



Demonstration of **5G** solutions for
SMART energy **GRIDS** of the future

Deliverable **7.3**

**Dissemination, Communication, Preliminary Exploitation
and Standardization report**

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D7.3 – Dissemination, Communication, Preliminary Exploitation and Standardization report

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Executive summary

This deliverable reports Smart5Grid dissemination and communication activities, project's interaction with the 5G-PPP and other 5G-PPP research projects, an initial market analysis, a preliminary exploitation plan and the initial standardization activities, during the first year of the project.

In specific, communication channels, communication activities and interactions are described in detail and evaluated against the goals that were set in D7.2 '*Plans for Dissemination and Communication, Standardisation and Interaction with 5G-PPP*', delivered in M3 of the project's lifetime.

Regarding communication channels, the Smart5Grid website and social media channels were created since M1, and their update with new content, posts and news is continuous, highlighting the latest project's activities and achievements as per communication plan and strategy. Newsletters are also issued quarterly, providing an important source of information about the consortium's activities. Other means of communication, like leaflet and poster, were also created in M6 and are used by partners during events for better promoting the project's main concepts and use cases.

Although, during this 1st year of the project, the core effort of the consortium focused on the technical WPs, early enough several partners started also contributing to the proper dissemination of the Smart5Grid project by presenting the project to conferences, 5G-PPP webinars and big events like InfoCom World 2021. Additionally, they contributed to many types of publications like conference paper, 5G-PPP white paper, articles, press releases, brochures etc. Finally, control mechanisms, evaluation of results, social media and website statistics as well as the impact of initial performed dissemination activities are presented in this document, while communication, dissemination goals and plans for the activities of the next period are also set.

Regarding 5G-PPP collaboration, Smart5Grid is committed with the 5G-PPP Programme and its intention to actively contribute to it in order to maximize its impact. Being identified the 5G-PPP and 5G IA WGs relevant to the project and the representative partners for each of them, in this deliverable, we report the main activities of each of these WGs during the first year, as well as the concrete Smart5Grid contributions to them. The list of on-going phase 3 projects with which we identified some kind of synergy and potential collaboration is foreseen and has been also updated.

Furthermore, as identified in the preliminary market assessment, the trends and dynamics of the Smart Grids are positive, as we have both a supportive regulatory framework and a shift to renewable energy sources which creates challenges to existing energy networks. After the first year of the project, we are updating the individual partner exploitation plans, while, during the next phase we start focusing on opportunities for cooperative exploitation.

Finally, Standardization activities during Y1 have mainly covered monitoring of some ESOs dealing with 5G ongoing challenges, as these have been identified by the several partners of the consortium (including 3GPP TSG SA WG2 (SA2), Open Source MANO, ETSI ISG MEC and ETSI ENI ISG). As the main architecture of the Smart5Grid project has been recently proposed (i.e., by early of October 2021 in the scope of the respective deliverable D2.2), it is

expected that more standardization-related effort shall take place in the forthcoming periods, in parallel with the corresponding trials.

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1. Introduction

1.1. Scope of the document

The scope of D7.3 is to present and evaluate the Dissemination and Communication activities, the interactions and collaborations with the 5G-PPP Programme and related research projects, to provide a first input about Market Aspects and Preliminary Exploitation Activities, and report the advancement of the Standardisation process, during the first year of its lifetime (Reported period M1-M11).

The document is kept on the point and is composed of five main sections:

- Communication and Dissemination Report
- Monitoring, Control and Evaluation Report
- Interaction with 5G-PPP plan
- Market Aspect and Preliminary Exploitation Activities
- Standardization Activities

1.2. Notations, abbreviations, and acronyms

Item	Description
3GPP	The Third Generation Partnership Project
5G	The Fifth Generation of Mobile Communications
5GAA	5G Automotive Association
5G-ACIA	5G Alliance for Connected industries and Automation
5G-IA	5G Infrastructure Association
5G-PPP	5G Public Private Partnership
6G	The Sixth Generation of Mobile Communications
AB	Advisory Board
AE	Analytical Engine
AF	Application Function
AI	Artificial Intelligence
AMF	Access & Mobility Management Function
AP	Access Point
API	Application Programming Interface
AUSF	Authentication Server Function
B5G	Beyond 5G
BSS	Business Support System
CA	Consortium Agreement
CAM	Connected and Automated Mobility
CAPIF	Common API Framework
CCAM	Cooperative Connected and Automated Mobility
CEPT	European Conference on Postal and Telecommunications Administrations

CN	Core Network
CNF	Cloud-native Network Function
CP	Control Plane
CPE	Customer Premises Equipment
CPU	Central Processing Unit
CU	Centralized Unit
C-V2X	Cellular Vehicle to Everything
DC	Data Centre
DE	Decision Engine
DoW	Description of Work
DP	Data Plane
DRES	Distributed renewable energy sources
DSO	Distribution System Operator
DU	Distributed Unit
E2E	End-to-End
EC	European Commission
ECC	Electronic Communications Committee
ESO	European Standardization Organization
EDSO	European Distribution System Operators for Smart Grids (non-profit association)
EEGI	European Electricity Grid Initiative
eMBB	enhanced Mobile Broadband
ENI	Experiential Networked Intelligence
ENTSO-E	European Network of Transmission System Operators for Electricity
EPIA	European Photovoltaic Industry Association
EPS	Evolved Packet System
ESP	Energy Security Project
ETP	European Technology Platform
ETSI	European Telecommunication Standards Institute
EU	European Union
EWEA	European Wind Energy Association
FP7	Seventh Framework Programme
FRMCS	Future Railway Mobile Communications System services
GA	Grant Agreement
GPU	Graphics Processing Unit
GSA	Global Suppliers Association
GUI	Graphical User Interface
H2020	Horizon 2020

ICT	Information and Communication Technology
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Task Engineering Force
IMS	IP Multimedia Subsystem
IoT	Internet of Things
IP	Internet Protocol
IRTF	Internet Research Task Force
ITU	International Telecommunication Union
ITU-R	International Telecommunication Union - Radiocommunication Sector
KPI	Key Performance Indicator
LCS	Longest Common Sequence
LMF	Location Management Function
LV	Low Voltage
MANO	Management and Orchestration
MCPTT	Mission Critical Push-to-Talk
MCS	Maximal Common Sequence
MEC	Mobile Edge Computing
MEC	Multi-access Edge Computing
MIMO	Multiple Input Multiple Output
ML	Machine Learning
mMTC	massive Machine-Type Communications
MNO	Mobile Network Operator
MoM	Minutes of Meeting
MPS	Multimedia Priority Service
MRP	Market Representation Partner
MS	Monitoring System
MV	Medium Voltage
MVNO	Mobile Virtual Network Operator
NEF	Network Exposure Function
NetApp	Network Application
NG	Next Generation
NGMN	Next Generation Mobile Networks
NG-RAN	Next Generation RAN
NFV	Network Functions Virtualization
NI	Network Intelligence
NRF	Network Repository Function
NS	Network Service
NSSF	Network Slice Selection Function
ONAP	Open Network Automation Platform
ODM	Open Source MANO

OLT	Optical Line Terminal
ONU	Optical Network Unit
O-RAN	Open Radio Access Network
OSM	Open Source MANO
OSS	Operations Support System
PAS IEC	Publicly Available Specification
PCF	Policy Control Function
PNF	Physical Network Function
PoC	Proof of Concept
PON	Passive Optical Network
PSCE	Public Safety Communication Europe
PSM	Pre-Structuring Model
PT	Project Team
QoS	Quality of Service
QR	Quick Response
R&D	Research and Development
RAN	Radio Access Network
RIS	Reconfigurable Intelligent Surface
RTD	Research and Technology Development
RU	Remote Unit
SB	Steering Board
SBA	Service-Based Architecture
SDO	Standards Development Organization
SDN	Software Defined Network
SG	Sub-Group
SLA	Service Level Agreement
SME	Small- and Medium-sized Enterprise
SMF	Session Management Function
SMS	Short Message Service
SNS	Smart Networks & Services
TB	Technology Board
T&D	Transmission and Distribution
T&L	Transport & Logistics
TMV	Test, Measurement and KPIs Validation
T&P	Trials and Pilots
TSDSI	Telecommunication Standards Development Society, India
TSG	Technical Specifications Group
TSO	Transmission System Operator
UC	Use Case
UDM	Unified Data Management

