



5GZORRO

Grant Agreement 871533

H2020 Call identifier: H2020-ICT-2019-2

Topic: ICT-20-2019-2020 - 5G Long Term Evolution

D6.3 Final Dissemination and Communication Report

Dissemination Level		
<input checked="" type="checkbox"/>	PU	Public
<input type="checkbox"/>	PP	Restricted to other programme participants (including the Commission Services)
<input type="checkbox"/>	RE	Restricted to a group specified by the Consortium (including the Commission Services)
<input type="checkbox"/>	CO	Confidential, only for members of the Consortium (including the Commission Services)

Intermediate version. Pending of EC revision. Do not cite

Grant Agreement no: 871533	Project Acronym: 5GZORRO	Project title: Zero-touch security and trust for ubiquitous computing and connectivity in 5G networks.
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Lead Beneficiary: CODI	Document version: V1.1
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Work package: WP6 – Impact Creation

Deliverable title: D6.3: Final Dissemination and Communication Report

Start date of the project: 01/11/2019 (Duration 30 months) (Extension 36 months)	Contractual delivery date: 30/04/2022	Actual delivery date: 11/11/2022
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Change History

Version	Date	Partners	Description/Comments
0.0	27-07-2022	CODI, UMU, All	Reviewed contributions. Updated info regarding joint events and publications
0.1	06-09-2022	CODI, UW, i2CAT, NXW	Initial TOC. Updated info regarding dissemination and standardisation
0.2	19-09-2022	CODI, UW, TID	Merged partners' individual contributions. Information on standardisation and exploitation activities.
0.3	26-09-2022	CODI, UMU	Document re-structuring and more individual contributions
0.4	17-10-2022	UMU	Review and final formatting improvements

1.0	04-11-2022	UMU, i2CAT, NXW	Final version with QA
1.1	11-11-2022	i2CAT	D6.3 Submission

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5GZORRO has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 871533. The content of this deliverable does not reflect the official opinion of the European Union. Responsibility for the information and views expressed in the deliverable lies entirely with the author(s).

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Executive Summary

This deliverable takes into consideration all Dissemination, Communication and Standardization activities carried out by the consortium **until 31 Oct 2022**. Activities which effects will last after project's ending as essential outcomes for the success of any research and innovation project.

Due to the very innovative nature of the core topics covered by 5GZORRO, i.e. zero-touch network and service management, security and trust across multiple domains, ubiquitous computing and connectivity for multi-operator 5G networks, Distributed Ledgers for Telcos, the Consortium has invested a significant amount of resources in generating awareness and visibility for projects results, both within the scientific community working on 5G and within network industry, operators, regulators, SMEs, etc.

During the planning phase reported in deliverable D6.1 and subsequent intermediate dissemination and communication report in D6.2, the 5GZORRO Consortium identified various types of outreach activities to best fulfil these goals. These included:

- *Production of scientific papers for international and impactful journals, where to promote and validate design artifacts and results from the implementation.*
- *Participation with talks and papers in scientific conferences of relevant interest for the 5G Community, where to maximise the impact of demonstrated results and generate opportunities for follow up research.*
- *Participation to relevant industry events with project activities and demos, in order to generate the conditions for profitable exploitation of 5GZORRO results for the various partners.*
- *Strong presence and recognition in the community through impactful and trending communication, like the organization of several Tech Talks that have involved not only the consortium partners but relevant external speakers from the 5G ecosystem, academia, and industry.*
- *Strong presence in standards developing communities, particularly at ETSI, leveraging on the profile of key researchers and partner organizations in the project, to achieve a long-lasting impact of results.*
- *Engaging directly with the EC Horizon Booster Results program to present the best Business Plan and Exploitation Strategy for the project.*

Like many other activities, also the 5GZORRO impact creation plan suffered from the COVID-19 pandemic conditions, in particular for what concerns the resulting limitations to networking and showcasing opportunities in cardinal events of the 5G community (MWC 2020 and 2021, EuCNC 2020 and 2021, ICT20, etc.). In fact, many calendarized events were cancelled or transformed into virtual programs since Feb 2020, with the majority of activities limited by force majeure to remote presentations of accepted papers. The 5GZORRO plans for MWC 2020 and 2021, EuCNC 2020 and 2021 and ICT2020 exhibitions, were completely jeopardised by last minute cancellations of planned showcases at booths, removal of workshop sessions, and overall reduction of programs.

Despite the effects of the pandemic on the outreach plan, the 5GZORRO Consortium re-focused the objectives and forms for impact creation for the entire reporting period (M1-M36), by generating a significant number of valuable results which can be summarised in the following list of major highlights per activity area:

- **Dissemination Area**
 - **24 scientific papers published** -12 journal papers (j), 11 conference papers in conferences (p), 1 book chapter (b).
 - **4 journals publications** currently under evaluation.
 - Participation in **38 events (19 scientific and 19 industry events)**, 6 of which organised by Consortium partners (5GZORRO Tech Talks and Final Event), 6 keynotes in relevant industry, research, and standard forums.

- Contributions to **5 whitepapers from 5GPPP**, 3 of which just published, 2 in the final editing queue.
- Active participation in **10 Working Groups of the 5GPPP or 5G IA**.
- Quite productive collaboration with 5 parallel 5GPPP projects (LOCUS, 5GCLARITY, 5G-COMplete, MonB5G, INSPIRE-5GPLUS) thanks to common bridging partners.
- Internal joint coding events, which included an initial training on Blockchain fundamentals done in Dec 2020; **4 Internal Hackathons** executed on: 17-18 March 2021, 14 October 2021 and 22 March 2022, 12 July 2022, to prepare 5GZORRO platform; and **4 Internal Workshops** executed on: 10 March 2020, 10 Dec 2020 and 22 March 2022, 11 July 2022 about 5GZORRO design, WPs, and UCs.
- **Communication Area**
 - Increased contents and impact statistics of the 5GZORRO website which reached 3.9K new users, 7.2K user engagement, **9.7K page views**, 4.9K sessions started, with an average engagement time of 1'08'' and 28,453 events counted.
 - 5GZORRO Twitter reached **1107 followers**, with > 1269 tweets (Oct.22); 210.8K impressions and engagement rate of 2.2% (Jan – April 2022), 32.4K impressions and 3.4% engagement rate (April-30 June 2022), 5.1K impressions and 1.9% engagement rate (July-Oct. 2022)
 - 5GZORRO LinkedIn page reached **307 members**, gaining from Nov. 2021-Oct. 2022, 257 unique visitors, 777 page views that gain 814 reactions, 27 comments, and 109 shares
 - YouTube project's Channel reached 185 members, with 43 videos uploaded, >12h of recorded videos, **>49.666 Visualizations**: 8 of which with >1000 visualizations, 3 with > 3000 visualizations, 2 with > 5000 visualizations, and 1 with > 7000 visualization.
 - The project produced and shared **12 Blog Posts** on: 5GZORRO architecture vision, use cases, dynamic spectrum marketplace, DLTs, ETSI ZSM Poc#5, MEC platform, Telco infrastructure Marketplace - Spectrum Resource Focus, and Testbeds & Demos.
 - The project produced and shared **13 press releases**, **10 newsletters**, 5 newsflashes, and 8 Save the Dates.
- **Standardization and Open-Source Communities Area**
24 adopted standards contributions, including:
 - One RFC published by IRTF: **RFC 9316**
 - The continuous leadership of two ETSI ISGs: **ZSM** and **PDL**
 - Leadership positions in other ETSI ISGs: **NFV** and **MEC**
 - The **new term** for ETSI ISG PDL
 - A **Proof-of-Concept**, reported to ETSI ZSM, in collaboration with the ETSI OSM open-source community and the H2020 project 5G-CLARITY
 - **14 work-item** in different committees, including the above ETSI ISGs, other ETSI groups (ENI, SAI) and 3GPP SA3
 - **2 ETSI PDL documents** on smart contracts
 - **An ETSI MEC whitepaper** on edge security

1 Introduction

Deliverable D6.3 is the final report on dissemination, communication, and standardization activities of the 5GZORRO project (from Nov. 2019 to Oct. 2022).

This deliverable contains the complete outcomes and results of the dissemination plan described in deliverable D6.1 [1], with the achieved impact along different activities such as:

- Production of contributions for scientific conferences and journals.
- Participation in events (most of which are in virtual mode due to the pandemic).
- Communication through the website, social channels, and various other means like blogposts, newsletters, technical pills, and press releases.
- Contributions to standards and to open-source communities.

As reported in the previous Deliverable D6.2 [2] all the activities reported are the result of an excellent coordination among the 5GZORRO partners throughout the project life span. Due to the COVID-19 lockdown, in order to reach the initially planned impact of project's outcomes, the consortium had to face the need to adapt by reinforcing the collaboration and participating in the programmed activities.

The Consortium was involved in implementing various levels of actions, with partners complementarily involved in: (i) identifying and selecting scientific and industry events where to propose 5GZORRO results; (ii) preparation of the most appropriate contributions for the target events; (iii) execution of the dissemination and/or communication and/or standardization activities; (iv) reporting and follow-up on event feedbacks, contacts, etc.

1.1 Document outline

This deliverable follows a structure built around three core sections which report the activities of the Consortium:

- Section 2 provides details on the dissemination activities executed by the partners during the project's life span, with a focus on scientific publications in conferences and journals, participation in events with presentations and keynotes, and collaboration within 5GPPP.
- Section 3 offers an overview of the communications activities executed by the Consortium with impact/results achieved, and reports from analytics from various tools.
- Section 4 covers the contribution towards Standard Developing Organizations (SDOs) and the Open-source communities of higher relevance to 5GZORRO research and technology portfolio.
- Section 5 contains the report conclusions and provides an overview of the final status on KPIs' impact creation.

2 Dissemination Activities

To adapt to COVID-19 lockdown measures, the 5GZORRO Consortium decided to re-direct its dissemination efforts towards two major lines of action:

- Primarily elaborate papers for journals and standard tracks of top conferences where to convey the preliminary results of technical deliverables and design.
- Experiment new forms of digital dissemination for 5GZORRO vision and initial use cases through dedicated virtual, live and recorded events (i.e., the 5GZORRO Tech Talks, Technical Pills, Final Event) and follow-up blog posts and increased Newsletters issued with Newsflash and Save the Date! through which approach virtually the large professional communities of 5G stakeholders.

This section summarises the activities for dissemination executed during the project's life span, keeping in mind that the majority of the activities were carried out during the lockdown and travel restriction due to the pandemic.

2.1 Scientific Publications in Conferences & Journals

From the start of the project until Oct 2022, the **5GZORRO Consortium** has published **24 scientific publications**, with 3 journals in review and 1 to be submitted at the time of writing this report.

In summary, the 5GZORRO Consortium produced:

- **24 scientific papers** - 12 journal papers , 11 conference papers and 1 book chapter.
- **3 scientific journals currently under review** and **1 to be submitted** .

In Table 2-1 a list of all published scientific papers produced by the Consortium from M01-M36 is reported, with reference to their status and link for accessing the paper. More details are available in section 2.1.1.

Table 2-1: Published scientific papers produced during M1-M36

#	Paper Title	Pub. Date	Journal / Conference	Status / Web Links	Involved Partners
1.	Adaptive ML-based Frame Length Optimisation in Enterprise SD-WLANs	Mar. 2020	Journal of Network and Systems Management	Published	FBK
2.	AI-driven Zero-touch Operations, Security and Trust in Multi-operator 5G Networks: a Conceptual Architecture	Jun. 2020	EuCNC 2020 Conference Paper	Published	NXW I2CAT ALB UMU ATOS FBK
3.	aiOS: An Intelligence Layer for SD-WLANs	Jun. 2020	NOMS 2020 Conference Paper	Published	FBK
4.	Centralized and Federated Learning for Predictive VNF Autoscaling in Multi-domain 5G Networks and Beyond	Mar. 2021	IEEE Transactions on Network and Service Management	Published	FBK I2CAT

#	Paper Title	Pub. Date	Journal / Conference	Status / Web Links	Involved Partners
5.	AI-Empowered Software-Defined WLANs	Mar.2 021	IEEE Communications Magazine	Published	FBK I2CAT
6.	Toward pre-standardization of reputation-based trust models beyond 5G	Mar.2 021	Computer Standards & Interfaces	Published	UMU
7.	Time-Sensitive Mobile User Association and SFC Placement in MEC-Enabled 5G Networks	Apr. 2021	IEEE Transaction on Network and Service Management	Published	FBK I2CAT
8.	A Bio-Inspired Reaction Against Cyberattacks: AIS-Powered Optimal Countermeasures Selection	Apr. 2021	IEEE Access: 9 pp. 60971 - 60996.	Published	UMU
9.	Smart Contracts in the 5G Roaming Architecture: The Fusion of Blockchain with 5G Networks	Apr. 2021	IEEE Communications Magazine	Published	FBK I2CAT
10.	S3: An AI-enabled User Continuous Authentication for Smartphones based on Sensors, Statistics and Speaker Information	Apr. 2021	Sensors – MDPI	Published	UMU
11.	Multi-Party Collaboration in 5G Networks via DLT-Enabled Marketplaces: A Pragmatic Approach	Jun. 2021	EuCNC2021 Conference Paper	Published	I2CAT NXW BARTR ALB UMU TID
12.	Blockchain-Based Zero Touch Service Assurance in Cross-Domain Network Slicing	Jun. 2021	EuCNC2021 Conference Paper	Published	ICOM IBM I2CAT UW FBK BARTR
13.	Zero-touch AIOps in multi-operator 5G networks	Jun. 2021	EuCNC2021 Special Session 8 Paper	Published	IBM NXW I2CAT
14.	Overview of the security and trust mechanisms in the 5GZORRO project	Jun. 2021	EuCNC2021 Workshop 8 Paper	Published	UMU ICOM BARTR I2CAT ALB MCA
15.	Dynamic Slice Scaling Mechanisms for 5G Multi-domain Environments	Jul. 2021	S4SI 2021: 4 th Workshop on Advances in Slicing for Softwarized Infrastructures (S4SI)	Published	IBM ICOM FBK NXW UW

#	Paper Title	Pub. Date	Journal / Conference	Status / Web Links	Involved Partners
16.	AISGA: Multi-Objective Parameters Optimization for Countermeasures Selection through Genetic Algorithm	Aug. 2021	The 16th International Conference on Availability, Reliability and Security (ARES), Vienna, Austria	Published	UMU
17.	Design of a Security and Trust Framework for 5G Multi-domain Scenarios	Oct. 2021	Journal of Network and Systems Management (2022)	Published	UMU ICOM i2CAT
18.	Toward True Cloud Native NFV MANO	Oct. 2021	12th International Conference on Network of the Future - NoF	Published	IBM
19.	Trusted Execution Environment-enabled platform for 5G security and privacy enhancement	Oct. 2021	Book chapter: Security and Privacy Preserving for IoT and 5G Networks Techniques, Challenges, and New Directions	Published	UMU ICOM UW
20.	Federated Learning for Malware detection in IoT Devices	Jan. 2022	Computer Networks Volume 204, 26 February 2022, 108693	Published	UMU
21.	A Security and Trust Framework for Decentralized 5G Marketplaces	Apr. 2022	Jornadas Nacionales de Investigación en Ciberseguridad (JNIC)	Published (pp. 237-240)	UMU
22.	Zero Touch Management: A Survey of Network Automation Solutions for 5G and 6G Networks	Oct. 2022	Journal art. IEEE Communications Surveys & Tutorials	Published	i2CAT
23.	Cutting-Edge Assets for Trust in 5G and Beyond: Requirements, State-of-the-Art, Trends & Challenges	Apr. 2022	ACM Computing Surveys (CSUR)	Accepted for publication (Oct. 2022)	UMU
24.	Zero-touch security automation mechanisms for edge NFV: the π -Edge approach	Oct. 2022	Conference: 18th International Conference on Network and Service Management (CNSM)	Accepted for publication	ICOM

The following papers are under review or in elaboration at the time of the release of this report.

Table 2-2: Publications submitted during M01-M36 Under Review/To be Submitted

#/ type	Paper Title	Sub. Date	Journal / Conference	Status	Involved Partners
1.	Blockchain-based Zero-Touch Service Assurance in Multi-domain 5G Networks	Nov. 2021	Journal art. EURASIP Journal on Wireless Communications and Networking	Submitted (Under review)	ICOM i2CAT FBK

#/ type	Paper Title	Sub. Date	Journal / Conference	Status	Involved Partners
2.	Unlocking the Path Towards Intelligent Telecom Marketplaces for 5G and 6G Networks	Jun. 2022	IEEE Communications Magazine	Revision Submitted (Under Review)	i2CAT ICOM
3.	SLA-driven trust and reputation framework for distributed 5G marketplaces	Nov. 2022	IEEE Transactions on Dependable and Secure Computing	Submitted (Under Review)	UMU ICOM
4.	Trust-as-a-Service: A reputation-enabled trust framework for 5G networks	Nov. 2022	Magazine Elsevier Computer Communications	To be submitted	UMU

2.1.1 Impact of 5GZORRO Publications on research community

The 5GZORRO publications have made a handsome impact on the research community. This is reflected in the quality journals and conferences where 5GZORRO published its research and results. The average impact factor of the 12 published journals is **8.5** with a minimum impact factor of 2.198 and maximum impact factor of 37.551. Furthermore, the aggregate number of citations received by all the 5GZORRO publications up until now add up to **214** citations. Moreover, another worth mentioning observation is that a series of independent publications from different institutions have cited 5GZORRO project in their work. Table 2-3 lists a few of them :

Table 2-3: Independent publication reporting 5GZORRO project

#	TITLE	DATE PUBLICATION	PUBLICATION	Reference
1.	SDN and NFV for QoE-driven multimedia services delivery: The road towards 6G and beyond networks	Accepted: 27 Jun. 2022	Computer Networks, 2022 - Elsevier	Section 2.2
2.	Machine learning-based zero-touch network and service management: A survey	Accepted: 1 Sep. 2021	Digital Communications and Networks 8 (2022) 105–123 journal homepage: www.keaipublishing.com/dcan	pp. 114
3.	Evaluation of a Blockchain-Enabled Resource Management Mechanism for NGNs	Posted: 4 Dec. 2021	International Journal of Network Security & Its Applications (IJNSA) Vol.13, No.5, September 2021, Available at SSRN: https://ssrn.com/abstract=3937071	Note 16- Website: 5G Zorro, link: https://www.5gzorro.eu/ Accessed on 01/04/2021
4.	A survey on Zero touch network and Service Management (ZSM) for 5G and beyond networks	Accepted: 3 Mar. 2022	Journal of Network and Computer Applications Volume 203, July 2022, 103362	pp. 16
5.	On blockchain-based cross-service communication and resource orchestration on edge clouds	Published: 26 Feb. 2021	Journals Informatics Volume 8 Issue 1	Section 2
6.	Autonomic Management and Orchestration Strategies in MEC-Enabled 5G Networks (Thesis)	31 Jan. 2021	University of Trento - School of Information and Communication Technology	Acknowledgements (pp. II)
7.	The KICK-OFF of 6G Research Worldwide: An Overview	Added IEEE Xplore: 17 Jan. 2022	2021 7th International Conference on Computer and Communications (ICCC)	Sign in required

8.	On the Integration of AI/ML-based scaling operations in the 5Growth platform	Added IEEE Xplore: 24 Dec. 2020	2020 IEEE Conference on Network Function Virtualization and Software Defined Networks (NFV-SDN)	Ref 10
9.	Results and Achievements of the ALLIANCE Project: New Network Solutions for 5G and Beyond	Published: 30 Sep. 2021	Journals Applied Sciences Volume 11 Issue 19	Section 2.3

2.2 Scientific and Industry Events

The impact of lockdown restrictions due to the COVID-19 pandemic impacted mostly the participation in presence to events as can be derived from the following Table 2-4 (highlighted in green scientific events and in blue industry events).

Despite the adverse conditions, the 5GZORRO Consortium has participated to a relevant number of events in virtual mode, and in particular:

- contributed to **38 events (19 scientific and 19 industry)** with 5GZORRO talks and presentations, **6 of which were organised by Consortium** partners (5GZORRO Tech Talks and Final Event), and **6 keynotes in relevant industry or standard forums**.

