



UNICO I+D Project
6G-DATADRIVEN

6G-DATADRIVEN

Report of communication and dissemination activities (2022)

Abstract

This document includes the following deliverables:

- 6G-DATADRIVEN-01-E18
- 6G-DATADRIVEN-02-E28
- 6G-DATADRIVEN-03-E24
- 6G-DATADRIVEN-04-E18
- 6G-DATADRIVEN-05-E17
- 6G-DATADRIVEN-06-E20

Which report the communication and dissemination activities of the 6G-DATADRIVEN subprojects in 2022.

Document properties

Document number	6G-DATADRIVEN-{01-E18, 02-E28, 03-E24, 04-E18, 05-E17, 06-E20}
Document title	Report of communication and dissemination activities (2022)
Document responsible	Carlos J. Bernardos (UC3M)
Document editor	Carlos J. Bernardos (UC3M)
Editorial team	María Molina (UC3M), Carlos J. Bernardos (UC3M)
Target dissemination level	Internal
Status of the document	Final
Version	1.0
Delivery date	31/12/2022
Actual delivery date	31/12/2022

Production properties

Reviewers	Antonio de la Oliva (UC3M)
------------------	----------------------------

Disclaimer

This document has been produced in the context of the 6G-DATADRIVEN Project. The research leading to these results has received funding from the Spanish Ministry of Economic Affairs and Digital Transformation and the European Union-NextGenerationEU through the UNICO 5G I+D programme.

All information in this document is provided "as is" and no guarantee or warranty is given that the information is fit for any particular purpose. The user thereof uses the information at its sole risk and liability.

Contents

Resumen Ejecutivo.....	4
Executive Summary.....	5
1. Introduction.....	6
2. Communication activities.....	7
2.1. Web page and YouTube channel.....	7
2.2. Communication Talks and other actions.....	7
3. Dissemination activities.....	11
3.1. Publications and technical dissemination.....	11
3.2. Synergies with other projects.....	11
3.3. Bachelor, Master, PhD theses and Internships.....	11
4. Exploitation activities.....	13
4.1. Standardization activities.....	13

Resumen Ejecutivo

Este documento informa sobre todos los logros y actividades realizadas durante la ejecución de los subproyectos 6G-DATADRIVEN en 2022 en relación con la comunicación y la difusión. Dado que estos subproyectos están relacionados entre sí, se ha decidido integrar los informes individuales de cada subproyecto en un solo documento.

Los principales logros durante 2022, considerando que en este año aún no hemos arrancado por completo todas las actividades debido a los retrasos en el proceso de licitación, son:

- Comunicación:
 - Generación de material de promoción inicial (incl. página web y comunicados de prensa) utilizado en la web y en varios eventos para dar a conocer el proyecto
 - Participación en eventos 5G/6G.
- Difusión:
 - Publicación de un número notable de artículos (considerando el corto período de tiempo y que es solo el primer año) en revistas y congresos arbitrados (4 en revistas y 1 en congresos).
- Explotación:
 - Contribuciones significativas a la estandarización en el IETF (6 contribuciones).

El resto del documento está redactado en inglés, de cara a facilitar una posible revisión por parte de expertos internacionales.

Executive Summary

This document reports on all the achievements and activities undertaken during the execution of the 6G-DATADRIVEN subprojects in 2022 in relation to communication and dissemination. Given that these subprojects are related to each other, it has been decided to integrate the individual reports of each subproject in a single document.

The key achievements during 2022, considering that in this year we have not yet fully bootstrapped all the activities due to the delays on the tender process, are:

- Communication:
 - Generation of initial promotion material (incl. web page and press releases) used on the web and in several events to raise awareness of the project.
 - Participation in 5G/6G events.
- Dissemination:
 - Publication of a remarkable number of papers (considering the short period of time and that it is just the first year) in peer-reviewed journals and conferences (4 in journals and 1 at conferences).
- Exploitation:
 - Significant contributions to standardization at the IETF (6 contributions).