UE	User Equipment
UMTS	Universal Mobile Telecommunications System
UP	User Plane
URLLC	Ultra-Reliable Low-Latency Communications
USIM	UMTS Subscriber Identity Module
V2X	Vehicle to Everything
VNF	Virtual Network Function
W3C	World Wide Web Consortium
WG	Working Group
WI	Working Item
Wi-Fi	Wireless Fidelity
WP	Work Package
WP	Work Program
WRC	World Radiocommunication Conference
WWW, www	World Wide Web
XCF	5G-Xcast Control Plane network Function
XUF	5G-Xcast User Plane network Function
ZSM	Zero Touch Network and Service Management

Table 1: Acronyms list

2. Communication and Dissemination

2.1. Introduction

The main goal of Smart5Grid Communication and Dissemination Action Plan, as already described in *D7.2 Plans for Dissemination and Communication, Standardisation and Interaction with 5G-PPP*, is to create and spread the awareness of the project and its results to the widest possible audience and to attract potential users and customers. To achieve this goal, during the first year of the project, the various communication channels were introduced and were efficaciously managed to communicate Smart5Grid's activities to the public audience. Additionally, a set of dedicated dissemination actions and community building activities took place contributing to the growth of the project, and to the appropriate dissemination of Smart5Grid's vision, main goals, Platform, 4 Use Cases and early trials, to the scientific communities, academia, relevant industries, and end-users. This continuous communication and dissemination effort becomes more intense as the project evolves, and trials and solid results will become the focus of the dissemination plan.

2.2. Target Audience

In order to proceed smoothly to the Communication and Dissemination activities, we present briefly the Target Audiences. The reader can read a more detailed description in *D7.2 Plans for Dissemination and Communication, Standardisation and Interaction with 5G-PPP*.

- SMEs is a key target stakeholder in Smart5Grid. Industry Manufacturers, Telecom Operators and Power Grid Operators, as well as SMEs, the 5G-PPP actors, 5G IA members, industrial organizations actively involved in 5G, DSOs/TSOs and ESPs.
- Researchers both in academia and industry.
- Incubators, Associations, Digital Innovation Hubs.
- 5G-PPP Actors and Projects.
- Standardisation Bodies and Open-Source Communities.
- Public Authorities, Initiatives and Policy Makers.
- Citizens / General Public.
- General Press.

2.3. Means of Outreach Activities

The communication channels and dissemination means, were introduced the first months of the project and were further developed within the year. In the following sub-chapters 2.3.1 and 2.3.2 there is a full report of all the developed and active communication channels and selected means of dissemination:

2.3.1. Communication Channels

2.3.1.1. Logo and Presentation Templates

The logo (Figure 1) and the Presentation Templates (Figure 2) designed and developed during the first two months of the project and are efficiently used to enhance the branding integrity among all the communication tools and dissemination activities.



Figure 1: Smart5Grid Final Logo

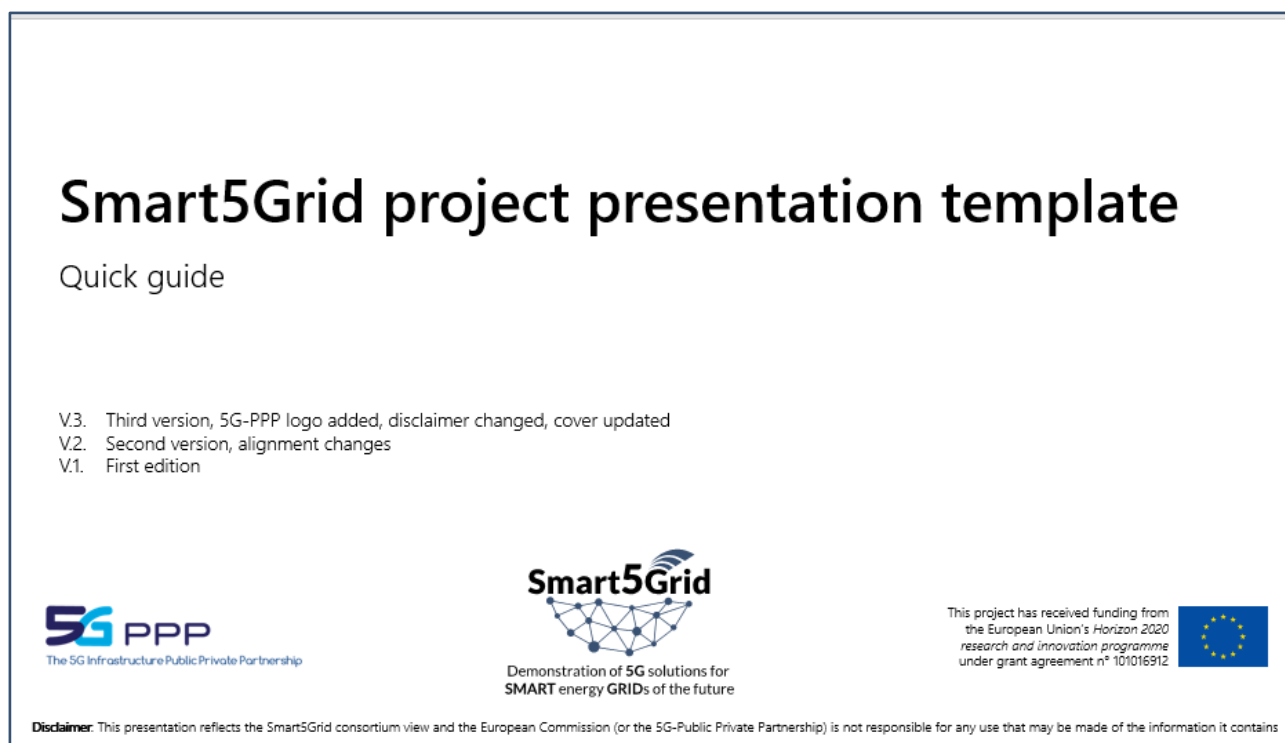


Figure 2: Smart5Grid Presentation Template

2.3.1.2. Website

As the main channel of communication and interaction with the wider public audience, Smart5Grid's website <https://smart5grid.eu>, is divided into eight menu sections, namely: Home, In Brief, The Project, Use Cases, Partners, Communication, Dissemination, Contact us.

