



Horizon 2020 European Union funding for Research & Innovation



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

# D5.2 Standardisation, Dissemination, Communication and liaison Activities Report

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5G PPP Research and Validation of critical technologies and systems

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# List of Acronyms

Acronym	Description
3GPP	3 <sup>rd</sup> Generation Partnership Project
3GPP SA1	Service and System Aspects WG
3GPP SA6	Mission Critical Application WG
5G-MAG	5G Media Action Group
5G-PPP	5 Generation Public-Private Partnership
5GMS	5G Media Streaming
Bol	Bodies of Interest
CMS	content management system
CN	Core Network
EC	European Commission
ETCS	European Train Control System
FRMCS	Future Railway Mobile Communication System
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
ISA	International Society of Automation
ISO	International Standard Organization
ITU	International Telecommunication Union
KTA	Kontron Transportation Austria AG
LCM	Lifecycle Management
MEC	Multi-access Edge Computing
mmWave	millimetre 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 Organisation
SG	subgroup
SLA	Service Level Agreement
SSL	Secure Sockets Layer
UIC	International Union of Railway
UNISIG	UNion of SIGnalling Industry
VIM	Virtualised Infrastructure Manager
WG	Work Group



### **Executive Summary**

The 5G-VICTORI project has developed a generic standardisation, dissemination, communication and liaison activities strategy including detailed activity plans during the first 6 months of the project, which is continuously monitored, maintained and adjusted throughout the project lifetime. These activities aim to realise the commitment of the project to share and promote its results to the international scientific community and to the European industry as well as to stakeholders of target vertical industries and to appropriate policymakers. At present the project is at the implementation phase of this plan, after going through two main cycles of impact assessment and revision of the activity plans.

This document is the second outcome of WP5 activities of 5G-VICTORI project and it shows the progress on standardization, dissemination, communication and liaison activities during the first 30 months of the project.

In general, standardisation activities are manifold. Key activities -presented in this documentrevolve around: (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 FRMCS Architecture, (b) monitoring of standardisation aspects of mission critical services (stemming from 5G-VICTORI findings) in the relevant 3GPP WGs, (c) contributing to ETSI NFV & ETSI MEC work groups (WGs) and on participating to ETSI NFV&MEC Plugtests with the media and energy related vertical service implementations, (d) participating in IEEE 802.11 and monitor 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 is performed on the dedicated website, but also on the social media platforms like LinkedIn, Twitter and YouTube. Information is also shared on the websites of the beneficiaries of the project and through a large number of blogposts and online posts. These activities and their impact are also part of this document.

As far as dissemination activities are concerned, the 5G-VICTORI consortium has been present in more than 40 industry events (in the field of ICT, Media, Transportation, City-related), has participated in more than 10 webinars and published 30 scientific papers at well recognized conferences or journals. Ahead of the project plan, the project has organised one workshop and has co-organised a second one. These activities are presented in detail in the current document.

In addition, this deliverable summarises the project 5G-PPP activities, with the aim of fostering the collaboration on similar 5G and beyond 5G topics with peer projects. The project has significant representation in the most relevant WGs and subgroups (SGs) of the 5G-PPP and 5G-IA partnerships, with partners providing technical contributions and undertaking the responsibility of chapter editors in key white papers, produced by the Architecture WG, the Software Networks WG, the Business Validation, Modelling and Ecosystems SG, the KPIs SG.

In general, monitoring the project activities against its target Key Performance Indicators (KPIs) shows very good progress that exceeds 70% of the committed targets documnented in the Description of Work (DoW). A brief assessment of the situation due to COVID-19 is provided together with the mitigation actions carried out to lessen its effects.



### 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, during the first 30 months of the project, the 5G-VICTORI consortium has actively contributed to the 5G Infrastructure 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 that is being assessed and updated in this document. More concretely, this deliverable provides an overview of the standardization, dissemination, communication and liaison – related activities performed from the beginning of the project until month 30 (M30).

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 Project partners. This document details the standardisation activities of the project carried out in the reporting period in terms of identified Bodies of Interests and partners' responsibilities and also provides the plan for the next period of the project.

Communication and dissemination activities conducted from the beginning of the project targeting to raise awareness on the project achievements and provide information on the project results, are listed and presented in detail. These are classified according to the means of dissemination to social media, press releases, webinars, industry events, scientific publications and other communication activities, while relevant dissemination and communication KPIs are presented.

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 are being shared in many 5G-PPP Work Groups (WGs) and the plan is to strengthen the presence of the project even further in terms of contributions to White Papers and joint dissemination activities.

#### 1.1 Objectives

This deliverable details the activities performed during the first 30 months of the project in terms of standardisation, dissemination, communication, as well as participation to 5G-PPP activities and liaison with other projects. These activities are strictly correlated with the strategy, principles and high-level plans presented in D5.1 and measured versus the KPIs there defined.

#### 1.2 COVID-19 Outbreak

During the first 30 months of the project the project has been severely impacted by the COVID-19 outbreak and this situation has altered the way the Consortium contributes and promotes dissemination, communication and standardisation activities. Clearly, this outbreak has hindered the plan to carry out these activities that was defined in deliverable D5.1. Risks have arisen and mitigation actions have been put by the organisers of the Conferences/Workshops, standardisation bodies, etc., which have allowed the 5G-VICTORI beneficiaries to continue their involvement in such activities. Nevertheless, it is undeniable that those activities could not be adequately conveyed given the lack of physical presence.



#### 1.3 Document Structure

Section 2 summarises the standardization activities performed in the scope of the project targeting different Standard Development Organisations (SDOs) (ETSI, 3GPP, IEEE, ITU-T) on various domains including: Edge mobility & synchronisation, zero touch autonomous applications, mission critical applications, etc. For each of these contributions the achieved and planned impact for the future months is detailed.

Section 3 focuses on communication and dissemination activities as a crucial part of innovative projects and as the means of raising awareness and transferring knowledge to interested parties. Relevant activities carried until month 30 are presented in detail including: 5G-VICTORI website, social network disseminations, press releases, participation in industry events, participation in and organization of conferences/ workshops/ summits and webinars.

Section 3.13 describes the liaisons activities by describing the interaction with relevant 5G-PPP projects and WGs with focus on achievements and impact.

Section 5 considers the changes that applied to the initial standardisation, communication and dissemination plans, and describes the planned activities in these topics.

Finally, section 6 concludes the deliverable.



### 2 Standardisation Activities Report

#### 2.1 Summary of standardisation activities until month M30

Standardisation activities carried out within the framework of 5G-VICTORI are manifold. The use of existing technologies bolstered with 5G connectivity and/or new 5G and/or 6G solutions are being researched along with the technical requirements and specifications they necessitate. Research also focuses on how the new deployments of 5G/6G technologies can leverage and/or improve existing standards of the Standards Development Organisations (SDOs). Findings of this research conducted in conjunction with standardisation bodies have been published in various platforms, the foremost of these being scholarly and/or professional journals.

A significant part of the project activities focus on the adoption of 5G technologies in support of the rail related services. Given the need for handling increasingly challenging data communication demands stemming from the digitization of the railway transportation systems, the deployment of FRMCS, based on 5G mobile radio technology, within digital railway infrastructure is being studied, tested and piloted in collaboration with other partners in an attempt to identify network configuration requirements as well as to develop and specify the first FRMCS/5G prototypes. In this regard, the project partners involved in rail related activities monitor the FRMCS standardization with the aim to identify specifications and requirements applicable to railway specific functions. Specifically, **DBN** studies the deployment of FRMCS within digital railway infrastructures in collaboration with other partners in an effort to ascertain network configuration requirements as well as to develop and specify the first FRMCS/5G prototypes. Similarly, **KCC** conducts normative work on the FRMCS Architecture, mainly in the Core Network Architecture and Onboard Architecture. In addition, it focuses on leveraging findings of the 5G-VICTORI Critical Service Deployment Validation for both Lab and Live Systems for standardization in the relevant WGs.

Moreover, contributions of other project partners to standardization continue unabated, revolving around the issues of how new deployments of 5G technologies can leverage and/or improve existing standards and in close cooperation and collaboration with SDOs. UNIVBRIS contributes 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 focus on ETSI NFV & ETSI MEC WGs. In this context, it works on ICOM's vCDN deployment according to Open Source MANO (OSM) specs (Information Model), based on ETSI NFV standards and examines the creation of a proof-of-concept on the vCDN deployment. ICOM plans to participate in events such as ETSI NFV&MEC Plugtests 2022 with the vCDN and uiTOP applications, extended with appropriate interfaces in order to be compatible with MEC standards and possibly compatible with NFV standards. IHP & FhG participate in IEEE 802.11 and monitor activities related to mmWave-related standards, Wi-Fi sensing as well as Broadcast Services. Moreover, IHP conducts research on the synchronization of wireless nodes and thereby contributes to the positioning/sensing capabilities of these nodes. **DCAT** has been working on mobility management of network service. An instantiated network service will be migrated from one registered Virtualised Infrastructure Manager (VIM) to another based on a set of given parameters. To enable mobility management functionalities, **DCAT** has defined a workflow using current OSM APIs but a new set of APIs in the Northbound Interface (NBI) of OSM and functionalities mainly with the help of or within the placement module (PLA), the policy management module (POL), and Lifecycle Management (LCM) components of OSM are investigated and potential extensions will be contributed to OSM community.



#### 2.2 Activities per standardisation body and sector

Here we will include a section for each standardisation body (correlated with Table 2-1), where 5G-VICTORI partners contribute – for each section we shall highlight the contribution & main achievements.

Partner	Target Domain	Target SDOs
UNIVBRIS	Future Networks Vision	ITU, FG-NET2030
	Zero touch autonomous Application	ONF, ORAN-Alliance
	OSM in design & 5G-VIOS components	ETSI
DBN	Railway related specifications & 5G-PPP	5G-PPP PreS WG, UIC, 5GRAIL & other SDOs
DCAT	Edge mobility & Orchestration	ETSI OSM / ZSM, possibly 3GPP
	Edge/ Cloud media rendering	W3C – Web & Networks Group
FhG	Broadcasting Services	IEEE 802.11
	Media Distribution	5G-MAG, DASH-IF
IHP	Synchronisation & Localisation	IEEE 802.11
ICOM	vCDN in NFV & MEC	ETSI NFV, ETSI MEC
ксс	FRMCS Architecture	ETSI RT – (FRMCS)
	Mission Critical Voice & Data Services	3GPP SA6 (Stage 2), 3GPP CT1 (Stage 3)

Table 2-1 Targeted SDOs for each of the 5G-VICTORI participants to standardisation activities



Partner Name	Target SDO	Target SDO WG	Target Study Item/Work Item	Achieved Impact until End of 2021
UNIVBRIS	O-RAN alliance	WG3	Zero touch autonomous Application	UNIVBRIS will aim to contribute Zero touch autonomous Application (X-APP), in WG3.
UNIVBRIS	ONF, ORAN- Alliance	ORAN- Alliance	Non-realtime RIC	UNIVBRIS has joined the O-RAN ONF initiative
UNIVBRIS	ETSI	ETSI NFV MANO (OSM)	OSM in design and development	<ul> <li>UNIVBRIS contributed with OSM in design and development of capability of using an external WIM to provision L2 VPN services using WIM connectors. Following are recent publications accepted* and submitted**</li> <li>* A. S. Muqaddas et al., "Field Trial of Multi-Layer Slicing Over Disaggregated Optical Networks Enabling End-to-End Crowdsourced Video Streaming," 2020 European Conference on Optical Communications (ECOC), Brussels, Belgium, 2020, pp. 1-4, doi: 10.1109/ECOC48923.2020.9333400.</li> <li>** A. S. Muqaddas et al., "NFV Orchestration over Disaggregated Metro Optical Networks with End-to-End Multi-Layer Slicing enabling Crowdsourced Live Video Streaming," accepted in IEEE Journal of Optical Communications and Networking 2021.</li> </ul>
UNIVBRIS	ETSI	ETSI NFV MANO (OSM)	5G-VIOS components	<ul> <li>Published Articles:</li> <li>1- N. Uniyal, A.S. Muqaddas, D. Gkounis, A. Bravalheri, S. Moazzeni, F. Sardis, M. Dohler, R. Nejabati, D. Simeonidou, "5GUK Exchange: Towards Sustainable End-to-End Multi-Domain Orchestration of Softwarized 5G Networks, "Computer Networks, In Press, "https://doi.org/10.1016/j.comnet.2020.107297"</li> <li>2- S. Moazzeni et al., "A Novel Autonomous Profiling Method for the Next-Generation NFV Orchestrators," in IEEE Transactions on Network and Service Management, Special issue on Advanced Management of Softwarized Networks, vol. 18, no. 1, pp. 642-655, March 2021, doi: 10.1109/TNSM.2020.3044707.</li> </ul>