Table 2-4: Scientific and Industry Events with 5GZORRO participation during M1-M36

#	Event	Date/Place	Activity	Partners
1.	Barcelona CyberSecurity Congress – ISACA Event	29-31 Oct. 2019 Barcelona (ES)	Presentation 5GZORRO project	I2CAT
2.	NOMS2020	20-24 Apr. 2020 VIRTUAL	Paper Presentation aiOS: An Intelligence Layer for SD-WLANs	FBK
3.	OpenNebula TechDays	11 Jun. 2020 VIRTUAL	Presentation 5GZORRO project	I2CAT
4.	EuCNC2020	15-18 Jun. 2020 VIRTUAL	Paper Presentation: AI-driven Zero-touch Operations, Security and Trust in Multi-operator 5G Networks: A Conceptual Architecture.	NXW
5.	Webinar: Empowering Vertical Industries through 5G Networks – The 5G PPP experience	9 Sep. 2020 VIRTUAL	5G Public Private Partnership (5G PPP) and the 5G Infrastructure Association (5G IA) held this webinar to present the key findings of the latest white paper on “Empowering Vertical Industries through 5G Network – Current Status and Future Trends” . This white paper summarizes the progress and results produced by 5G PPP	NXW

			projects, while developing some innovative 5G network services and solutions for vertical industries.	
6.	IEEE Communications Society EMEA Region	2 Oct. 2020 VIRTUAL	Invited seminar with Diego Lopez, TID. 5GZORRO mention on: Dissemination of project goals and plans.	TID
7.	LAYER123 WORLD CONGRESS 2020	12-15 Oct. 2020 VIRTUAL	Invited Keynote by Diego Lopez – TID 5GZORRO mention on: Dissemination of project goals and plans.	TID
8.	5GZORRO Tech Talk#1: TELCO & DLT/BLOCKCHAINS 5G TECH TALK	20 Oct. 2020 VIRTUAL	5GZORRO Tech Talk#1 for a focus discussion with experts on the role Distributed Ledger Technologies (DLT) / Blockchains are having in the 5G Telco business. Paul Henderson - CEO, Bartr Group - Official 5GZORRO representative; Michele Nati - Head of Telco and Infrastructure Development at IOTA Foundation - DLTs Architect, Data Trust Expert: Artem Barger - Manager, Blockchain Group, IBM Hyperledger; Thomas Spencer -Telecom Lead, R3 CORDA; Antoine Sciberras – Chief Spectrum Management & Technology, MCA; Louisa Gregory - CEO CBAN (Communications Business Automation Network); Moderator: Andrea Michelozzi - CoDi	MCA IBM CODI BARTR (Ex partner) All
9.	Ericsson Spain Outside - InSights Session	30 Oct. 2020 VIRTUAL	Invited Keynote by G. Carrozzo, NXW. AI-driven Zero-touch Operations, Security and Trust in Multi-operator 5G Networks	NXW
10.	IEEE Conference on Network Function Virtualization and Software Defined Networks, IEEE NFV-SDN 2020	11 Nov. 2020 VIRTUAL	Invited Keynote by Diego Lopez – TID Dissemination of project goals and plans	TID

11	CONNECT Tech Talk: 5G & Verticals	1 Dec. 2020 VIRTUAL	5GZORRO Video presentation (2'16") closing the event. With Colin Willcock, Nokia, Chairman of the Board at 5G Infrastructure Association, Jordi Joan Giménez, Head of Technology, 5G Media Action Group (5G-MAG); Francesco Sacco, Board Member at S3K, Professor at SDA Bocconi School of Management; Panagiotis Demestichas, University of Piraeus Ioannis Neokosmidis, CEO at inCITES Consulting; Moderator: Jörn Krieger, Broadband TV News	CODI
12	5G PPP Technical eWorkshop	9-10 Dec. 2020 VIRTUAL	Presentation: 5G ZORRO AI-driven Zero-touch Operations, Security and Trust in Multi-operator 5G Networks: the 5GZORRO reference architecture.	NXW UMU I2CAT
13	ETSI NFV&MEC Remote API Plugtests 2021	1-28 Feb. 2021 VIRTUAL	ICOM fs CDN Anywhere Solution deployed as Edge vCDN NSD/VNFD and tested translation from Opensource MANO Rel. 8 descriptors to SOL006 & Cloud-Native attributes	ICOM
14	ARCH WG telco	5 Feb. 2021 VIRTUAL	Presentation: AI-driven Zero-touch Operations, Security and Trust in Multioperator 5G Networks: Reference architecture	ICOM ALTICE NXW
15	The City Nervous System: 5G enabled verticals for cities	23 Mar. 2021 VIRTUAL	In this Webinar were invited several speakers to approach the benefits and implementation challenges of 5G networks and share the impact envisioned by 5GZORRO in this sector. Participating projects URBSense, 5GO (co-funded by COMPETE2020) and UNICRINF (co-funded by CENTRO2020).	UW

16	5G FED2021	14 May 2021 VIRTUAL	5G virtual event. 5GZORRO video presentation (2:16") shown at 1:27" opening conference. LIVE: TY 5182 viewers. TW 171	CODI
17	IFIP/IEEE IM2021	19 – 20 May 2021 VIRTUAL	Keynote on data-driven orchestration, and its application to autonomous networks. Participation in a Distinguished Expert Panel on Programmable Networks.	TID
18	BEREC Workshop on 5G	3 June 2021 VIRTUAL	Participation in a panel discussion on the pace of innovation in 5G services, representing the 5G ZORRO project point of view.	I2CAT MCA
19	EuCNC2021	8-11 June 2021 VIRTUAL	Presentation of 2 papers in standard conference track Chairing and presentation at Special Session 8: Autonomous Network Management towards 6G. Presentation in Workshop 8: From 5G to 6G Automated and Intelligent Security.	I2CAT NXW IBM ICOM UMU
20	16th European Spectrum Management Conference	23-25 June 2021 VIRTUAL	5GZORRO share outcomes on Spectrum Sharing and presented research and development of Use Case 2: Dynamic Spectrum Allocation. 5GZORRO virtual booth w/ Flyer 2	MCA UW NXW i2CAT
21	MWC 2021	28 June -1 Jul. 2021 VIRTUAL	Dissemination and promotion at i2CAT booth of project's outcomes and Flyer 2	i2CAT
22	IEEE First VIRTUAL IEEE 5G BLOCKCHAIN Summit	23-24 Sept. 2021 VIRTUAL	Invited talk and panel participation	TID
23	Barcelona Cybersecurity Congress	5-7 Oct. 2021 VIRTUAL	5GZORRO Presentation and participation in a round table i2Cat was involved in the organization of event via innovation office of Catalunya Cybersecurity Agency.	i2CAT

24	12th International Conference on Network of the Future - NoF	6-8 Oct. 2021	Paper accepted Video Presentation	IBM
25	2021 IEEE 5G World Forum (5GWF'21)	13-15 Oct. 2021 VIRTUAL	Workshop proposal with LOCUS Project on "Pioneering Autonomous Network Management for the 6G era"	NXW
26	IEEE 5G World Forum	15 Oct. 2021	Invited talk at the Blockchain enabling Verticals workshop	TID
27	CNSM 2021	29 Oct. 2021	Tutorial Session. Intelligent Behavioral Fingerprinting - From Theory to Practice	UMU
28	ETSI OSM12 Ecosystem Day	1 Dic. 2021	Invited Keynote- Presentation: Marketplace-driven 5G network slices among multiple operators in 5GZORRO	NXW
29	ECO6G European Ecosystem Event	10 Feb. 2022	5GZORRO presentation during i2CAT organization First edition of ECO6G, international event for 6G discussions., key 5G and future 6G stakeholders discussed about 6G from a European perspective, as the leading world region in 5G.	I2CAT CODI
30	MWC22	28 Feb.-3 March 2022 Barcelona	Tech Talk#3 organization at MWCcapital stage with stakeholders. Speakers: José Antonio Aranda (Cellnex); Shuaib Siddiqui (i2CAT) Intro. to 5GZORRO project; Esther Garrido (ATOS) 5GZORRO Business modelling; Raymond Forbes- (ETSI POL) recorded interview; Moderator: Antoine Sciberras (MCA); Andrea Michelozzi (CoDi) Video message from MEP: Brando Benifei; Video#2 5GZORRO Platform; 5GZORRO Survey; 5GZORRO Pills pre-MWC22 (3 interviews to MCA, ATOS, UMU)	I2CAT ATOS MCA CODI

31	Altice Labs 119^o Tech Days	3 March 2022	Presentation of European Projects where Altice Labs has participation	ALTICE UW
32	Tech Talk#4	26 May 2022	5GZORRO Tech Talk#4: Enabling Data-driven Automation for 5G and beyond. Speakers: Panagiotis Demestichas (Wings ICT) Pouria Khodashenas (Huawei), Rita Santiago (UW) Moderator: Katherine Barabash (IBM) 5GZORRO Pills Pre-TT#4 (2 interviews to Altice Lab, FBK)	IBM UW CODI
33	EuCNC 2022	7-10 June 2022	Booth, posters, flyers, demos. In loco recorded videos to posters, demos, project coordinators. 5GZORRO Pills pre-EuCNC22 (3 interviews to i2Cat, UW, NXW)	i2CAT NXW UMU ATOS ICOM (CODI)
34	ETSI OSM13 Ecosystem Day	15 June 2022	Demo presentation of work relevant to the Security Analytics Automation research item of 5GZORRO, and the mechanisms for automatic enrichment of slices with security services offered by π -Edge Platform.	ICOM
35	52nd BEREC ordinary meetings and High level workshop	5-7 Oct. 2022	15-minute presentation slot during the plenary of Board of European Regulators for Electronic Communications (BEREC), in Salzburg. MCA discussed 5GZORRO from the regulator's perspective in the BEREC Planning and Future Trends working group.	MCA
36	EMERG	20 Oct. 2022	Webinar: Towards a dynamic marketplace for 5G resources, dedicated to the 5GZORRO project: to explain how the 5GZORRO marketplace facilitates the exchange of 5G related resources across multiple and diverse players in a	MCA, i2CAT, NXW, ATOS

			trusted and zero-touch approach.	
37	Final Event	27 Oct. 2022	5GZORRO DEMOS hands-on platform - Madrid	ALL
38	Tech Talk#5	27 Oct. 2022	5GZORRO Tech Talk#5: Trust in B5G Networks This 5GZORRO Tech Talk #5 explored the new requirements and characteristics introduced by B5G and 6G networks, which have not previously been covered by solutions in the literature, and the current efforts of major standardization groups to homogenize the main processes of trust models to provide trust in cross-domain scenarios, as well as some of the current solutions from European projects.	ALL

2.2.1 5GZORRO Tech Talks

Strong effort was spent by the Consortium in the execution of five 5GZORRO Tech Talks. Three were streamed live online only and the other two were held in presence and streamed live as well. The events had a wide impact in terms of engagement and interest among the stakeholders and the 5G ecosystem. These events, some held during pandemic times, offered a great opportunity for partners to collaborate during the organization and moderation of the events. The Tech Talks were also a great opportunity through the invited external speakers to receive important contributions from relevant organizations and institutions. In Table 2-5 a short list of Talks is reported, which is followed by a brief description of each event.

Table 2-5: 5GZORRO Tech Talks

Nº	Date	Title	Link
TT#1	20 Oct. 2020 Streamed	Telco & DLTs/Blockchains	www.youtube.com/watch?v=8HJwALUCN5E
TT#2	13 Jan. 2022 Streamed	AI and ML for 5G and beyond	www.youtube.com/watch?v=Ko_a6TM-bNs&t=6s
TT#3	1 Mar. 2022 Live/Streamed	Towards a Dynamic Spectrum Marketplace	www.youtube.com/watch?v=eEAGkaQZhDI&t=861s
TT#4	26 May. 2022 Streamed	Enabling Data-driven Automation for 5G and Beyond, Data-driven Automation for 5G	www.youtube.com/watch?v=sjS9X1pU7q8
TT#5	27 Oct. 2022 Live/Streamed	Trust in B5G Networks	https://www.youtube.com/watch?v=6raCTwxX440

TECH TALK#1 (STREAMED)

DATE: 20 Oct 2020

PLACE: Online on Connect platform (CoDi)

TIME: 4:00-5:00 pm CET

TITLE: Telco & DLTs/Blockchains

INTRODUCTION: Given the disruptive potential the 5GZORRO outcomes in Telecom industry and Regulatory bodies, the event aimed at stimulating a focus discussion with experts in the field on the role Distributed Ledger Technologies (DLT) / Blockchains are having in the 5G Telco business.

In fact, many standard developing organizations, associations, and Telcos are looking today at DLTs as basic enablers for multi-stakeholder 5G network infrastructure and services across various actors of the value chain, capable to contribute to the automation, security and traceability of settlements when building cost-effective deployment of intelligent 5G networks in multi-stakeholder environments.

Standards, as well as technical solutions are in great demand by Telecom Operators, Spectrum Regulators, Vertical Users, Content Service Providers and Facility Owners who need to implement utterly secure and coordinated business operations for their flexible 5G network and services deployed across multiple domains and operators.

5GZORRO Tech Talk#1 explored these topics with the help of relevant speakers from IBM, IOTA, CBAN, R3 CORDA, MCA, BARTR:

- External keynote speakers
 - **Artem Barger** – Manager, Blockchain Group, IBM Hyperledger
 - **Michele Nati** – Head of Telco and Infrastructure Development at IOTA Foundation – DLTs Architect, Data Trust Expert
 - **Thomas Spencer** – Telecom Lead, R3 CORDA
 - **Louisa Gregory** – CEO CBAN (Communications Business Automation Network)
- From 5GZORRO
 - **Antoine Sciberras** - Chief Spectrum Management & Technology, MCA
 - **Paul Henderson**- CEO, BARTR Group Moderator Round Table, former 5GZORRO representative
 - **Andrea Michelozzi** – CODI, Moderator



Figure 2-1: 5GZORRO Tech Talk#1: Telco & DLT/Blockchain 5G Tech Talk

The event was publicly streamed on the 5GZORRO website, YouTube channel, and Twitter account, obtaining great results in terms of views and impressions:

- [Website]: www.5gzorro.eu/5gzorro-tech-talktelco-dlt-blockchains
- [Youtube]: www.youtube.com/watch?v=8HJwALUCN5E
- [Twitter]: <https://twitter.com/5Gzorro/status/1318553068187885569>

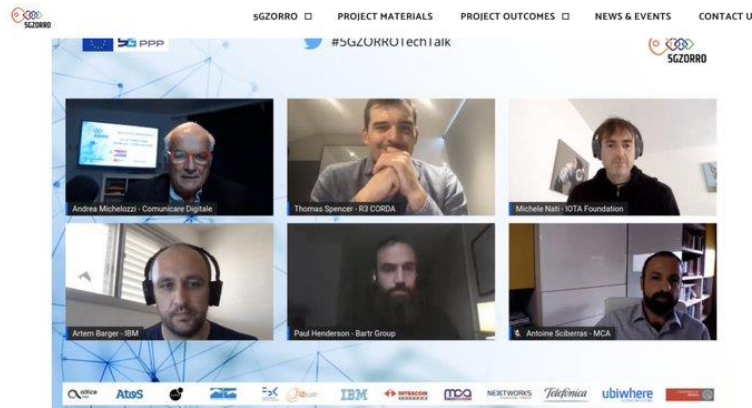


Figure 2-2: 5GZORRO Telco & DLT/Blockchain 5G Teck Talk speakers in action

Impact analytics before the event are:

- LinkedIn: 12,241 impressions (15 Oct 2020);
- Twitter: 7 posts; 63,668 visualizations; 1,537 engagements (15,16,18,19 Oct 2020).

Impact analytics during the LIVE on 20 Oct 2020 are:

- YouTube: 540 viewers live.
- Twitter: 15 posts; 12,953 impressions; 235 engagements.
- LinkedIn: 348 impressions.

Impact analytics after the event are:

- Periscope 670 viewers.
- Twitter: 7 posts; 58,743 visualizations; 1,259 Impressions.
- YouTube 1,354 visualizations.

TECH TALK#2 (STREAMED)

DATE: 13 Jan. 2022

TIME: 3:00-3:50 pm CET

PLACE: Online on Connect platform (CoDi)

TITLE: **AI and ML for 5G and beyond**

INTRODUCTION: While the introduction of closed-loop mechanisms is not such a radical change in network management, the use of data-driven techniques, and specifically AI and ML, will bring new ways of deriving further insights from behavioural data and radically improve network operation and management (OAM), towards network self-awareness. This second 5GZORRO Tech Talk provided a view of the current landscape for AI/ML applications for networking, considering different perspectives, from general principles to current standardization efforts, including how the trustworthy and distributed data infrastructure of 5G-ZORRO is developing and can help to fulfil the AI/ML promise.

- External keynote speakers
 - **Nurit Sprecher** - ETSI ZSM Vice Chair, Nokia
 - **Alexandros Kaloxylos** - 5G Infrastructure Association
 - **Miltiadis Filippou** – Hexa-X, Intel
- From 5GZORRO
 - **Gino Carrozzo** – Nextworks
 - **Shuaib Siddiqui** – i2CAT
 - **Diego López** – Telefónica, Moderator Round Table
 - **Andrea Michelozzi** – CODI, Moderator



Figure 2-3: 5GZORRO Tech Talk#2: AI and ML for 5G and beyond

The event was publicly streamed on the 5GZORRO website, YouTube channel, and Twitter account, obtaining great results in terms of views and impressions:

- [Website]: www.5gzorro.eu/5gzorro-tech-talk-january-13-2022-3-00-pm-cet/
- [Youtube]: www.youtube.com/watch?v=Ko_a6TM-bNs&t=6s
- [Twitter]: <https://twitter.com/5Gzorro/status/1481627246502694912>



Figure 2-4: 5GZORRO Tech Talk#2: AI and ML for 5G and beyond speakers in action

Impact analytics before the event are:

- LinkedIn: 2 posts; 407 impressions; 7% engagement rate (3, 12 Jan 2022)
- Twitter: 7 posts; 1,978 visualizations; 54 engagements (3, 10, 12 Jan 2022)

Impact analytics during the LIVE on 13 Jan. 2022 are:

- YouTube: 1500 viewers live
- Twitter: 12 posts; 3,919 impressions; 121 engagements,
- LinkedIn: 184 impressions; 1,63% engagement rate

Impact analytics after the event are:

- YouTube 7867 visualizations.
- Twitter: 2 posts; 36,982 impressions; 8486 engagements (13 Jan).

TECH TALK#3 (LIVE & STREAMED)

DATE: 1 March 2022

TIME: 5:00-5.45 pm CET

PLACE: MWC2022 -Mobile World Capital Stand 4G100 - Hall 4

TITLE: **Towards a Dynamic Spectrum Marketplace**

INTRODUCTION: Future multi-stakeholder communication networks place unprecedented demands on wireless connectivity's most valuable and scarce resource, the radio spectrum. It also introduces further complexity in the connectivity value chain with the role of intermediaries who, along with traditional network operators, repackage and customise connectivity to the needs of particular economic and industrial sectors or verticals. In the pursuit of an optimal balancing act between spectrum efficiency and effective use, collaboration in research and development projects which explore innovative and dynamic spectrum solutions, including those enabled by artificial intelligence and blockchain technologies is necessary.

This Tech Talk will briefly explore developments where the use of innovative technologies facilitate access to spectrum, and in some cases, such as in the 5GZORRO project, enable a marketplace where 5G-related resources, including spectrum, can be traded securely amongst diverse stakeholders, based on market-driven business models to meet dynamic supply and demand.

- External keynote speakers
 - **José Antonio Aranda** - Cellnex
 - **Raymond Forbes** recorded interview – ETSI-PDL
 - Video message from MEP **Brando Benifei**, participating at MWC Barcelona 2022 - European Internet Forum
- From 5GZORRO
 - **Esther Garrido** – Atos
 - **Shuaib Siddiqui** – i2CAT
 - **Antoine Sciberras** – MCA, Moderator Round Table
 - **Andrea Michelozzi** – CODI, Moderator



Figure 2-5: 5GZORRO Tech Talk#3: Towards a Dynamic Spectrum Marketplace

The event was publicly streamed on the 5GZORRO website, YouTube channel, and Twitter account, obtaining great results in terms of views and impressions:

- [Yotube]: www.youtube.com/watch?v=eEAGkaQZhDI&t=861s
- [Twitter]: <https://twitter.com/5Gzorro/status/1481627246502694912>



Figure 2-6: 5GZORRO Tech Talk#3: Towards a Dynamic Spectrum Marketplace speaker in action

Impact analytics before the event are:

- LinkedIn: 183 impressions, 4,37% engagement rate (3 Jan 2022)
- Twitter: 7 posts; 1,978 visualizations, 54 engagements (3, 10, 12 Jan 2022)

Impact analytics during the LIVE on 13 Jan. 2022 are:

- YouTube: 1500 viewers live
- Twitter: 12 posts; 3,919 impressions; 121 engagements
- LinkedIn: 184 impressions, 4,89% engagement rate

Impact analytics after the event are:

- Twitter: 2 posts; 36,982 impressions; 8486 engagements (13 Jan).
- YouTube: 7867 visualizations.

TECH TALK#4 (STREAMED)

DATE: 26 May 2022

TIME: 11:00-11:45 am CET

PLACE: Online on Connect platform (CoDi)

TITLE: Enabling Data-driven Automation for 5G and Beyond, Data-driven Automation for 5G

INTRODUCTION: As AI and ML techniques begin to prove their applicability to the management of complex 5G networks, e.g., by building models for the normal network behaviour, using these models for alerting on the abnormal situations, and, more recently, computing predictive insights and recommendations, we open the discussion on architectural support required to achieve the data-driven automation in 5G/6G environments. In this, forth, 5GZORRO Tech Talk, we will dig deeper into questions related to technology enablers for emerging 5G/6G data architectures and hear opinions on how data-related topics, including support for data modelling, sharing, processing, storing, etc., are manifested in complex multi-provider business settings and multi-domain technology environments of 5G/6G networks.