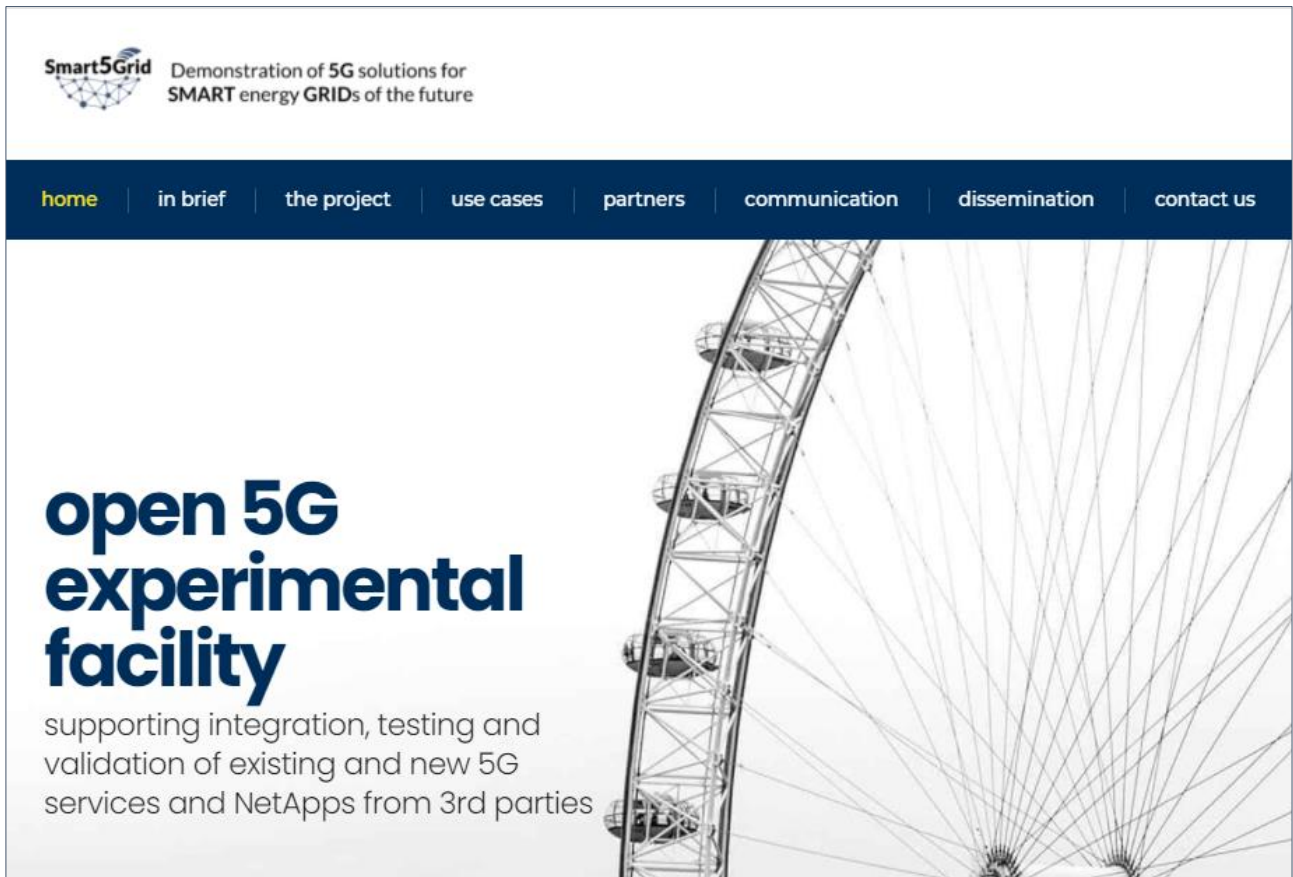


Figure 3: Smart5Grid Website

All the Communication and Dissemination Activities of the first year are uploaded on the website in order to keep informed all the relevant stakeholders about the project's activities, news and achievements. The update of the website is a continuous procedure, according also to the project's ventures.

Detailed analysis of the website has been provided in D7.1 and D7.2. However, since then several changes and updates have taken place. **Updated Webpages during the first 11 months of the Smart5Grid project are presented below:**

USE CASES TAB

Use Cases webpage (<https://smart5grid.eu/use-cases/>)

Use Cases Section was updated, as the technical pillars of the project have been further elaborated and finalized and reported in D2.2 *Use cases, system requirements and planned demonstrations*.

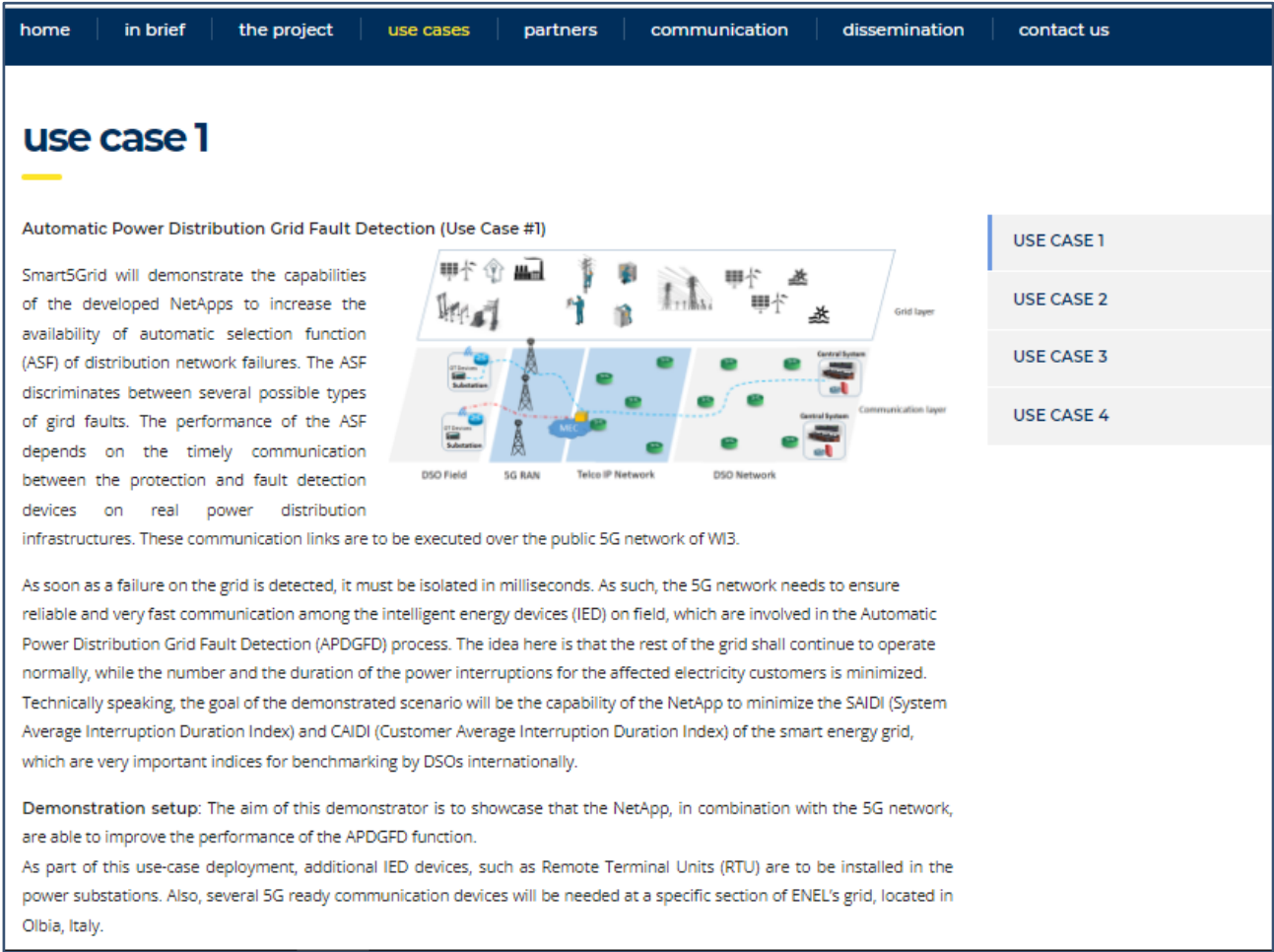


Figure 4: Smart5Grid Use Cases Section

COMMUNICATION TAB

News webpage (<https://smart5grid.eu/category/communication/news/>)

News is one of the sections of the website that is regularly updated (Figure 5). The update is weekly and there is a constant flow of news to the target audience in the form of Articles, Events, Newsletters, 5G-PPP News, and every internal or external activity which involves or concerns the project.