				<ul> <li>3. R. Nejabati, S. Moazzeni, P. Jaisudthi and D. Simenidou, "Zero-Touch Network Orchestration At The Edge," <i>2021 International Conference on</i> <i>Computer Communications and Networks (ICCCN)</i>, 2021, pp. 1-5, doi: 10.1109/ICCCN52240.2021.9522194.</li> <li>4. 5G-PPP architecture v4.0 White Paper.</li> </ul>
				https://5g-ppp.eu/wp-content/uploads/2021/11/Architecture-WP-V4.0- final.pdf
				(Contribution on Chapters: 1. Overall Architecture. 2. Management and Orchestration, and 3. Multidomain Orchestration).
FhG	W3C	W3C Second Screen	Presentation API, Remote Playback API, Open Screen Protocol	<ul> <li>Co-chair of Working group and Community group:</li> <li>Definition of specifications for Presentation API, Remote Playback API, Open Screen Protocol</li> <li>Define interface requirements for multi-display user experiences on the Web</li> </ul>
FhG	DASH- IF	Ad-insertion, Live streaming (task forces)	As specified under Impact	<ul> <li>New major dash.js player version: 4.1.0</li> <li>Whitepaper guidelines for integrating WebRTC Streaming into DASH ecosystem</li> <li>Define/reuse interfaces from DASH player for 3gpp</li> <li>New ABR algorithms for low-latency streaming</li> <li>Guidelines for ad-insertion</li> </ul>
FhG	5G-MAG	5G-MAG WG		• 5G-MAG Reference tools workshop: "Developing the 5G-MAG Reference Tools for Media"
DB Netz AG	ERA	ERA-ERTMS	Coordination of the overall ERTMS activities	Agreement with UIC on adapted timeline for UIC specification documents
DB Netz AG	ERTMS Users' Group	SC3	European Train Control System (ETCS) over FRMCS	First Version of ETCS over FRMCS document ready and reviews within involved groups



DB Netz AG	UIC FRMCS	ATWG; FWG; TOBA; UGFA; ERIG	AT-7800 - FRMCS System Requirement Spec (SRS) FU-7120 - FRMCS Functional Requirement Spec (FRS) TOBA-7530 - FRMCS TOBA SRS TOBA-7510 - FRMCS TOBA FRS	Finalization of first stable draft versions of FRMCS specification documents incl, Functional Requirement Specification (FRS), System Requirement Specification (SRS), Form Fit Function Interface Specification (FFFIS), Functional Interface Specification (FIS), TOBA FRS, TOBA SRS. Finalization of v1.0 specifications expected until end of December
DB Netz AG	ETSI	TC-RT	Normative technical specifications (TSs) of FRMCS: TS 103 764 Architecture TS 103 765-1 Transport Stratum TS 103 765-2 Service Stratum TR 103 768 Interworking	Drafting of High-level architecture as input for TS 103 764, TS 103 765-1 and TS 103 765-2. Identification and prioritization of required 3GPP functions for TS 103 765- 1 and TS 103 765-2 Defining the required 3GPP functions for the study item of interworking between FRMCS and GSM-R (TR 103 768)
DB Netz AG	3GPP	Special Task Force on developing Technical Specifications (TS) and Technical Reports (TR)	Specifications of 3GPP building blocks on 5G Core/RAN (Release 17/18), mission critical services for FRMCS transport and service strata, MCX using 5G (TS 23.289)	Freeze of Release 16 specifications, Update on Release 17/18 specifications



DB Netz AG	ECC/CE PT – 3GPP Interacti on	ECC/CEPT – 3GPP Interaction	Radio spectrum regulation, Defining radio characteristics and specification of features in 3GPP bands, discussions on potential usage of FR2 spectrum (>20 GHz) in addition to FR1 spectrum	With the ECC Decision on spectrum for railways (Railway Mobile Radio, RMR), a proposal has been achieved to allocate additional 1.6 MHz in the 900 MHz band (overall 5.6 MHz) and 10 MHz in the 1900 MHz band.
DB Netz AG	5GRAIL	5GRAIL_DLS T	Conduction of tests of DLST (Digital control and safety technology - esp. digital interlockings) on digital rail test fields	Permanent exchange with the FRMCS Specifications and Standardisation (> UIC FWG, ATWG, TOBA, and 3GPP & ETSI and UNISIG) established; A mobile communications infrastructure operated by DB Netz is currently being set up over a length of approx. 10 km.
DCAT	ETSI OSM / ZSM, possibly 3GPP		Edge mobility & Orchestration	<ul> <li>DCAT plans contribution to OSM related to 5G-VIOS activities on service mobility.</li> <li>DCAT joined ETSI as a member Sept. 2020.</li> <li>3 WGs identified for potential contribution:</li> <li>ETSI OSM In OSM R8, an optimised VNF placement for static placements component was introduced. DCAT would seek to provide dynamic placement based on mobility patterns.</li> <li>ETSI ZSM (Zero-touch network and Service Management) WG ZSM has SI on end-to-end cross-domain service life-cyclemanagement; relevant to the cross-domain orchestration work in 5G-VIOS.</li> <li>3GPP - SA2 R17 SI on "enhancement of support for Edge Computing in 5GC"; particularly edge relocation issue: "As the UE moves across the 5G system, the UE location may change and require the network and the edge to deal with the change of UE location." Potential for contribution will be investigated based on work on edge mobility.</li> </ul>



FhG	W3C – Web & Networ ks Group		Edge/ Cloud media rendering	FhG is member of the W3C and actively participating in several groups related to Media Delivery and Playback on the Web. The Web & Networks Interest Group considers topics relevant for 5G-VICTORI, esp. for Cloud/Edge Rendering (Future Mobility UC) and Media Distribution (CDN Use Case). "The mission of the Web & Networks Interest Group is to explore solutions for web applications to leverage network capabilities in order to achieve better performance and resources allocation, both on the device and network". FhG Planned activities: FhG will participate at the next W3C ("Technical Plenary / Advisory Committee") TPAC 2020 which will take place online this year and will provide a Demo (recording) as part of the Web & Networks Breakout sessions related to cloud & edge computing/ rendering of 360° videos (https://www.w3.org/wiki/TPAC2020/Demos).
FhG	IEEE 802.11		Broadcasting Services	<ul> <li>IHP &amp; FhG participate in IEEE 802.11 WG and are monitoring activities related to:</li> <li>The evolution of mmWave-related standards WLAN sensing</li> <li>Contributions to be proposed related to the work of IHP on the topics of synchronization, positioning and localization.</li> <li>Broadcast Services Task Group: FhG Leading IEEE task group on the topic of broadcast services.</li> </ul>
IHP	IEEE 802.11	IEEE 802.11bf (WLAN Sensing)	Synchronisation & Localisation	The integration of the sensing functionality together with communication is currently seen as a key feature of the 6G Radio Access Network (RAN), which allows to exploit the dense cell infrastructure of 5G for constructing a perceptive network. The work on WLAN sensing carried out in IEEE 802.11bf is currently proving its capability to enable many applications, such as in home security, health care, enterprise, and building automation/management markets. This Task Group proposes revising current communication infrastructures towards offering sensing capabilities. This can be done with rather slight modifications in hardware, signaling strategy, and communication standards. In the project, part of the activities will focus on the creation of programmable network functions (PNFs) that are necessary for the operation of vertical industries. Examples of these are synchronization and



			positioning, which are key to promote the joint sensing and communication wireless systems that the task group addresses.
ICOM	ETSI NFV, ETSI MEC	vCDN in NFV & MEC	ICOM's standardization activities focus on ETSI NFV & ETSI MEC WGs ETSI NFV: develops 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 participation in ETSI NFV-related events (e.g. OSM Hackfests) ICOM plans to work on ICOM's vCDN deployment according to OSM specs (Information Model), based on ETSI NFV standards 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 examine the creation of a proof-of-concept on the vCDN deployment.
КСС	ETSI RT (FRMCS )	FRMCS Architecture	<ul> <li>KCC is deeply involved as rapporteur in the ETSI FRMCS/GSM-R I/W study and contributes to the normative technical specifications (TSs) of FRMCS:</li> <li>TS 103 764 Architecture</li> <li>TS 103 765-1 Transport Stratum</li> <li>TS 103 765-2 Service Stratum</li> </ul> ETSI TC RT - Technical Committee Railways Telecommunications focuses on railways telecom aspects - not being part of the transmission technologies specification; esp. on: <ul> <li>Development &amp; maintenance of standards related to GSM-R as well as introduction of the new Future Radio Mobile Communication System (FRMCS).</li> <li>Specifications related to railway specific functions, out of scope of 3GPP.</li> <li>Collaborating with 3GPP providing inputs for Railways specific aspects.</li> </ul> KCC activities will focus on: <ul> <li>FRMCS study under finalization (stable draft), heading towards new WI for normative work</li> </ul>



				<ul> <li>Subsequent normative work on FRMCS Architecture, mainly in:</li> <li>Core network Architecture</li> <li>Onboard Architecture</li> </ul>
КСС	3GPP SA6 (Stage 2)		Mission Critical Voice & Data Services	<ul> <li>KCC's contribution pertain to a New Solution for call forwarding between MCPTT users in different MCPTT systems within the framework of the study numbered S6-212697.</li> <li>KCC is involved in the following 3GPP WGs:</li> <li>TSG-SA – Service and Systems Aspects; responsible for the overall architecture &amp; service capabilities of systems of 3GPP specifications; and for cross TSG co-ordination.</li> <li>TSG-SA1 – Services, responsible for: Specification of features (stage1), Specification of services (stage 1), Specification of service operation, Identification of requirements for service intervorking, Identification of requirements for service intervorking, Identification of requirements.</li> <li>TSG-SA6 – Mission Critical Applications, responsible for: Definition, evolution and maintenance of Stage 2 technical specification(s) for application layer functional elements and interfaces supporting critical communications and other applications (at the application layer), based on Stage 1 service requirements from SA1, and for the MCA application layer aspects. Works with relevant groups from other SDOs.</li> </ul>
КСС	3GPP	SA6		<ul> <li>Add call transfer for MCPTT private calls</li> <li>Add enhancements for interworking of MCPTT group calls with GSM- R, Add missing server to server information flows for group calls. Add origination side handling of functional alias for group calls</li> <li>Add announced call redirection and call deflection for MCPTT private calls</li> <li>Corrections and security enhancements for MCPTT private call forwarding</li> <li>Further corrections and security enhancements for MCPTT private call forwarding</li> <li>Adding to MCPTT private call transfer support for functional alias as a target</li> <li>Corrections to private call transfer</li> </ul>



				<ul> <li>Monitoring work in study items and work items related railway communication and mission critical communication</li> </ul>	
ксс	3GPP	SA6		Adding solution into Study on Mission Critical services support over 5G System to support CP/CP separation and better support low latency applications. This was done in cooperation with UIC (contribution was cosigned by Kontron).	
КСС	3GPP CT1 (Stage 3)		Mission Critical Voice & Data Services	<ul> <li>KCC is also involved in the following 3GPP Working Groups:</li> <li>TSG-CT1 MM/CC/SM (Mobility Management, Call Control, Session Management), responsible for the specifications and for managing WIs related to:</li> <li>User Equipment - Core network L3 radio protocols (CC, SM, MM, SMS) (and Core network side of the lu reference point).</li> <li>KCC Involvement includes specifically:</li> <li>Specification of Mission Critical Voice Services</li> <li>Specification of Mission Critical Data Service across these WGs that the company has presence.</li> </ul>	
3GPP	CT1			<ul> <li>Provide list of MCPTT group members who did not ack the group call req</li> <li>Add PConnectivity signalling part. Add Automatic group affiliation and deaffiliation based on location or functional alias</li> <li>Add PConnectivity extension to include IP Information</li> <li>Corrections in IP Connectivity SDP offer/answer generation</li> <li>Add Media plane for IP connectivity</li> <li>LS to SA6 on Private call transfer</li> <li>Add call transfer for MCPTT private call</li> <li>Add call forwarding for MCPTT private call</li> </ul>	



#### 2.3 Timeline towards standardization contributions

This section provides the plans of the 5G-VICTORI partners for the next period.