- External keynote speakers
 - **Panagiotis Demestichas** – Wings ITC Solutions
 - **Pouria Khodashenas** - Huawei
- From 5GZORRO
 - **Ana Rita Santiago** - Ubiwhere
 - **Katherine Barabash**, IBM, Moderator Round Table
 - **Andrea Michelozzi** – CODI, Moderator



Figure 2-7: 5GZORRO Tech Talk#4: Enabling Data-Driven Automation for 5G and Beyond

The event was publicly streamed on the 5GZORRO website, YouTube channel, and Twitter account, obtaining great results in terms of views and impressions:

- [Youtube]: www.youtube.com/watch?v=sjS9X1pU7q8
- [Twitter]: <https://twitter.com/5Gzorro/status/1529749114509873153>



Figure 2-8: 5GZORRO Tech Talk#4: Speakers in action

Impact analytics before the event are:

- LinkedIn: 2 posts; 973 impressions; 1,71% engagement rate (3, 25 Jan 2022)
- Twitter: 3 posts; 1,008 visualizations; 57 engagements (3, 25 May 2022)

Impact analytics during the LIVE on 26 May 2022 are:

- YouTube: 3500 viewers live
- Twitter: 6 posts; 694 impressions; 81 engagements
- LinkedIn: 2 posts; 788 impressions; 3,98% engagement rate

Impact analytics after the event are:

- Twitter: 2 posts; 388 impressions; 25 engagements (30 May 2022).
- YouTube 5785 visualizations.

TECH TALK#5 (LIVE & STREAMED)

DATE: 27 October 2022

TIME: 4:00-5:00 pm CET

PLACE: UC3M – Leganés Madrid

TITLE: **Trust in B5G Networks**

INTRODUCTION: The number of connections in mobile telecommunication networks has increased in the last years, and in consequence, the figure and type of relationships among entities. If we want to ensure trustworthy ecosystems with profitable interactions across domains, entities should rely on each other. Thus, mobile telecommunication networks demand new trust approaches that allow the development of feasible communications in 5G and beyond networks, through which a group of entities can establish chains of services between cross-operators/domains with trustworthiness and security.

One of the key obstacles to achieving generalized connectivity beyond 5G networks is the lack of automatized, efficient, and scalable trust models for establishing trustworthiness and security. Hence, we open the discussion on new requirements, features, and proposals to be considered to achieve cross-domain reliable connectivity in 5G/6G environments. This 5GZORRO Tech Talk #5 will explore the new requirements and characteristics introduced by B5G and 6G networks, which have not previously been covered by previous solutions in the literature, and the current efforts of major standardization groups to homogenize the main

processes of trust models, the different angles currently considered to provide trust in cross-domain scenarios, as well as some of the current solutions from European projects.

- External keynote speakers
 - **Raimo Kantola** - AALTO
 - **Tooba Faisal** – King’s College London
- From 5GZORRO
 - **Gregorio Martinez-Perez** - UMU, Moderator Round Table
 - **Andrea Michelozzi** – CODI, Welcome Moderator
 - **Diego Lopez** - Telefónica



Figure 2-9: 5GZORRO Tech Talk#5: Trust in B5G Networks

The event was live from University Carlos III Madrid and publicly streamed on 5GZORRO website, YouTube channel, and Twitter account, obtaining great results in terms of views and impressions:

- [youtube] <https://youtu.be/6raCTwxX440>
- [LinkedIn] www.linkedin.com/video/event/urn:li:ugcPost:6991054849790349312
- [Twitter] <https://twitter.com/5Gzorro/status/1585602825870278656>



Figure 2-10: 5GZORRO Tech Talk#5: Trust in B5G Networks speakers in action

Impact analytics before the event are:

- LinkedIn: 11 posts; 4.297 impressions; 104,70% impressions (19, 28 Sept; 3, 11, 19, 25, 26, 27 Oct 2022)
- Twitter: 14 posts; 16.926 visualizations; 119,6% engagement rate (19, 28 Sept; 3, 11, 19, 24, 25, 26, 27 Oct. 2022)

Impact analytics during the LIVE on 27 Oct. 2022 are:

- YouTube: 1200 viewers LIVE
- Twitter: 6 posts; 869 impressions; 65,8% engagement rate, LIVE 100 viewers
- LinkedIn: 2 posts; 553 impressions; 9,73% engagement rate, LIVE 272 viewers

Impact analytics after the event are:

- YouTube: 2664 visualizations
- Twitter: 2 posts; 235 impressions; 34,3% engagement rate (31 Oct. 2022).

2.2.2 5GZORRO Pills, Demonstrations, and Posters

From 2022, to increase the awareness of the project's outcomes and promote the project participation in specific events, and in particular for the events/activities organized by the Consortium during those international events (MWC22, Tech Talk#3, EuCNC22, Final Event and Tech Talk#5) a series of brief very specific contribution (Pills) were recorded by technical partners. Similar recordings were done during the EuCNC22 for Demos and Poster presentations (Demo and Poster) by consortium partners.

The **5GZORRO 12 Pills, 4 Demos, and 1 Poster** presentation recorded are listed in Table 2-6:

Table 2-6: 5GZORRO PILLS and PRESS

Date	Type	Event	Partner	Topic	Youtube Link	Visualization
Feb. 2022	PILL	Pre-MWC22	MCA	DLT-based Spectrum Market for real-time spectrum allocation among diverse business agents	https://youtu.be/ZdT8zH6jiLw	3943
Feb. 2022	PILL	Pre-MWC22	ATOS	Validation and Business Modelling	https://youtu.be/3l9BakGhVg8	5125
Feb. 2022	PILL	Pre-MWC22	UMU	Zero-touch automation, Security and Trust Orchestration	https://youtu.be/coWAie79ipU	3085
Apr. 2022	PILL	Pre-TechTalk#3	FBK	Cross domain slicing mechanism in 5GZORRO project	https://youtu.be/djOuyWV9Qag	524
Apr. 2022	PILL	EuCNC22	ALTICE	Concept of Trust in a 5GZORRO Governed Distributed Environment	https://youtu.be/TqJaC63RzfE	414
May 2022	PILL	Pre-EuCNC22	NXW	Technical overview in the project (architecture oriented)	https://youtu.be/6t0VFLKslOc	76
May 2022	PILL	Pre-EuCNC22	i2CAT	5GZORRO solutions for zero-touch services, challenges, and pillars	https://youtu.be/uemzPkt92gk	98
May 2022	PILL	Pre-EuCNC22	i2CAT	Invitation to 5GZORRO BOOTH at EuCNC2022	https://youtu.be/f-2faxTw9HI	276
May 2022	PILL	Pre-TechTalk#3	UW	Trusted and Secure SLA Monitoring component of the project	https://youtu.be/i_M_LivpZ9c	203
Jun. 2022	PILL	During-EuCNC22	NXW	5GZORRO invites you to the 2022 edition of the EuCNC, booth 36	https://youtu.be/kVlxDaaW2NI	349
Jun. 2022	PILL	During-EuCNC22	i2CAT	5GZORRO Coordinator shows the great interest on project outcomes received from attendees of EuCNC22 in Grenoble.	https://youtu.be/DFhrd8t32gM	231

Jun. 2022	PRESS	During-EuCNC22	ATOS	5GZORRO e-licensing management	https://youtu.be/c6dgD-GqPJM	1193
Jun. 2022	DEMO #1	During-EuCNC22	NXW	Automated Market for real-time resource allocation	https://youtu.be/mjwH2velbls	1162
Jun. 2022	DEMO #2	During-EuCNC22	I2CAT	Licensed Spectrum Sharing Use Case	https://youtu.be/gXFY22-9aI0	1027
Jun. 2022	DEMO #3	During-EuCNC22	ICOM	vCDN Use Case	https://youtu.be/ySkFy9Gf0TA	1116
Jun. 2022	DEMO PoC#5	During-EuCNC22	I2CAT	5GZORRO demo for ETSI ZSM PoC#5 with 5Gclarity project	https://youtu.be/9F4AVyadTB4	1883
Oct. 2022	PILL	Post-Final Event	I2CAT/UW	5GZORRO Final Statements		

2.3 Collaboration within 5G PPP and with Other Projects

The Consortium has played an active role in the various activities of 5G PPP working Groups and with other 5G PPP projects of Phase 3, following along with the discussions within these WGs, with the intent to contribute back with 5GZORRO's findings and outcomes.

The key Working Groups of 5G PPP and 5G Infrastructure Association where 5GZORRO partners participated are briefly reported in the following Table 2-7 together with the main activities executed in the period.

Table 2-7: 5GZORRO activity within 5G PPP

Area	Working Group	5GZORRO representative	Main activities
5G PPP	Steering Board	i2CAT (S. Siddiqui)–PC	<ul style="list-style-type: none"> • Main program coordination and SB periodic meetings • Annual Program report 2020, 2021
5G PPP	Technical Board	NXW (G. Carrozzo and G. Bernini) – TM	<ul style="list-style-type: none"> • Project cartography for Phase 3 projects • Cross-project technical coordination • 5G PPP Whitepaper on Verticals for MWC2020 • Contributions to Whitepaper on Edge Computing for EuCNC'21 • Contributions to Whitepaper on AI/ML for 5G (in progress) • Presentations of project progresses at Technical Workshop (May.20, Dec.20) • Annual Program report 2020, 2021 • EuCNC'21 coordinated participation • Contribution to 5G PPP standardization trackers • Contribution to 5G PPP key achievements
5G PPP	COMMS	CODI	<ul style="list-style-type: none"> • Coordinated communication initiatives of the 5G PPP
5G IA	Pre-Standardization	TID	<ul style="list-style-type: none"> • Contributions to WG activities and periodic meetings
5G IA	Spectrum	I2CAT, MCA	<ul style="list-style-type: none"> • Discussion on spectrum sharing • Contributions to WG activities and periodic meetings
5G PPP	Architecture	ALB, ICOM, NXW	<ul style="list-style-type: none"> • 5GZORRO Architecture presentation • Contributions to WG's Architecture Whitepaper (in progress) • Initial contributions to the Whitepaper

5G PPP	Software Networks (SDN/NFV)	UW, ICOM, ATOS	<ul style="list-style-type: none"> • Discussion on new whitepaper • Workshops at EuCNC'21 • Participation to periodic meetings
5G IA	Security	UMU, ICOM	<ul style="list-style-type: none"> • Contributions to WG's new Security whitepaper • Workshops at EuCNC • Participation to periodic meetings
5G IA	Vision and Societal Challenges	NXW, TID	<ul style="list-style-type: none"> • Contributions to Strategic Research & Innovation Agenda for Smart Network and Services • Participation to periodic meetings
Networld 2020	SME	NXW	<ul style="list-style-type: none"> • Co-chair of WG • Coordination SME activities for events and within 5G PPP

The Consortium contributed to **5 published whitepapers from 5G PPP, and 3 in the editing pipeline** as reported in

#	5G PPP Whitepaper	Publication Link /Status	Involved partners	Originating WG
1.	Empowering Vertical Industries through 5G Networks	Published Sept 2020	NXW	5G PPP Technology Board & 5G IA Verticals Task Force
2.	AI and ML – Enablers for Beyond 5G Networks	Published Dec 2020	I2CAT, UMU, FBK, ICOM, NXW	5G PPP Technology Board
3.	Edge Computing for 5G Networks	Published Feb 2021	I2CAT, NXW	5G PPP Technology Board Working Group 5G-IA's Trials Working Group
4.	5G Ecosystems 2021	Published Sept 2021	I2CAT, ATOS	5G Infrastructure Association Vision and Societal Challenges Working Group Business Validation, Models, and Ecosystems Sub-Group
5.	5G PPP Architecture Working Group – View on 5G Architecture, Version 4.0	Published Oct 2021	NXW, IBM, I2CAT, ATOS, TID	5G PPP Architecture Working Group
6.	SDN/NFV virtualisation 5G Slicing and Security Considerations	In progress	UMU	Whitepaper 5G IA Security WG
7.	5G Attack Referential	In progress	UMU	Whitepaper 5G IA Security WG
8.	Ecosystem business modelling	In progress	ATOS	Whitepaper 5G PPP Vision – BVME subgroup

Table 2-8: 5G PPP whitepapers with 5GZORRO contributions

#	5G PPP Whitepaper	Publication Link /Status	Involved partners	Originating WG
1.	Empowering Vertical Industries through 5G Networks	Published Sept 2020	NXW	5G PPP Technology Board & 5G IA Verticals Task Force

2.	AI and ML – Enablers for Beyond 5G Networks	Published Dec 2020	I2CAT, UMU, FBK, ICOM, NXW	5G PPP Technology Board
3.	Edge Computing for 5G Networks	Published Feb 2021	I2CAT, NXW	5G PPP Technology Board Working Group 5G-IA's Trials Working Group
4.	5G Ecosystems 2021	Published Sept 2021	I2CAT, ATOS	5G Infrastructure Association Vision and Societal Challenges Working Group Business Validation, Models, and Ecosystems Sub-Group
5.	5G PPP Architecture Working Group – View on 5G Architecture, Version 4.0	Published Oct 2021	NXW, IBM, I2CAT, ATOS, TID	5G PPP Architecture Working Group
6.	SDN/NFV virtualisation 5G Slicing and Security Considerations	In progress	UMU	Whitepaper 5G IA Security WG
7.	5G Attack Referential	In progress	UMU	Whitepaper 5G IA Security WG
8.	Ecosystem business modelling	In progress	ATOS	Whitepaper 5G PPP Vision – BVME subgroup

As planned in D6.2, the collaboration and liaisons with 5G PPP took place in particular with those projects funded in the same H2020 Call ICT-20-2019. The effort was focused on the participation of **9 5G PPP and EU Project joint events: 5 Workshops, 2 Webinars, 1 Tutorial, 1 Training, Presentation of the ETSI ZSM PoC#5**, and the share of results between the following projects:

- **LOCUS** (www.locus-project.eu, bridging partners: NXW, IBM, UMU)
 - share of testing experiences with Open Data Hub for data lake implementation
 - co-organisation of the workshop on Autonomous Network Management
- **5GCLARITY** (www.5gclarity.com, bridging partners: i2CAT, TID)
 - Share of vision and results on private and public networks using licensed spectrum
 - Contributions to the whitepaper on AI and ML as Enablers for Beyond 5G Networks coordinated by 5GCLARITY Technical Manager
 - Participation in the workshop on Autonomous Network Management
 - Joint ETSI ZSM PoC titled, “On-demand Non-Public Networks (NPNs) for industry 4.0: zero-touch provisioning practices in public-private network environments. (c.f. Section 2.3.1)
- **5G-COMPLETE** (<https://5gcomplete.eu>, bridging partner: NXW)
 - Results shared on testing Kubernetes with ETSI OSM
 - Participation in the workshop on Autonomous Network Management
- **MonB5G** (www.monb5g.eu, bridging partner: UMU)
 - Results shared on trust in Beyond 5G networks
- **INSPIRE-5GPLUS** (www.inspire-5gplus.eu, bridging partner: UMU, TID)
 - Results shared on trust in Beyond 5G networks

Table 2-9: 5GZORRO collaboration with 5G PPP and Other Projects

#	Date	Event	Activity Name	Activity Type	Partner involved/P articipants	Link
1.	9 Sep. 2020	Empoweri ng Vertical Industries through 5G Networks – The 5G PPP experience	Empowering Vertical Industries through 5G Networks – The 5G PPP experience	Webinar: 5GPPP and 5GIA held event to present key findings of white paper “Empowering Vertical Industries through 5G Network – Current Status and Future Trends” .	NXW	https://5g-ppp.eu/event/webinar-empowering-vertical-industries/
2.	23 Mar. 2021	The City Nervous System: 5G enabled verticals for cities	Fully Fledged 5G-as-Service Democratising 5G networks	Webinar: several speakers to approach the benefits and implementation challenges of 5G networks and share the impact envisioned by 5GZORRO in this sector.	UW/URBSEN SE, 5GO (Co-funded COMPLETE 2020), UNICRINF (co-funded by CENTRO2020)	https://www.youtube.com/watch?v=XgQNsW_8to
3.	11 Jun. 2021	EuCNC 2021	Autonomous Network Management toward 6G	5G PPP synergies Joint event Workshop 8: From 5G to 6G Automated and Intelligent Security.	NXW, IBM/ LOCUS, 5G-COMplete, 5GCLARITY	https://6g-ia.eu/event/5gzorro-30th-eucnc-6g-summit-3/
4.	13-15 Oct. 2021	2021 IEEE 5G World Forum (5GWF'21)	“Pioneering Autonomous Network Management for the 6G era”	Workshop proposal with LOCUS Project	NXW/LOCUS	https://ieee-wf-5g.org/
5.	29 Oct. 2021	CNSM 2021	Intelligent Behavioural Fingerprinting – From Theory to Practice	Tutorial Session: overview of tools and techniques toward behavioural fingerprinting and used to optimize efficiency of application scenarios such as cybersecurity/device authentication. To explain techniques used to create and evaluate	UMU/ CONCORDIA H2020	http://www.cnsm-conf.org/2021/index.html

#	Date	Event	Activity Name	Activity Type	Partner involved/P articpants	Link
				fingerprints, Machine Learning (ML) and Deep Learning (DL) approaches.		
6.	28 Apr. 2022	5GPPP Technical Board Workshop	“Design and implementation of a zero-touch and zero-trust security architecture for multi-stakeholder scenarios”	Security Workshop 5G PPP synergies Joint event	UMU/ MonB5G, LOCUS, INSPIRE- 5Gplus, 5G-COMplete, DEDICAT6G	
7.	8 Jun. 2022	EuCNC 2022	ETSI ZSM PoC#5	Demo: 5G PPP synergies Joint event	TID, NXW, i2CAT/ 5Gclarity, Interdigital ETSI, Interdigital Universidad Carlos III, UC3m, 5Tonic	https://youtu.be/9F4AvyadTB4
8.	5 Oct. 2022	5GPPP Steering Board Workshop	5GPPP Steering Board Workshop	Workshop: 5G PPP synergies Joint event	i2CAT	all 5GPPP projects
9.	6 Oct. 2022	5GPPP Technical Board Workshop	5GPPP Technical Board Workshop	Workshop: 5G PPP synergies Joint event	NXW	all 5GPPP projects

2.3.1 ETSI ZSM PoC#5 On-demand Non-Public Networks (NPNs) for industry 4.0

A great result was also achieved between 5GZORRO and 5Gclarity Projects collaboration, with the ETSI ZSM PoC#5 On-demand Non-Public Networks (NPNs) which was approved by ETSI ZSM (ETSI Zero-touch network and Service Management group) featuring Zero-Touch provisioning practices in networks environments.

Abstract: After interviews with real-world industry 4.0 verticals, participants have identified the as-is situation: nowadays, autonomous Guide Vehicles (AGV) navigate autonomously in a factory, and the vertical does not know how often it does stop, and why. The objective is to PoC is to precisely allow the vertical to gain this knowledge (business intelligence), and then use it to optimize AGV trajectories (e.g., replan trajectory). This PoC is conceived to demonstrate the use of ZSM services and associated zero-touch

management capabilities to provision a private 5G network on-demand. This private 5G network will be used to enhance autonomous navigation of AGV in the shop floor of a factory, allowing a remote worker to keep track of AGV trajectory and alert him/her on unexpected incidents (also known as disturbances) that cause deviations from the planned route. When the unexpected incident happens, the AGV slows down or stops, captures a photo on what is in front of it with the on-board camera, and sends the photo to a pre-trained obstacle detection function. This application identifies that the root cause of the incident is an obstacle, and notifies the remote worker accordingly, with the coordinates where the obstacle is, together with the photo taken. The private 5G network will not be confined to on-premises infrastructure; in fact, it will rely on the capabilities of telco edge computing to host obstacle detection function. The result is a PNI-NPN. To make an agile yet efficient provisioning of the PNI-NPN, network slicing will be used.

The full PoC proposal has been submitted to the ZSM ISG and approved in March 2022 [3].

The PoC was implemented by 5GZORRO and 5Gclarity in time for a public demonstration at EUCNC & 6G Summit event in June 2022, where the PoC was showcased at both project booths [5]. The final report of the PoC implementation has been submitted to ZSM ISG in October 2022 [4]. The PoC was disseminated on the official project website [6] as well as on the 5GPPP portal [7].