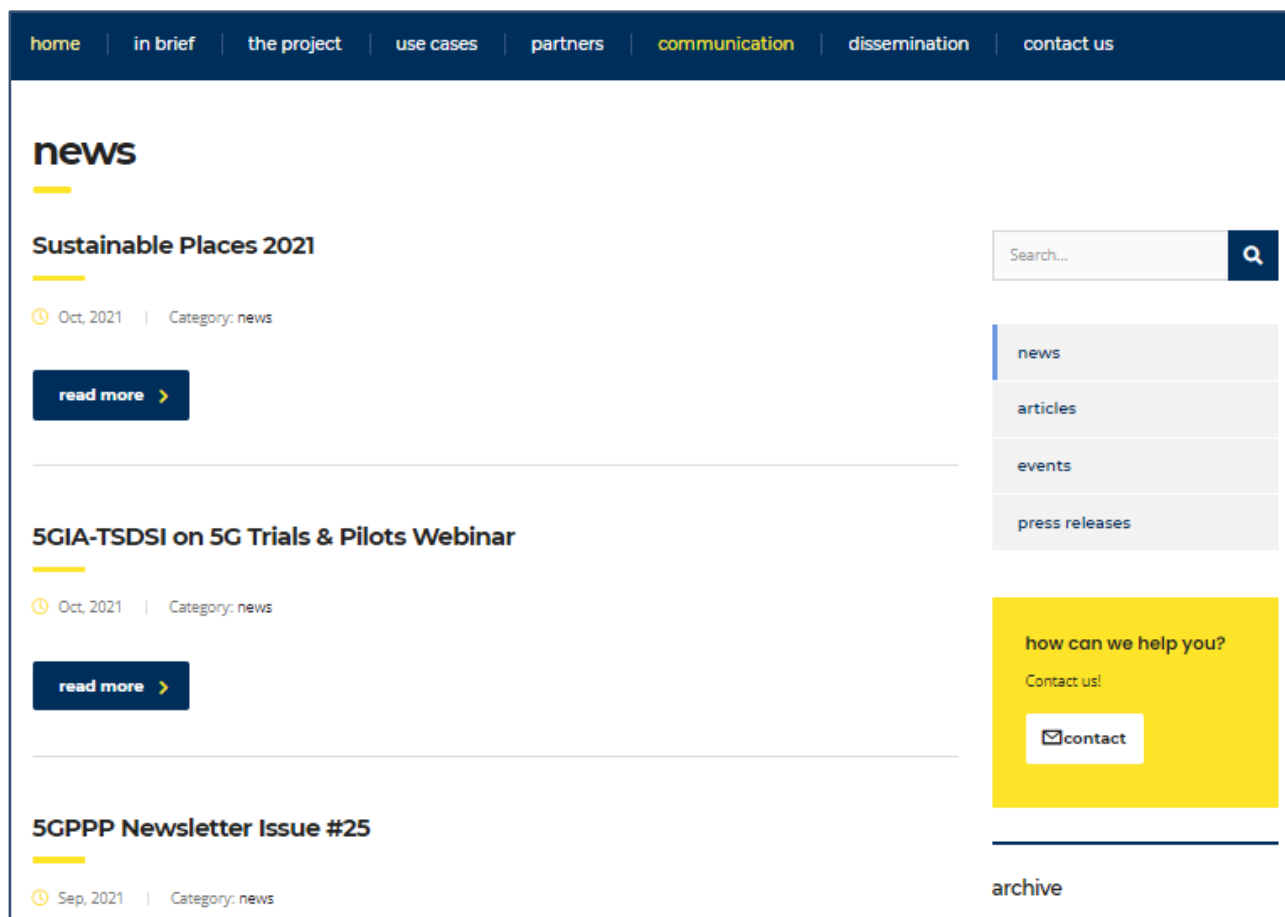


Figure 5: Smart5Grid News Section

Apart from the dedicated section under the Communication Tab, there is also a dedicated spot on the Home Page with the current News and Events.

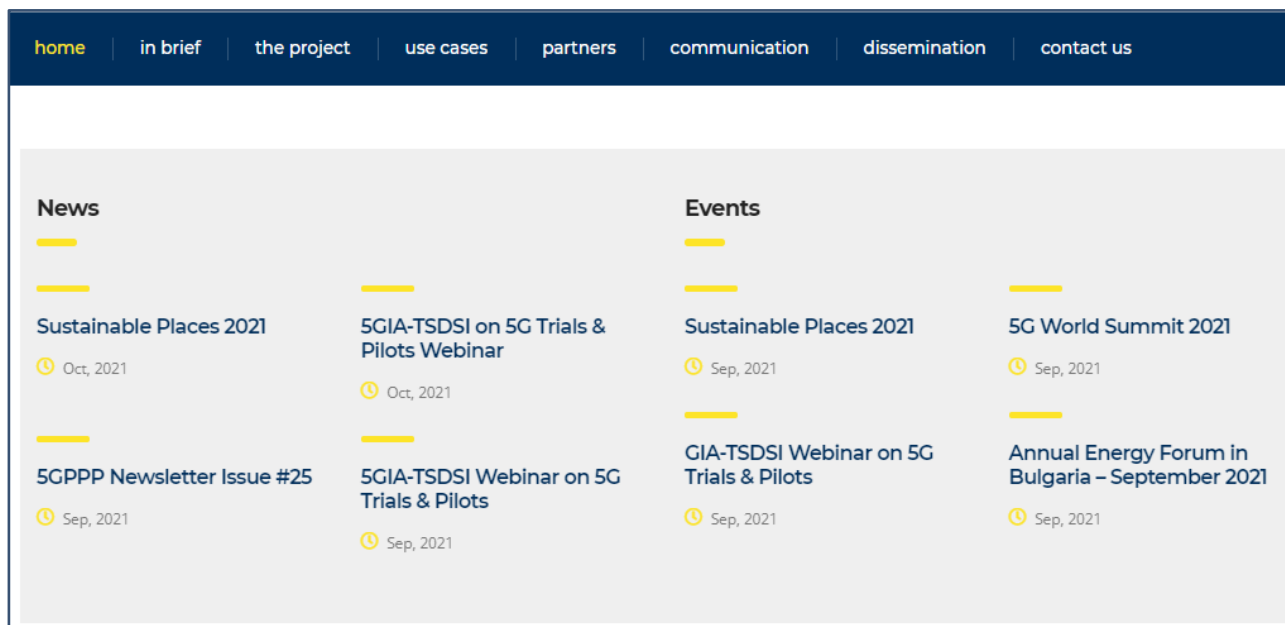


Figure 6: Website Home Page – Current News and Events dedicated spot

Articles webpage (<https://smart5grid.eu/category/communication/articles/>)

In this section, there is a variety of articles, in different languages, published in a variety of sources, e.g., online magazines, specialized energy, or economical websites etc., all related to project's and partners' activities Figure 7. These articles are available to read online or to download.

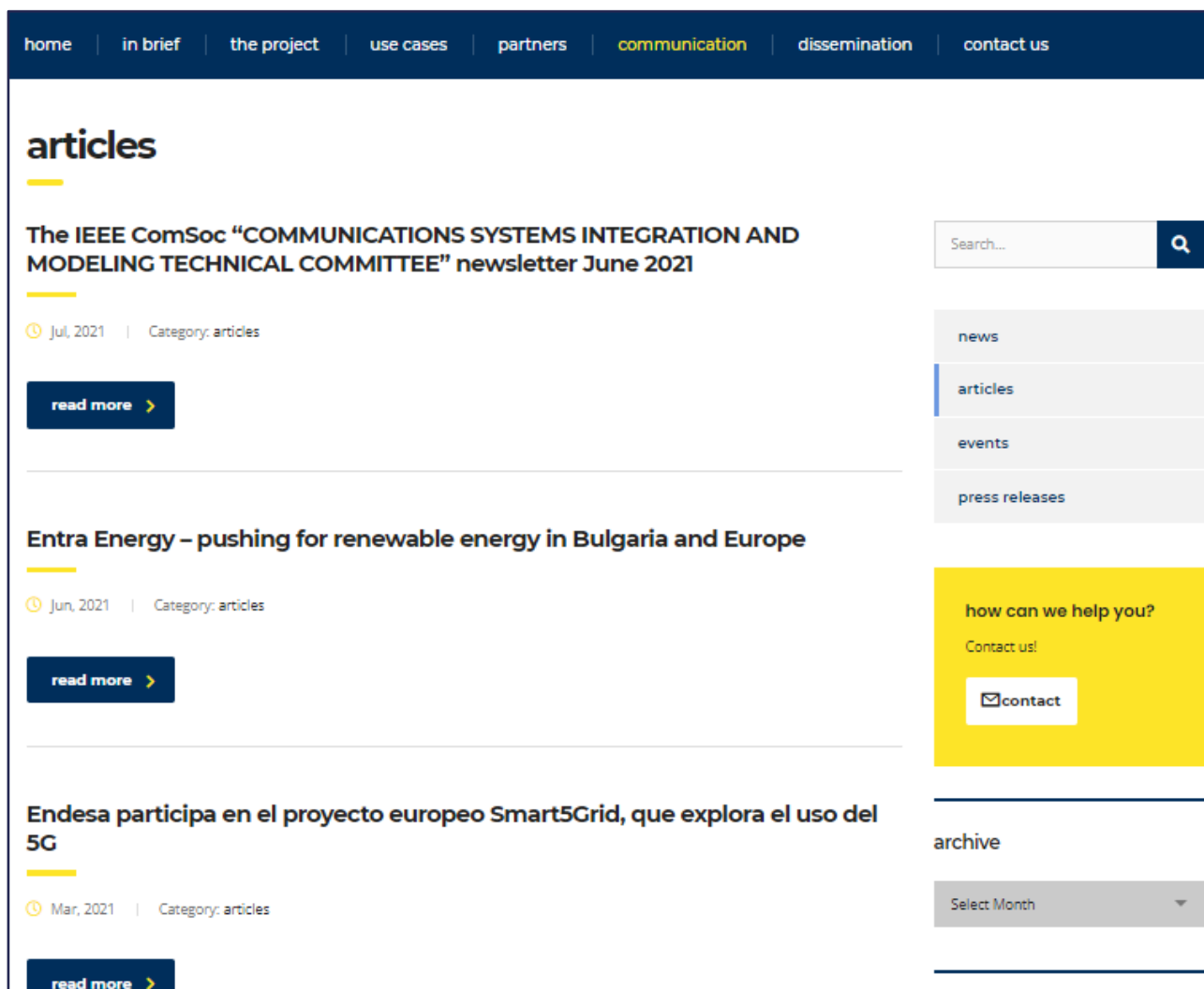


Figure 7: Website Articles Section

Events webpage (<https://smart5grid.eu/category/communication/events/>)

All the Events (Figure 8), where Smart5Grid's partners were involved are highlighted in this Section with descending chronological order, starting with the project's Kick-off Event. Even though many of these events took place virtually, the content of this section, apart from the participation description and the context of each event, is flourished with photos provided by the partners.