UNIVBRIS						
Target SDO	Target SDO WG	Target Work Item	Planned activities to be carried out towards standardization contributions after M30	Impacts/outcomes to be achieved through the planned activities		
O-RAN alliance	WG3	Zero touch autonomous Application	UNIVBRIS will publish its findings in academic journals in order the industrial community to benefit from this contribution towards the WG3 O-RAN alliance.	Zero touch autonomous Application will enable reduce the configuration efforts in certain solutions.		
ETSI	ETSI NFV MANO (OSM)	OSM in design and development	UNIVBRIS indirectly provides input to ETSI standardization through its academic publication.	The OSM in design and development of the capability of using an external WIM to provision L2 VPN services using WIM connectors.		
ETSI	ETSI NFV MANO	5G-VIOS components	UNIVBRIS indirectly provides input to ETSI standardization through its academic publication.	The 5G-VIOS components (profiling and Monitoring) has been designing on the concept of a common inter-facility orchestration platform. It will be able to broker network services (NSs) across multiple domains and facilities that comprise the 5G-VICTORI platform. UNIVBRIS researchers have been working on NFV related research in the light of submitting academic Journals in 2022. This indirectly will provide input to ETSI standardisation		
ONF, ORAN- Alliance	O-RAN- Alliance	Non-Realtime RIC	UNIVBRIS will publish its findings in academic journals in order the industrial community to benefit from this contribution towards the O- RAN alliance.			



	DBN						
Target SDO	Target SDO WG	Target Work Item	Planned activities to be carried out towards standardization contributions after M30	Impacts/outcomes to be achieved through the planned activities			
ERA	ERA-ERTMS	Coordination of the overall ERTMS activities	Synchronization with UIC & SC3/SC4 on the final FRMCS specification documents, w.r.t. sufficiency & consistency. Approval of FRMCS documents for TSI 2022.	FRMCS specification is ready for getting referenced in TSI 2022.			
ERTMS Users' Group	SC3	ETCS over FRMCS	Synchronization on ETCS/ATO over FRMCS specification content, w.r.t. defined work items	Required SC3/SC4 alignment on FRMCS documents and UNISIG ETCS documents achieved			
UIC FRMCS	ATWG; FWG; TOBA; UGFA; ERIG	AT-7800 - FRMCS System Requirement Spec (SRS) FU-7120 - FRMCS Functional Requirement Spec (FRS) TOBA-7530 - FRMCS TOBA SRS TOBA-7510 - FRMCS TOBA FRS	Finalization of all FRMCS specification documents in v1.x (FRMCS SRS, FRS, TOBA FRS, TOBA SRS, FIS, FFFIS)	All required FRMCS documents ready and approved for next steps with ERA and SC3/SC4			
ETSI	TC-RT	Normative technical specifications (TSs) of FRMCS: TS 103 764 Architecture TS 103 765-1 Transport Stratum TS 103 765-2 Service Stratum TR 103 768 Interworking	Progress on ETSI specification documents with finalization of all TSs until end of 2022	ETSI documents ready for supplementing the UIC FRMCS specification documents			
3GPP	Special Task Force on developing Technical Specifications (TS) and Technical Reports (TR)	Specifications of 3GPP building blocks on 5G Core/RAN (Release 17/18), mission critical services for FRMCS transport and service strata, MCX using 5G (TS 23.289)	3GPP Release 17 with stage 3 contributions finalized in 2022. Relevant FRMCS Release 18 stage 2 & Release 19 stage 1 items progressing, especially w.r.t. Mission Critical Services specifications	Release 17 ready for ETSI specifications. Release 18 prepared to be included in FRMCS update			



ECC/CEPT – 3GPP Interaction	ECC/CEPT – 3GPP Interaction	Radio spectrum regulation, Defining radio characteristics and specification of features in 3GPP bands, discussions on potential usage of FR2 spectrum (>20 GHz) in addition to FR1 spectrum	For spectrum/radio activities relevant for FRMCS would be - UGFA in UIC: to address TDD 1900 MHz cross-border co-existence (to FM56) - ETSI/3GPP: to finalize ETSI FRMCS radio characteristics TS based on 3GPP specs	Finalization of FRMCS radio characteristics and specifications
5GRAIL	5GRAIL_DLST	Conduction of tests of DLST (Digital control and safety technology - esp. digital interlockings) on digital rail test fields	Progressing on relevant Work-packages for preparing the field trials based on test specifications	Pre-requirements for field trials finalized

DCAT					
Target SDO	Target SDO WG	Target Work Item	Planned activities to be carried out towards standardization contributions after M30	Impacts/outcomes to be achieved through the planned activities	
ETSI OSM	NFV/SDN	LCM, POL, PLA	DCAT will contributes towards mobility management in the OSM platform.	Mobility of network service within virtual infrastructure will be done efficiently.	

FhG						
Target SDO	Target SDO WG	Target Work Item	Planned activities to be carried out towards standardization contributions after M30	Impacts/outcomes to be achieved through the planned activities		
5G-MAG	Content Distribution WG	MBMS	Proof-of-concept open source implementation of the MBMS standard	Improvement of the Data Shower multi- CDN towards live streaming in addition to on-demand content		
W3C	Web & Network WG	Edge Rendering	Development of Web specifications for Edge Rendering	Implementation of Future Mobility Edge Rendering feature for the platform		



	IHP					
Target SDO	Target SDO WG	Target Work Item	Planned activities to be carried out towards standardization contributions after M30	Impacts/outcomes to be achieved through the planned activities		
IEEE	IEEE P802.11	802.11bf (WLAN Sensing)	The work IHP is carrying out for synchronization of wireless nodes directly impacts the positioning/sensing capabilities of that node. This work will be realized as PNFs in the project and the part of the work related to positioning/sensing will be proposed to the Task group in the IEEE 802.11bf meetings.	Incorporation of some of the ideas for carrying out joint sensing and communication activities to the standard. Open source contribution to be used broadly.		

	ICOM							
Target SDO	Target SDO WG	Target Work Item	Planned activities to be carried out towards standardization contributions after M30	Impacts/outcomes to be achieved through the planned activities				
ETSI NFV, ETSI MEC		vCDN & uiTOP solutions in NFV & MEC	ICOM plans to participate in events such as ETSI NFV&MEC Plugtests 2022 with our vCDN and uiTOP applications, extended with the appropriate interfaces in order to be compatible with MEC standards and possibly compatible with NFV standards.					

	KCC						
Target SDO	Target SDO WG	Target Work Item	Planned activities to be carried out towards standardization contributions after M30	Impacts/outcomes to be achieved through the planned activities			
3GPP	3GPP SA6	Mission Critical Voice & Data Services	Meetings to be participated: SA6#33 (2019-09-02 - Sophia- Antipolis(FR)) SA6#34 (2019-11-11 - Reno, Nevada(US)) SA6#35 (2020-01-13 - Hyderabad(IN)) SA6#36-BIS-e (2020-03-31 - Online) SA6#37-e (2020-05-14 - Online) SA6#38-e (2020-07-20 - Online) SA6#41-e (2021-01-18 - Online)	Solution into Study on Mission Critical services support over 5G System to support CP/CP separation and better support low latency applications. 5G-VICTORI Use Case Rail Critical Voice and Data Communications			



Follow up on solution into Study on Mission Critical services support over 5G System to support CP/CP separation and better support low latency applications. Continue with normative work to follow up. Meeting to be participated: SA6#40-e (2020-11-16 - Online)	
Standardisation Focus KCC standardization activities will focus on leveraging of findings in 5G-VICTORI Critical Service Deployment Validation for both Lab and Live Systems for standardization in the relevant WGs. - 5G-VICTORI Use Case Rail Critical Voice and Data Communications KCC is also involved in other specification bodies e.g. dealing with Radio Aspects for Railway communication but relevance for 5G- VICTORI is not observed as it is mainly associated with GSM-R Radio Interference (out of second character)	
Meetings to be participated: CT1#121 (2019-11-11 - Reno, Nevada(US))	
Meeting to be participated: CT1#122-e (2020-02-20 - Online)	
CT1#123-e (2020-04-16 - Online)	
CT1#124-e (2020-06-02 - Online)	
CT1#125-e (2020-08-20 - Online)	
CT1#127-e (2020-11-13 - Online)	
CT1#128-e (2021-02-25 - Online)	
CT1#130-e (2021-05-20 - Online).	



# **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 present and future academic and industry aspirations, communication and dissemination activities are a crucial part of innovative projects as the means of raising awareness and transferring knowledge to interested parties. The 5G-VICTORI consortium committed to raise awareness and maximise impact of project results at various target audiences, has developed at the early stages of the project (in deliverable D5.1 [1]) a concrete communication and dissemination activities strategy, which is maintained throughout the project lifetime. The main objectives of these activities and strategy are to:

- raise awareness and attract attention at the local, national and international levels on the project targets and achievements,
- inform specific target groups (especially industrial stakeholders) about the results and linking them to the line of work of each target group addressed, and
- 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 open to future collaboration, and
- pave the way for the market demand for the project products as the first necessary stage of exploitation activities.

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 has evolved to detail a specific activities plan, which was initially presented in [1]. To date the project is at the implementation phase, after going through two main cycles of impact assessment and revision of the activities plan. The first cycle aimed to



adjust and cope with the impact of the COVID-19 pandemic (since March 2020) on the dissemination and communication activities of the project, while the second focused on addressing the assessment feedback received as the output of the project review. It should be noted that these revisions took into account the extension of the project duration by 13 months (up to M49).

#### 3.2 Brief Overview of the Activities and Plan Revision

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 and include:

- Publicly accessible Internet web-pages addressing the general public and whoever is interested in 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.
- Social networks addressing the general public and whoever is interested on the project activities. 5G-VICTORI maintains a number of social network accounts, namely at LinkedIn, Twitter, YouTube, for the purposes of reaching out the general public and professional communities.
- Press Releases. A number of press releases have been issued by commercial companies as well as by research institutes, for reaching out their customers and targeted audience.
- EC supported communication mechanisms, such as the 5G-PPP projects' site, and CORDIS.
- Participation in industry events, for the purposes of addressing actors activated in specific vertical industries.
- Participation in and organization of conferences/ workshops/ summits, for the purposes of addressing the research communities.

In addition to these, for the purposes of mitigating the pandemic effect on the number of events – mainly industrial events- 5G-VICTORI proceeded with the participation in a number of webinars as well as the organisation of a workshop – besides the planned final project workshop.

To address the target audiences, a rich set of communication material has been created, and is continuously maintained and updated throughout the project lifetime. This includes a number of targeted presentations, the project brochure/leaflet, the project poster, videos, etc. It shall be mentioned that for the purposes of keeping interest on the project at high levels 5G-VICTORI decided the production of informative blogposts to be posted in website and the project's social media accounts on a bi-weekly basis – which eventually became more frequent!

The updated complete activities plan is presented in Table 3-1. The following sections elaborate more on the dissemination and communication activities performed from the beginning of the project up to the present.



Activity	1st Year			2nd	Year		3rd Year		4th Year				5th Year				
Activity	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)	Cre	ation by M4			Maintenance				Maintenance								
Blogposts						Creation of Blogposts											
LinkedIn Account	Cre	ation by M5								Mainte	nance						
Twitter Account	Cre	ation by M6								Mainte	nance						
YouTube Account	Crea	ation by M7			Maintenance												
Partner Permanents Webpages			Creatio	n by M12	Maintenance & creation of new ones												
Press Releases		Initial Par	ticipatior	n - related		Activities - related			Results - related								
EC Communication	Pages Cre	ation by M4			Partici	pation in N	letworking	Events	Part	rticipation in Networking Events			Participati	ion in Networki	ng Events		
Logo	Creation M1																
Presentation	1st	Version M4			2nd ver	sion M18					De specific v	monstrator - versions M36					
Brochure/ Leaflet (MS9)		1st Version															
Poster												1st Version			2nd Version		
Video						Official Video											
Participation in Industrial Events		Continuous															
Workshop (MS11)						Workshops Organisation			Project D Work	edicated shop							
Internal Communication						Continuous											
Publications in Journals/ Magazines		Continuous															
Participation in Conferences		Continuous															
Trainings/ Tutorials / Webinars												Continuou	ıs	_			
Monitoring					D5.2 Stan Dis Commu liais	D5.2 Standardisation, Dissemination, Communication and liaison Activities Report			ndardisation, ssemination, n and liaison vities Report								

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



#### 3.3 **Project Website and Dissemination Material**

The 5G-VICTORI public website was developed by I2CAT (supported by IHP) and it is available at <u>www.5g-victori-project.eu</u> since November 2019. The structure, content and design of the website has been improved to fulfil the recommendations received from the EC reviewers. The website currently comprises the sections shown in Figure 3-2.