2.4 Internal events: Webinar, Workshops, Hackathons

In addition to the participation and the organization of public events and Teck Talks with guest speakers from relevant institutions and companies, the Consortium has also organised a series of **10 internal events: 1 Training Webinar, 4 Internal Workshops, 4 Internal Hackathons, and 1 Workshop with EC Booster Result program** aimed to share among partners: knowledge and progressing on software integration, business plan and exploitation strategies. In Table 2-10 the list of internal events held by the consortium – webinars, hackathons, and workshops (in light blue are highlighted the workshops, in green the hackathons):

Table 2-10: 5GZORRO Internal Events

#	Date	Event	Activity Name	Activity Type	Partner involved /Participants	Link/Description
1	12 Dec. 2019	Organized on demand	Blockchain fundamentals	Training Webinar VIRTUAL	Lead: BARTR/ALL	https://youtu.be/3WP2GsPaHUQ_ /Internal training on blockchain technologies.
2	10-Mar. 2020	1 st Virtual Meeting	Data Lakes for 5GZORRO	Internal Virtual design Workshop VIRTUAL	Lead: IBM /ALL	Reference tools, functionalities, experiences, system requirements, installation options
			DLTs for 5GZORRO		Lead: BTL /ALL	Reference tools, functionalities, experiences, system requirements, installation options

#	Date	Event	Activity Name	Activity Type	Partner involved /Participants	Link/Description
			5GZORRO Security & Trust Framework Design (T2.2) + 5GZORRO Platform Architecture (T2.3)		Lead: UM U+ALB+N XW /BTL, IBM, All	Brainstorming & electronic whiteboard-ing, supported by slidesets on <ul style="list-style-type: none"> - design principles - role of DLTs - role of Data Lakes - role of AI - main offered services and enablers - functional architecture including DLT, 5G Ops Data Lake, AI, Zero-touch interdomain & intradomain - the platform concept and forms - initial requirements on software (code repositories, CI/CD, development methodologies, ...)
3	10-Dec. 2020	2 nd Virtual Meeting	MVP Epics from WP3	Virtual 5GZORRO-core Design internal Workshop VIRTUAL	Lead: BTL / ALL WP3, WP4, WP5	Review & discussion of (max 3) priority end-to-end MVPs with key & core 5GZORRO functionalities 5GZORRO software modules involved Interfaces (to be reported in D3.1) Data models (to be reported in D3.1) software development streams/actions Assumptions, constraints, prioritization
			MVP Epics from WP4		Lead: UMU/ All WP3, WP4, WP5	Review & discussion of (max 3) priority end-to-end MVPs with key & core 5GZORRO functionalities 5GZORRO software modules involved

#	Date	Event	Activity Name	Activity Type	Partner involved /Participants	Link/Description
						Interfaces (to be reported in D4.1) Data models (to be reported in D4.1) software development streams/actions Assumptions, constraints, prioritization
			5GZORRO-core release planning & testbed		Lead: NXW, ALB/All	GitHub repository organization for these sprints CI/CD tooling Release schedule and organization Requirements and actions on testbeds
4	17 Mar. 2021 18 Mar. 2021	3 rd Plenary Meeting	Team Governance (INTEGRATION)	5GZORRO 1 st Internal Hackathon – VIRTUAL Hackathon Take-aways (from prototypes to a 1 st 5GZORRO-core end-to-end demo)– —	Lead: ALB + i2CAT + NXW/ALL	Objectives Teams Tools, resources, to-do, joints develop integrate run planned tests
			Team Marketplace (INTEGRATION)		Lead: ALB + i2CAT + NXW /ALL	Objectives Teams Tools, resources, to-do, joints develop integrate run planned tests
			Team E2E Slices (INTEGRATION)		Lead: ALB + i2CAT + NXW /ALL	Objectives Teams Tools, resources, to-do, joints develop integrate run planned tests
			Team e-Licensing Control (INTEGR.)		Lead: ALB + i2CAT + NXW /ALL	Objectives Teams Tools, resources, to-do, joints develop integrate run planned tests
5	14 Ott. 2021	4 th Plenary Meeting	Team#1 Governance	5GZORRO 2 nd Internal	Leads: i2CAT+BT	Objectives Teams Tools, resources, to-do,

#	Date	Event	Activity Name	Activity Type	Partner involved /Participants	Link/Description
			(INTEGRATION)	Hackathon – VIRTUAL Hackathon Take-aways (from prototypes to use case validations)– —	L+ICOM+ ATOS+IBM / ALL	joints develop integrate run planned tests
			Team#2 Marketplace (INTEGRATION)		Leads: i2CAT+BT L+ICOM+ ATOS+IBM / ALL	Objectives Teams Tools, resources, to-do, joints develop integrate run planned tests
			Team#3 E2E Slices + Team#4 e-Licensing (INTEGRATION)		Leads: i2CAT+BT L+ICOM+ ATOS+IBM / ALL	Objectives Teams Tools, resources, to-do, joints develop integrate run planned tests
			Team#5 SLA - Data Lake (INTEGRATION)		Leads: i2CAT+BT L+ICOM+ ATOS+IBM / ALL	Objectives Teams Tools, resources, to-do, joints develop integrate run planned tests
6	22 Mar 2022	5 th Plenary Meeting	UC1 workshop	5GZORRO Internal Workshop VIRTUAL–	Lead: NXW / ALL	Define in detail demo scenarios and roadmaps, demo workflows and storylines (incremental), first iteration for EuCNC, final demo for EC-review, identification of platform components involved, identification of features required, how to showcase security features
			UC2 workshop		Lead: i2CAT /ALL	Define in detail demo scenarios and roadmaps, demo workflows and storylines (incremental), first iteration for EuCNC, final demo for EC-review, identification of platform components involved, identification of features required, how to showcase security features

#	Date	Event	Activity Name	Activity Type	Partner involved /Participants	Link/Description
			UC3 workshop		Lead: ICOM /ALL	Define in detail demo scenarios and roadmaps, demo workflows and storylines (incremental), first iteration for EuCNC, final demo for EC-review, identification of platform components involved, identification of features required, how to showcase security features
7	22 Mar 2022	5 th Plenary Meeting	Team# A MARKETPLACE	5GZORRO Internal Hackathon – VIRTUAL –	Lead: i2CAT+ UMU+ IBM+ ICOM+ALB /ALL	Joints develop, integrate focus on demo functionalities
			Team# B ZERO-TOUCH-SLICING		Lead: i2CAT+ UMU+ IBM+ ICOM+ ALB /ALL	Joints develop, integrate focus on demo functionalities
			Team# C SLA-DATALAKE		Lead: i2CAT+ UMU+ IBM+ ICOM+ ALB /ALL	Joints develop, integrate focus on demo functionalities
			Team# D E2E Security		Lead: i2CAT+ UMU+ IBM+ ICOM+ ALB /ALL	Joints develop, integrate focus on demo functionalities
			Team# Z TESTBED		Lead: i2CAT+ UMU+ IBM+ ICOM+ ALB / ALL	Team activities cross-team support

#	Date	Event	Activity Name	Activity Type	Partner involved /Participants	Link/Description
8	11 July 2022	6 th Plenary Meeting	UC1 mini-workshop	5GZORRO Internal Workshop – VIRTUAL—	Lead: NXW /ALL	Final demo scenario and roadmap Platform components involved Features required and open points
			UC2 mini-workshop		Lead: i2CAT /ALL	Final demo scenario and roadmap Platform components involved Features required and open points
			UC3 mini-workshop		Lead: ICOM / ALL	Final demo scenario and roadmap Platform components involved Features required and open points
9	12 July 2022	6 th Plenary Meeting	Hackathon on common platform issues and open points	5GZORRO Internal Hackathon – VIRTUAL	Lead: NXW+ i2CAT+ ICOM /ALL	Joints develop integrate test
			UC1 Hackathon	–	Lead: NXW /ALL	Joints develop Integrate test focus on KPI validation and final demo functionalities
			UC2 Hackathon	–	Lead: i2CAT /ALL	Joints develop Integrate test focus on KPI validation and final demo functionalities
			UC3 Hackathon	–	Lead: ICOM /ALL	Joints develop Integrate Test focus on KPI validation and final demo functionalities

#	Date	Event	Activity Name	Activity Type	Partner involved /Participants	Link/Description
10	05 and 07 Oct. 2022	Horizon Booster Results program	Workshops	EC Experts 5GZORRO Consortium	Lead: ATOS, UW/ALL	Workshop with the Horizon Booster Results program to prepare the Business Plan and the Exploitation Strategy

At an early stage a webinar was conducted; but for the project's final outcomes, the Consortium preferred to conduct more internal hackathons, which goals were to create functioning software that included the functional testing and troubleshooting of software modules in context of the 5GZORRO system architecture as well as use cases. Internal workshops helped partners to present, discuss and agree on specific technical topics relevant and informative to the project's results.

2.5 Planned Collaborations with EC Platforms

As stated in D6.2 to further boost the project dissemination of results, following Jean-Eric Paquet (Director-General of the European Commission's Research and Innovation department) recommendations, among the planned EC platforms, the Consortium had the chance to concretely collaborate with:

- **CORDIS [8]:** 5GZORRO profile was published at the beginning of the project. A series of publication have been regularly published on the platform: 2 Project summary, Project description (EN, FR, IT, ES, PL, DE), 10 Deliverables, 10 Publications.
- **Horizon Result Booster [9]:** Commission services to support projects in their Dissemination and Exploitation activities.

2.5.1 Horizon Result Booster

As programmed in D6.2, the consortium entered the Horizon Result Booster Business Plan Development service in the second part of the project in order to bring project's results closer to the market through an effective business plan. There were several documents and early meetings in order to prepare the Business Plan.

Table 2-11: 5GZORRO Planned Timeline with Horizon Result Buster

Date	Action	Institution/Partners
07.07.2022	Introductory call	EC experts and Beneficiaries (ATOS, UW)
14.07.2022	Pre-assessment template & BOSAT form	Beneficiaries (i2CAT, ATOS, NXW, UW)
08.08.2022	BDP first set of guidelines	EC experts
16.08.2022	Webinar lean canvas	EC experts and Beneficiaries
06.09.2022	First draft of canvas (presented at workshop)	UW and ATOS
05-07.10.2022	Workshops	EC experts and Beneficiaries (Consortium)
13.10.2022	Consultation 42esión I	EC experts and Beneficiaries (UW, ATOS)
21.10.2022	Consultation 42esión II	EC experts and Beneficiaries (UW, ATOS)
31.10.2022	Development final report incl. tools	EC experts

A template was submitted to collect info about key Exploitation Strategy for our purpose in the whole platform. HRB submitted written feedback:



Figure 2-11: Business Plan Development First Set of guidelines-HRB-20220808

The project's representatives had a meeting with HRB representatives where they explained the lean canvas activity and asked to fill in the template.

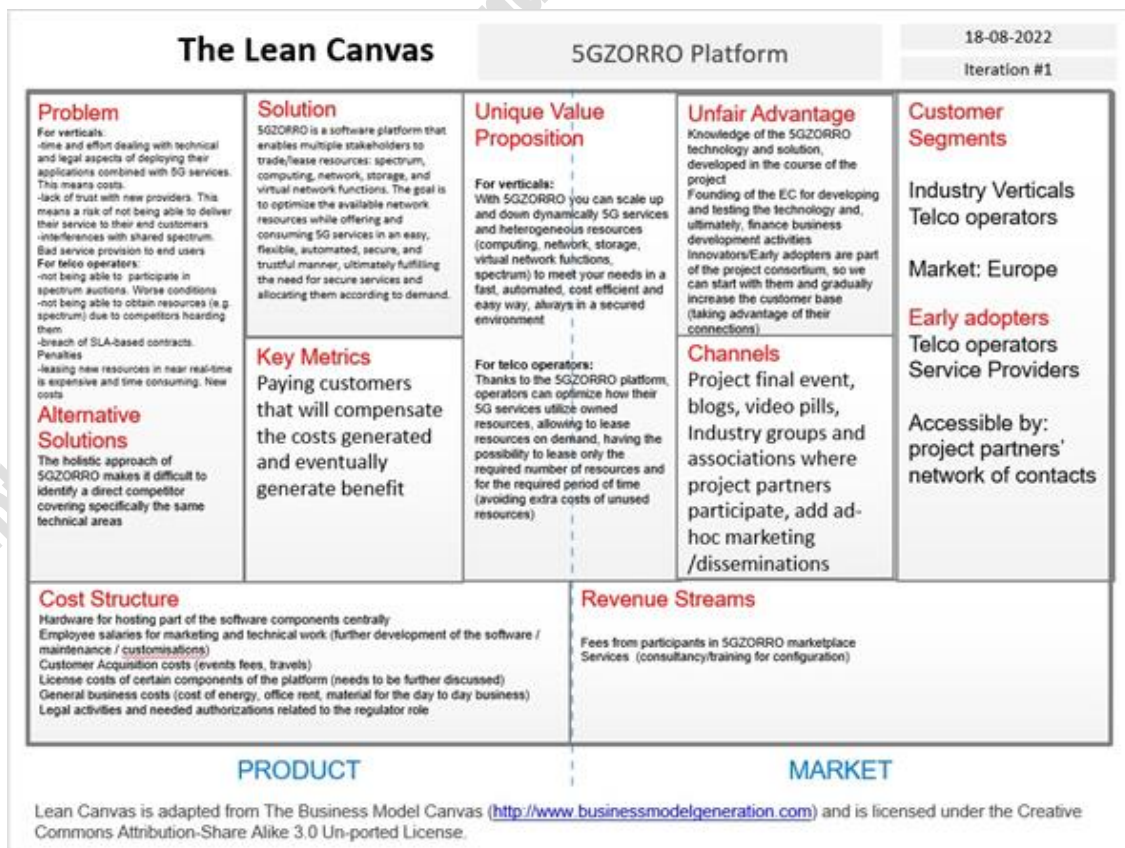


Figure 2-12: 5GZORRO Lean Canvas 1st iteration

The next step was to discuss this lean canvas in the workshop with all partners, also addressing the Exploitation roadmap. Thus, on October 05-07 2022 the consortium engaged on this workshop with the Horizon Booster Results program with BDO Consulting experts: Hannes Oberschmid and Stefan Haberlandt that required the presence of most partners, especially those involved in the task T5.4.

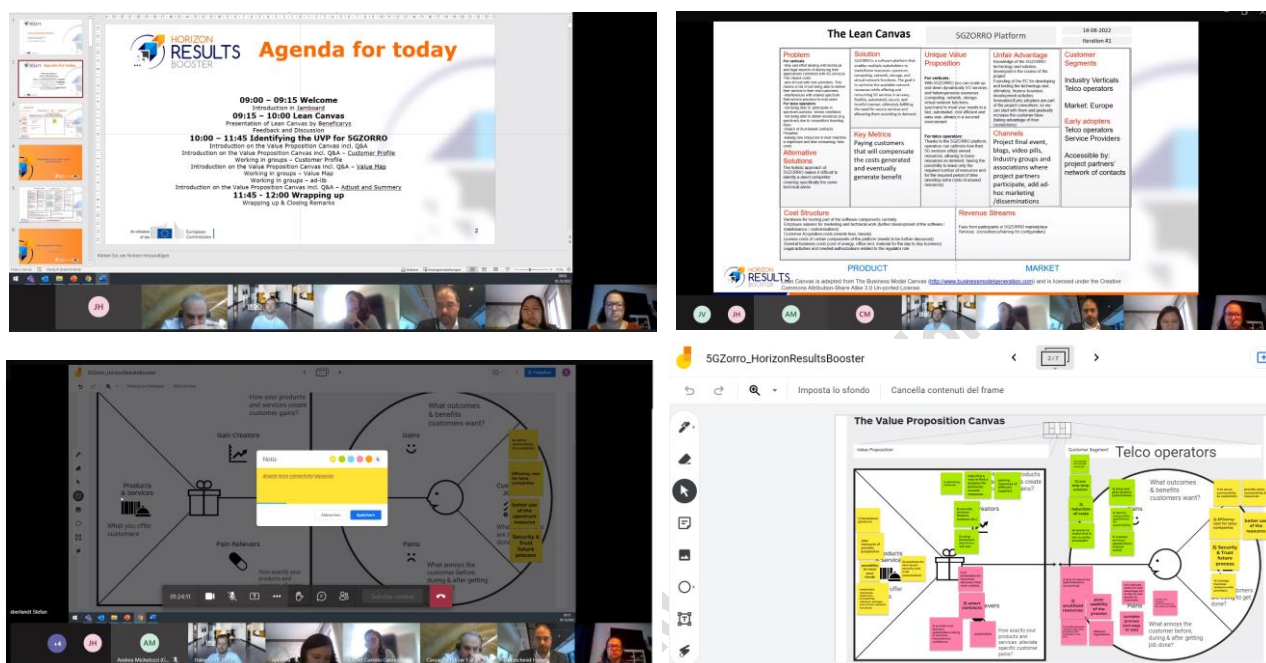


Figure 2-13: 5GZORRO HRB Workshop 5-7 Oct.

22

After the workshop HRB consultant experts have had two more sessions with partners (UW and ATOS) and by the end of Oct. 2022 the HBR gave further feedback in a final report.

2.6 5GZORRO Survey

A 5GZORRO Survey [10] was launched in Dec. 23rd 2021 by partners, under WP5 T5.4, to explore the attractiveness and challenges of marketplace platforms, as part of its research into the potential changes to the value chain and business models that could be provided by 5G-related resources, including spectrum, in a dynamic, zero-touch, secure, and trusted way, and to better understand and characterised the needs and benefits which a digital marketplace such the one enabled by 5GZORRO can have across diverse stakeholders, especially on: Mobile Operators, Industry Verticals, National Regulatory Authorities.

The Survey was constantly disseminated throughout several communication tools, materials, and events: project's website, Twitter, and LinkedIn accounts. It was included also on **3 Newsletters** (NL#7 Winter 2022,

Some survey outcomes were shared during 5GZORRO pills, at MWC22 Tech Talk, during the EuCNC and 6G summit 2022 poster presentations, at the 52nd BERC ordinary meetings and High level workshop, and the EMERG workshop.



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3 Communication Activities

This section reports on the results achieved with communication activities across the various channels which were setup at the beginning of the project until its final completion (Nov 2019- Oct 2022).

3.1 Website

Since the beginning of the project, the website www.5gzorro.eu has been the main channel for project communications. For the whole duration of the project, it has been continuously uploaded and updated with the latest and relevant news, newsletters, press releases, videos, and the main Consortium's results: project deliverables, papers, demos, blog posts, presentations, etc. The communication was complemented and completed throughout the social networks.



Figure 3-1: 5GZORRO website (Homepage, Video Gallery, Blog Post, News, and Papers sections)

To measure the attractiveness and impact of the website in terms of number of visitors and engagement metrics it was used Google Analytics, while most recently it was switched to Google Analytics 4 and Google Search Console.

Since January 2020 the number of new users topped up the number of 700. This was an early valuable indicator of project popularity, visibility, and promotion of its activities. Also, the page visualization was interestingly high (2.73) with an average of 3:10 minutes of session duration.

The bounce rate appears still a bit high 58.31%. Efforts to reduce this rate have been activated to understand if visitors accessing the website were not interested in the content offered, despite the value the web brings to the community.

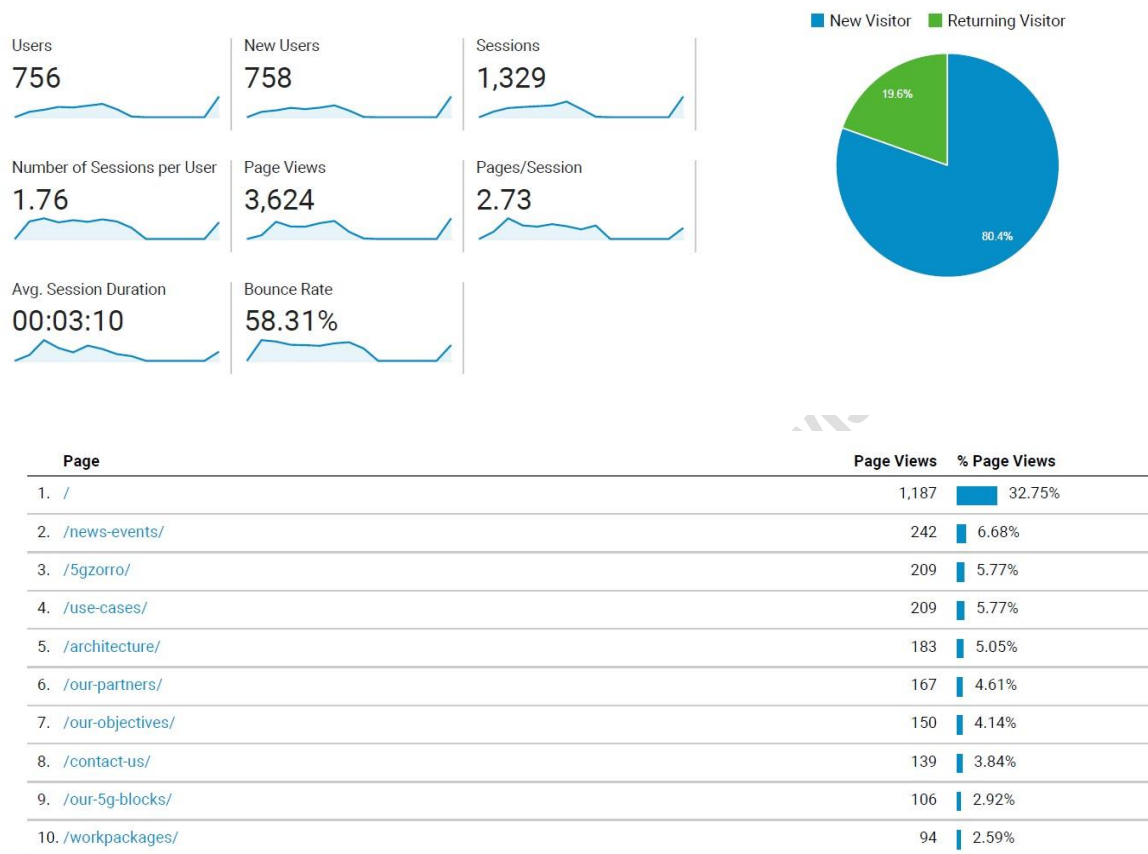


Figure 3-2: 5GZORRO Website Analytics January 2020 – March 2021

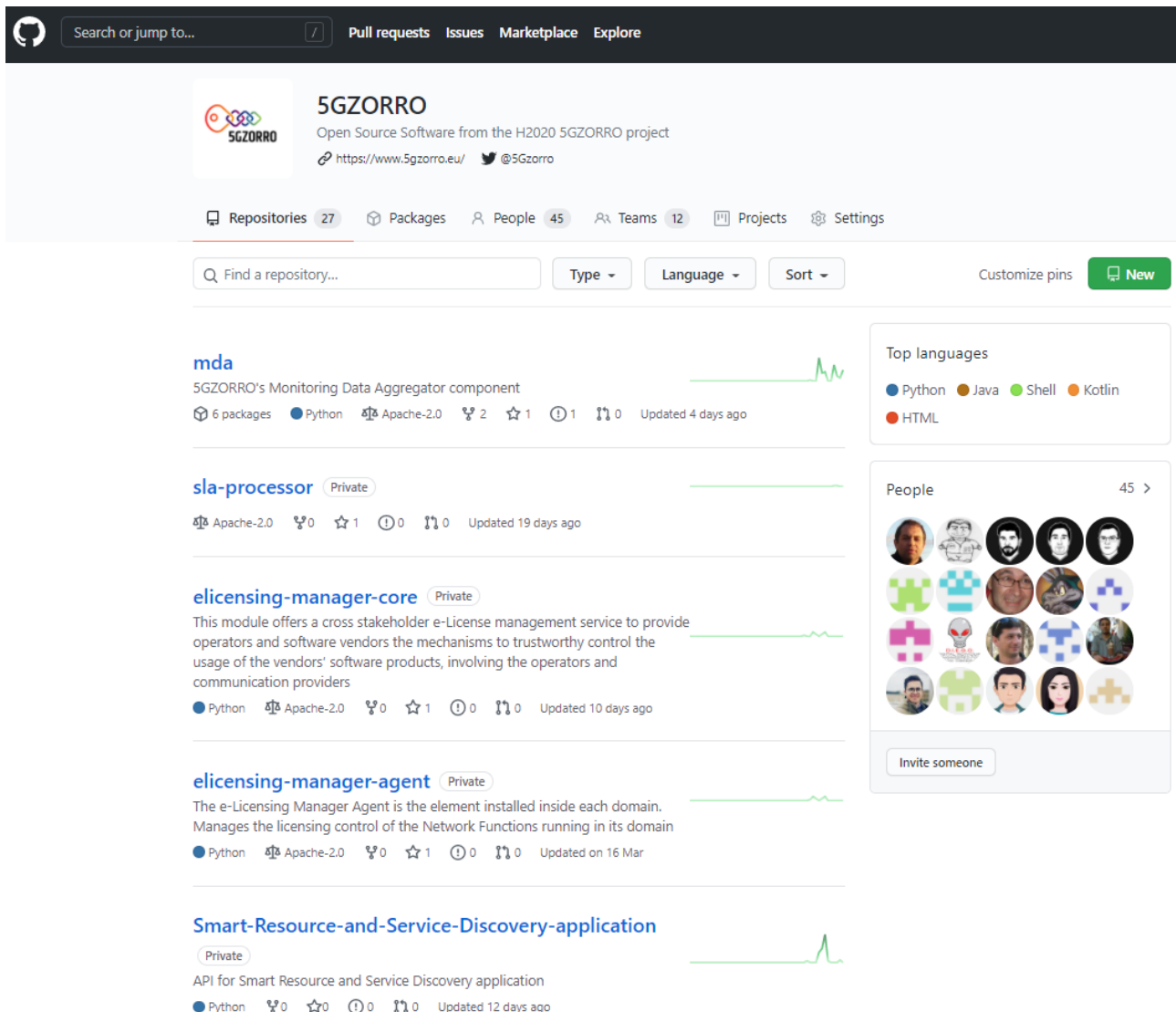
In comparative analytics between March 2021 vs March 2020 (see Figure 3-3) shows that the Bounce rate decreased substantially to a -18.09%, with a 21.19 % increase on page views, an increase of 77.78% unique page views; reaching an average result of 90.81%. These improved results were achieved with the publication of papers, blog posts, deliverables, and newsletters that attracted a more focused attention on the project.