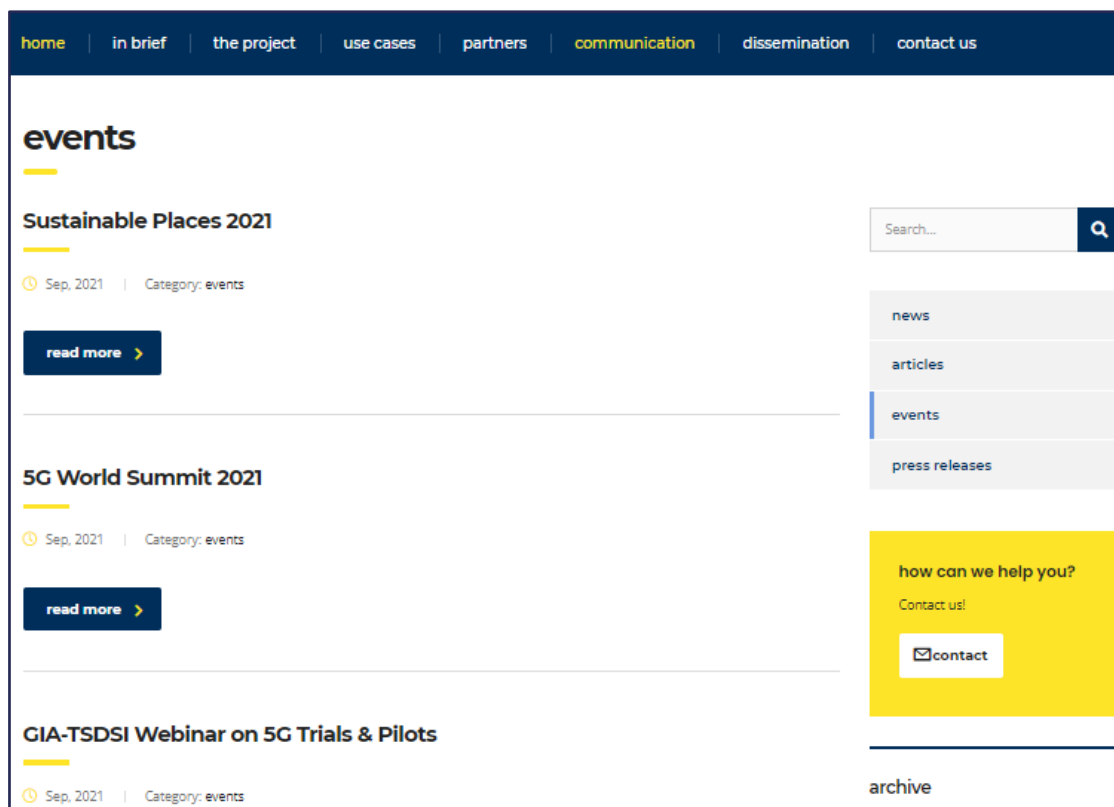


Figure 8: Website Events Section

Press Releases webpage (<https://smart5grid.eu/category/communication/press-releases/>)

Press Release section, for the time being, hosts material released by different partners to announce their participation to the Project (Figure 9).

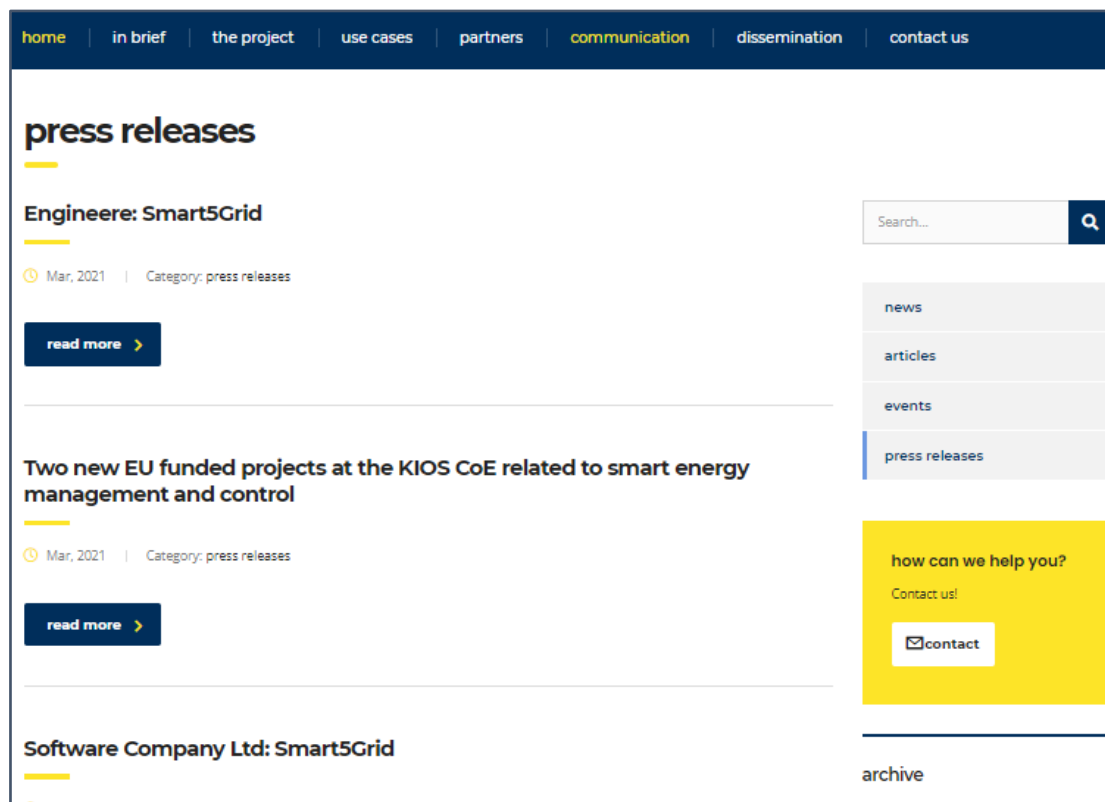


Figure 9: Website Press Releases Section

DISSEMINATION TAB

Deliverables webpage (<https://smart5grid.eu/dissemination-activities/deliverables/>)

All the submitted and upcoming Deliverables of the project are cited, listed by the No of Deliverable and the name. Delivery date, Status, Lead Partner, Type and Nature of the Deliverable (Public or Confidential) are also stated (Figure 10). The Deliverables, open to Public, are downloadable in .pdf.

No.	Deliverable Name	Delivery Date (Project Month)	Lead Beneficiary	Type	Dissemination Level (Confidential - C / Public - P)
D1.1	Project management handbook with strategic plan for quality assurance and risk management	02 (submitted)	ENEL	Report	C
D1.2-1.3	Periodic/Final project report (including financials) RP1 / PR2	18 / 36	ENEL	Report	C
D1.4-D1.6	Data Management Plan Y1/Y2/Y3	12 / 24 / 36	ENEL	Report	C

Figure 10: Website Deliverables Section

Leaflets and Posters webpage (<https://smart5grid.eu/dissemination-activities/leaflets/>, <https://smart5grid.eu/dissemination-activities/posters/>)

This section was updated on M6, when the final versions of the first Leaflet and Poster were completed. The files can be downloaded in .pdf files here [poster](#) and here [leaflet](#) (Figure 11 and Figure 12)