5G-VICTORI project partners contribute regularly to the website with articles published on the 'News & events' section. To date, a total of 32 articles have been published, and are listed in Table 3-2.

	About 5G-VICTORI	Consortium	Project Outcomes	News & Events	Contact 🤰	in	۵
	Motivation Work Plan Use Cases		Deliverables Publications Contributions within 5G-PPP				
5GWECTORI			Materials				
field trials for rail, energy and me industries	ge scale edia						
		, 1997 , 1997 , 1997				And and a second	
5G-VICTORI will conduct	t <b>large scale trials</b> fo	or advanced v	ertical use case verif	ication focusing	on:		
Transportation Energy		Media	Factories o	f the future	Cross-vertica	use cases	

Figure 3-2 5G-VICTORI public website: sections













**Publication** 

Post

#### date European 5G-VICTORI Project kick-off in Berlin 30/7/2019 4/11/2019 5G-VICTORI contributes to the Fraunhofer FOKUS FUSECO Forum 2019 21/2/2020 User survey - Use of Media in Public Transport Track-to-train communication for Enhanced Mobile Broadband under High-Speed 23/4/2020 Mobility 22/5/2020 Dr.Navid Nikaein (EUR) interviewed at l'MTech The University of Bristol contributes to 5G-VICTORI's UC #1.2 – Digital Mobility 27/5/2020 Digital Catapult develops a cross-testbed connectivity management platform 3/9/2020 29/9/2020 Webinar on 5G Trials in Europe: 5G Experimentation Facilities and Vertical Trials ADMIE contribution to 5G-VICTORI's UC # 2: "Digitization of Power Plants" 29/10/2020 11/9/2020 5G-VICTORI at INFOCOM World Conference 2020 A10 Networks interviews Kostas Katsaros (DCAT) on Edge Computing, IIoT and 18/11/2020 **Mobile Networks** 19/11/2020 5G-VICTORI in Romania Orange Romania participates in the 2020 Mosaic5G Virtual Workshop 30/11/2020 30/11/2020 Rail Signaling over 5G 21/12/2020 Media Services provisioning in Railway Environment 28/12/2020 5G - the internet of people, business and things 3/2/2021 Leveraging 5G at DB Netz 5G For Optimizing Media Delivery in Mobile Environments by Fraunhofer FOKUS 24/3/2021 (FhG) 10/3/2021 Industry 4.0: Is 5G the right Networking Technology? 20/4/2021 5G Network slicing approach by i2CAT Media Services in Railway Environments for Onboard Infotainment and enhanced 29/4/2021 Safety and Security 13/5/2021 5G-VICTORI researchers receive Runners-up Award at IEEE 5G for CAM Assessing the services of 5G-VICTORI through a sustainability lens - IZT takes 19/5/2021 on an important green perspective in EU project Enabling virtually unlimited onboard Wi-Fi bandwidth for passengers to stream 17/6/2021 media, while preserving the vehicles' existing cellular network for other uses Webinar on "Optical Networking an Enabler for 5G and Beyond" by Anna 28/5/2021 Tzanakaki 4/6/2021 5G-VICTORI activities at EuCNC & 6G Summit 2021 7/6/2021 Rail Critical Services on the way towards FRMCS 18/6/2021 A closer look at the Digital Mobility Use Case 25/6/2021 5G-VICTORI dissemination activity at the 5G-PPP TB eWorkshop 27/7/2021 UHA's Polaron Engine approved for NVIDIA DLS 4/11/2021 UHA is driving the Future Mobility concept in 5G-VICTORI

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







Figure 3-5 5G-VICTORI Website audience overview (source: Google Analytics)

The website performance is monitored with Google Analytics, which provides insightful metrics on usage, user engagement and content performance. According to this metrics, the website traffic has steadily increased since the beginning of the project (3500 sessions/year). Other relevant indicators, such as number of sessions per user, pages/session, average session duration, and bounce rate, show good results in terms of user's experience and behaviour.

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.

#### Dissemination Material

As already reported in [1], initial dissemination material has been generated at the early phases of the project and it is continuously enriched. This includes the project presentation, the project brochure/ leaflet, the project poster and project videos. In particular, a project presentation has been created and is continuously updated and used as base material for various presentations. A project brochure has been also created (see Figure 3-6) and is available at the project website for the interested audience (URL: <a href="https://www.5g-victori-project.eu/wp-content/uploads/2021/09/5GVICTORI\_tryptich\_v1.1\_WEB.pdf">https://www.5g-victori-project.eu/wp-content/uploads/2021/09/5GVICTORI\_tryptich\_v1.1\_WEB.pdf</a>).





#### Figure 3-6 5G-VICTORI project brochure

Due to the epidemic situation, and the delays incurred in the deployment activities of the project – reflected also in the extension of the project timeline- the project videos have been also delayed. However, this activity will be on the project focus of as soon as on-site demonstration activities are performed. As originally planned, the final distribution of the video can use the project web-site, the YouTube 5G-VICTORI <u>channel</u> as well as COSMOTE TV's streams for reaching out the Greek public.

#### 3.4 Social Media

Social media dedicated channels have been created to disseminate 5G-VICTORI among the target audiences and to build an online community around the project. The project's website serves as the main backbone of all communication activities, while social media is used to maintain daily presence and interact with the 5G community. Thanks to a constant flow of updates, the engagement and interactions have increased constantly over time.

**LinkedIn** (URL: <u>https://www.linkedin.com/company/5gvictori/</u>): The 5G-VICTORI LinkedIn page counts with 241 followers to date. The page is continuously fed with updates on project activities, blog posts and partners' dissemination activities.

**Twitter** (URL: <u>https://twitter.com/5gvictori</u>): The project's Twitter account is followed by more than 550 users. Twitter is used to drive engagement through dissemination of project updates and outcomes (60% of the content), and other relevant information for the project community and ecosystem (40% of the content).

Both social media channels are maintained by **i2CAT**. The metrics obtained from LinkedIn and Twitter, through the Hootsuite social media management tool, show that the project is successfully building a core audience (see Figure 3-7).





Figure 3-7 5G-VICTORI LinkedIn & Twitter followers

**YouTube** (<u>https://www.youtube.com/channel/UCEck7riXv0UZm3xiwDhU7sA</u>): A dedicated account to publish the forthcoming videos produced within the project activity has been created and is managed by **i2CAT**. The channel hosts 8 videos to date, which are listed in Table 3-3. Project partners have also contributed to disseminate the project on social media by sharing relevant information on their corporate channels (see Table 3-4).

Title	Link
Berlin Future Mobility Remote Rendering - Demo 1	https://youtu.be/YZvj17ppqsk
Berlin Future Mobility Remote Rendering - Demo 2	https://youtu.be/Uo6-hjK068w
Rail Critical Services	https://youtu.be/ZMiGYF9bIQY
Digital Twins	https://youtu.be/GTM9WNhNCAU
Data Shower Application for Uninterrupted Video Streaming using Multi-Level vCDN Solution	https://youtu.be/Hq_AOWNek9Y
Passenger Safety	https://youtu.be/MrCT9bTDJ8M
p4-based Session Management in a Rail Environment	https://youtu.be/04lwUSOAq_0
5G Network E2E slice deployment using 5G open RAN and Core software components (OpenAirInterface)	https://youtu.be/AXtlFftepS8

#### Table 3-4 Partners' mentions to the project on Social Media

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/114052327580360 7041
i2CAT	Twitter	At @i2CAT we keep on paving the way to the #5G revolution! Our project @5gVictori is ()	https://twitter.com/i2CAT/st atus/11423437173129666 56
RBB	Twitter	Good to be part of @5gVictori . #5g #horizon2020	https://twitter.com/rbb_inno /status/114633549707944 7553



FhG	Twitter	We're proud to be part of the @5gVictori consortium! More information ()	https://twitter.com/fraunhof erfokus/status/115403137 6682766336
ORO	Twitter	Happy to be part of the #H2020 @5gVictori project where we will contribute to use ()	https://twitter.com/oranger omania/status/115404413 7416454152
i2CAT	Twitter	@i2CAT is glad to be involved in @5gVictori We will participate in the Railways and (…)	https://twitter.com/i2CAT/st atus/11543971537097400 34
INTRA	Twitter	Digital Catapult is proud to be a part of @5gVictori #5GVictori and contributing ()	https://twitter.com/DigiCata pult/status/115472756837 9142145
INTRA	Twitter	Intracom Telecom participated in the kick-off meeting of the new EU research ()	https://twitter.com/Intracom Telecom/status/11589843 22059264001
i2CAT	Twitter	.@5gVictori was launched last month in Berlin. It will conduct large scale #5G ()	https://twitter.com/i2CAT/st atus/11612045125662720 00
ORO	Twitter	.@orangeromania at @5gVictori technical meeting, presenting #5G use case ()	https://twitter.com/Orange PR_ro/status/1187024077 577490432
INTRA	Twitter	A few days ago, Intracom Telecom participated at the 1st technical meeting ()	https://twitter.com/Intracom Telecom/status/11927653 00267200514
ORO	Twitter	.@5GVICTORI work visit in @visitalbaiulia on cross-vertical use cases focusing ()	https://twitter.com/Orange PR_ro/status/1197456776 704204800
ORO	Twitter	. @orangeromania took part in the @5GVICTORI 2nd Tech Meeting. The ()	https://twitter.com/Orange PR_ro/status/1225460477 477740544
FhG	Twitter	Macht mit bei der "Nutzerumfrage zur Mediennutzung in öffentlichen ()	https://twitter.com/fraunhof erfokus/status/122975577 0578915328
EUR	Twitter	5G-Victori : des tests à grande échelle pour les industries verticales ()	https://twitter.com/GwenCo mte/status/126304859753 4195713
IRT	Twitter	#Streaming on rails — Improving #VoD for train passengers. Read more about the ()	https://twitter.com/IRTpres se/status/1265280980526 534658
ORO	Twitter	We are proud to support #Comms2020 for the 7th time and be part of the innovation ()	https://twitter.com/oranger omania/status/127352136 6579494912
IZT	Twitter	Interested in #5G? Check out the @5GVICTORI Project for info about ()	https://twitter.com/IZT_Zuk unft/status/131204353426 7092993
ORO	Twitter	Dezvoltarea Alba Iulia ca #SmartCity continuă cu ajutorul tehnologiei #5G în ()	https://twitter.com/Orange PR_ro/status/1329750216 615075840
ORO	Twitter	Discover the latest @5GPPP white paper that provides an in-depth analysis of ()	https://twitter.com/Orange PR_ro/status/1362684261 657108483
DCAT	Twitter	The @5GVICTORI project aims to demonstrate how dynamic #5G pop-up ()	https://twitter.com/DigiCata pult/status/136636253320 9194504



FhG	Twitter	Let's take a look at the #5G Playground, our 5G campus network in Berlin, which is (…)	https://twitter.com/fraunhof erfokus/status/137471638 5696358405
i2CAT	Twitter	Des de les àrees de Mobile Wireless Internet i Software Networks, @MiguelCatCid i ()	https://twitter.com/i2CAT/st atus/13862286354771066 99
IZT	Twitter	@IZT_Zukunft und @uxberlin veranstalteten am vergangenen Freitag den ersten ()	https://twitter.com/IZT_Zuk unft/status/138662769893 2469766
ORO	Twitter	Ducem tehnologia 5G din laborator în proiecte publice ce aduc beneficii reale ()	https://twitter.com/Orange PR_ro/status/1446427708 372705280
ORO	Twitter	Descoperă progresul și evoluția inițiativelor incluse în @5GPPP , din ultima ()	https://twitter.com/Orange PR_ro/status/1462742335 469535233
MATI	LinkedIn	Let's have a closer look to Mativision's applications in 5G-VICTORI Project!	https://www.linkedin.com/p osts/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: <u>https://lnkd.in/d2KZqZX</u>	https://www.linkedin.com/p osts/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 și inovației din acest domeniu. ()	https://www.linkedin.com/f eed/update/urn:li:activity:6 768449265065975808/
ORO	LinkedIn	Începută în 2018, prin parteneriatul cu Orange, dezvoltarea orașului Alba Iulia ca #SmartCity continuă cu ajutorul tehnologiei #5G în ()	https://www.linkedin.com/f eed/update/urn:li:activity:6 735514919816499201/

The project's social network 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 project exploitation activities in how to address interest in the networks' contents, and the maintenance of them beyond the project end.