Figure 3-3: 5GZORRO Website Comparative Analytics March 2020 vs. March 2021

On that same period on the website, a new section SOFTWARE was opened to better link the project website with the public software repository on [Github](#) [12]. This new page allowed visitors to obtain comprehensive

information on 5GZORRO software prototypes and direct references to the open-source code for download and contribution. .



The screenshot displays the GitHub profile for the 5GZORRO organization. At the top, the organization's name and logo are shown, along with a description: "Open Source Software from the H2020 5GZORRO project". Below this, navigation tabs for Repositories (27), Packages, People (45), Teams (12), Projects, and Settings are visible. A search bar and filters for Type, Language, and Sort are present. The main content area lists several repositories:

- mda**: 5GZORRO's Monitoring Data Aggregator component. It has 6 packages, is written in Python, uses the Apache-2.0 license, has 2 forks, 1 star, 1 issue, and 0 pull requests. It was updated 4 days ago.
- sla-processor**: A private repository with Apache-2.0 license, 0 forks, 1 star, 0 issues, and 0 pull requests. Updated 19 days ago.
- elicensing-manager-core**: A private repository described as a cross stakeholder e-License management service. It has Python packages, Apache-2.0 license, 0 forks, 1 star, 0 issues, and 0 pull requests. Updated 10 days ago.
- elicensing-manager-agent**: A private repository described as the e-Licensing Manager Agent. It has Python packages, Apache-2.0 license, 0 forks, 1 star, 0 issues, and 0 pull requests. Updated on 16 Mar.
- Smart-Resource-and-Service-Discovery-application**: A private repository described as an API for Smart Resource and Service Discovery application. It has Python packages, 0 forks, 0 stars, 0 issues, and 0 pull requests. Updated 12 days ago.

On the right sidebar, the "Top languages" section shows Python, Java, Shell, Kotlin, and HTML. The "People" section shows 45 contributors with their avatars.

Figure 3-4: 5GZORRO GitHub Repository

In a last comparison report from Oct. 2021 to Oct. 2022, some interesting data can be extrapolated from Google Analytics Universal, Google Search Console, and Google Analytics 4, as shown below.

Panoramica del pubblico

SALVA ESORTA CONDIVIDI APPROFONDIMENTI

Tutti gli utenti
100,00% Utenti

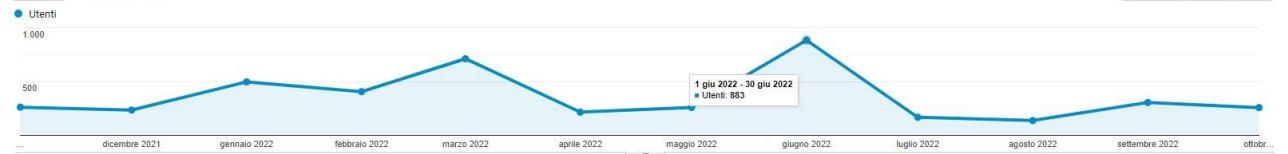
+ Aggiungi segmento

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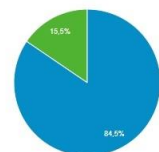
Panoramica

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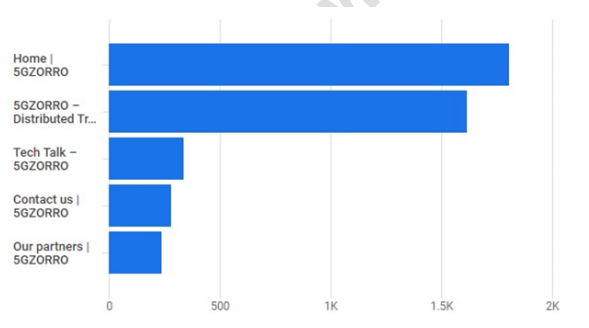
Ora Giorno Settimana Mese



New Visitor Returning Visitor



Paese	Utenti	% Utenti
1. United States	603	15,08%
2. Spain	395	9,88%
3. France	183	4,58%
4. Italy	180	4,50%
5. Germany	162	4,05%
6. United Kingdom	155	3,88%
7. Netherlands	149	3,73%
8. India	143	3,58%
9. Greece	124	3,10%
10. China	119	2,98%



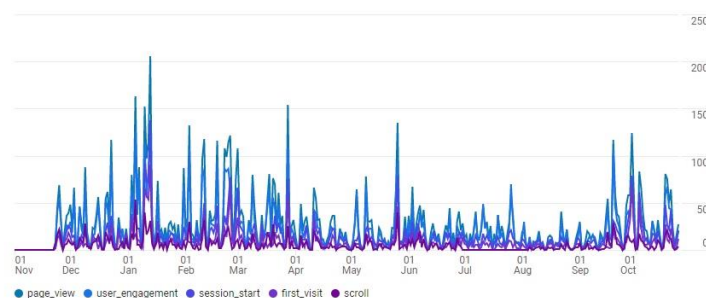
All Users Add comparison +

Custom Nov 1, 2021 - Oct 24, 2022

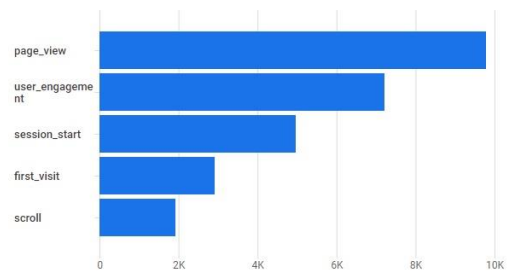
Events: Event name

Add filter +

Event count by Event name over time



Event count by Event name



Events: Event name ✓ + Custom Nov 1, 2021 - Oct 24, 2022

Q Search...

	Event name	↓ Event count	Total users	Event count per user
		28,453 100% of total	2,952 100% of total	9.64 Avg 0%
1	page_view	9,793	2,924	3.35
2	user_engagement	7,207	1,810	4.02
3	session_start	4,966	2,919	1.70
4	first_visit	2,917	2,916	1.00
5	scroll	1,932	867	2.23
6	file_download	467	165	2.83
7	click	459	184	2.49
8	video_progress	380	91	4.18
9	video_start	281	144	1.95
10	video_complete	51	43	1.19

All Users Add comparison Custom Nov 1, 2021 - Oct 24, 2022

Demographics overview ⚠

Users by Country



COUNTRY	USERS
United States	545
Spain	352
Italy	164
France	150
United Kingdom	144
Netherlands	142
Germany	141

Google Search Console in "5gzorro.eu"

Rendimento nei risultati di ricerca

Tipo di ricerca: Web Data: 1 nov 2021-22 ott 2022 + Nuovo

☒ Clic totali
☒ Impressioni totali
☐ CTR media
☐ Posizione media



Q Search...

	Country	↓ Users	New users	Engaged sessions	Engagement rate
		2,952 100% of total	2,917 100% of total	2,560 100% of total	50.86% Avg 0%
1	United States	545	524	125	21.33%
2	Spain	352	339	673	60.3%
3	Italy	164	156	231	55.83%
4	France	150	147	123	60.29%
5	United Kingdom	144	137	116	60.1%
6	Netherlands	142	141	61	38.36%
7	Germany	141	137	121	55.8%
8	Finland	122	118	39	30%
9	Greece	116	114	168	58.33%
10	China	111	97	43	32.58%
11	India	90	89	87	63.97%
12	Portugal	88	87	115	64.25%
13	Malta	76	76	88	56.05%
14	Austria	70	68	33	35.11%
15	Sweden	58	56	34	43.04%
16	Canada	48	46	27	51.92%
17	Israel	36	34	47	56.63%
18	South Korea	36	35	26	53.06%
19	Norway	33	33	26	69%
20	Brazil	29	28	25	59.52%
21	Australia	27	27	19	55.88%
22	Ireland	25	25	25	37.31%
23	Japan	22	22	20	71.43%
24	Poland	21	21	18	69.23%
25	Switzerland	21	21	12	46.19%

Figure 3-5: 5GZORRO Website Google Analytics Nov. 2021- Oct. 2022

In the past year, an average of **28,453 events** were registered, **9,7K** were page view, **7.2K** the user engagement, with **2.9K** first visits, **4.9K** sessions started, and **138K** total impressions. It is interesting to notice that the website is followed by visitors coming from not only from Europe, but a relevant number of visitors from different countries around the world.

3.2 Social Media

The set of 5GZORRO social media channels have been particularly relevant in the spread and promotion of research and innovation actions. These tools have guaranteed and provided an effective communication and dissemination of project's results.

3.2.1 Twitter

Twitter (@5gzorro) is the most immediate and effective tool to communicate project's news, events, and achievements. It allows keeping the 5GZORRO partner, 5G community, EU institutions, media, and the large public of followers updated, informed, and involved in specific trending topics.

The 5GZORRO Twitter account started in Nov. 2019 with 95 followers, less than 30 days from account creation. On Oct. 2020, the impressions skyrocket to 93.6K in view of 5GZORRO Tech Talk (on 20 Oct. 2020); and by April 2021, it has reached a total of 701 followers and 1,738 profile visits.

At the time of writing, it counts with **1,107 followers**, following **381 accounts**. In total there were published **>1,269 tweets**, and reached **210.8K impressions** with an engagement rate of **2.2% (Jan – April 2022)**, **32.4K impressions** and **3.4% engagement rate (April-30 June 2022)**, and after the summer break **5.1K impressions** and **1.9% engagement rate (July-Oct. 2022)**, as shown in Figure 3-6 and Figure 3-7:

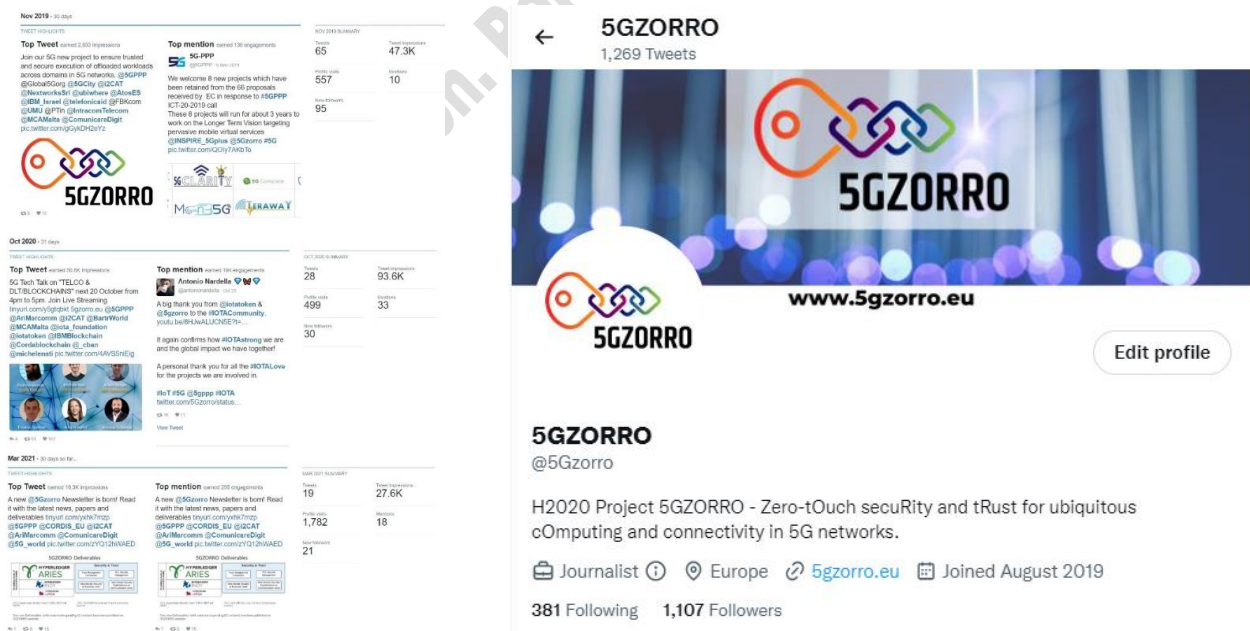


Figure 3-6: 5GZORRO Twitter account

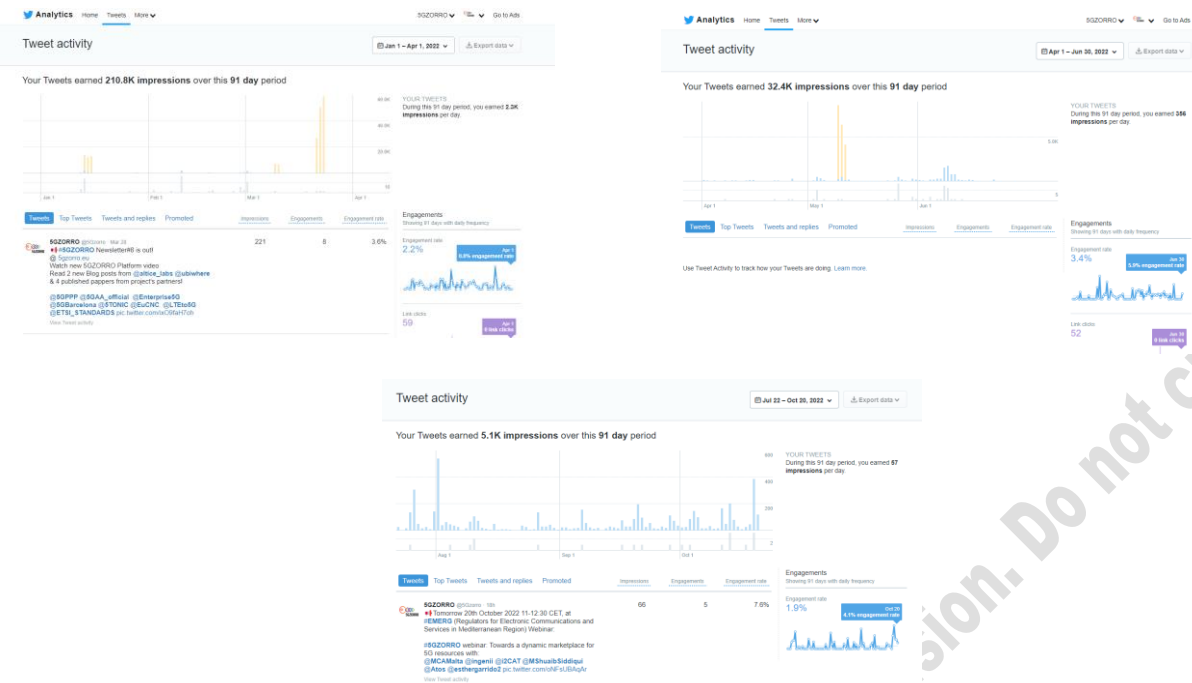


Figure 3-7: 5GZORRO Twitter account analytics Jan.-Oct. 2022

Among the most relevant European and international Top followers on twitter, there are important researchers, professors, experts, H2020 projects, institutions. It is worth listing those presented in Table 3-1 due to the potential impact generated by their attention on the project activities.

Table 3-1: Top followers of 5GZORRO's Twitter account

Follower	Description
Dominik Krimpmann @KrimpmannD (27.1K followers) Germany	Business & Technology Futurist at Accenture Helping Companies Reimagine via Disruptive Technology
Thales Security @thalessecurity (10.8K followers) Europe	World-class technology, 80,000 employees and operations in 68 countries make Thales a key player in keeping the public safe and secure, guarding vital infrastructure and protecting the national security interests of countries around the globe.
QLC Chain @QLCchain (32,3K followers) Singapore	QLC Chain is the next generation public chain for Network-as-a-Service (NaaS). It is the multi-dimensional block lattice structured ledger with embedded telecom service capabilities.
5G-PPP @5GPPP (8,913 followers) International	The 5G-Infrastructure-PPP will deliver architectures, technologies and standards for the ubiquitous 5G communication infrastructures.
Net Technologies @NetTechEU (6,263 followers) Europe	Network Technologies focusing on #5G & the #InternetOfThings/#IoT. Part of @DigitalEU- Flag of European Union.
AI-on-Demand Platform @AI4EU (4,474 followers) Europe	Uniting Europe's Artificial Intelligence community to the benefit all of European society.

GSMA @GSMA <i>(2,121 followers)</i> <i>International</i>	represents the interests of +750 mobile operators worldwide, with almost 400 companies in the broader mobile ecosystem, device makers, software companies, equipment providers and internet companies, and adjacent industry sectors. The GSMA produces the industry leading MWC events held in Barcelona, Los Angeles and Shanghai, and the Mobile 360 Series of regional conferences.
SEIDOR @seidor <i>(3,389 followers)</i> <i>International</i>	Multinational consulting firm in the technology sector, offers consulting, infrastructure services, implementation, development, maintenance applications, and outsourcing services. Turnover of €464 million in 2019. Workforce +4,800 highly qualified professionals. Service partner: SAP, IBM, Microsoft, Adobe.
Cyberwatching.eu @cyberwatchingeu <i>(1,632 followers)</i> <i>Europe</i>	The EU watch on #cybersecurity & #privacy. The EU's authoritative and independent source for democratising cybersecurity & privacy.
-DATA SYNDICATE- @SyndicateData <i>(1,581 followers)</i>	An Egregoric Alignment of highly networked Individuals. Connections to Space travel, Cryptocurrency OPs, Miners, NFT-creators, Blockchain Developers & Capital.
OSM – Open Source MANO @OpenSourceMANO <i>(1,511 followers)</i> <i>International</i>	OSM is an ETSI-hosted project developing an Open-Source MANO stack aligned with ETSI NFV.
Dr. Sally Eaves @sallyeaves <i>(117,5K followers)</i> <i>US/UK</i>	Innovating #tech #education #business CEO CTO Advisor Prof #AI #Cloud #IoT #IoT #TechForGood #FinTech #SDGs #STEM #education #CX #Sustainability
CONNECT Centre @connect_ie <i>(4,339 followers)</i> <i>Ireland</i>	Science Foundation Ireland Research Centre for Future Networks & Communications. Co-funded by European Regional Development Fund.
LACChain @LACChain <i>(1,251 followers)</i> <i>Latin America</i>	Global alliance for the development of the Blockchain ecosystem in Latin America and the Caribbean promoted by the @IDB_LAB (Laboratory of #innovation of @the_BID. Mobilizing capital, knowledge, and connections to promote innovation for #inclusion in LAC.
Rita Wezenbeek @rita_wezenbeek <i>(356 Followers)</i> <i>EU</i>	Director Connectivity DG CNECT European Commission
Dominik Krimpmann @KrimpmannD <i>(21.8K Followers)</i>	Business & Technology Futurist at Accenture Helping Companies Reimagine via Disruptive Technology
Antonio Grasso @antgrasso @antgrasso_IT <i>(244.1K Followers)</i> <i>EU</i>	Entrepreneur, technologist, sustainability passionate FRSA Digital creator, B2B influencer Author, researcher, speaker Member @spj_tweets
2022 EuCNC & 6G Summit @EuCNC <i>(2,041 Followers)</i> <i>EU</i>	2022 EuCNC & 6G Summit focuses on various aspects of 5G and 6G communications systems and networks under the theme Connectivity for a Sustainable World
EU Blockchain @EUBlockchain <i>(13.8K Followers)</i>	Twitter account of the EU Blockchain Observatory & Forum. Visit http://eublockchainforum.eu .