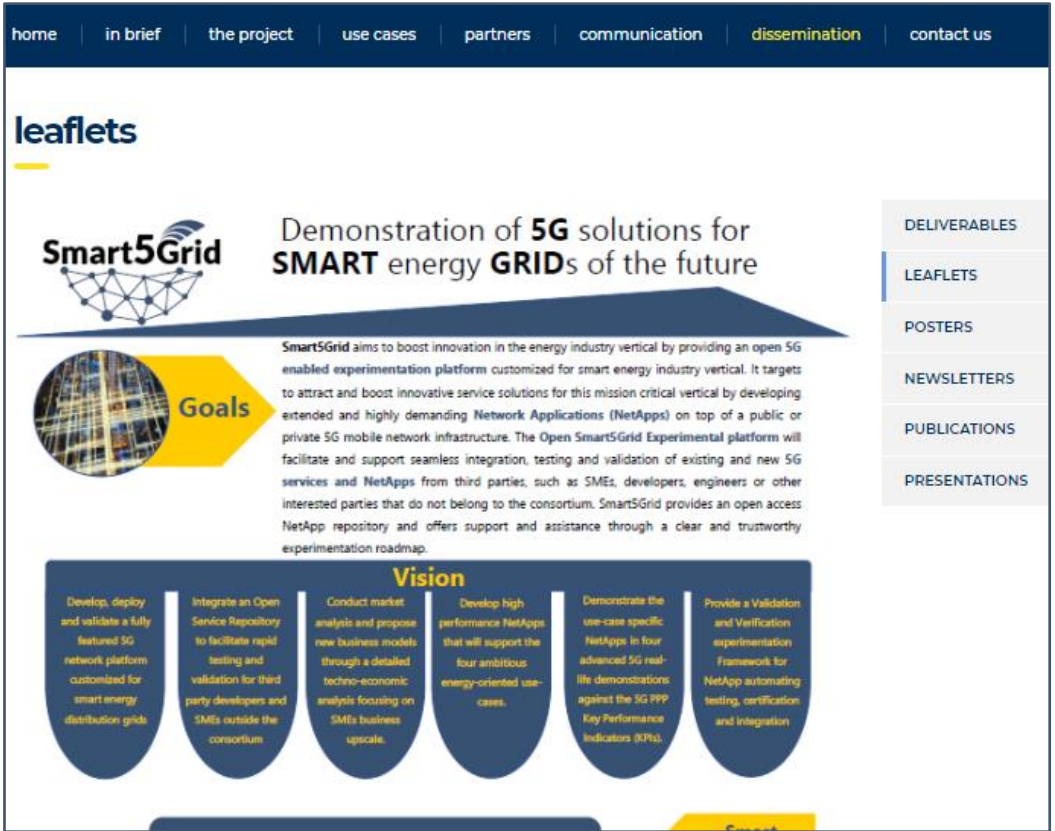


Figure 11: Website Leaflets Section



Figure 12: Website Posters Section

Newsletter webpage (<https://smart5grid.eu/dissemination-activities/newsletters/>)

Newsletters section is updated every 3 months, when a new Smart5Grid Newsletter issue is released. The Newsletters can be read and downloaded in a .pdf form, here [Issue 1](#), [Issue 2](#) and [Issue 3](#).

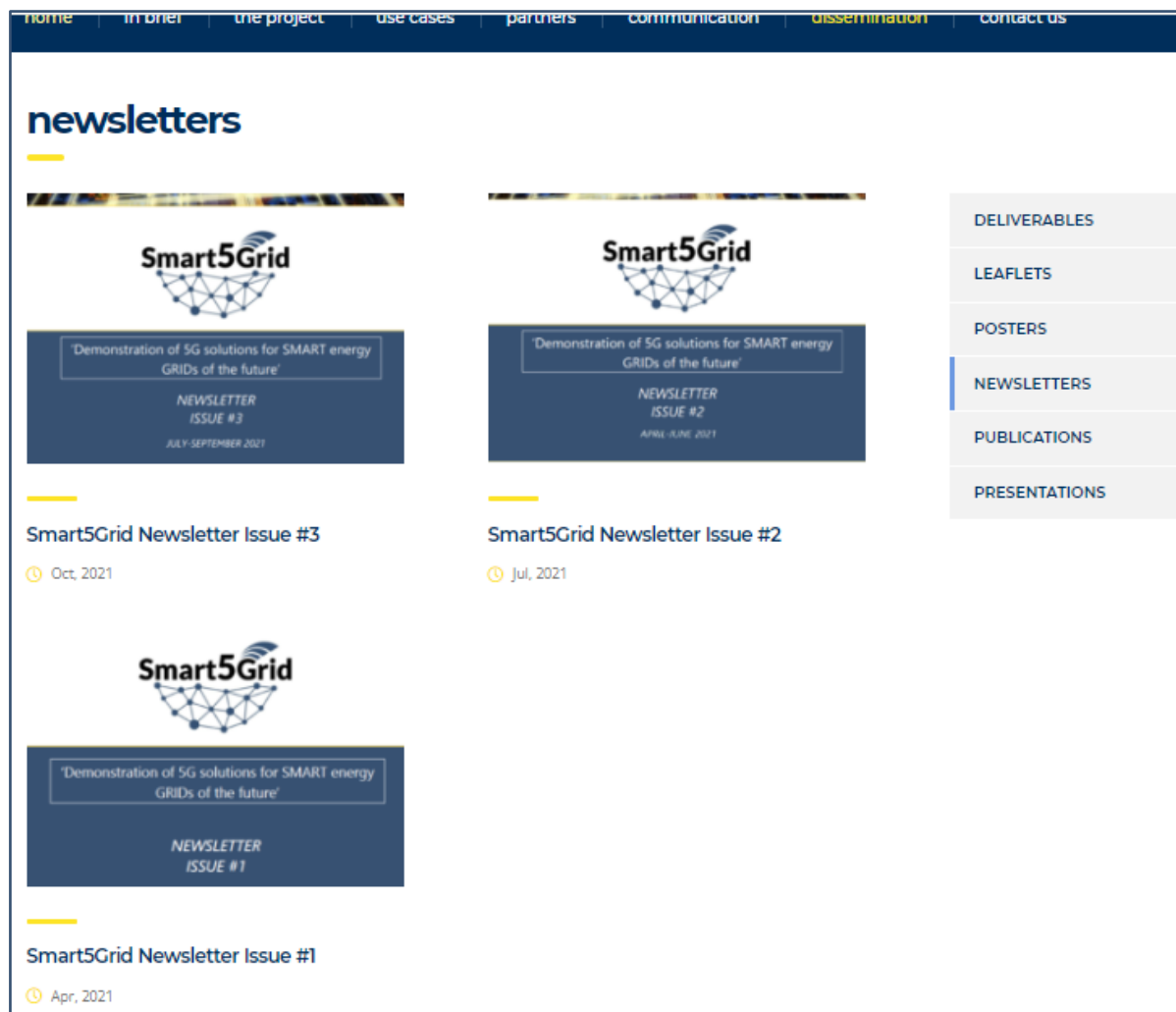


Figure 13: Website Newsletter Section

Publications webpage (<https://smart5grid.eu/dissemination-activities/publications/>)

This page is dedicated to research papers, which are or will be published in journals, conferences workshops etc, as also to white papers and 5G-PPP publications. Each one of these publications has its date and location of publication, as well as its respective link to be accessed (Figure 14).

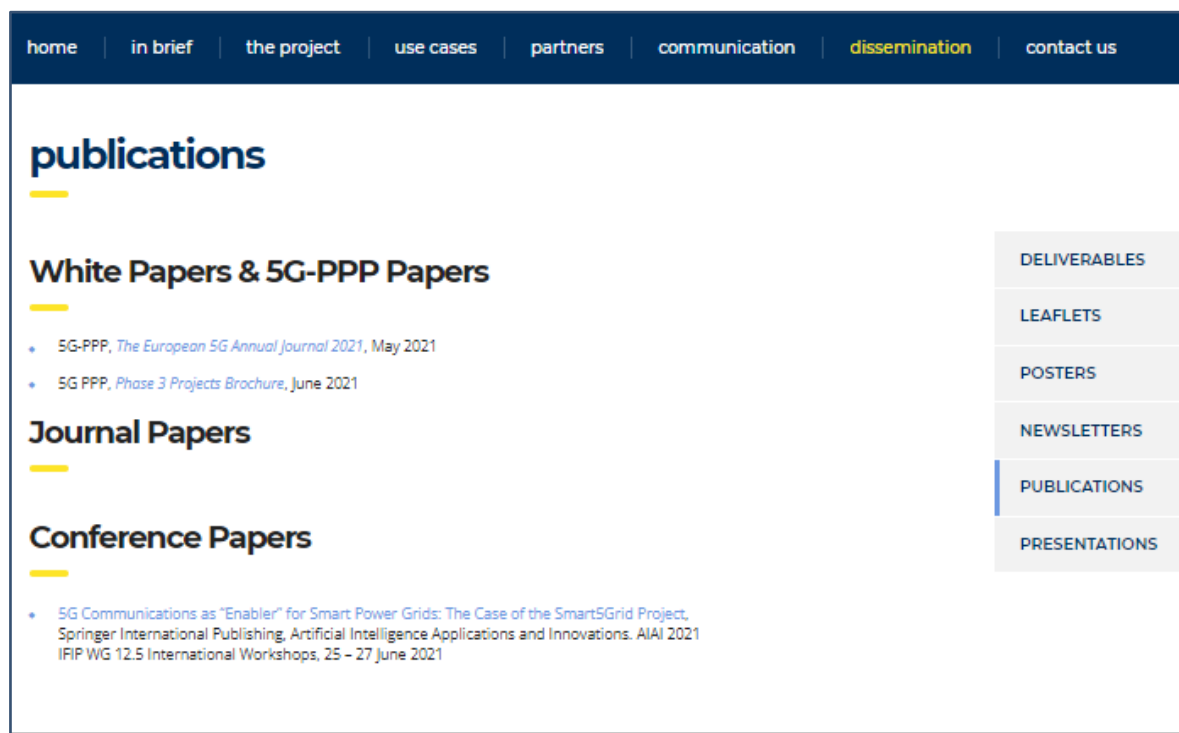


Figure 14: Website Publications Section

Presentations webpage (<https://smart5grid.eu/dissemination-activities/presentations/>)

This section is dedicated to the list of presentation activities which the Smart5Grid partners have participated in. Various presentations are taking place in workshops, webinars, working groups and other events (Figure 15).