#### 3.5 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. The number is continuously growing and at present we count 13 partners' 5G-VICTORI dedicated webpages, as well as additional webpages referencing 5G-VICTORI. A non-exhaustive list is included in Table 3-5.

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

Website
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IHP	https://www.ihp- microelectronics.com/res earch/communication- and-embedded-system- architectures/projects/5g- victori	English       Deutsch       A       A       Contact         Search       Contact         Dependence       Dependence         Dependence       Dependence         Dependence       Dependence       Dependence         Dependence       Dependence       Dependence       Dependence         Dependence       Dependence       Dependence       Dependence         Security       Dependence       Dependence       Dependence         Dependence       Dependence       Dependence
UNIVBRIS	<u>http://www.bris.ac.uk/eng ineering/research/hpn/pr ojects/5g-victori/</u>	
FhG	https://www.fokus.fraunh ofer.de/en/fame/projects/ 5g-victori and https://www.fokus.fraunh ofer.de/en/ngni/projects/ 5gvictori	<page-header></page-header>



COSM	<u>https://www.cosmote.gr/c</u> <u>s/otegroup/en/5g_victori.</u> <u>html</u>	<page-header></page-header>
I2CAT	https://www.i2cat.net/proj ects/5g-victori/	Rect       Image: Bit interaction to inte
RBB	<u>https://www.rbb-</u> online.de/en/unternehme n/der_rbb/profil/innovatio nsprojekte/projekte/5g- victori/	<text><text><text><text><text><text><text><text><text><text><text><text><text></text></text></text></text></text></text></text></text></text></text></text></text></text>
ORO	https://5glab.orange.ro/e n/5g-research-projects/ (EN) https://5glab.orange.ro/pr oiecte-de-cercetare-in- domeniul-5g/ (RO)	i Orange 56 Lab Q    i Orange 56 Lab Q     Image: Solid Control of



DCAT	<u>https://www.digicatapult.</u> org.uk/how-we-can- <u>help/what-we-</u> offer/programme/5g- <u>victori/</u>	EXPLORE ALL CATAPULTS - PROGRAMME <b>5G-VICTORI</b> Showcasing how advanced 5G technology can transform service offerings from a wide range of industry sectors VISIT WEBSITE
INTRA	http://www.intracom- telecom.com/en/compan y/profile/rnd/5gNetworks. htm	EVERTICATION AND A CONTRACTION OF A CONTRACT
ADMIE	https://www.admie.gr/e n/company/structure/ge neral-department- activities/research- technology-and- development- department/5g-victori (EN & GR) https://www.admie.gr/kai notomia/erga-ereunas- kai-anaptiksis/5g-victory (GR)	<page-header></page-header>
IZT	<u>https://www.izt.de/them</u> en/view/project/5g_victo <u>ri/</u> (DE)	<page-header></page-header>
IRT	https://www.irt.de/en/res earch/media-services- and-application/5g- victori/ (online for as long as IRT maintained its business activities)	





#### 3.6 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. These press releases (see Table 3-6) are planned to be channelled to appear in a number of local electronic and printed media. Until present the following press releases have been issued, related to the initiation of the project and to specific activities:

Partner	Press Release Title & URL	Issued on
IHP	<ul> <li>IHP's essential participation in developing high performance 5G wireless technologies Third Horizon 2020 EU-project within the 5G-framework coordinated by IHP</li> <li><a href="https://www.ihp-microelectronics.com/uploads/media/PM_2019-04-24_5G-Projects_eng.pdf">https://www.ihp-microelectronics.com/uploads/media/PM_2019-04-24_5G-Projects_eng.pdf</a></li> </ul>	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
FhG	European 5G-VICTORI Project kick-off in Berlin	July 30, 2019

#### Table 3-6 Press Releases issued by 5G-VICTORI Partners.





	https://www.fokus.fraunhofer.de/en/ngni/news/5Gvictori 2019 07	
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- <u>Romania</u> (To appear also in UHA website in: <u>https://urbanhawk.space/News/)</u>	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
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-iulia1362884	November 23, 2020
ORO	5G – internetul oamenilor, al afacerilor și al lucrurilor https://www.zf.ro/info/p-5g-internetul-oamenilor-al-afacerilor-si-al- lucrurilor-19789910 (RO)	December 17, 2020

#### 3.7 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 <a href="https://sg-ppp.eu/5g-victori/">https://sg-ppp.eu/5g-victori/</a>, and CORDIS under <a href="https://sg-ppp.eu/5g-victori/">https://sg-ppp.eu/5g-victori/</a>.

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

#### 3.8 Participation in Industry Events

According to the project plan, the participation to targeted industry events is 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 current pandemic situation. Although due to the current conditions many delays and cancellations of many of the originally planned events have occurred, the project partners have sought opportunities to participate in virtual industry meetings, in on-line talks and in hybrid events over this period. These activities are listed in Table 3-7.



#	Partner	Communication Event	Communication Event Date of Event Location		<b>Type of action</b> (e.g. presentation, talk, exhibition, etc.)
		2019			
1	ORO	Digital Assembly	2019-06-(13-14)	Bucharest, Romania	Boot/Presentation
2	IHP	EuCNC 2019, session FrA0- 5G-PPP ICT19	2019-06-21	Dubrovnic, Croatia	Presentation
3	UHA	On board of RFA LYME BAY (helicopter carrier of the Royal Navy) together with the Department for Transport	2019-07-01	London, UK	Exhibiting and presentation
4	ΜΑΤΙ	TC3 is the Telecom Council's annual conference, Menlo Park, San Francisco USA	2019-09-(25-26)	Menlo Park, San Francisco USA	Presentation in event workshops and exhibition
5	MATI	Final workshop in Greenwich (Ravensbourne University)-present on Mativision's 5G work, Ravensbourne University London, 6 Penrose Way, London, SE10 0EW	2019-09-30	Greenwich (Ravensbourne University)-Ravensbourne University London	Presentation
6	MATI	UK Spectrum Sharing Alliance, TechUK, London, UK	2019-10-01	TechUK, London, UK	Presentation
7	MATI	OFCOM All Colleague Event, London, UK	2019-10-10	London, UK	Presentation
8	ΜΑΤΙ	Neighbourhoods of the future - Stakeholder Event, Coventry University, Coventry, West Midlands, UK	2019-10-15	Coventry University, Coventry, West Midlands, UK	Presentation
9	IHP	10th Fuseco Forum	2019-11-(07-08)	Berlin, DE	Presentation
10	FhG	10th Fuseco Forum	2019-11-(07-08)	Berlin, DE	Presentation
11	UHA	Bristol Technology Showcase	2019-11-08	Bristol, UK	Exhibiting
12	UHA	Insurance Innovators Summiot	2019-11-(13-14)	London, UK	Workshop participation
13	COSM	Innovation Forum by Deutsch-Griechische Industrie- und Handelskammer, GR-DE 2019	2019-11-18	Athens, Greece	Presentation/ talk
14	ΜΑΤΙ	The Immersive Economy in the UK and Beyond, Digital Catapult Centre, London, UK	2019-11-19	Digital Catapult Centre, London, UK	Presentation
15	UHA	Maintenance of Infrastructure Assets using Geospatial Insight	2019-11-21	Birmingham, UK	Panel participation
16	ΜΑΤΙ	4th Boao International Tourism Communication Forum, Boao, Hainan, China	2019-11-(23-24)	Boao, Hainan, China	Presentation
17	COSM	INFOCOM World - Athens 2019	2019-11-26	Athens, Greece	Presentation/ talk

#### Table 3-7 Participation in Industry Events by 5G-VICTORI Partners.



#	Partner	Communication Event	Date of Event	Location	<b>Type of action</b> (e.g. presentation, talk, exhibition, etc.)
		2020			
1	UHA	Insurtech Matchmaking Event	2020-01-30	London, UK	Presentation
2	UHA	Rail Safety and Standards Board	2020-02-11	London, UK	workshop
3	UHA	Connected Places Catapult Future mobility event	2020-03-04	Newport, UK	Talk and Presentation
4	UHA	Speaking at the Business Growth Show	2020-03-12	Birmingham, UK	Panel participation
5	ORO	5G Online Challenge /Founders meeting with Tech Hub Bucharest	2020-05-10	Online	Presentation/WS
6	ORO	COMM2020/5G-VICTORI a driver for industrial and societal changes	2020-06-18	WebConference	Keynote
7	IASA	The Role of Optical Networking in the 5G Era and Beyond	2020-06-22	Online	Plenary talk
8	ΜΑΤΙ	5G World (UK5G) - 5G as a building block for advanced digital infrastructure. (On Line Panel)	2020-08-03	UK sourced (On Line Panel)	Presentation
9	FhG	Cloud-based 360° Video Playout on TV	2020-10-30	Berlin, DE	Demo talk/footage
10	COSM	INFOCOM World - Athens 2020	2020-11-(04-06)	Online Conference	Presentation/ talk
11	MATI	Innovation Forum, London, UK, On Line	2020-11-05	London, UK, On Line	Presentation
12	IHP	Presentation of 5G-VICTORI to the 5G TRIALS Workshop	2020-10-14	Online	Presentation
13	MATI	5GTT - Private networks in a 5G World, London, UK, On Line	2020-11-(11-12)	London, UK, On Line	Presentation
14	ΜΑΤΙ	5G TECHRITORY: 3rd-annual Baltic Sea Region 5G ecosystem forum Virtual event, Latvia, On Line conference	2020-11-(11-12)	Virtual event, Latvia, On Line conference	Presentation
15	ΜΑΤΙ	5G Private Networks: Impacts on COMS, Edge Computing, and the shop floor, London UK, On Line	2020-11-19	London UK, On Line	Presentation
16	UHA	Roundtable debate: Driving Through the Myths and Barriers to Make Automated Transportation a Reality!	2020-12-20	online/live streamed	Roundtable host
17	ADMIE	5G-PPP TB Workshop: 5G for Verticals, "Digital Transformation of Power Utilities", Presenter: Nikolaos Tzanis (ADMIE)	2020-12-10	online/live streamed	Presentation
18	MATI	Innovation Workshop (Q3), London, UK, On Line	2020-12-20	London, UK, On Line	Presentation



#	Partner	Communication Event	Date of Event	Location	<b>Type of action</b> (e.g. presentation, talk, exhibition, etc.)
		2021			
1	MATI	IUK South East Event – London UK, On Line	2021-02-08	London UK, On Line	Presentation
2	ΜΑΤΙ	Digital Economy 5G impact planning call (Innovate UK event) – London UK, On Line	2021-02-24	London UK, On Line	Presentation
3	MATI	Unleashing digital connectivity innovation, London UK, On Line	2021-03-08	London UK, On Line	Presentation
4	UHA	West of England Space Leaders Meeting (satellites and data)	2021-03-10	Online	workshop
5	ΜΑΤΙ	GLA - Greater London Authority - Emerging Technology Charter, London UK, On Line	2021-03-19	London UK, On Line	Presentation
6	UHA	NVEC Demonstration Event (digital twins in nuclear facility management)	2021-03-23	Online	Presentation
7	IHP	IEEE 5G for Connected and Automated Mobility (CAM)	2021-05-12	Online	Presentation
8	IASA	"Adaptive FH Optimization in MEC Assisted 5G environments",	2021-06-28	Online	Poster
9	IASA	"Mobility aware Dynamic Resource management in 5G Systems and Beyond"	2021-06-29	Online	Invited presentation
10	UHA	Home delivery Asia online conf and expo	2021-07-(06-07)	Online	Presentation
11	ADMIE	2021 Joint EuCNC & 6G Summit, WS6 - 5G Private Networks	2021-06-(08-11)	Online	Presentation
12	COSM	Innovation Forum by Deutsch-Griechische Industrie- und Handelskammer, GR-DE 2021	2021-11-24 Online		Presentation/ talk

#### 3.9 Webinars

Further focusing on the communication activities, partners have participated in a number of webinars, in an attempt to reach out the industry and research communities. These are summarised in Table 3-8.