<i>EU</i>	Posts and retweets do not represent the views of the European Commission.
Christine HASSOUN @Chassoun1 (1,393 Followers) <i>EU</i>	Dissemination @UIC of @EU_H2020 Projects #Railways #UICrail System #Bicycle #transport #Mobility. @Shift2Rail_JU #LOCATE #CARBODIN #FUNDRES.
5G Americas @5GAmericas (7,385 Followers) <i>America</i>	5G Americas advocates for and fosters the advancement and full capabilities of LTE wireless technology and its evolution beyond to 5G.
OpenNebula @opennebula (5,932 followers) <i>Spain</i>	The #OpenSource Cloud & Edge Computing Platform
Council of Quamf @CQuamf (3,265 Followers)	DLT interoperability and the new secure Internet of Trust. Technology, Finance, Macro and Standards. Highlights from https://t.me/councilofquamf
5G Automotive Association (5GAA) #MWC22 @5GAA_official (3,465 Followers) <i>International</i>	We bridge the automotive and telecommunications industries to define the next generation of connected mobility solutions with #CV2X. Join the #5GMobility!
Cathy Mulligan, PhD @API_Economics (3,426 followers) <i>Portugal</i>	Prof at Técnico #IST, ERA Chair, @DCentral_IST, #WEF #DCPI
UK5G @UK_5G (3,416 Followers) <i>UK</i>	Helping the UK to be at the forefront of global #5G development #UK5G
MegaArtvision @MegaArtvision (2,624 followers) <i>Greece</i>	MegaArtvision is a branded you tube channel for over 12 years in education creating original content tutorials in various fields. Publications in Amazon stores.
Monica Espinosa @monica_eg (1039 followers) <i>Spain</i>	#Cybersecurity & #Innovation CoFounder @WeRock_Capital Mentor @CherieBlairFndn UN @Empower_Women Global Community Champion #soyEJECON #BCN
COLLABS-Project @project_collabs (501 followers) <i>EU</i>	A COMprehensive cyber-intelligence framework for resilient coLLABorative manufacturing Systems
nIoVe_project @NioveProject (458 followers) <i>EU</i>	H2020 #Innovation project to detect in real-time and prevent #cyberattacks in #connectedvehicles & #autonomousvehicles (Gr. Agr. No.833742) #Cybersecurity #IoV
5G Test Network Turku @5GTNT (259 Followers) <i>Finland</i>	The Twitter account of 5G Test Network Turku at @TurkuAMK in Turku, Finland. We are part of 5G Test Network Finland @5GTNF and an @EU_H2020 @5GPPP testbed.
Julie Snell @julesnell (546 Followers)	Chair Scotland 5G Centre. Non-Exec Dir H&W Health & Care NHS Trust. Non-Exec Dir WLEP. Passion for change that can benefit all

UK	
Osservatori Digital @Osserv_Digital (16K Followers) Italy	Osservatori Digital Innovation of @polimi: Digital Innovation, #ICT and strategic information for business
Pascal SBH @PascalSBH (663 Followers) Island	Innovation Manager - FttX, Energy, Smartgrid - Regional Cooperation - St Barth Smart Island
A10 Networks @A10Networks (16.1K Followers) International	A10 Networks provides secure, scalable application services for on-premises, cloud and edge-cloud environments.
Prakash Sangam @MyTechMusings (35.3K Followers) USA	Tech Industry Analyst, Forbes, RCRWireless, EETimes contributor, 3GPP/ETSI member, Cellular IPR expert, Cover 5G/AI/IoT/Wi-Fi/Cloud. Ex. @Qualcomm @Ericsson @ATT
NGI4eu @NGI4eu (4,979 Followers) EU	The Next Generation Internet initiative by the @DigitalEU of the @EU_Commission! #NGI4eu #NextGenerationInternet
(EDMA) European Dissemination Media Agency @EUDissemination (1,497 Followers) EU	EDMA specialize in the promotion of EU- and nationally-funded research projects. Publishers of the Project Repository Journal: https://bit.ly/ThePRJ

3.2.2 LinkedIn

As described in D6.1 and D6.2, a more effective communication strategy through LinkedIn was achieved by creating a [5GZORRO](#) “company” profile [13] to implement a more accessible and more direct link of followers to project activities than what could have been possible with a LinkedIn group.

The company account has shared relevant news and updates during the period, but also insights, unusual and curious news from partners, EU institutions, specialized media, and the 5G ecosystem to keep a high level of attention and engagement with partners, followers, other groups connected to 5G, as well as companies, opinion leaders, press, and stakeholders; always to broaden the project’s audience and highlight the capacities expressed by the Consortium.

The 5GZORRO LinkedIn account grew from 43 in Jan 2020 to **155 members by April 2021**. In its first year visitor’s demographic showed that Research was by far the most significant community that follows the account, most coming from project partners; but also many from other renowned institutions and companies, such as: the University of Luxembourg, North-western Polytechnical University, Ghent University, Swansea University, Qualcomm California, IOTA Argentina Community Cluster, Safran Elastomer, Cellnex, SMPTE, BBC, EBU, DigiTech Global Consulting, FastWeb, Dolby Labs, Italtel, Iskratel, Proximus, A-Tono, Kineton, etc.

In this past year (Nov. 2021-Oct. 2022), the situation has substantially changed, the account has gain attention and account has increased at **307 members**, gaining in this last year, **257 unique visitors**, with **777 page views** and **814 reactions** mainly from the Engineering, Information Technology, Business Development, and Research areas, as shown in Figure 3-8:

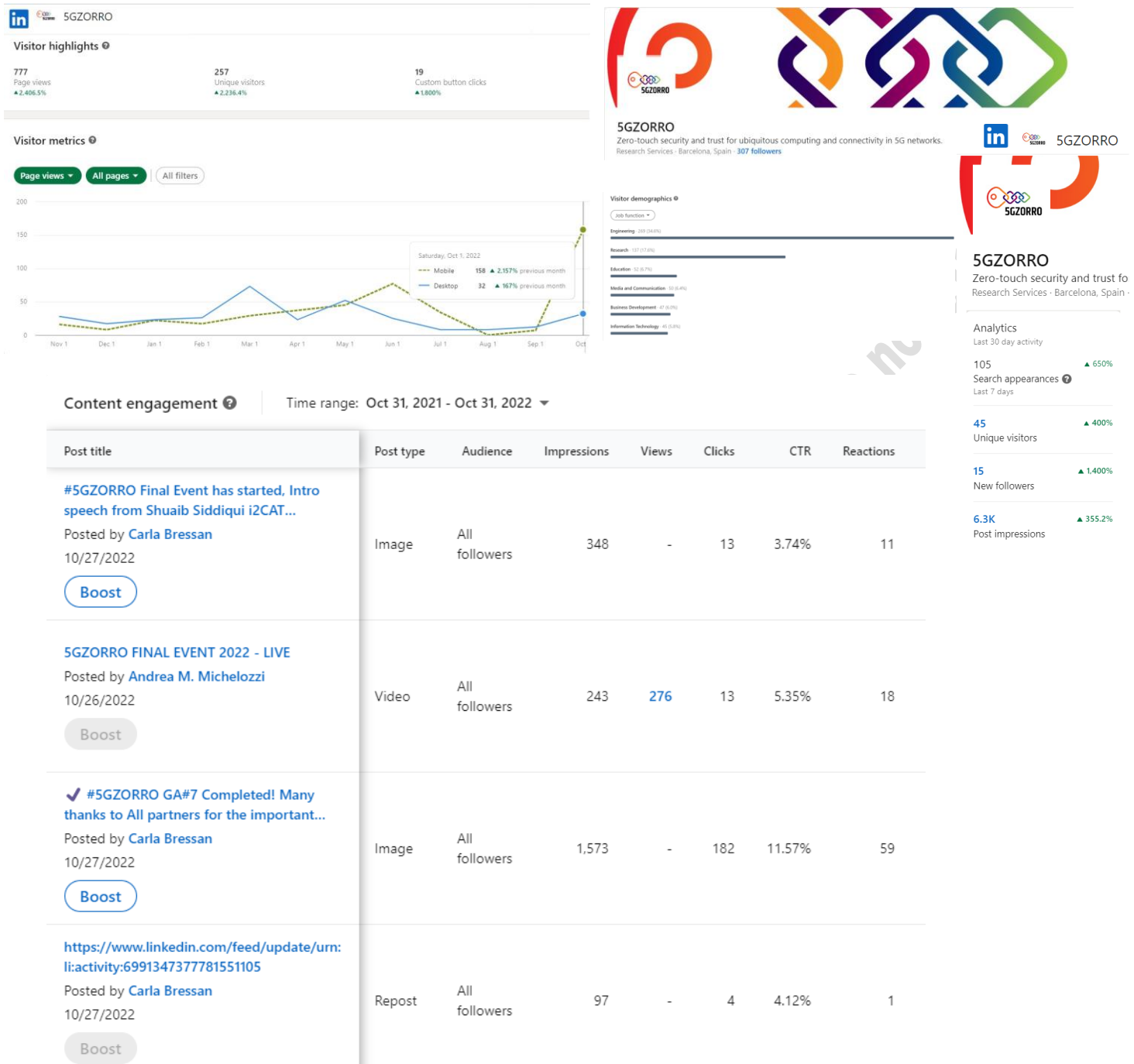
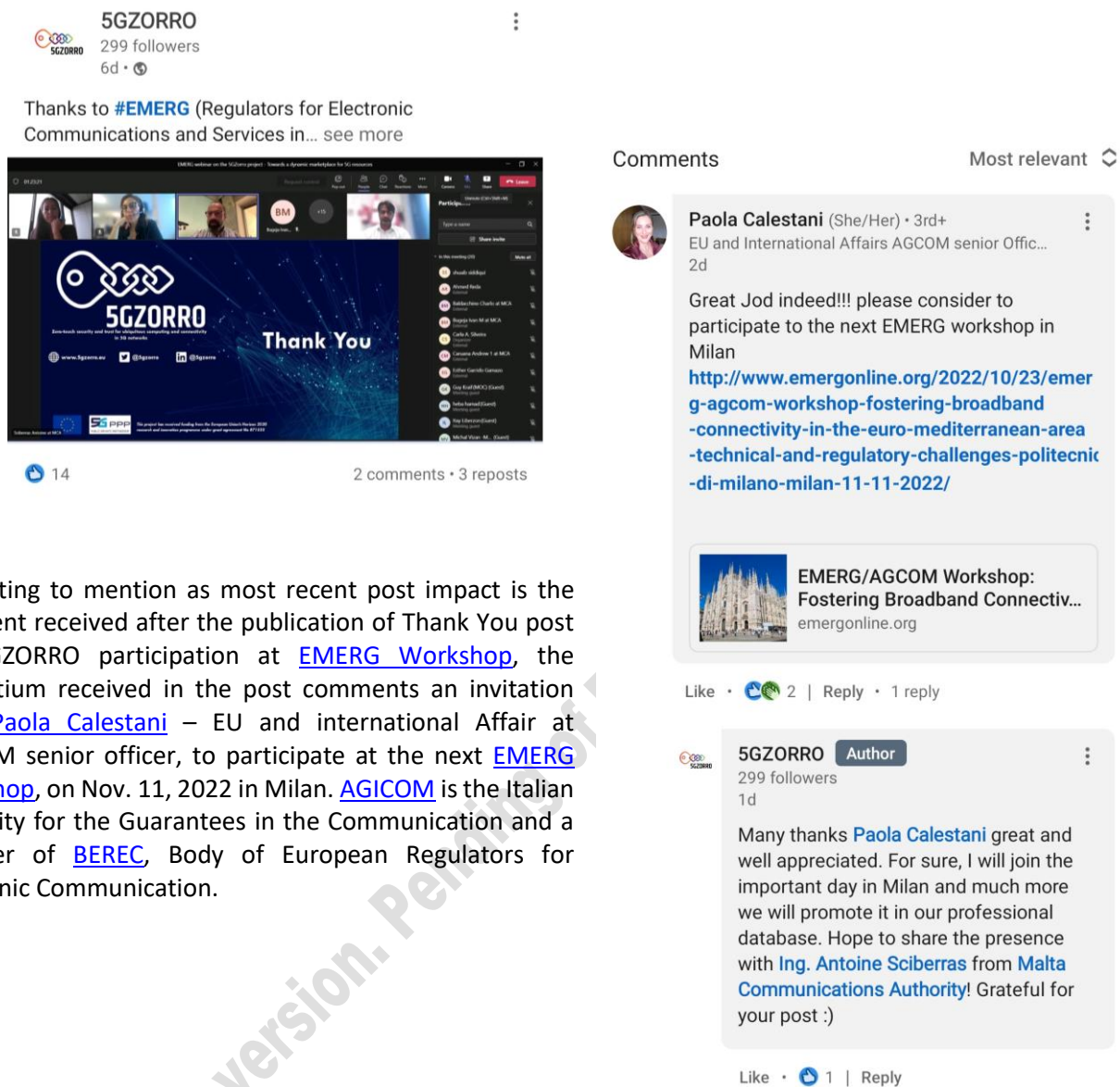


Figure 3-8: 5GZORRO LinkedIn analytics Nov. 2021- Oct. 2022

LinkedIn posts publication have been constant, although impressions move in a pyramidal shape depending on the seasonality, some posts reached good results up to **4.6K (TT#3 from MWC22 -1st March 2022)** and **4.2K (TT#4 - 1st May 2022)** and lower points of 738 impressions (1st Dec. 2021) and 705 (1st Aug. 2022).



Interesting to mention as most recent post impact is the comment received after the publication of Thank You post for 5GZORRO participation at [EMERG Workshop](#), the consortium received in the post comments an invitation from [Paola Calestani](#) – EU and international Affairs at AGICOM senior officer, to participate at the next [EMERG Workshop](#), on Nov. 11, 2022 in Milan. [AGICOM](#) is the Italian Authority for the Guarantees in the Communication and a member of [BEREC](#), Body of European Regulators for Electronic Communication.

Figure 3-9: 5GZORRO LinkedIn post impact

3.2.3 YouTube

The [5GZORRO YouTube channel](#) [14] has **185 members** and it was created to host relevant 5GZORRO presentations, videos, Tech Talks, Pills, and interviews.

At the moment, **43 videos were published in the channel** with a total of **49.666 visualizations** (Oct. 22) as described in Table 3-2 below:

Table 3-2: List 5GZORRO YouTube Videos

#	VIDEO	TIME	VISUALIZATION
1.	5GZORRO Final Event Shuaib Siddiqui Speech	09'14"	6
2.	5GZORRO Final Event Giacomo Bernini Speech	12'16"	4

3.	5GZORRO Final Event Demo 1	19'28"	5
4.	5GZORRO Final Event Demo 2	23'09"	7
5.	5GZORRO Final Event Demo 3	23'42"	0
6.	5GZORRO Final Event and Tech Talk#5 full version	2h52'58"	2664
7.	5GZORRO at OSM #13 Ecosystem Day	23'50"	2886
8.	EuCnC 2022 5GZORRO Demo for ETSI ZSM PoC#5	11'14"	1883
9.	EuCnC 5GZORRO DEMO 3: vCDN Use Case	06'08"	1116
10.	EuCnC 5GZORRO DEMO 2: Licensed Spectrum Sharing Use Case	06'03"	1027
11.	EuCnC 5GZORRO DEMO #:1 Automated Market	05'26"	1162
12.	5GZORRO e-licensing management- (ATOS)	05'56"	1193
13.	EuCnC 2022 5GZORRO Coordinator -(i2Cat)	01'13"	231
14.	EuCnC 2022 5GZORRO Technical Manager- (NXW)	0'39"	349
15.	5GZORRO Pills - Technical overview- (NXW)	02'10"	76
16.	5GZORRO Pills – Trusted & Secure SLA Monitoring -(UW)	02'22"	203
17.	5GZORRO Pills - 3 Pillars in 5GZORRO – (i2CAT)	05'08"	98
18.	5GZORRO Tech Talk#4	47'22"	5800
19.	EuCnC22 5GZORRO invitation (i2CAT)	01'49"	279
20.	5GZORRO Pills - Concept of Trust in a 5GZORRO (ALTICE)	02'29"	414
21.	5GZORRO Pills - Cross domain slicing mechanism in 5GZORRO (FBK)	02'14"	524
22.	5GZORRO Platform Marketplace corporate video	03'20"	1278
23.	5GZORRO Tech Talk #3 MWC22	37'26"	956
24.	5GZORRO Pills - Solutions for zero-touch service, network, and security (UMU)	02'07"	3085
25.	5GZORRO Pills – Business Validation (ATOS)	02'06"	5125
26.	5GZORRO Pills – Dynamic Spectrum Sharing (MCA)	02'14"	3943
27.	5GZORRO TECH TALK#2: AI and ML for 5G & Beyond	59'58"	7895
28.	5G Marketplace Best Wishes 2022	0'32"	52
29.	5GZORRO wishes wonderful holidays 2021	0'59"	62
30.	5GZORRO: Toward True Cloud Native NFV MANO	16'50"	90
31.	EuCnC 2021 Blockchain-based Zero Touch Service in Cross-domain Network Slicing	14'33"	108
32.	1st EC Review 2021 Demo #4: 5GZORRO Trust Management	02'52"	69
33.	1st EC Review 2021 Demo #3: Multi-operator Network Slicing with SLA prediction	15'56"	161
34.	1st EC Review 2021 Demo #2: 5GZORRO Marketplace	04'14"	79
35.	1st EC Review 2021 Demo #1: Stakeholder Registration with Legal Prose Creation	05'31"	59

36.	EuCnC 2021 Multi-Party Collaboration in 5G Networks DLT-Enabled Marketplaces	14'57"	92
37.	EuCnC 2021 Zero-touch AI Ops in multi-operator 5G networks	13'16"	123
38.	5GZORRO Greetings - Happy 2021	0'33"	49
39.	5GZORRO introduction video	02'17"	3703
40.	5GZORRO Tech Talk#1 Telco & DLT/Blockchain	1h06'38"	1370
41.	Interview to Louisa Gregory, CBAN	5'55"	38
42.	AI driven Zero touch Operations, Security and Trust in Multi operator 5G Networks at EuCNC 2020	22'17"	246
43.	5GZORRO webinar on Blockchain Fundamentals	1h40'10"	1156
	TOTALS	>12h	49.666

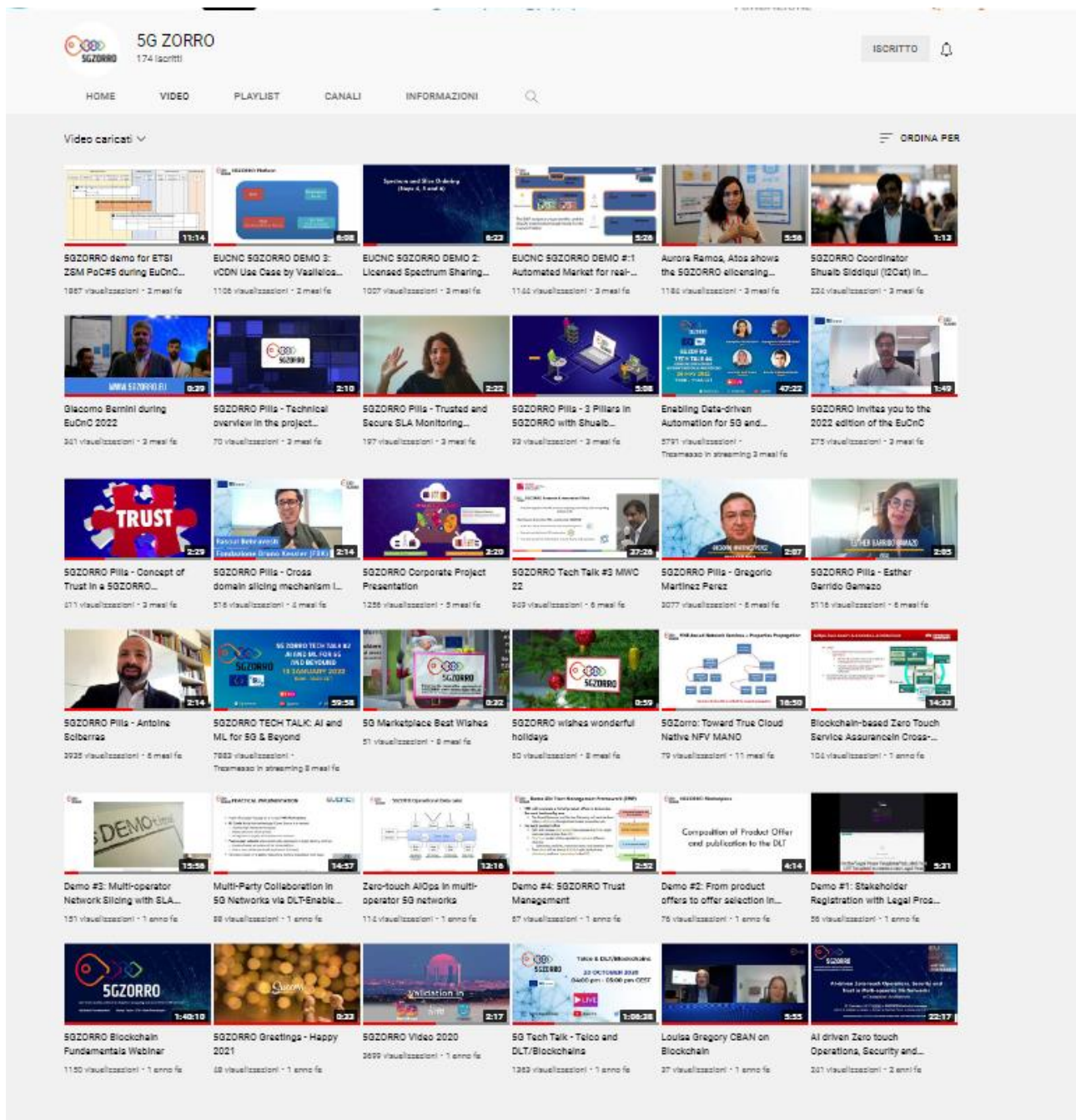


Figure 3-10: Video catalogue on 5GZORRO YouTube channel

3.3 Blog Posts

To help in making 5GZORRO a reference approach for zero-touch automation, spectrum sharing, AI, and DLTs for 5G, the Consortium started publishing blog posts on some of project research specific topics.