Event	Partner	Date	Title
ETNO Webinar	Entra Energy	7 December 2020	Smart5Grid project - Use Case 3
5GPPP webinar	ENEL	5 March 2021	5G Innovations for Verticals
AIAI 2021, Online conference	OTE	25-27 June 2021	5G Communications as "Enabler" for Smart Power Grids: The Case of the Smart5Grid Project
5G-PPP Trials WG Plenary Meeting	UCY-KIOS cpe	5 July 2021	Overall vision and goals of the Smart5Grid project
Annual Energy Forum in Bulgaria	ESO	September 2021	Overall vision and goals of the Smart5Grid project - Focus on UC3&4
SGIA-TSDSI Webinar on 5G Trials & Pilots	UCY, ENEL, ENG	September 2021	NRG-5 Trials to Smart5Grid
Sustainable Places 2021, Rome	ESO	September 2021	Overall vision and goals of the Smart5Grid project
National Energy Conference "The Smart Grids in Bulgaria: Good Practices and Perspectives"	ESO	18 November 2021	"Smart5Grid: Demonstration of 5G solutions for SMART energy GRIDs of the future" and current state
INFOCOM WORLD 2021	OTE	26 November 2021	Smart5Grid: Demonstration of 5G Solutions for SMART energy GRIDs of the Future
INFOCOM WORLD 2021	OTE	26 November 2021	Smart5Grid: OTE's Contribution to Wide Area Monitoring

Figure 15: Website Presentations Section

2.3.1.3. Social Media channels

Social Media platforms are already active since M1 and are updated weekly in order to communicate project's activities, achievements and highlights. Social Media are an efficient and cost-effective mean of communication and play an important role to reach wider and diverse audience and the content is managed adequately. The content, which is communicated, covers a great variety of topics and activities; from events, presentations, and articles related to Smart5Grid, to 5G-PPP activities, relevant industry news and important European events. The creation of the hashtag **#LearnAboutSmart5Grid**, groups all the relevant Smart5Grid posts under a common Smart5Grid umbrella, promoting important activities of the project and differentiate it from other posts. Moreover, the hashtags **#smart5grid**, **#innovation** and **#research**, are used to give the core essence of the project

and the hashtags **#5G** and **#5G-PPP** are used in order to reference the 5G-PPP and engage the 5G community with Smart5Grid project.

All Smart5Grid social media channels can be found in project's official website, in the footer of the Newsletters and in all the rest of communication channels (leaflet, poster etc.) with activated links leading to the corresponding platform.

The Smart5Grid social media channels are the following:

- a. **LinkedIn:** smart5Grid Project (<https://www.linkedin.com/in/smart5grid-project/>)

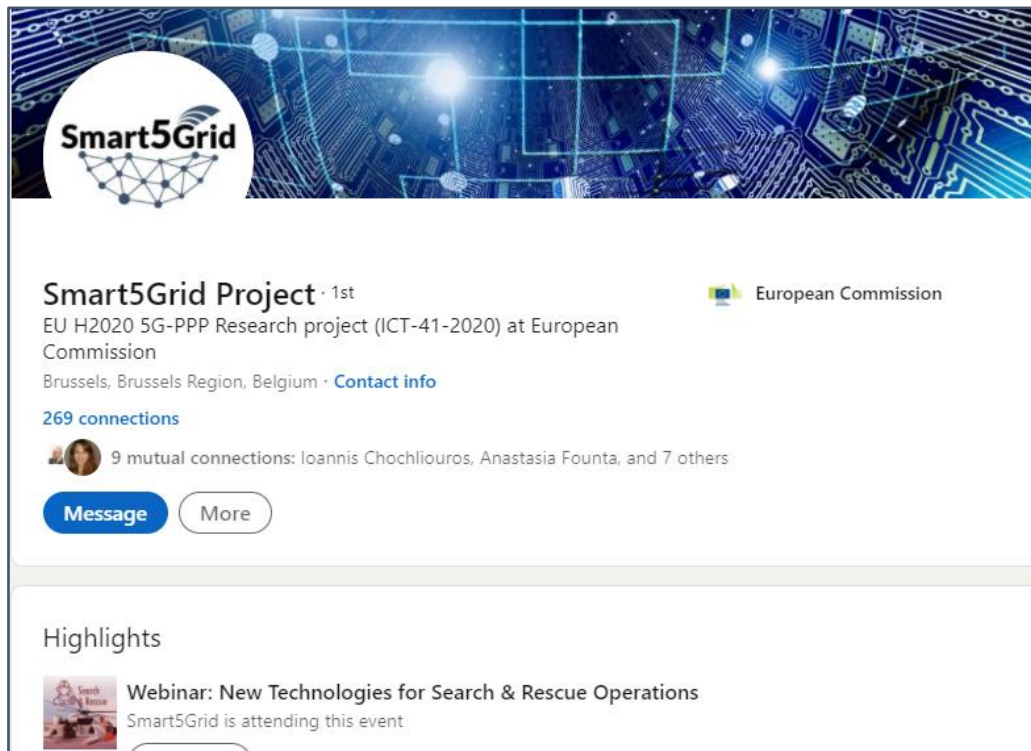


Figure 16: LinkedIn Page

- b. **Twitter:** @smart5grid (<https://twitter.com/smart5grid>)



Figure 17: Twitter Page

- c. **Facebook:** Smart5Grid (<https://www.facebook.com/smart5grid>)

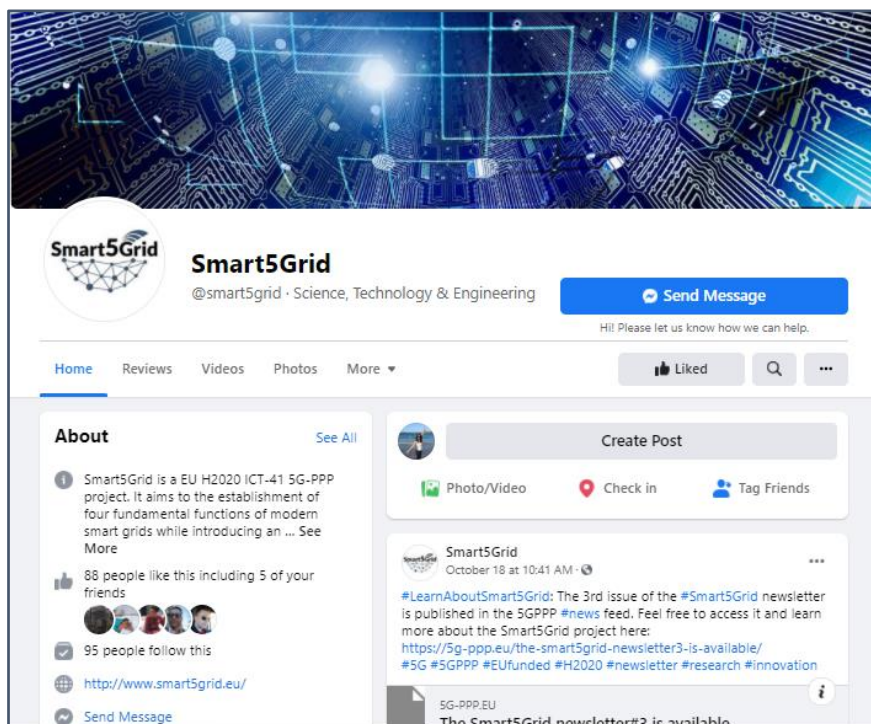


Figure 18: Facebook Page

d. **Instagram:** smart5grid (<https://www.instagram.com/smart5grid/>)