#	Partner	Webinar-Training	Date of event	Location	Type of action
1	ORO	Innovation Labs 2020 / Communication architectures in 5G networks (business opportunities based on 5G)	2020-04-07	Online	Webinar Presentation
2	ORO	Orange Educational Program/5G Technology	2020-05-11	Online	Webinar Presentation
3	IHP	Webinar organized by NCSR "Demokritos" (ICT-17 5GENESIS Project)	2020-10-14	Online	Webinar Presentation
4	ORO	Orange Group SWI Webinar/5G-VICTORI FR/RO cluster	2020-11-20	Online	Webinar Presentation
5	Orange	Orange Labs Webinar	2020-11-20	Online	Webinar Presentation/ Talk
6	UNIVBRIS	5G New Radio Implementation and Migration from Non-Standalone to Standalone	2021-01-28	Online	Training
7	UNIVBRIS	Techncial writing course	2021-03-(22-26)	Online	Training
8	ORO	Communication architectures in 5G networks/Business opportunities based on 5G	2021-05-21	Online	Webinar Presentation
9	Orange	Final 5G EVE Webinar	2021-05-26	Online	Webinar Presentation/ Talk
10	IASA	"Optical Networking an Enabler for 5G and Beyond"	2021-05-26	Online	Webinar Presentation
11	ORO	Orange Educational Program/5G Technology	2021-06-10	Online	Webinar Presentation
12	ICOM	"5G Telco cloud service orchestration" webinar organized by DCAT	2021-12-02	Online	Webinar Presentation

Table 3-8	Participation	in Webinars and	Trainings b	by 5G-VICTORI	Partners.
				· <b>,</b> · · · · · · · · · · ·	

#### 3.10 Other Communication Activities

To further maximise impact, partners performed additional communication activities including the following:

- ORO participated in a Workshop organised by 5G Mosaic, where they made a presentation entitled "Presentation 5G-VICTORI verticals experimented in Romania on top of open-source 5G platforms" (3/12/2020).
- ORO participated in the 13th edition of the New European Media Summit organized as virtual event by NEM, EC and Orange. 5G-VICTORI intervention was in the Future of Media Distribution session chaired by Pierre-Yves Danet, Orange. 5G-VICTORI project (Digital Mobility and CDN services in dense, static and mobile environments): Cristian Patachia - Orange RO. Audience: 375 participants from media related

businesses and academia and representatives of the 5G-PPP projects with media related use cases.

- ICOM published a number of articles at the corporate internal newsletter "InFocus" (07/2019, 11/2019, and 02/2020) on 5G-VICTORI project and the role and activities of ICOM in the project.
- **FhG** made an online announcement on "5G For Optimizing Media Delivery in Mobile Environments" (24/3/2021).
- **RBB** featured 5G-VICTORI in its Innovation Projects brochure published in September 2019. The text written in German and English, included the project logo, a description of the project, RBB's role and also listed other partners. The brochure was circulated to staff and visitors to RBB's booth at the IFA consumer trade fair in Berlin.

#### 3.11 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. The scientific publications are summarised in Table 3-9.

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

#### Table 3-9 Scientific Paper Publications.

#	Authors	Title	Conference/Journal	Date	DOI & Relevant Links
1	M. Karatisoglou, K. Choumas and T. Korakis	Controller Placement for Minimum Control Traffic in OpenDaylight Clustering	IEEE WF-5G 2019, Dresden, Germany, September-October 2019.	October 1, 2019	https://doi.org/10.1109/5GWF.2019.8911697 http://web.nitlab.inf.uth.gr/~kohoumas/image s/pdf/conferences/5gwf_2019_odlclustering. pdf
2	K. Chounos, N. Makris and T. Korakis	Enabling Distributed Spectral Awareness for Disaggregated 5G Ultra-Dense HetNets	IEEE WF-5G 2019, Dresden, Germany, 30 September - 02 October 2019	October 1, 2019	https://doi.org/10.1109/5GWF.2019.8911661 https://nitlab.inf.uth.gr/NITlab/papers/wf_5G 2019_spectral_awareness.pdf
3	J. Cosic, C. Schlehuber and D. Morog	Digital Forensic Investigation Process in Railway Environment	2019 IEEE Conference on Application, Information and Network Security (AINS)- Information Security, 19 – 21 November 2019, Penang, Malaysia	November 1, 2019	
4	R. Schmidt and N. Nikaein	Demo: Efficient Multi-Service RAN Slice Management and Orchestration	NOMS 2020 - 2020 IEEE/IFIP Network Operations and Management Symposium.	April 20-24 2020	https://doi.org/10.1109/NOMS47738.2020.91 10253, http://www.eurecom.fr/en/publication/6240/d ownload/comsys-publi-6240.pdf
5	N. Uniyal, A. Siddique Muqaddas, D. Gkounis, A. Bravalheri, S. Moazzeni, F. Sardis, M. Dohler, R. Nejabati, and D. Simeonidou	5GUK Exchange: Towards Sustainable End-to-End Multi- Domain Orchestration of Softwarized 5G Networks	Computer Networks (Journal)	May 12, 2020	https://doi.org/10.1016/j.comnet.2020.10729 <u>7.</u> https://www.sciencedirect.com/science/articl e/pii/S1389128619316287?via%3Dihub
6	M. Catalan-Cid, D. Camps-Mur, M. Montagud, A. Betzler	FALCON: Joint Fair Airtime Allocation and Rate Control for DASH Video Streaming in Software Defined Wireless Networks	ACM NOSSDAV'20 - 30th Workshop on Network and Operating System Support for Digital Audio and Video	June 1, 2020	https://doi.org/10.1145/3386290.3396931, https://zenodo.org/record/5482529#.YTc2yo 4zaUk, https://dl.acm.org/doi/abs/10.1145/3386290. 3396931
7	C. Ziegler, Ralf Neudel, Stefan Pham, and Eric Troudt	Improving media streaming services for train passengers with 5G	ACM International Conference on Interactive Media Experiences (IMX '20)	June 17–19, 2020	https://doi.org/10.1145/3391614.3399399
8	R. Schmidt and N. Nikaein	Demo: Service-Oriented Intelligent and Extensible RAN	MobiCom 2020 (MobiCom '20), September 2125, 2020, London, United Kingdom. ACM, New York, NY, USA	September 21-25, 2020	http://www.eurecom.fr/fr/publication/6323/do wnload/comsys-publi-6323.pdf
9	H. Ştefănescu, M. Iordache, B. Rusti, C. Brezeanu, J. Ghenţa, M. Chabiera, Ł. Rajewski, G. Panek	5G Programmable Infrastructure Orchestration Using ONAP	The Sixteenth Advanced International Conference on Telecommunications, AICT 2020, September 27, 2020 to October 01, 2020 - Lisbon, Portugal	September 27-October 1, 2020	https://zenodo.org/record/5484380#.YTfCII4z aUk, http://www.thinkmind.org/index.php?view=art icle&articleid=aict_2020_1_30_10037

10	S. Moazzeni, P. Jaisudthi, A. Bravalheri, N. Uniyal, X. Vasilakos, R. Nejabati, and D. Simeonidou	A Novel Autonomous Profiling Method for the Next Generation NFV Orchestrators	IEEE Transactions on Network and Service Management (Journal)	December 15, 2020	https://doi.org/10.1109/TNSM.2020.3044707, https://ieeexplore.ieee.org/abstract/document /9295398
11	K. Tittelbach-Helmrich	Digital DC blocker filters	Frequenz. Journal of RF-Engineering and Telecommunications (Journal)	February 18, 2021	https://doi.org/10.1515/freq-2020-0177
12	R. Schmidt and N.Nikaein	RAN Engine: Service-Oriented RAN Through Containerized Micro- Services	IEEE Transactions on Network and Service Management (Journal)	February 18 2021	http://dx.doi.org/10.1109/TNSM.2021.305764 2, https://www.eurecom.fr/publication/6430
13	P. Karamichailidis, N. Makris, P. Flegkas, A. Tzanakaki, M. Anastasopoulos, I. Mesogiti, G. Lyberopoulos, C.Politi, C. Tranoris and T. Korakis	Session Management across Heterogeneous Wireless Technologies in a Rail Transport Environment	CAM'21: IEEE 5G for Connected & Automated Mobility	May 11-12, 2021	
14	I. Mesogiti, E. Theodoropoulou, F. Setaki, G. Lyberopoulos, A. Tzanakaki, M.Anastassopoulos, C. Politi, P. Papaioannou, C. Tranoris, S. Denazis, P. Flegkas, N. Makris, N. Maletic, D. Cvetkovski, J. Gutierrez Teran, P. K. Chartsias, K. Stamatis, M. Xezonaki, D. Kritharidis, A. Dalkalitsis, M. Taferner, M. Piovarci	5G-VICTORI: Future Railway Communications Requirements Driving 5G Deployments in Railways	6th Workshop on 5G – Putting Intelligence to the Network Edge (5G-PINE 2021), AIAI 2021 17th International Conference on Artificial Intelligence Applications and Innovations	June 25 - 27, 2021	https://doi.org/10.1007/978-3-030-79157-5_2
15	L. Bassbouss, M.B. Fadhel, A. Chen, S. Pham, E. Troudt, J. Gutierrez Teran, N. Maletic, E. Grass, S. Schinkel, A. Wilson, S. Glaser, C. Schlehuber	5G-VICTORI: Optimizing Media Streaming in Mobile Environments using mmWave, NBMP and 5G Edge Computing	6th Workshop on 5G – Putting Intelligence to the Network Edge (5G-PINE 2021), AIAI 2021 17th International Conference on Artificial Intelligence Applications and Innovations	June 25 - 27, 2021	https://zenodo.org/record/5484378#.YTfAKY <u>4zaUk</u>
16	P. Papaioannou, N. Tzanis, C. Tranoris, S. Denazis	A prototype 5G/IoT implementation for transforming a legacy facility to a Smart Factory	6th Workshop on 5G – Putting Intelligence to the Network Edge (5G-PINE 2021), AIAI 2021 17th International Conference on Artificial Intelligence Applications and Innovations	June 25 - 27, 2021	https://doi.org/10.1007/978-3-030-79157-5_5
17	D. Giannopoulos, P. Papaioannou, C. Tranoris, S. Denazis	Monitoring as a Service over a 5G Network Slice	2021 Joint European Conference on Networks and Communications & 6G Summit (EuCNC/6G Summit)	June 8 - 11, 2021	
18	A. Tzanakaki	The Role of Optical Networking in the 5G Era and Beyond	1st International Workshop on Time- Sensitive and Deterministic Networking - TENSOR 2020, Ifip - Plenary Presentation	June 22-25, 2020	https://networking.ifip.org/2020/index.php/wo rkshops/tensor-2020.html
19	O. Arouk; N. Nikaein	Kube5G: A Cloud-Native 5G Service Platform	IEEE GLOBECOM	December 7- 11, 2020	http://dx.doi.org/10.1109/GLOBECOM42002. 2020.9348073, https://www.eurecom.fr/publication/6417/dow nload/comsys-publi-6417.pdf