Since Dec 2020, **12 Blog Posts have been published** in the website dedicated section, mostly linked to the major design results achieved in the period.

Table 3-3: 5GZORRO Blog post from the start of the project

Date	Topic	Partners
15 Dec. 2020	Design principles for AI-driven Zero-Touch Operations, Security & Trust in multi-operator 5G Networks	NXW
25 Feb. 2021	5GZORRO Use Case 1: Smart Contracts for Ubiquitous Computing/Connectivity	ATOS
01 Apr. 2021	5GZORRO Use Case 2: Dynamic Spectrum Allocation	ATOS
18 May 2021	5GZORRO Use Case 3: Pervasive Virtual Content Distribution Network (vCDN) Services	ATOS
24 Ago. 2021	5GZORRO WP4: Zero Touch Automation with Trust, Security and AI	UMU
23 Dec. 2021	Towards a dynamic spectrum marketplace - the 5GZORRO approach	MCA
31 Gen. 2022	5GZORRO Platform: The future of multi-party 5G networks in automated, secure, and trustful way	NXW
28 Feb. 2022	5GZORRO: Enabling Governed Distributed Security & Trust in 5GZORRO	ALB
20 Mar. 2022	Distributed Ledger Technologies (DLTs) in the Telecom space	UW
24 Apr. 2022	POC#5 ON-DEMAND NON-PUBLIC NETWORKS (NPNS) FOR INDUSTRY 4.0	i2CAT
20 June 2022	5GZORRO CLOUD-NATIVE OPEN SOURCE MEC PLATFORM	IBM
19 Sept. 2022	vCDN IN PERVASIVE NETWORKS	ICOM

3.4 Promotional Material

3.4.1 Promotional Videos

To follow a more dynamic communication approach, partners created 2 corporate videos:

- [5GZORRO introductory video presentation](#): describing the overall concept, core research areas, and use cases
- [5GZORRO platform animated video](#): describing the structure and services offered by the Platform

These videos were created to be shown in public events and at showcases, originally planned for MWC2020 and EuCNC2020, MWC2022 and EuCNC2022.

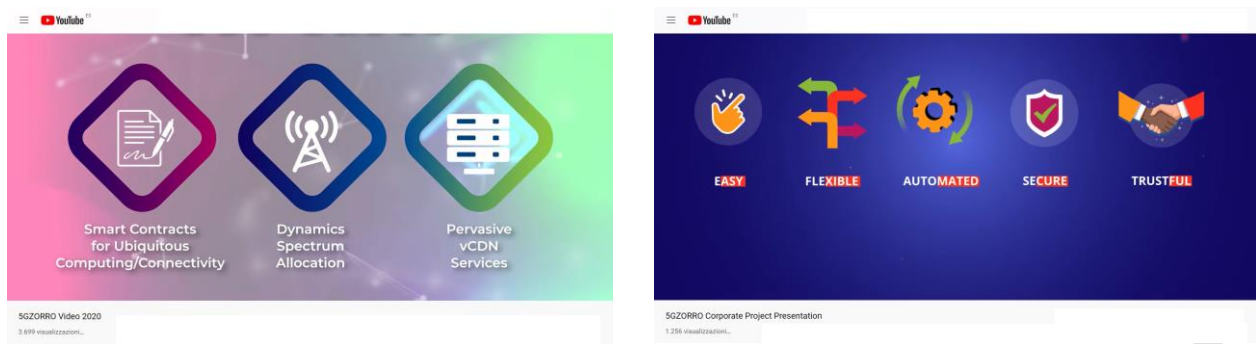


Figure 3-11: 5GZORRO Corporate introductory video and animated platform video

3.4.2 Promotional Flyers

Two versions of the project flyer were prepared for publication and distribution: EuCNC2022:

- **Flyer 1st version:** it describes the 5GZORRO vision, use-cases, and expected outcomes. The flyer was produced to be disseminated during MWC2020 and EuCNC2020; but due to absence of physical events, the Flyer 1st version was extensively published on Newsletters 2020 and through the website and social media.
- **Flyer 2nd version:** it describes the challenges, solution, core technology and use-cases. Printed and disseminated during EuCNC2022 and published on Newsflashes, website, and social media.

3.4.3 Technical Posters and Handouts

During the EuCNC 2022 five posters were designed by partners:

- [Automated and Secured transactive Spectrum sharing – i2CAT](#)
- [Trust management – UMU](#)
- [Security Management - UMU](#)
- [e-Licensing Management - ATOS](#)
- [Business Validation - ATOS](#)



Figure 3-12: 5GZORRO Corporate Flyer 2nd version, handouts, and posters at EuCNC2022

During EuCNC2022 there were produced also 4 Handouts that were showed at the project Booth n.36. Thanks to all this material: flyer, posters, handouts, video, demos, interviews, pills, and the excellent work done by the 5GZORRO team attending the event in Grenoble, a great result in terms of dissemination and promotion was obtained. So it was, that made it possible to obtain the **Best Booth Award** for 5GZORRO.



Figure 3-13: 5GZORRO Best Booth Award EuCNC2022

3.5 Press Releases and News

Press releases are commonly used to generate public awareness and reach the general public, industry, Telcos, ICT stakeholders, opinion leaders, institutions related to 5GZORRO research.

Press releases were periodically published on the website and socials, issued especially for those events where 5GZORRO activities and relevant participation were expected. Also, news from partners' involvement in other relevant events were published on the 5GZORRO web and socials, as shown in Figure 3-13.

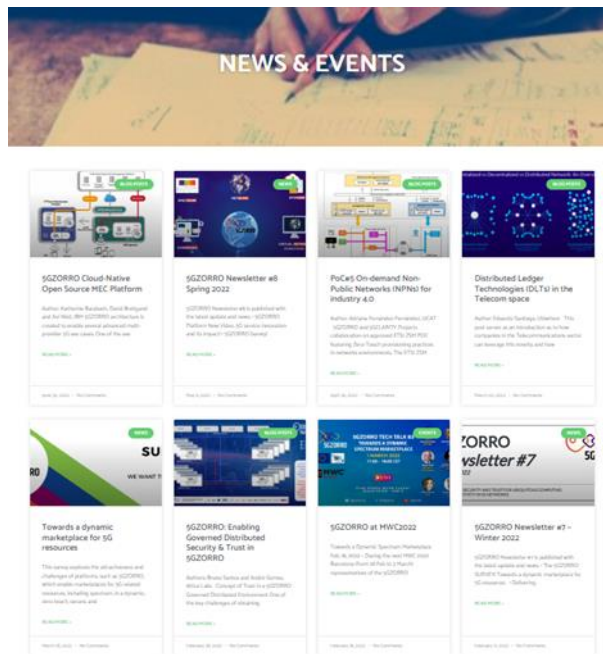


Figure 3-14: 5GZORRO News & Events

13 Press Releases were issued during the project as a great instrument to promote activities, event participation, and results as reported in Table 3-4 below.

Table 3-4: Published Press Releases in the period M01-M36

Date	Type	Publication Date/Link	Dissemination channels
Nov. 2019	5GZORRO Kick-off meeting.	25 Nov 2019 www.5gzorro.eu/kick-off-barcelona	5GZORRO Web/Socials Partners' Web/Socials 5G PPP Web/Socials
Feb. 2020	5GZORRO Press Release pre-MWC20 event	10 Feb 2020 www.5gzorro.eu/5gzorro-at-the-mwc-2020	5GZORRO Web/Socials Partners' Web/Socials 5G PPP Web/Socials
Jun. 2020	5GZORRO Press-release post-EUCNC2020 event – results	20 June 2020 www.5gzorro.eu/5gzorro-at-eucnc-2020	5GZORRO Web/Socials Partners' Web/Socials 5G PPP Web/Socials
Oct. 2020	5GZORRO Tech Talk Press-release	15-19 Oct 2020 www.5gzorro.eu/5gzorro-tech-talktelco-dlt-blockchains	5GZORRO Web/Socials Partners' Web/Socials 5G PPP Web/Socials

Mar. 2021	5GZORRO 3rd Plenary Meeting	27 April 2021 www.5gzorro.eu/5gzorro-partners-came-together-for-their-3rd-plenary-meeting-and-a-2-days-software-hackathon	5GZORRO Web/Socials Partners' Web/Socials 5G PPP Web/Socials
Jun. 2021	5GZORRO Press-release pre- EUCNC2021 event	3 June 2021 www.5gzorro.eu/wp-content/uploads/2021/06/EUCNC2021-5GZORRO-Press-Release-Final2.pdf	5GZORRO Web/Socials Partners' Web/Socials 5G PPP Web/Socials
Jun. 2021	16th European Spectrum Management Conference	22 June 2021 www.5gzorro.eu/wp-content/uploads/2021/06/Spectrum-Conference-2021-5GZORRO-Press-Release.pdf	5GZORRO Web/Socials Partners' Web/Socials 5G PPP Web/Socials
Jun. 2021	MWC2021	27 June 2021 https://www.5gzorro.eu/wp-content/uploads/2021/06/5GZORRO-MWC-2021.pdf	5GZORRO Web/Socials Partners' Web/Socials 5G PPP Web/Socials
Nov. 2021	OSM12 Ecosystem Day	25 Nov. 2021 www.5gzorro.eu/wp-content/uploads/2021/11/OSM12-Ecosystem-Day-2021-5GZORRO-Press-Release_v2.pdf	5GZORRO Web/Socials Partners' Web/Socials 5G PPP Web/Socials OSM ETSI Web
Feb. 2022	MWC2022	18 Feb. 2022 www.5gzorro.eu/5gzorro-at-mwc2022	5GZORRO Web/Socials Partners' Web/Socials 5G PPP Web/Socials
Jun. 2022	EUCNC2022 (STD)	6 June 2022 https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=wuutxze&x=pv&je=qzfi-=uxz-c79.=tGZORRO6ALL&x=pp&v19r59j6&x=pv&8g4&x=pv&0d=tr1NCLM https://5g-ppp.eu/newsflash-june-2022-2/	5GZORRO Web/Socials Partners' Web/Socials 5G PPP Web/Socials
Sept. 2022	5GZORRO Final Event	19 Sept. 2022 https://www.5gzorro.eu/wp-content/uploads/2022/09/5GZORRO-Final-Event-Press-Release-v01.pdf 30 Sept. 2022 5GPPP Newsflash Sept.22: https://5g-ppp.eu/newsflash-september-2022/#event7	5GZORRO Web/Socials Partners' Web/Socials 5G PPP Web/Socials
Oct. 2022	5GZORRO Tech Talk#5	17 Oct. 2022 https://www.5gzorro.eu/wp-content/uploads/2022/10/5GZORRO-Tech-Talk5-Press-Release-v01.pdf	5GZORRO Web/Socials Partners' Web/Socials

		NF#5: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=wuutxe&x=pv&je=qzfi-zny40d1:&x=pv&zGZORRO3ALL&x=pp&ww:q&6k/b7m1.4g=s1/NCLM	5G PPP Web/Socials
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In general, for any major conference or exhibition in which the project participated (e.g., focused on topics in scope with 5GZORRO research like AI, ML, DLTs, security), the communication team prepared a press release before the event to describe activities and locations, and/or to report participation results post-event.

Additional promotion of 5GZORRO news and events regularly occurs via communication channels (website, social accounts) of the Consortium partners, as shown in Figure 3-15.



Figure 3-15: Partners press 5GZORRO News & Events

3.6 Newsletters

Newsletters, NewsFlashes, and Save The Dates are effective means to notify activities and outcomes through news, papers, blog posts, promotional materials, etc. to a network of contacts engaged with the project.

In total in the life span of project 10 Newsletters (NL), 5 NewsFlashes (NF), and 11 Save the Dates (STD) have been produced to highlight project achievements in the period Nov 2020 – Oct. 2022.

Table 3-5: 5GZORRO Newsletters in the period M01-M36

Document / Date	Covered Topics	Link	Analytics
Save the Date Oct 2020	5GZORRO Tech Talk#1 Live Streaming	Newsletter: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=vxzvrze&x=pv&je=qzfi=-ntz-c79.=4k0jd4a&x=pp&y/9.ahg&x=pv&91f7:&x=pv&-9h3e069hzb9j=qtxNCLM	Recipients: 2013 Open: 418 Clicks: 82
NewsLetter #1 Summer 2020	5GZORRO Website, Presentation at EUCNC2020, Upcoming Activity: Tech Talk#1, 5GZORRO digital Flyer.	Website: https://www.5gzorro.eu/5gzorro-newsletter-1-summer-2020/ Newsletter: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=vxzvrze&x=pv&je=qzfi=-n_7f6.:5e-ij1b&x=pp&s38f-iab87c86b:.e4&x=pv&-5.e_&i=/vNCLM	N/A
NL#2 Autumn 2020	5GZORRO Website, Papers#1, Video presentation, Upcoming events: Tech Talk#2, Past Events: Tech Talk#1, Layer123, IEEE NFV-SDN.	Website: www.5gzorro.eu/5gzorro-newsletter-2-autumn-2020 Newsletter: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=vxzvrze&x=pv&je=qzfi=-oqz-c79.=4k0jd4a&x=pp&y/9.ahg&x=pv&91f7:&x=pv&-9h3e069hzb9j=nvpNCLM	Recipients: 2355 Open: 324 Clicks: 60
NL#3 Winter 2020	Season Greetings (Dec 2020), Blog post#1, Papers#1, Public Deliverables D2.1, D2.2, D6.1 Upcoming Events 5GZORRO Tech Talk II.	Website: www.5gzorro.eu/5gzorro-newsletter-3-winter-2020 Newsletter: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=2vvn_&x=pv&bik=n_.l:=vg_7f6.:a&&-&:cms&x=pv&&x=pp&ww6bfke963k0090&m6c53&m1.4g=p/vNCLM	Recipients: 2524 Open: 373 Clicks: 65
NL#4 Spring 2021	Blog post#2 Paper#2 Public Deliverable D.3.1, D4.1; Past Events: 5G PPP Architecture WG presentation.	Website: www.5gzorro.eu/5gzorro-newsletter4-spring-2021 Newsletter: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=vxzvrze&x=pv&je=qzfi=-qqz-c79.=4k0jd4a&x=pp&y/9.ahg&x=pv&91f7:&x=pv&-9h3e069hzb9j=oqtNCLM	Recipients: 1960 Open: 336 Clicks: 123
NewsFlash #1 Spring 2021	Papers#3 + #4, Press News Plenary + Hackathon, Blog post#3	Website: www.5gzorro.eu/5gzorro-newsflash-1-spring-2021/ Newsflash#1: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=vxzvrze&x=pv&je=qzfi=-qvz-c79.=4k0jd4a&x=pp&y/9.ahg&x=pv&91f7:&x=pv&-9h3e069hzb9j=osrNCLM	Recipients: 1901 Open: 299 Clicks: 491
NL#5 Summer 2021	After EUCNC2021 Events 2 EUCNC Papers: Blockchain-Based Zero Touch Service Assurance in Cross-Domain Network Slicing Multi-Party Collaboration in 5G Networks via DLT-Enabled Marketplaces: A Pragmatic Approach GitHub Blog Post#4	Website: https://www.5gzorro.eu/5gzorro-newsletter-5-summer-2021/ Newsletter: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=wuutyze&x=pv&je=qzfi=-rvz-c79.=t.8.em/9bc&x=pp&qz&w87e3a-j297f=w_yNCLM	Recipients: 1919 Open: 408 Clicks: 94

	Deliverables: 2.3; 5.1; 6.2		
NL#6 Autumn	6 Papers: 5G Ecosystem 2021 AI and ML –Enablers for Beyond 5G Networks Edge Computing for 5G Networks Overview of the security and trust mechanisms in the 5GZORRO project Zero-Touch AI Ops in Multi- Operator 5G Networks Smart Contracts in the 5G Roaming Architecture: The Fusion of Blockchain with 5G Networks Blog Post#5 GitHub	Website: https://www.5gzorro.eu/5gzorro-newsletter-6-autumn-2021/ Newsletter: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=vxzvrze&x=pv&je=qzfi=-stz-c79.=4k0jd4a&x=pp&y/9.ahg&x=pv&91f7:&x=pv&-9h3e069hzb9j=pqvNCLM	Recipients: 1765 Open: 249 Clicks: 49
NF#2	GitHub 6 Papers: Toward True Cloud Native NFV MANO A Bio-Inspired Reaction Against Cyberattacks: AIS- Powered Optimal Countermeasures Selection Design of a security and trust framework for 5G multi-domain scenarios Toward pre- standardization of reputation-based trust models beyond 5G Time-Sensitive Mobile User Association and SFC Placement in MEC-Enabled 5G Networks Trusted Execution Environment-enabled platform for 5G security and privacy enhancement	Website: https://www.5gzorro.eu/5gzorro-newsflash-2-autumn-2021/ NewsFlash#2: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=wvrvrve&x=pv&je=qzfi=-swz-c79.=jbbbc94.8m&25&x=pp&s3m&25f-6i3&2&e6f&x=pv&zb9j=psyNCLM	Recipients: 1737 Open: 303 Clicks: 59
NF#3	Xmas video 5GZORRO Survey Tech Talk#2 MWC2022 Blog Post (MCA) Paper: AI Empowered Software Defined WLANs	Website: https://www.5gzorro.eu/5gzorro-newsflash-3-winter-2022/ NewsFlash#3: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=vxzvrze&x=pv&je=qzfi=-trz-c79.=4k0jd4a&x=pp&y/9.ahg&x=pv&91f7:&x=pv&-9h3e069hzb9j=puqNCLM	Recipients: 1651 Open: 289 Clicks: 48
STD 3 Jan. 2022	Tech Talk#2 - Save the Date! 5GZORRO Survey Blog Post (MCA)	Website: https://www.5gzorro.eu/5gzorro-tech-talk-january-13-2022-3-00-pm-cet/ STD: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=vxzvrze&x=pv&je=qzfi=-ttz-	Recipients: 1669 Open: 307 Clicks: 51

		c79.=4k0jd4a&x=pp&y/9.ahg&x=pv&91f7:&x=pv&-9h3e069hzb9j=pvpNCLM	
STD 12 Jan. 2022	Tech Talk#2 - Speakers	STD: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=vxzvrze&x=pv&je=qzfi=-tuz-c79.=4k0jd4a&x=pp&y/9.ahg&x=pv&91f7:&x=pv&-9h3e069hzb9j=quyNCLM	Recipients: 1676 Open: 274 Clicks: 41
NL#7 Winter 2022	Events: MWC22 - TT#3 + Get together 5GZORRO Survey D5.2 Blog Post (NXW) Tech Talk#2 outcomes	Website: https://www.5gzorro.eu/5gzorro-newsletter-7-winter-2022/ NL: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=vxzvrze&x=pv&je=qzfi=-twz-c79.=4k0jd4a&x=pp&y/9.ahg&x=pv&91f7:&x=pv&-9h3e069hzb9j=pxvNCLM	Recipients: 1633 Open: 286 Clicks: 51
STD 18 Feb. 2022	Tech Talk #3	STD: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=wuutxz&x=pv&je=qzfi=-uqz-c79.=tGZORRO6ALL&x=pp&v19r59j6&x=pv&8g4&x=pv&0d=sxyNCLM	Recipients: 1629 Open: 344 Clicks: 47
STD 25 Feb. 2022	TT#3 Pill Antoine 5GZORRO Survey	STD: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=vxzvrze&x=pv&je=qzfi=-urz-c79.=4k0jd4a&x=pp&y/9.ahg&x=pv&91f7:&x=pv&-9h3e069hzb9j=pyuNCLM	Recipients: 1606 Open: 271 Clicks: 49
NL#8 Spring 2022	New Platform video 5GZORRO Survey 5GZORRO 5th Plenary Meeting Events MWC- Tech Talk#3 Blog Posts (ALTICE + UW) Paper: AISGA: Multi-Objective Parameters optimization for Countermeasures Selection through Genetic Algorithm White paper: 5G PPP Architecture Working Group - View on 5G Architecture, Version 4.0 Paper: Dynamic Slice Scaling Mechanisms for 5G Multi-domain Environments	Web: https://www.5gzorro.eu/ NL: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=vxzvrze&x=pv&je=qzfi=-usz-c79.=4k0jd4a&x=pp&y/9.ahg&x=pv&91f7:&x=pv&-9h3e069hzb9j=qqtNCLM	Recipients: 1655 Open: 362 Clicks: 63
NF#4 9 May 2022	TT#4 Speakers Pill FBK - Cross domain slicing mechanism in 5GZORRO (Rasoul Behravesh) Blog post (i2CAT)- POC#5 ON-DEMAND NON-PUBLIC NETWORKS (NPNS) FOR INDUSTRY 4.0 D 2.4	Web: https://www.5gzorro.eu/ NF: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=wuutxz&x=pv&je=qzfi=-utz-c79.=tGZORRO6ALL&x=pp&v19r59j6&x=pv&8g4&x=pv&0d=tqwNCLM	Recipients: 1593 Open: 301 Clicks: 40
STD 25 May 2022	TT#4 Speakers	STD: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=vxzvrze&x=pv&je=qzfi=-uvz-	Recipients: 3055

