTORI to take part in this survey, collected their inputs and duly delivered them to the management of the WG. Thus, 5G-VICTORI empowered the 5G-PPP Pres-standardisation WG to recognize and better appreciate the standardisation needs and opportunities in regard to technologies associated with 5G and 6G. Besides, 5G-VICTORI also enabled the WG to produce a more consolidated and concretized roadmaps towards the achievement the standardization goals.

As latest activities, the WG runs a consultation to identify the potential to impact standardisation from the expected timeline, phases, and key areas of work for B5G (Beyond 5G) and 6G research towards 2030. The idea is to collect feedback, which will be suitably anonymised, to help consolidating a B5G and 6G research with standardisation potential roadmap. In that regard, **DBN** provided contribution in the form of submission of standardization trackers collected from all related 5G VICTORI partners to the group.

Besides, the representatives joined the monthly sessions held by the 5G-PPP Pres-standardisation WG and monitored and/or contributed to the work being done in the respective meetings, be it a review of a report or answers to queries.

In that regard, the representatives currently provided feedback on the ETSI Technology Radar which highlight top 20 and 3 technology trends as well as top 3 UCs.

Finally, the representatives acted as a bridge between the WG and 5G-VICTORI participants, having facilitated the flow of information, the most outstanding of which are success stories, SDO impacts and significant results. Thus, participants on the both spectrums have found ample opportunities to extract lessons-learned from each other's achievements.

4.3.8 Security WG

Association:	5G-PPP IA
Work Group:	Security Work Group
Representatives on behalf of 5G-VICTORI:	Ioan Constantin (ORO)
Activities and Achievements:	
Only one collaboration tentative for a common whitepaper 5G-VICTORI and other H2020 projects for EuCNC 2020, but it was not materialized.	
Future Plans:	
N/A	

5 Conclusions

This deliverable presented the specific standardisation, dissemination, communication and liaison activities that have taken place in the second half of 5G-VICTORI project, with the aim to maximise its impact and visibility to the research and industry communities.

Starting with the standardisation activities, most of the partners of the consortium were actively engaged in different work groups from SDOs like ETSI, 3GPP, IEEE, and ITU-R.

KCC introduced new and correcting service layer functionality required by FRMCS within the context of the Mission Critical services specified within 3GPP, for a better support of low latency communication. **DBN**, worked on the standardization of the Future Railway Mobile Communication System (FRMCS), by drafting system requirement specifications, functional requirement specifications, and interface specifications for FRMCS. **ICOM** focused on vCDN deployment according to Open Source MANO (OSM) specifications and implemented a proof-of-concept for vCDN deployment. Also, as 5G-VICTORI partner and as participant in 5G PPP TMV group, **Orange** has contributed to ITU-R IMT VISION by presenting the 5G-PPP TMV group view on Key Performance Indicators (KPIs) and Target Values for Beyond 5G (B5G) and 6G technologies.

Concerning communication activities, the 5G-VICTORI consortium was fully dedicated to raise the awareness and maximize the impact of its project achievements among diverse target audiences from both the scientific and industry realms. To achieve this, the consortium utilized an efficient communication and dissemination strategy, leveraging various channels, including a dedicated project website, social media networks, partners' websites, blog spots and press releases. By using these communication channels, the consortium ensured that the project's progress, achievements and findings were effectively disseminated and accessible to stakeholders in a timely and engaging manner.

Regarding the dissemination activities, 5G-VICTORI has an active participation in industry events and in scientific conferences/ workshops/ summits. On the entire lifespan of the project the 5G-VICTORI consortium has been present in 79 industry events, has organized more than 16 webinars and has published 45 scientific papers within well recognized conferences (IEEE, etc.) and 12 scientific papers in journals plus 2 more under submission.

The KPIs established in the Description of Work were continuously measured and the final values, presented in the document, show that the targets were exceeded in most cases, showing both the quality of results achieved within the project, but also the commitment in communicating / disseminating these results.

Last but not least, many of the 26 5G-VICTORI partners are heavily involved in 5G-PPP actions, facilitating therefore joint or complementary work/activities further maximising impact, visibility and fostering research in a coordinated way at EU level. Active engagement with other 5G-PPP projects was achieved, where the following stand out: 5GENESIS, 5G-EVE, 5G-VINNI, 5GRAIL and 5GZORRO, on integrating or developing several components within and among the facilities. At the same time, the project had a significant representation in the most relevant WGs and SG of the 5G-PPP and 5G-IA partnerships even extending further to the work of 6G-IA, with partners undertaking the responsibility of chapters in key white papers that fuse the 5G-PPP projects' experience; such as the Architecture WG and its White Paper 4.0, the Software Networks WG and its White Paper, the Business Validation, Modelling and Ecosystems SG and its whitepapers, the KPIs SG and its White Paper.