20	V.M Alevizaki, M. Anastasopoulos, A. Tzanakaki, D. Simeonidou	"Dynamic Selection of User Plane Function in 5G Environments"	ONDM 2021, 25th International Conference on Optical Network Design and Modelling	June 28- July 1, 2021	https://ondm2021.chalmers.se/full-program/
21	A. Tzanakaki, M. Anastasopoulos, A. Manolopoulos, and D. Simeonidou	"Mobility aware Dynamic Resource management in 5G Systems and Beyond"	ONDM 2021, 25th International Conference on Optical Network Design and Modelling, Invited presentation	June 28- July 1, 2021	https://ondm2021.chalmers.se/full-program/
22	Reza Nejabati, Shadi Moazzeni, Pratchaya Jaisudthi, Dimitra Simenidou	Zero-Touch Network Orchestration At The Edge	30th International Conference on Computer Communications and Networks (ICCCN 2021)	July 19 - 22, 2021	https://doi.org/10.1109/ICCCN52240.2021.9 522194
23	Viktoria-Maria Alevizaki, Markos Anastasopoulos, Anna Tzanakaki, and Dimitra Simeonidou	"Adaptive FH Optimization in MEC Assisted 5G environments",	Photonic Network Communications, Springer, (Journal)		https://doi.org/10.1007/s11107-020-00906-8
24	N. Gkatzios, M. Anastasopoulos, A. Tzanakaki, and D. Simeonidou	"Optimized Placement of Virtualized Resources for 5G Services Exploiting Live Migration"	Photonic Network Communications, Springer, (Journal)		https://doi.org/10.1007/s11107-020-00905-9
25	M. Anastasopoulos, A. Pelekanou, A. Manolopoulos, A. Tzanakaki and D. Simeonidou	"Optical Networks in Support of Open-RAN in 5G Systems and Beyond", ECOC 2021	ECOC 2021, European Conference on Optical Communication	September 13-16, 2021	https://www.ecoc2021.org/
26	V.M Alevizaki, A.I. Manolopoulos,, M. Anastasopoulos, A. Tzanakaki	"Dynamic User Plane Function Allocation in 5G Networks enabled by Optical Network Nodes", ECOC 2021, submitted	ECOC 2021, European Conference on Optical Communication	September 13-16, 2021	https://www.ecoc2021.org/
27	S. Bhattacharjee, K. Katsalis, O. Arouk, R. Schmidt, Tongtong Wang, Xueli An, T. Bauschert and N. Nikaein	Network Slicing for TSN-based Transport Network	IEEE Access (Journal)	2021	https://doi.org/10.1109/ACCESS.2021.30748 02, https://ieeexplore.ieee.org/stamp/stamp.jsp?t p=&arnumber=9410215
28	M. Irazabal, E. Lopez-Aguilera, I. Demirkol, R. Schmidt and N. Nikaein	Preventing RLC Buffer Sojourn Delays in 5G	IEEE Access (Journal)	2021	https://doi.org/10.1109/ACCESS.2021.30637 69, https://ieeexplore.ieee.org/stamp/stamp.jsp?t p=&arnumber=9369375
29	<ul> <li>A. Fernández-Fernández, C.</li> <li>Colman-Meixner, L. Ochoa-Aday,</li> <li>A. Betzler, H. Khalili, M. S.</li> <li>Siddiqui, G. Carrozzo, S.</li> <li>Figuerola, R. Nejabati, and D.</li> <li>Simeonidou</li> </ul>	Validating a 5G-Enabled Neutral Host Framework in City-Wide Deployments	Sensors, Vol. 21, No. 23 (Journal)	December 3, 2021	http://dx.doi.org/10.3390/s21238103 https://www.mdpi.com/1424- 8220/21/23/8103
30	A. Tzanakaki, A. Manolopoulos, M. Anastasopoulos, D. Simeonidou	Optical Networking in Support of User Plane Functions in 5G Systems and Beyond	Photonics in Switching and Computing (PSC) 2021	Sept 27 – 29 2021	https://www.osapublishing.org/abstract.cfm? uri=PSC-2021-W2B.3

# 3.12 5G-VICTORI Dissemination and Communication Activities KPIs achievement at M30

The communication and dissemination activities progress is continually being monitored throughout the course of the project, and are evaluated against the initial planning, in order to be able to adjust the communication strategy, uptake corrective actions, towards maximising project visibility and impact. At present the results of the monitoring process are summarised in Table 3-10.

Communication Means	KPI Description	KPI Target	Achievement at M30
Publications in	Publications in ICT Conferences	30	19 with papers + 5 with presentations
Scientific Conferences	Participation in Media related Conferences	5	2
	City Related Conferences	3	1
	Participation in ICT Industry exhibitions	7	3 exhibiting + 28 presenting
Exhibitions / Industry	Participation in Transportation/ Mobility Industry exhibitions	2	1 exhibiting + 3 presenting
Events	Participation in Media related exhibitions	3	4 presenting
	Participation in City-related Industry Exhibitions	2	5 presenting
Journals Magazines	Publications in Scientific Journals/ Magazines	12	7 presenting
Training sessions Tutorials/ Summer Schools/ other Training Sessions		>2	>12 webinars and training sessions
Workshop Organisation of Workshop		1	1 organisation, 1 co- organisation
	Official Website	1	1
	User sessions per year	1500-2000	3500
Wedsites	Partners' Webpages	>5	13 (plus two referencing partners' webpages)
	Press Releases	>20	11
Online publishing	Online magazines, newspapers, blogs (not counting press releases copied retransmissions)	>20	>32 blogposts, 3 ICOM internal newsletters, 1 online announcement
Social media accounts		3	3
LinkedIn page	Number of followers	≥ 300	238
Twitter followers	Number of followers	≥ 200	567
5G-VICTORI	Number of Videos	≥ 3	8
YouTube views	Number of views	≥300	N/A
Project Videos		>1	>5 (midterm videos)

#### Table 3-10 5G-VICTORI Dissemination and Communication Activities KPIs Evaluation.

Leaflets/ Brochures	>2	1 project brochure, 1 partner (RBB) brochure
Posters	>3	1 (In progress)

#### 3.13 Organisation of Workshops

According to the 5G-VICTORI dissemination activities plan, at least one 5G-VICTORI Workshop and/or educational exhibitions open to various stakeholders/vertical industries' representatives shall be organised. However, to compensate the shortage of industrial events organised due to the epidemic situation, 5G-VICTORI partners worked on the organisation of two workshops in 2021. These have been the following:

- Organisation of the Workshop "Large scale 5G Trials in support of high-performance vertical industries" in IEEE MeditCom 2021, by IASA, IHP and UoP, where the workshop included invited talks related to trials and use cases from various vertical industries. In the context of the workshop, three presentation were given by 5G-VICTORI Technical Coordinator Dr. Anna Tzanakaki (IASA), by Dr. Paris Flegkas (UTH), and by Dr Eleftherios Mylonas (ADMIE) and Dr Nikolaos Tzanis (ADMIE, UoP) (URLs: <u>https://meditcom2021.ieee-meditcom.org/program/workshops/, https://meditcom2021.ieee-meditcom.org/wpcontent/uploads/sites/159/2021/03/WS4\_5G-VICTORI\_Meditcom\_2021\_Workshop.pdf ).
  </u>
- Co-Organisation of 6th Workshop on 5G Putting Intelligence to the Network Edge (5G-PINE 2021), AIAI 2021 17th International Conference on Artificial Intelligence Applications and Innovations (along with 5G-DRIVE, MOTOR5G and Smart5Grid projects), by COSM, IASA, IHP. In the context of this workshop 5G-VICTORI was also represented by three joint papers and the relevant presentations from partners (Dr. Jesús Gutiérrez, IHP, Dr Louay Bassbouss, FhG, and Mr. Panagiotis Papaioannou, UoP, on June 25-27, 2021. (URLs: <u>https://www.aiai2021.eu/workshops/, https://www.5g-essence-h2020.eu/Contact/5GPine-Importantdates.aspx</u>)

In addition to these workshops, further opportunities will be sought, and a final 5G-VICTORI workshop is planned to be organised with the finalisation of the project activities.

## 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 M30

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.

#	Partner	Events	Date of event	Location	<b>Type of action</b> (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

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

					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 they are being prepared 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 360° video service on top of a nomadic 5G infrastructure that could be installed anywhere. This nomadic 5G infrastructure is being 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								
<b>Pre-Standardization WG</b> Ricardo Trivisonno, Huawei, Stephanie Parker, Trust-IT Services	5G IA	Ioanna Mesogiti (COSM)				Yasir Gökce (DBN)				
<b>Spectrum WG</b> Giovanna d'Aria, TIM	5G IA	5G IA Eckhard Grass (IHP)								
<b>5G Architecture WG</b> Simone Redana, Nokia, Ömer Bulakci, Nokia	5G-PPP Projects	Anna Tzanakaki (IASA)	dache )	Manfred Taferner (KCC)						
<b>Software Networks WG</b> Bessem Sayadi, Nokia, Marius Iordache, Orange	5G-PPP Projects	Marius Iordache (ORO) Paris Flegkas (UTH)					ostas Katsaros ( <b>DCAT</b> )			
Vision and Societal Challenges WG Artur Hecker, Huawei, Håkon Lønsethagen, Telenor	5G IA	Anna Tzanakaki (IASA)			Jesús Gutiérrez (IHP)					
<b>Security WG</b> Jean-Philippe Wary, Orange, Pascal Bisson, Thales	5G IA	A Ioan Constantin (ORO)			Victor Cranz (DBH)					
<b>SME WG</b> Jacques Magen, AUSTRALO	Networld2020	O UHA, IRT, ZN, MATI								
Trials WG Carles Antón-Haro, CTTC	5G IA	Jesús Gutié		Spyros Denazis (UoP)						
<b>Test, Measurement and KPIs Validation</b> Evangelos Kosmatos, WINGS ICT Michael Dieudonné, Keysight Technologies	5G-PPP Projects	Ioanna Mesogiti (COSM) Katrin Ludwig (IZT) Drissa H				a Houatra ( <mark>Orange</mark> )				
WG Vision Business – BVME SG - Business Validation, Models, Ecosystems	5G IA	Ioanna Mes	SM)	Doreen Burdack (IZT)						

Partner/Project	5G-VINNI	5G-EVE	<b>5GENESIS</b>	ARIADNE	5G-CLARITY	5G-COMPLETE	INSPIRE-5Gplus	rocus	MonB5G	TERAWAY	5G ZORRO	5GSolutions	5G-TOURS	5G!Drones	5G-HEART	5Growth	5G SMART	Full5G	5G-MOBIX	5GCroCo	5G CARMEN	<b>5GLOGINNOV</b>	5GMETA	<b>5GRECORDS</b>	AFFORDABLE5G	COREnect	dragon	FUDGE-5G	Int5Gent	5G BLUEPRINT	5GMED	5Groutes	5GRail
IHP			$\checkmark$		√~ (P C)	$\checkmark$																											
UNIVBRIS					V																												
COSM			$\checkmark$			$\checkmark$													$\checkmark$										$\checkmark$				$\checkmark$
DBN																																	
EUR		$\checkmark$							$\checkmark$					$\checkmark$						$\checkmark$					$\checkmark$								
FhG	$\checkmark$		$\checkmark$																									$\checkmark$					
I2CAT					$\checkmark$						√ (P C)									$\checkmark$					$\checkmark$						$\checkmark$		
IASA																																	
ICOM	$\checkmark$			$\checkmark$							$\checkmark$	$\checkmark$			$\checkmark$																		
IRT												$\checkmark$																					
КСС																																	$\checkmark$
Orange		$\checkmark$					$\checkmark$		$\checkmark$				$\checkmark$					$\checkmark$		$\checkmark$													
ORO		$\checkmark$																															
UoP	$\checkmark$											$\checkmark$																					

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

#### 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						
<ul> <li>Work on a 6G Vision whi</li> </ul>	<ul> <li>Work on a 6G Vision white paper of the 6GIA.</li> </ul>					
Work on a business ecos	system analysis.					
Discussions about promo	Discussions about promotion activities around the produced documents.					
<ul> <li>Discussions with the relevant stakeholders about the requirements from and expectations towards novel SGs (e.g. 6G SIG).</li> </ul>						
Achievements						
<ul> <li>A comprehensive and consensual 6G Vision white paper of the 6GIA has been produced, accepted by the Board and published on June 7, 2021.</li> </ul>						
<ul> <li>A comprehensive and consensual business ecosystem analysis has been produced and sent for review to the 6GIA Board.</li> </ul>						
Future Plans:	Future Plans:					
A new subgroup "Societal Needs and Value Creation" has been created.						

#### 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), Doreen Burdack (IZT)						
Activities and Achievements:							
Since the establishment of the SG in April 2020, 5G-VICTORI follows up the BVME activities.							

In 2020, COSM contributed to the SG's 1<sup>st</sup> White Paper: "Business Validation in 5G PPP vertical use cases", published in June 2020. The 1<sup>st</sup> White Paper is available under URL: <u>https://5g-ppp.eu/wp-content/uploads/2020/06/5G\_White\_paper\_Business-validation-v1.0a.pdf</u>, as well as in URL: <u>http://doi.org/10.5281/zenodo.3775405</u>.