1. Introduction

6G-DATADRIVEN's vision is (i) to empower the (r)evolution of the industrial sector towards more secure, resilient, and sustainable manufacturing; and (ii) to bring to the next level the automation and personalized reaction to emergency situations. Towards this vision, 6G-DATADRIVEN will realize the full digitization of manufacturing and emergency support processes and their complete integration with data-driven approaches by (i) designing and incorporating distributed AI/ML tools exploiting distributed data collection and processing within edge computing platforms; (ii) creating plug-and-play solutions to flexibly deploy and operate non-public 5G networks, building on the platforms developed in previous projects; (iii) developing secure data distribution schemes; (iv) implementing zero-touch, AI-based network and service management, fully meeting the specific needs of smart manufacturing and emergency support environments.

The 6G-DATADRIVEN project is contributing to the following groups of activities:

- Communication: It includes all the activities related to the promotion of the project and its results beyond the project's own community. This includes the communication of the research results in a way that is understood by the non-specialist, e.g., the media and the public.
- Dissemination: It includes activities related to presenting its results in a technical community working on the same research field. In general, this will be done through peer-reviewed publications in academic conferences and journals, interaction with other research projects (e.g., HEU SNS and other UNICO I+D projects), participation and organization of technical events, realization of exhibitions and technology demonstrations in different conferences and workshops, and the dissemination of standardization activities.
- Exploitation: it covers activities aiming at using the results in further research activities other than those covered by the project, which mostly imply 1) developing, creating and marketing products or processes, 2) creating and providing a service, or 3) standardization activities

The 6G-DATADRIVEN project has been structured in 6 subprojects (6G-DATADRIVEN-01 to 6G-DATADRIVEN-06).

2. Communication activities

2.1. Web page and YouTube channel

The project website has been established at the beginning of the project and it is reachable at the following URL: <https://unica6g.it.uc3m.es/en/6g-datadriven/>. The landing page is reported in Figure 4.



FIGURE 1: 6G-DATADRIVEN WEBSITE LANDING PAGE

A YouTube channel has also been created (<https://www.youtube.com/channel/UCgaljol7HG-TYhTx2C-V26A>). Initial content is being prepared, waiting for all the contracts to be finalized.

2.2. Communication Talks and other actions

The project has participated to several events in 2022, as summarized next.

V5G Days 2022



Carlos J. Bernardos participated in the V5GDays event, which took place on May 30 and 31, 2022 at the Valencia Oceanographic, representing the projects *6G-EDGEDT* and *6G-DATADRIVEN*. These projects are part of the Program UNICO-5G, which wants to promote the implementation of 4G/5G technology in rural areas through the extension of passive infrastructures.

V5G Days is the largest European event on 5G Technology, "the new engine of digitalization". In it, it will be exposed, debated and demonstrated how 5G technology is becoming a catalyst for the modernization of our industry.

Topics discussed:

- 5G in Spain (in relation to the pilots and use cases of 5G already consolidated as commercial products and services), in which Mobile World Capital collaborates
- "Beyond 5G", collecting the work already started in the UNICO R&D 6G Projects program.
- Business innovation and new technological challenges in Europe, in which AMETIC collaborates.
- Regulation, Deployment and Cybersecurity in 5G Industrial Networks, in collaboration with various partners from Latin America and the IEEE ComSoc.

V5G Days is sponsored by IDRICA (a leading company in the digitalization of the water sector) which makes a very interesting review about the event:

<https://www.aguasresiduales.info/revista/noticias/idrica-patrocina-el-evento-v5g-days-2022-en-valenc-mW9UI>

For more info about V5G Days (speakers, registration, etc): <https://v5g.es/>

Conectados 5G @ Ciudad Real

Carlos J. Bernardos was invited to an event organized by the National 5G observatory, to a panel to discuss about 5G applications and future of 6G. More information can be found (in Spanish) at:

<https://on5g.es/conectados-5g-ciudad-real/>

Agenda

10:00h Bienvenida institucional

- **Eva María Masías**, alcaldesa de Ciudad Real

10:10h Keynote: Conectividad inteligente, caminando hacia el futuro

- **Federico Ruiz**, responsable del Observatorio Nacional 5G

10:25h Sesión debate: Ciudad Real: innovación tecnológica en el ecosistema 5G

- **Federico Ruiz**, responsable del Observatorio Nacional 5G
- **Carlos Jesús Bernardos**, vicepresidente de 5TONIC y catedrático en la Universidad Carlos III de Madrid
- **Iván Rejón**, Head of Strategy and Corporate Affairs at Ericsson
- **Moderadora: Pilar Bernat**, profesora de Nuevas Tecnologías y de Contenidos para Plataformas Digitales de la Universidad Nebrija, fundadora de Zonamovilidad y CEO de Novocuatro Ediciones