6 References

[1] 5G-VICTORI deliverable D5.1, "Standardisation, Dissemination, Communication and liaison Activities Plan", December 2019, https://www.5g-victori-project.eu/wp-content/uploads/2020/01/2019-12-14-5G-VICTORI_D5.1_v1.0.pdf

[2] 5G-VICTORI deliverable D5.2, "Initial Report on Standardisation, Dissemination, Communication and liaison Activities Report", January 2022, https://www.5g-victori-project.eu/wp-content/uploads/2022/02/2022-01-12-D5.2-5G-VICTORI-Standardisation-Dissemination-Communication-and-liaison-Activities.pdf

7 Annex I

Table 7-1 Partners' mentions to the project on Social Media – Delta since January 2022

Partner	Channel	Post	Link
RBB	Twitter	We are happy to announce that we are partner in the new #5G PPP project (…)	https://twitter.com/rbb_inno/status/1140523275803607041
i2CAT	Twitter	At @i2CAT we keep on paving the way to the #5G revolution! Our project @5gVictori is (…)	https://twitter.com/i2CAT/status/1142343717312966656
RBB	Twitter	Good to be part of @5gVictori . #5g #horizon2020	https://twitter.com/rbb_inno/status/1146335497079447553
FhG	Twitter	We're proud to be part of the @5gVictori consortium! More information (…)	https://twitter.com/fraunhoferfokus/status/1154031376682766336
ORO	Twitter	Happy to be part of the #H2020 @5gVictori project where we will contribute to use (…)	https://twitter.com/orangeromania/status/1154044137416454152
i2CAT	Twitter	@i2CAT is glad to be involved in @5gVictori We will participate in the Railways and (…)	https://twitter.com/i2CAT/status/1154397153709740034
INTRA	Twitter	Digital Catapult is proud to be a part of @5gVictori #5GVictori and contributing (…)	https://twitter.com/DigiCatapult/status/1154727568379142145
INTRA	Twitter	Intracom Telecom participated in the kick-off meeting of the new EU research (…)	https://twitter.com/IntracomTelecom/status/1158984322059264001
i2CAT	Twitter	.@5gVictori was launched last month in Berlin. It will conduct large scale #5G (…)	https://twitter.com/i2CAT/status/1161204512566272000
ORO	Twitter	.@orangeromania at @5gVictori technical meeting, presenting #5G use case (…)	https://twitter.com/OrangePR_ro/status/1187024077577490432
INTRA	Twitter	A few days ago, Intracom Telecom participated at the 1st technical meeting (…)	https://twitter.com/IntracomTelecom/status/1192765300267200514
ORO	Twitter	.@5GVICTORI work visit in @visitalbaiulia on cross-vertical use cases focusing (…)	https://twitter.com/OrangePR_ro/status/1197456776704204800
ORO	Twitter	. @orangeromania took part in the @5GVICTORI 2nd Tech Meeting. The (…)	https://twitter.com/OrangePR_ro/status/1225460477477740544
FhG	Twitter	Macht mit bei der "Nutzerumfrage zur Mediennutzung in öffentlichen (…)	https://twitter.com/fraunhoferfokus/status/1229755770578915328
EUR	Twitter	5G-Victori : des tests à grande échelle pour les industries verticales (…)	https://twitter.com/GwenComte/status/1263048597534195713
IRT	Twitter	#Streaming on rails — Improving #VoD for train passengers. Read more about the (…)	https://twitter.com/IRTpresse/status/1265280980526534658
ORO	Twitter	We are proud to support #Comms2020 for the 7th time and be part of the innovation (…)	https://twitter.com/orangeromania/status/1273521366579494912

IZT	Twitter	Interested in #5G? Check out the @5GVICTORI Project for info about (…)	https://twitter.com/IZT_Zukunft/status/1312043534267092993
ORO	Twitter	*Dezvoltarea Alba Iulia ca #SmartCity continuă cu ajutorul tehnologiei #5G în (…)*	https://twitter.com/OrangePR_ro/status/1329750216615075840
ORO	Twitter	Discover the latest @5GPPP white paper that provides an in-depth analysis of (…)	https://twitter.com/OrangePR_ro/status/1362684261657108483
DCAT	Twitter	The @5GVICTORI project aims to demonstrate how dynamic #5G pop-up (…)	https://twitter.com/DigiCatapult/status/1366362533209194504
FhG	Twitter	Let's take a look at the #5G Playground, our 5G campus network in Berlin, which is (…)	https://twitter.com/fraunhoferfokus/status/1374716385696358405
i2CAT	Twitter	*Des de les àrees de Mobile Wireless Internet i Software Networks, @MiguelCatCid i (…)*	https://twitter.com/i2CAT/status/1386228635477106699
IZT	Twitter	*@IZT_Zukunft und @uxberlin veranstalteten am vergangenen Freitag den ersten (…)*	https://twitter.com/IZT_Zukunft/status/1386627698932469766
ORO	Twitter	*Ducem tehnologia 5G din laborator în proiecte publice ce aduc beneficii reale (…)*	https://twitter.com/OrangePR_ro/status/1446427708372705280
ORO	Twitter	*Descoperă progresul şi evoluția inițiativelor incluse în @5GPPP , din ultima (…)*	https://twitter.com/OrangePR_ro/status/1462742335469535233
MATI	LinkedIn	Let's have a closer look to Mativision's applications in 5G-VICTORI Project!	https://www.linkedin.com/posts/mativision_a-closer-look-to-mativisions-applications-activity-6813831809143463936-H2wg
FhG	LinkedIn	Let's take a look at the #5G Playground, our 5G campus network in Berlin, which is used in the 5G-VICTORI Project to optimize media delivery: https://lnkd.in/d2KZqZX	https://www.linkedin.com/posts/fraunhoferfokus_5g-for-optimizing-media-delivery-in-mobile-activity-6780807370764242944-Tcmi
ORO	LinkedIn	*Tehnologia #5G este încă la început, însă viitorul ei se scrie în fiecare zi datorită cercetării şi inovaţiei din acest domeniu. (…)*	https://www.linkedin.com/feed/update/urn:li:activity:6768449265065975808/
ORO	LinkedIn	*Începută în 2018, prin parteneriatul cu Orange, dezvoltarea oraşului Alba Iulia ca #SmartCity continuă cu ajutorul tehnologiei #5G în (…)*	https://www.linkedin.com/feed/update/urn:li:activity:6735514919816499201/