During 2021, 5G-VICTORI partners COSM and IZT followed up the BVME activities, and contributed to the WG in the following ways:

- **COSM** (Ioanna Mesogiti) held the role of Leading Editor to 5G Ecosystems White paper, in particular formulating, bringing significant contribution and incorporating input from other WG members in chapter "5G Provisioning Ecosystems", as well as reviewing various sections of the White Paper.
- IZT (Doreen Burdack and Matthias Ruhland) provided contribution to the Sustainability Section of the 5G Ecosystems White paper.
- **COSM** (Ioanna Mesogiti) presented the relevant work on "5G Provisioning Ecosystems" in the 5G-PPP TB e-Workshop held online on May, 21, 2021.
- **COSM** (Ioanna Mesogiti) contributed to the creation of a presentation entitled "From 5G to 6G Ecosystem- Research Questions", provided to the Visions of Future Communication Summit (https://futurecomresearch.eu/), which took place in Lisbon, 24-26 November 2021.

The 2<sup>nd</sup> BVME "5G Ecosystems" white paper was published in September 2021 is available under URL: <u>https://5g-ppp.eu/wp-content/uploads/2021/09/White\_paper\_5G-Ecosystems\_1-0-final.pdf</u>, and URL: <u>http://doi.org/10.5281/zenodo.5094340</u>.

#### Future Plans:

In 2022 the BVME SG will work on Business Modelling methodologies and their applicability and limitations to modelling activities related to services, use cases, companies, etc. in 5G provisioning and vertical Ecosystems. The SG will also focus on disseminating its activities. COSM and IZT will continue to participate actively in BVME activities, and will channel its work to the 5G-VICTORI business modeling activities of the project. In the opposite way, work performed in the context of 5G-VICTORI will be used to bring value to BVME activities.

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 BVME since they started. Two of the representatives have been engaged in the WG discussions since its conception in 2015.							
The initial trigger of the activitie	s took place in November 2020 and the WG involved bi-						

#### 4.3.3 **5G Architecture WG**

The initial trigger of the activities took place in November 2020 and the WG involved biweekly 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 (<u>link</u>). 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 – Force						
Representatives on behalf of 5G-VICTORI:	Ioanna Mesogiti (COSM), Manfred Taferner (KCC), Peter Lundh (Alstom), Drissa Houatra (Orange)					
Activities and Achievements:						
In 2020-2021, COSM (Ioanna Mesogiti), Kontron (Manfred Taferner) and Alstom (Peter Lundh) contributed to the KPIs TF White Paper: "Service performance measurement methods over 5G experimental networks – (May 2021)", published in May 2021. The White Paper is available in short and long versions under URL: <u>https://5g-ppp.eu/wp-content/uploads/2021/06/Service-performance-measurement-methods-over-5G-</u>						
experimental-networks 0805202	21-Final.pdf and URL:					
https://doi.org/10.5281/zenodo.4	1748385 (long version), as well as URL: <u>https://5g-</u>					
ppp.eu/wp-content/uploads/202	1/06/Service-performance-measurement-methods-over-					
5G-experimental-networks_sho	rt_version_08052021-Final.pdf and URL:					
https://doi.org/10.5281/zenodo. 4748482 (short version).						
Drissa Houatra followed up tl	he TMV activities and reviewed the TMV Whitepaper					
"Understanding the Numbers C	Contextualization and Impact Factors of 5G Performance					

Results" (published in July 2021). The White Paper is available in short and long versions under URL: <u>https://5g-ppp.eu/wp-content/uploads/2021/08/TMV-Results-Explanation-White-Paper-V1.0.pdf</u> and URL: <u>https://doi.org/10.5281/zenodo.5094973</u>. Moreover:

- On 26<sup>th</sup> May 2020 **COSM** (Ioanna Mesogiti) participated in the 5G-PPP TB eWorkshop (Working on Validation and KPIs) with a presentation.
- On 18<sup>th</sup> June 2021 **COSM** (Ioanna Mesogiti) participated 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".

#### Future plans:

In 2022 the KPIs TF will focus on applying the 5G KPIs identification and evaluation on B5G/6G technologies and use cases. In this framework, as initial step the H2020-ICT-52 projects have been contacted, and a template for collecting this information has been created and distributed. Keysight is leading these activities while COSM along with Eurescom participates actively in this work as co-organiser. This work will be channeled to 5G-VICTORI evaluation activities. In this context also, COSM has been invited to participate also in 6G-IA VSC Societal Needs and Value Creation subgroup, which works on the identification of 6G Key Value Indicators (KVIs).

#### 4.3.5 Software Networks WG

Association:	5G-PPP
Work Group:	Software Networks WG
Representatives on behalf of 5G-VICTORI:	Paris Flegkas ( <b>UTH</b> ), Kostas Katsaros ( <b>DCAT</b> ), Cristian Patachia ( <b>ORO</b> ), Marius Iordache ( <b>ORO</b> )

#### 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 accepted on "Digital mobility: P enabled two 5G services: 1) In services media streaming and so video streaming (bottom) is del automated and real time threat appropriate QoS for emergency	Brochure Nr.3, where 5G-VICTORI had a contribution ublic safety, security and infotainment". The trial system fotainment in public buses (top), containing municipality ocial networking; and 2) for public safety, a high-resolution ivered over 5G to AIM C&C server, allowing through AI s identification using a 5G network that is allocating the services.					
There has been a webinar held	There has been a webinar held in November with TSDSI 5GIA-TSDSI Online webinar on					

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.

#### 4.3.6.1 White Paper on Edge Computing for 5G Networks

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 <u>Edge Computing for 5G Networks</u>. 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:	<ul> <li>5G-PPP Pre-standardisation WG – common platform aiming at</li> <li>identifying standardization and regulatory bodies to align with e.g. ETSI, 3GPP, IEEE and other relevant standards bodies, &amp; ITU-R (incl. WPs) and WRC (including e.g. ECC PT1),</li> <li>developing a roadmap of relevant standardization and regulatory topics for 5G,</li> <li>evaluating existing roadmaps at international level,</li> <li>proposing own roadmap for 5G being aligned at international level,</li> <li>influencing pre-standardization on 5G and related R&amp;D: potentially proposing where topics should be standardized, and</li> <li>Influencing the timing on R&amp;D work programs (e.g. EC WPs).</li> </ul>
Representatives on behalf of 5G- VICTORI:	Yasir Gökçe ( <b>DBN</b> ), Ioanna Mesogiti ( <b>COSM</b> )
Activities and Achiev	vements:

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 <u>survey</u> 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.

The engaging partner 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.

Besides, the representatives joined the monthly sessions held by the 5G-PPP Presstandardisation 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.

#### Future Plans:

5G-VICTORI will continue to monitor and contribute to the the 5G-PPP Pres-standardisation WG within the framework of its monthly Telcos and represent the views of the 5G-VICTORI participants. Especially, 5G-VICTORI will strive to help the WG concretize the standardization roadmaps for both 5G and 6G.

#### 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 Plans for the second half of the project

#### 5.1 Standardization plan

Planned activities to be carried out towards standardization contributions after M30 as well as the expected impacts to be achieved through these activities are covered in detail in section 2.3 of this report. Please kindly refer to the table below.

In general, most SDOs have incurred delays given the COVID-19 pandemic. However, all of them try to reduce the impact by establishing procedures and best practices for virtual collaboration.

#### 5.2 Dissemination and Communication plan

The latest 5G-VICTORI Dissemination and Communication Activities plan has been described in section 3.2. Given that the project is currently in its 30<sup>th</sup> month, the activities for the forthcoming period will focus on:

Communication activities:

- Maintaining the social media accounts.
- Maintaining the 5G-VICTORI website and partners' webpages, and enhance them with new material disseminating the status and activities of the project.
- Intensify activities related to capturing videos and communicating them via the project YouTube channel, and initiate activities related to the project final video.
- Intensify partner activities related to issuing press releases.
- Continue partners' internal communication activities.

#### Dissemination activities:

- Focus on the publication of papers in scientific journals.
- Pursue the participation in scientific events (conferences, workshops, summits, etc.), and the publication of relevant papers in the events' proceedings.
- Seek to organise/ co-organise workshops in highly attended events.
- Perform initial activities related to the organisation of the project dedicated final workshop.

Regarding communication activities and the impact of COVID-19 no specific actions are foreseen in the plan, as most of the communication activities are conducted through electronic means. The only foreseen impact is still expected in the initial months of 2022 regarding onsite events, which may be turned into webinars or live-streaming events using the communication tools available.

For dissemination activities COVID-19 is still expected to have an impact on several events that are targeted by 5G-VICTORI. The project partners are monitoring frequently the evolution of the pandemic to seek for opportunities to disseminate the project results on-site. For paper presentations, all conferences will be still presented 'online' and the presentations and demonstrations can still be done through videoconferencing systems. We are convinced that by mid-2022 and, concretely, for EuCNC & 6G Summit 2022, a big representation of the project will be able to attend in situ.

### 6 Summary and Conclusions

This deliverable presented the concrete and effective standardisation, dissemination, communication and liaison activities that have taken place in the framework of the 5G-VICTORI project, towards maximising its visibility and impact to the research and industry communities.

Starting with the standardisation activities, most of the partners of the consortium are actively engaged in different work groups from SDOs like ETSI, 3GPP, IEEE, ITU, O-RAN Alliance. DBN studies the deployment of the FRMCS within digital railway infrastructure in collaboration with other partners in an effort to ascertain network configuration requirements as well as to develop and specify the first FRMCS/5G prototypes. The results will be fused to the wide network of SDOs of DBN especially to FRMCS standardisation. Likewise, KCC conducts normative work on FRMCS Architecture, mainly in Core network Architecture and Onboard Architecture, as well as on Mission Critical Services standardisation in the context of 3GPP. UNIVBRIS contributes to O-RAN alliance and ETSI Standardizations in areas such as zero touch autonomous application or 5G-VIOS components. Likewise, ICOM's standardization activities focus on ETSI NFV & ETSI MEC WGs. IHP and FhG participate in IEEE 802.11 WG and monitor activities related to mmWave-related standards, Wi-Fi sensing as well as Broadcast Services. Moreover, IHP conducts research on the synchronization of wireless nodes and thereby contributes to the positioning/sensing capabilities of that node. DCAT has been working on mobility management of network service.

In terms of communication activities, the 5G-VICTORI consortium is committed to raise awareness and maximise impact of project results at various target audiences from both the scientific and industry worlds. The project communication and dissemination is being performed over effective channels such a dedicated project website and social networks. Communication material is continuously generated and shared also in the form of bi-weekly (or even more frequent) blog-posts, press releases, and presentations.

Regarding the dissemination activities, 5G-VICTORI has an active participation in industry events and in scientific conferences/ workshops/ summits. Until M30, the 5G-VICTORI consortium has been present 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 supports the open access practice to make the results more accessible, thus almost all publications are freely available in online repositories. Ahead of the project plan, the project has organised one workshop (in the context of IEEE Meditcom 2021) and has co-organised a second one (in the context of AIAI 2021 (5G-PINE)).

These activities as well as the measured impact (to the level that it can be) show both the quality of results achieved within the project but also the commitment in communicating / disseminating these results.

Last but not least, it is important to be aware of the scope and research activities and results of other 5G-PPP projects, and at the same time share the 5G-VICTORI results with them for the purposes of maximising impact, visibility and foster research in a coordinated way at EU level. For this purpose, many of the 26 5G-VICTORI partners are heavily involved in 5G-PPP actions, facilitating therefore joint or complementary work/activities. Currently, there is an active engagement with other 5G-PPP projects, 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 has a significant representation in the most relevant WGs and SG of the 5G-PPP and 5G-IA partnerships, 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, 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.

The updated plans captured in this document outline the intention of the 5G-VICTORI Consortium towards still achieving the goals set in the DoW in its areas of interest despite the difficulties given by the COVID-19 pandemic. Still the effort will be put to maximise the project's impact and the plan will be subject to continuous monitoring, revision and modification in this direction. The final report on the communication, dissemination and standardisation activities will be released at the end of the project, whose formal reference is deliverable D5.3 'Final Report on Standardisation, Dissemination, Communication and liaison Activities Report'.

# 7 References

[1] 5G-VICTORI deliverable D5.1, "Standardisation, Dissemination, Communication and liaison Activities Plan", December 2019, <u>https://www.5g-victori-project.eu/wpcontent/uploads/2020/01/2019-12-14-5G-VICTORI\_D5.1\_v1.0.pdf</u>