	Pill Altice Lab - Concept of Trust in a 5GZORRO Governed Distributed Environment (Bruno Santos) 5GZORRO Survey	c79.=4k0jd4a&x=pp&y/9.ahg&x=pv&91f7:&x=pv&-9h3e069hzb9j=qrvNCLM	Open:554 Clicks:87
STD 6 Jun. 2022	EUCNC 2022 Pill NXW - Technical overview in the project 5GZORRO (Giacomo Bernini) Pill i2CAT- 3 Pillars in 5GZORRO (Shuaib Siddiqui) Pill UW- Trusted and Secure SLA Monitoring component of the project (Filipa Martins) 5GZORRO Survey	STD: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=wuutxz&x=pv&je=qzfi=-uxz-c79.=tGZORRO6ALL&x=pp&v19r59j6&x=pv&8g4&x=pv&Od=tr1NCLM	Recipients: 3077 Open: 478 Clicks:74
NL#9 Summer 2022	5GZORRO 6th Plenary Meeting 5GZORRO wins the EUCNC & 6G Summit Best Booth Award- Outcomes Pill NXW - Technical overview in the project 5GZORRO (Giacomo Bernini) Pill i2CAT- 3 Pillars in 5GZORRO (Shuaib Siddiqui) Pill UW- Trusted and Secure SLA Monitoring component of the project (Filipa Martins) 5GZORRO Video#2 5GZORRO Survey Blog Post (IBM): 5GZORRO Cloud-Native Open Source MEC Platform Paper (UMU): Federated learning for malware detection in IoT devices	Web: https://www.5gzorro.eu/5gzorro-newsletter-9-summer-2022/ NL: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=wuutxz&x=pv&je=qzfi=-vsz-c79.=tGZORRO6ALL&x=pp&v19r59j6&x=pv&8g4&x=pv&Od=ttyNCLM	Recipients: 1540 Open: 556 Clicks: 108
STD 19 Sept. 2022	5GZORRO Final Event 5GZORRO Tech Talk#5 ICOM Blog Post 5GZORRO Survey	Web: https://www.5gzorro.eu/5gzorro-final-event-2022/ STD: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=vxzvrze&x=pv&je=qzfi=-vuz-c79.=4k0jd4a&x=pp&y/9.ahg&x=pv&91f7:&x=pv&-9h3e069hzb9j=qvyNCLM :	Recipients: 1502 Open:656 Clicks:95
STD 26 Sept. 2022	5GZORRO Final Event – UC3M Auditorium ICOM Blog Post Papers -S3: An AI-Enabled User Continuous Authentication for Smartphones Based on Sensors, Statistics and Speaker Information	STD: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=wuutxz&x=pv&je=qzfi=-vvz-c79.=tGZORRO6ALL&x=pp&v19r59j6&x=pv&8g4&x=pv&Od=tuyNCLM	Recipients: 1878 Open:771 Clicks:77

	<ul style="list-style-type: none"> - A Security and Trust Framework for Decentralized 5G Marketplaces - Empowering Vertical Industries through 5G Networks Current Status and Future Trends 5GZORRO Survey		
STD 3 Oct. 2022	5GZORRO TT#5 - Speakers + Final Event BEREC EMERG	STD: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=vxzvrze&x=pv&je=qzfi=-vwz-c79.=4k0jd4a&x=pp&y/9.ahg&x=pv&91f7:&x=pv&-9h3e069hzb9j=qvvNCLM	Recipients: 2697 Open: 665 Clicks: 160
NF#5 17 Oct. 2022	5GZORRO Final Event TT#5 - Speakers	NF: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=wuutxze&x=pv&je=qzfi=-nzy40d1:&x=pv&=zGZORRO3ALL&x=pp&ww:q&6k/b7m1.4g=s1/NCLM	Recipients: 1473 Open: 573 Clicks: 88
STD 25 Oct. 2022	5GZORRO Final Event TT#5 – Speakers Paper: Zero Touch Management: A Survey of Network Automation Solutions for 5G and 6G Networks	STD: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=wuutxze&x=pv&je=qzfi=-nzq40d1:&x=pv&=zGZORRO3ALL&x=pp&ww:q&6k/b7m1.4g=s1uNCLM	Recipients: 1467 Open: 550 Clicks: 87
NL#10 Autumn 30 Oct. 2022	Project Final Results and Outcomes Events: Final Event, GA, TT#5 Papers Blog Post	Web: www.5gzorro.eu NL: https://a4c9f7.emailsp.com/f/rnl.aspx/?fge=wuutxze&x=pv&je=qzfi=-nzy40d1:&x=pv&=zGZORRO3ALL&x=pp&ww:q&6k/b7m1.4g=s1wNCLM	Recipients: 1457 Open: 370 Clicks: 581

4 Standardization and Open-Source Activities

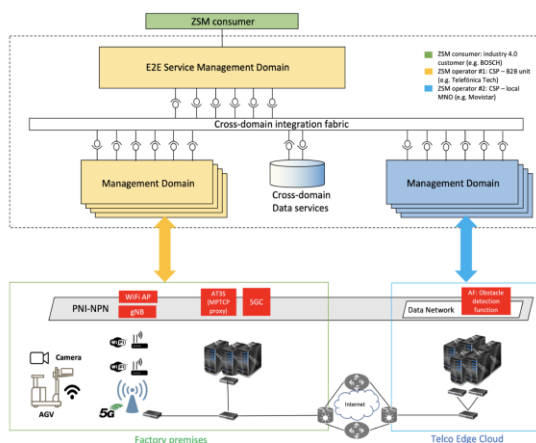
The standardization activities during this final phase of the project have been essentially focused on the continuation and, whenever possible, the conclusion of the opportunities that were identified and followed during the project lifetime. Some of these activities have even translated in extended activities that can be considered target for further exploitation of project results.

The leadership position in the ETSI activities focused on network transformation have extended, continuing with the chair position in ISG PDL (on blockchain services and infrastructures), adding the chair of ISG ZSM (on network automation) and the leadership of the ISG MEC (on edge environments) Support Team. Apart from specific contributions to the work in these ETSI committees, the most remarkable achievements include:

- The contribution to a MEC whitepaper on edge security, focused on future research challenges.
- The extension for a new two-year period of the PDL term, connected to the selection by the European Commission of the results produced by PDL as the base for a European Norm on smart contracts.
- The conclusion of the work of ZSM on AI and closed loops, the starting of activities related to Network Digital Twin, and the contacts with other SDOs to address detailed specification (*Stage 3*) work.

Within the IETF, the work on intent classification has been recently published as RFC 9316, while the work on monitoring metadata as a key enabler for AI/ML is being translated into several drafts on telemetry manifest formats, transaction identification and data provenance requirements. The team activity has also focused on the rechartering of the RATS WG (on attestation mechanisms) and the I2NSF WG (on security management).

During this period, the scope of the standardization activities has expanded towards 3GPP, supporting a study of privacy of identifiers over radio access to consider newer methodologies such as those applying AI/ML, and in the participation in the ITU-T Focus Group on Autonomous Networks.



The collaboration with the Open Source MANO (OSM) community has continued, exemplified by the proof of concept (PoC), jointly executed under the auspices of ETSI ISG ZSM with the 5G-CLARITY project. The PoC addressed user-driven automation integration, focused on edge-based AGV control, and was demonstrated at EUCNC 2022 (Grenoble) and reported at the ZSM plenary meeting held in October 2022 in Dublin.

Apart from a direct contribution to validate the ZSM work on automation and closed-loop approaches, the PoC has been an interesting example of collaboration of open-source (OSM) and standards (ZSM) to address the common

objectives of facilitating technology evolution and supporting interoperability. Moreover, 5GZORRO actively participated to two ETSI OSM Ecosystem days (as reported in section 2.2), where it was shared with the OSM community how the ETSI OSM orchestration tool was adopted and used for the 5GZORRO platform purposes.

Finally, it is worth noting as an opportunity for further exploitation focused on open-source applicability, the collaboration with the Hexa-X 6G flagship project, started within the 5GPPP. A proposal for evaluating and extending the 5GZORRO trust evaluation framework is being discussed as the base to analyse the implications of the *Level of Trust* KVI proposed within Hexa-X.

Table4-1 lists all the contributions made by 5GZORRO project to different SDOs and Open Source Communities, out of which 24 have been achieved the status of adoption.

Table 4-1 5GZORRO Standards and Open Source Community contributions

#	SDO / Project / Organization	Contribution / Activity	Short Description	Status
1	ETSI PDL	Leadership	Chair of the ETSI ISG on Permitted Distributed Ledgers https://www.etsi.org/committee/pdl	Term extended by the ETSI DG till the end of 2022
2	ETSI OCG	Charter	ETSI joint group on AI applications	Working on a second version of the white paper https://www.etsi.org/newsroom/news/1788-2020-06-etsi-issues-new-white-paper-on-artificial-intelligence
3	ITU-T	Charter	Creation of the ITU-T FG on Autonomous Networks https://www.itu.int/en/ITU-T/focusgroups/autonomous-networks/Pages/default.aspx	FG created. A presentation of the project, goals and results would be welcome, in order to further contribute to the FG document
4	ETSI ENI	Charter	New work-item ENI0023, <i>Intent Policy Model</i>	Ongoing. Opportunities to contribute on the expression of intent for the location of resources and verification via smart contracts
5	ETSI PDL	Charter Contribution	New work-item PDL009 on DLT application to federated data infrastructures, including contributions to initial draft index	Work item progressing. Opportunities to contribute on the connection of DLT and datalakes
6	ETSI ENI	Charter	New work-items on <i>Prominent Control Loop Architectures</i> (ENI027), and on <i>Representing</i> ,	Work item approved. Opportunities to contribute on the applicability of automation mechanisms

			<i>Inferring, and Proving Knowledge</i> (ENI029)	
7	ETSI PDL	Contribution	Contributions to ETSI PDL 010 on offline operation, in matters related to scenarios, TEE applicability and the usage of side-chaining	Specification progressing through successive drafting calls, current version is https://docbox.etsi.org/ISG/PDL/Open/0010 Offline Mode/PDL-0010 Offline Modev005.docx
8	IRTF NMRG	Contribution	draft-irtf-nmrg-ibn-intent-classification, on the classification of intent declarations and applications	Adopted by the group. RG last call progressing
9	IETF I2NSF	Charter	Proposal for the extension of the I2NSF charter to address security policies, including trust negotiation	Under discussion within the IETF Security Area. It would be an interesting target for security management mechanisms,s
10	ETSI PDL	Charter	New work-item PDL011, on the specification of smart contract operational aspects, including security	Work-Item approved. Opportunities for a PoC demonstrating smart contract applicability to the project scenarios
11	ETSI MEC	Contribution	Whitepaper on MEC security	Document approved, in the process of being published as part of the series of <i>ETSI whitepapers</i>
12	ETSI NFV	Leadership	Editor of the ETSI NFV Research Agenda	Available at the ETSI NFV technology pages and the RISE initiative https://docbox.etsi.org/ISG/NFV/Open/Other/NFV Research Agenda-202104.pdf
13	ETSI MEC	Charter	New work-item on MEC Security	https://portal.etsi.org/webapp/WorkProgram/Report_WorkItem.asp?WKI_ID=63028

14	ETSI MEC	Publication	Whitepaper on MEC security	https://www.etsi.org/images/files/ETSIWhitePapers/ETSI_WP_46-MEC_security.pdf
15	ETSI PDL	Contribution	Introduction to project goals and results, looking for contribution opportunities, including PoCs	Contribution presented at PDL#08 plenary, available as https://docbox.etsi.org/ISG/PDL/05-CONTRIBUTIONS/2021/PDL(21)008_007_Introduction_to_the_5GZORRO_project.pdf
16	ETSI MEC	Leadership	Chair of ETSI MEC Support Team	In charge of approving and supervising PoCs: https://portal.etsi.org/ngppapp/ContributionCreation.aspx?Param=&primarykeys=226661
17	ETSI SAI	Charter	New work-item on privacy aspects of AI/ML systems application	https://portal.etsi.org/webapp/WorkProgram/Report_WorkItem.asp?WKID=63499
18	ETSI PDL	Publication	Group Report PDL004: "Smart Contracts; System Architecture and Functional Specification"	Published as https://www.etsi.org/deliver/etsi_gr/PDL/001_099/004/01.01.01_60/gr_PDL004v010101p.pdf
19	ETSI PDL	Publication	Group Report PDL010: "Operations in Offline Mode"	Published as https://www.etsi.org/deliver/etsi_gr/PDL/001_099/010/01.01.01_60/gr_PDL010v010101p.pdf
20	ETSI PDL	Publication	Group Report PDL009: "Federated Data Management"	Published as https://www.etsi.org/deliver/etsi_gr/PDL/001_099/009/01.01.01_60/gr_PDL009v010101p.pdf
21	ETSI PDL	Charter	New work-item PDL013, on "Supporting Distributed Data Management"	Work-Item description available at https://portal.etsi.org/webapp/WorkProgram/Report_WorkItem.asp?WKID=63559&curlItemNr=1&totalNrItems=14&optDisplay=10&titleType=all&qSORT=HIGHVERSION&qETSI_ALL=&SearchPage=TRUE&qTB_ID=873%3BPDL&qINCLUDE_SUB_TB=True&qINCLUDE_MOVED_ON=&qSTOP_FLG=&qKEYWO

				RD_BOOLEAN=OR&qCLUSTER_BOOLEAN=OR&qFREQUENCIES_BOOLEAN=OR&qSTOPPING_OUTDATED=&butExpertSearch=Search&includeNonActiveTB=FALSE&includeSubProjectCode=FALSE&qREPORT_TYPE=SUMMARY
22	ETSI PDL	Contribution	Alignment of PDL reference architecture with the CBAN framework	Agreed by the ISG. Work is ongoing
23	ETSI NFV	Charter	New IFA WG work-item on management of data analytics	https://portal.etsi.org/webapp/WorkProgram/Report_WorkItem.asp?WKI_ID=63972
24	ETSI ZSM	Leadership	Appointment as chair of the ETSI ISG ZSM	https://portal.etsi.org/tb.aspx?tbid=862&SubTB=862,863#/
25	ETSI OSM	Presentation	Using OSM within a multi-site NFV ecosystem	https://list.etsi.org/scripts/wa.exe?A2=OSM_TECH;8eb8c7f5.2202&S=
26	ETSI PDL	Publication	Group Specification PDL012: "Smart contacts. System architecture and functional specification"	Published as https://www.etsi.org/deliver/etsi_gr/PDL/001_099/004/01.01.01_60/gr_PDL004v010101p.pdf
27	ETSI NFV	Charter	New work-item IFA049 on NFV OAM	https://portal.etsi.org/webapp/WorkProgram/Report_WorkItem.asp?WKI_ID=64336
28	IETF PPM	Charter	WG PPM (Privacy Preserving Measurement) approved	https://datatracker.ietf.org/wg/ppm/about/
29	IETF SFC	Charter	Recharter proposal for SFC	https://mailarchive.ietf.org/arch/browse/sfc/
30	IETF NMRG	Contribution	Characterization and classification of network intents	Under final review for publication as RFC https://datatracker.ietf.org/doc/draft-irtf-nmrg-ibn-intent-classification/

31	IETF Ops Area	Contribution	Manifest for telemetry data	https://datatracker.ietf.org/doc/draft-claise-opsawg-collected-data-manifest/
32	ETSI ZSM	Charter	New work-item ZSM015 on Network Digital Twins,	Approved: https://portal.etsi.org/webapp/WorkProgram/Report_WorkItem.asp?WKI_ID=64372
33	3GPP SA3	Charter	New WID for Study of privacy of identifiers over radio access	Approved: https://portal.3gpp.org/desktopmodules/Workitem/WorkitemDetails.aspx?workitemId=940016
34	ETSI ZSM	PoC	PoC proposal, in coordination with 5G-CLARITY	Approved: https://zsmwiki.etsi.org/index.php?title=PoC 5 On-demand Non-Public Networks (NPNs) for industry 4.0: zero-touch provisioning practices in public-private network environments .
35	ETSI PDL	Charter	New work-item PDL019 on Distributed Ledger Services for Identity and Trust Management	Approved: https://portal.etsi.org/webapp/WorkProgram/Report_WorkItem.asp?WKI_ID=66207
36	ETSI PDL	Charter	New work-item PDL015 on Reputation management	Approved: https://portal.etsi.org/webapp/WorkProgram/Report_WorkItem.asp?WKI_ID=66206
37	IETF NMRG	Publication	RFC on intent classification	https://www.rfc-editor.org/info/rfc9316

5 Conclusions

This deliverable has reported on the results of dissemination, communication, and standardization activities carried out by the 5GZORRO Consortium during the whole lifespan of the project.

Despite the adverse conditions due to COVID-19 pandemic and some forced internal reorganization, the Consortium has successfully worked to build a consistent and relevant impact results throughout the entire project.

At the end, the Consortium counts on a significant number of publications published and few for which review feedback is expected. The partners have actively participated in many events where they have published, promoted, and explained project results, in a constant and continuous effort to engage with the scientific and industrial communities working on 5G and beyond.

5.1 Progress on Impact creation KPIs

As for the number of KPIs identified in the 5GZORRO Description of the Action, they are listed in Table5-1 below. The progress on the achievement of respective targets has been evaluated at M18 (Apr 2021) and presented in the same table with the final status achieved at M36 (Oct.2022). The table shows a fulfilment trend in line with the plan with substantial neutralization of the negative effects of pandemic restrictions.

Table 5-1: 5GZORRO Impact Creation KPIs –Oct. 2022

KPI Description	KPI Target			Status at M36
	M12	M22	M30	
<i>Participation in relevant scientific events</i>	3	6	8	19
<i>Presentation or demonstrations of 5GZORRO in industry events</i>	3	7	10	19
<i>Number of scientific publications (journals and conference proceedings)</i>	3	20	30	36 i)24 published + 4 under evaluation ii)8 Whitepapers (5 published + 3 in progress)
<i>Number of standard contributions with adoption status</i>	1	2	>5	24
<i>Number of organized events, 5G PPP synergies, workshops</i>	2	4	6	9
<i>Contributions to joint publications from within 5G PPP WGs</i>	1	3	>5	5
<i>Number of yearly unique visits on 5GZORRO website</i> <i>Impressions</i> <i>Pages visualization</i> <i>Engagement</i>	>3.500	>7.000	>10.000	3950 13383 138K 28K
<i>Social media channels followers</i>	>800	>1.400	>2.000	1599

<i>Press and news releases</i>	3	7	11	14
<i>5GZORRO Newsletter</i>	4	8	11	26
<i>Videos views on YouTube</i>	>300	>600	>800	49666
<i>5GZORRO events</i>	3	4	5	6 (Final Event+5TT)
<i>Joint events, workshops and networking</i>	4	5	9	9
<i>Trainings and workshops</i>	2	3	5	10 (internal: 1 Training Webinar, 4 Internal Workshops, 4 Internal Hackathons, and 1 Workshop with EC Booster Result program) 6 (other events: Empowering verticals, City Nervous, EUCNC21, 5GWF21, CNSM21, EMERG)

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6 Abbreviations and Definitions

6.1 Definitions

No definition introduced in this deliverable.

6.2 Abbreviations

5G IA	5G Infrastructure Association
5G PPP	5G Public Private Partnership
AIOps	Artificial Intelligence for IT operations
CNF	Cloud Native Function
DoA	Description of Action
DLT	Distributed Ledger Technology
EC	European Commission
ENI	Experiential Networked Intelligence
IPR	Intellectual Property Rights
MANO	Management and Orchestration
NFV	Networks Function Virtualization
NFVO	Networks Function Virtualization Orchestrator
OSM	Open-Source Mano
PDL	Permissioned Distributed Ledgers
PoC	Proof of Concept
PPP	Public Private partnership
SBA	Service Based Architecture
SBI	Service Based Interface
SC	Smart Contract
SDO	Standard Developing Organization
VIM	Virtual Infrastructure Manager
VNF	Virtual Network Function
WG	Working Group
WP	Work Package
ZSM	Zero touch network & Service Management

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