11:05h Entrevista: El 5G como palanca de digitalización de nuevos sectores

- **Pedro Maroto**, concejal de promoción económica, formación y empleo del Ayuntamiento de Ciudad Real y presidente del Impefe

11:20h Mesa redonda: Explorando el 5G en el sector agroalimentario

- **Victor Falguera**, CEO Akis International
- **Ignasi Servià**, Consultor en temas estratégicos y territoriales sobre agricultura de regadío
- **Mario González**, socio fundador y CEO de Agromarketing.online y director técnico de Gestixplot (premio a la innovación de AJE Ciudad Real)
- **Moderadora: Pilar Bernat**, profesora de Nuevas Tecnologías y de Contenidos para Plataformas Digitales de la Universidad Nebrija, fundadora de Zonamovilidad y CEO de Novocuatro Ediciones

12:00h Pausa café


12:30h Presentación de casos de uso: Transformando el sector agro con el poder del 5G

- **Sergi Sarri**, Head of Digital Connectivity de Mobile World Capital Barcelona
- **Diego Cabrera**, Consultor desarrollo de negocio de VisualNACert
- **Mario González**, socio fundador, CEO de Agromarketing.online y director técnico de Gestixplot (premio a la innovación de AJE Ciudad Real)
- **Alberto Ramírez**, Area Sales Manager de Corteva
- **David Ruiz**, director de Operaciones de UtilTech


13:10h Clausura

13:10h Comida networking


Ponentes:




Eva María Masías
Alcaldesa de Ciudad Real



Carlos Jesús Bernardos
Vicepresidente de 5TONIC y profesor titular en la Universidad Carlos III de Madrid



Pilar Bernat
Periodista, moderadora de Conectados 5G



Federico Ruiz
Responsable Observatorio Nacional 5G

FIGURE 2: AGENDA OF CONECTADOS 5G EVENT



FIGURE 3: PARTICIPANTS OF THE CONECTADOS 5G EVENT

Participation at the UC3M focus group para valoración del Reto I+D+I: La amplificación del IoT para conectarlo todo

In 2020, the Vice-Management for Research and Transfer of UC3M began the approach of presenting the responses of our researchers to various challenges identified in the market, which have been disseminated through their presence in events, publications, and the University website throughout 2020, 2021 and 2022 ([Tendencias 2020](#), [Retos 2021](#) y [Retos 2022 para innovar juntos](#)). For 2023, UC3M has identified 10 new challenges in R&D&I. Carlos J. Bernardos was asked to help validate one of them, based on his participation in the project of "Next generation networks (B5G and 6G) driven by data for sustainable manufacturing and emergency response". The tentative working title of the specific challenge is "La amplificación del IoT para conectarlo todo" (The amplification of IoT to connect everything). More information about past year initiatives can be found at: <https://www.uc3m.es/innovacion/innova/open-innovation>. At the same URL, the outcome of the challenge where we have participated will be posted once it is ready.

3. Dissemination activities

3.1. Publications and technical dissemination

The following papers, which include an official acknowledgement to the integrated 6G-DATDRIVEN project, have been accepted for publication in 2022:

- Milan Groshev, Javier Sacido, and Jorge Martín-Pérez. 2022. FoReCo: a forecast-based recovery mechanism for real-time remote control of robotic manipulators. In Proceedings of the SIGCOMM '22 Poster and Demo Sessions (SIGCOMM '22). Association for Computing Machinery, New York, NY, USA, 7–9. <https://doi.org/10.1145/3546037.3546047>
- Milan Groshev, Jorge Martín-Pérez, Carlos Guimarães, Antonio de la Oliva, Carlos J. Bernardos. 2022. FoReCo: A Forecast-Based Recovery Mechanism for Real-Time Remote Control of Robotic Manipulators. Accepted to appear in IEEE Transactions on Network Management
- J. Martin-Perez, N. Molner, F. Malandrino, C. J. Bernardos, A. d. I. Oliva and D. Gomez-Barquero, "Choose, not Hoard: Information-to-Model Matching for Artificial Intelligence in O-RAN," in IEEE Communications Magazine, doi: 10.1109/MCOM.003.2200401
- Milan Groshev, Gabriele Baldoni, Luca Cominardi, Antonio de la Oliva, Robert Gazda, Edge robotics: are we ready? An experimental evaluation of current vision and future directions, Digital Communications and Networks, 2022, ISSN 2352-8648, <https://doi.org/10.1016/j.dcan.2022.04.032>
- Federico Mungari, Milan Groshev, Carla Fabiana Chiasserini, Resource Requirements of an Edge-based Digital Twin Service: An Experimental Study, Virtual Reality & Intelligent Hardware, Volume 4, Issue 6, 2022, Pages 506-520, ISSN 2096-5796, <https://doi.org/10.1016/j.vrih.2022.05.005>

The following papers are currently under submission, pending decision:

- Cyril Shih-Huan Hsu, Jorge Martín-Pérez, Chrysa Papagianni, Paola Grosso, V2N Service Scaling with Deep Reinforcement Learning, IFIP/IEEE NOMS.

3.2. Synergies with other projects

We are currently exploring synergies with two Horizon Europe SNS projects that will start on Jan. 1st, 2023: PREDICT-6G and DESIRE6G. Joint publications, standard contributions and workshop/event organizations are expected and will be reported in future deliverables.

3.3. Bachelor, Master, PhD theses and Internships

The following theses related to the project are under realization now:

- "Análisis y experimentación de las capacidades de confiabilidad y sensibilidad al retardo de WIFI 6E," Bachelor tesis. Expected finalization date: Oct. 2023.
- "Análisis y experimentación con soluciones para redes deterministas en entornos inalámbricos," Bachelor tesis. Expected finalization date: Mar. 2024.

- “Enhanced AI-based time sensitive, reliable and available wireless networks,” Carlos Barroso, PhD. Thesis. Expected finalization date: Sep. 2025.

4. Exploitation activities

4.1. Standardization activities

The project has significantly contributed to the IETF, namely we have participated as co-author and/or editor of the following contributions:

- Bernardos, C. J., & Mourad, A. (2022, September). Extensions to enable wireless reliability and availability in multi-access edge deployments. Internet-Draft, IETF Secretariat. Retrieved from <https://www.ietf.org/archive/id/draft-bernardos-raw-mec-04.txt>
- Bernardos, C. J., & Mourad, A. (2022, September). RAW multidomain extensions. Internet-Draft, IETF Secretariat. Retrieved from <https://www.ietf.org/archive/id/draft-bernardos-raw-multidomain-01.txt>
- Bernardos, C. J., & Mourad, A. (2022, July). RAW multidomain extensions. Internet-Draft, IETF Secretariat. Retrieved from <https://www.ietf.org/archive/id/draft-bernardos-detnet-multidomain-00.txt>
- Bernardos, C. J., & Mourad, A. (2022, September). Terminal-based joint selection and configuration of MEC host and RAW network. Internet-Draft, IETF Secretariat. Retrieved from <https://www.ietf.org/archive/id/draft-bernardos-raw-joint-selection-raw-mec-03.txt>
- Bernardos, C. J., Papadopoulos, G. Z., Thubert, P., & Theoleyre, F. (2022, October). RAW Use-Cases. Internet-Draft, IETF Secretariat. Retrieved from <https://www.ietf.org/archive/id/draft-ietf-raw-use-cases-08.txt>
- Mirsky, G., Theoleyre, F., Papadopoulos, G. Z., Bernardos, C. J., Varga, B., & Farkas, J. (2022, October). Framework of Operations, Administration and Maintenance (OAM) for Deterministic Networking (DetNet). Internet-Draft, IETF Secretariat. Retrieved from <https://www.ietf.org/archive/id/draft-ietf-detnet-oam-framework-07.txt>