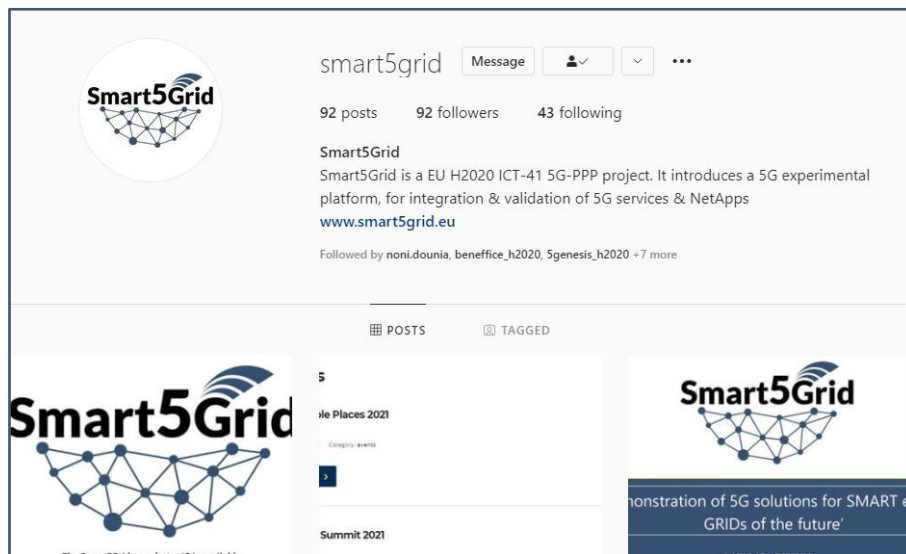


Figure 19: Instagram Page

e. **YouTube:** Smart5Grid Project (<https://www.youtube.com/channel/UC3B4D0B2iw16FFbgiP4BJ4g>)

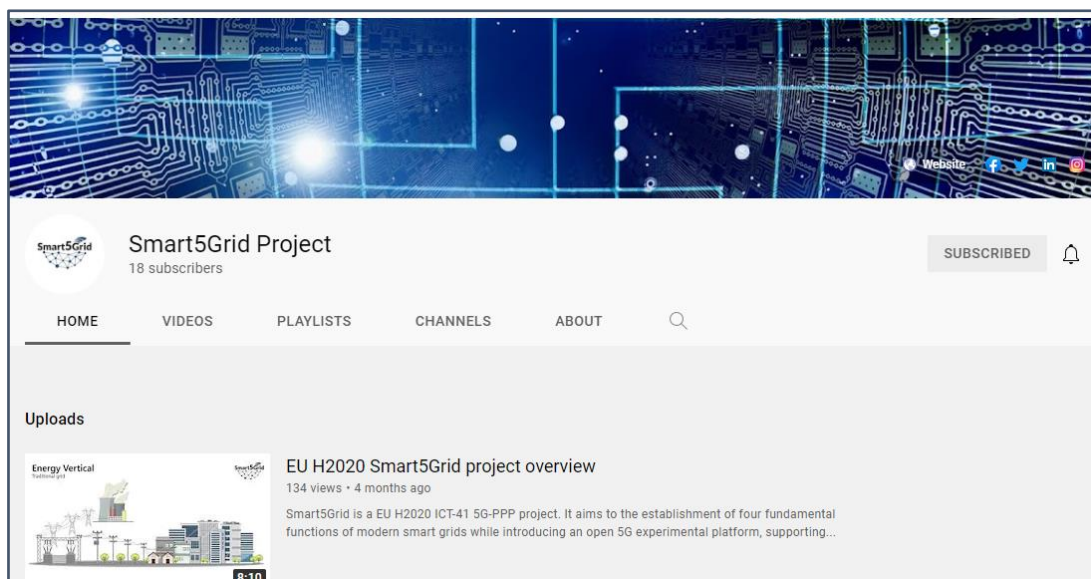


Figure 20: YouTube Page

2.3.1.4. Newsletters

Newsletters are important as they accumulate and communicate all the activities and the highlights of a specific period. The Smart5Grid Newsletter is issued quarterly, and three Newsletters have been already released communicating the project's activities per period (Figure 21). The structure consists of three permanent sections, Communication & Dissemination Activities, 5G-PPP activities, Deliverables, and new sections may be added, if it is acquired.

The release procedure starts with sharing the Newsletter to the project's partners, then it is published in the official website, is posted on the social media channels and finally it is distributed to the 5G-PPP Comms, list of subscribers.

All the newsletter issues published can be accessed at the dedicated page at the official website (<https://smart5grid.eu/dissemination-activities/newsletters/>), where they can be read online or downloaded.



Figure 21: Newsletter #3

2.3.1.5. Posters

Smart5Grid poster was designed and became available to the Consortium partners in M6 with the aim to represent the project on conferences and likewise events. All the important introductory elements are included in a 1-page, A1 size poster including the Partners, Goals, Vision, the 4 Use Cases and other communication elements like website and Social Media links. For the print version a QR code linking to the website is also available.



Figure 22: First Smart5Grid A1 size Poster

2.3.1.6. Leaflet

In accordance with the Poster, an introductory Smart5Grid leaflet (2-page leaflet in A4 size), was designed and became available to the partners in M6. It also includes all the introductory elements of the project Consortium, Goals, Vision, 4 Use Cases plus the Architecture of the Open Experimental 5G platform. Links to website and social media are also available for the digital version. For the print version a QR code linking to the website is also available.

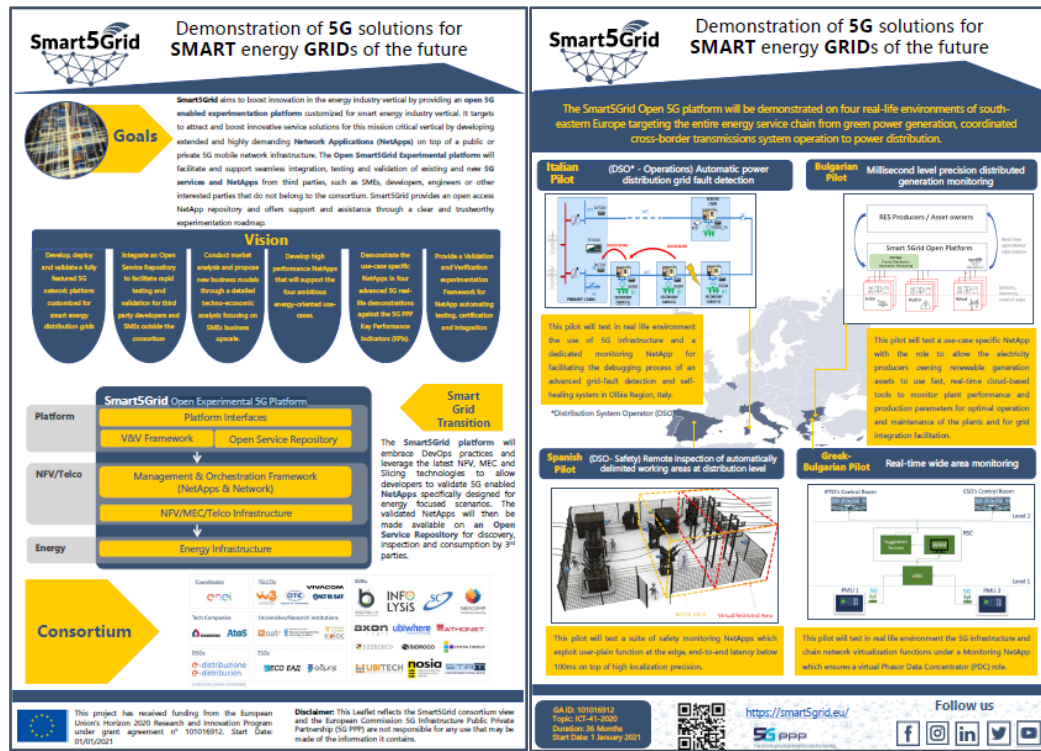


Figure 23: First Smart5Grid 2-sided A4 Leaflet

2.3.1.7. Video

An introductory YouTube video was developed and uploaded in M6, in order to provide an overview of the project, including the structure, the objectives, expected impact and the 4 Use Cases, in a simple and straight forward way in order to raise awareness and familiarity with the project to the public audience. The video was communicated via the Smart5Grid Channels and the 5G-PPP network.

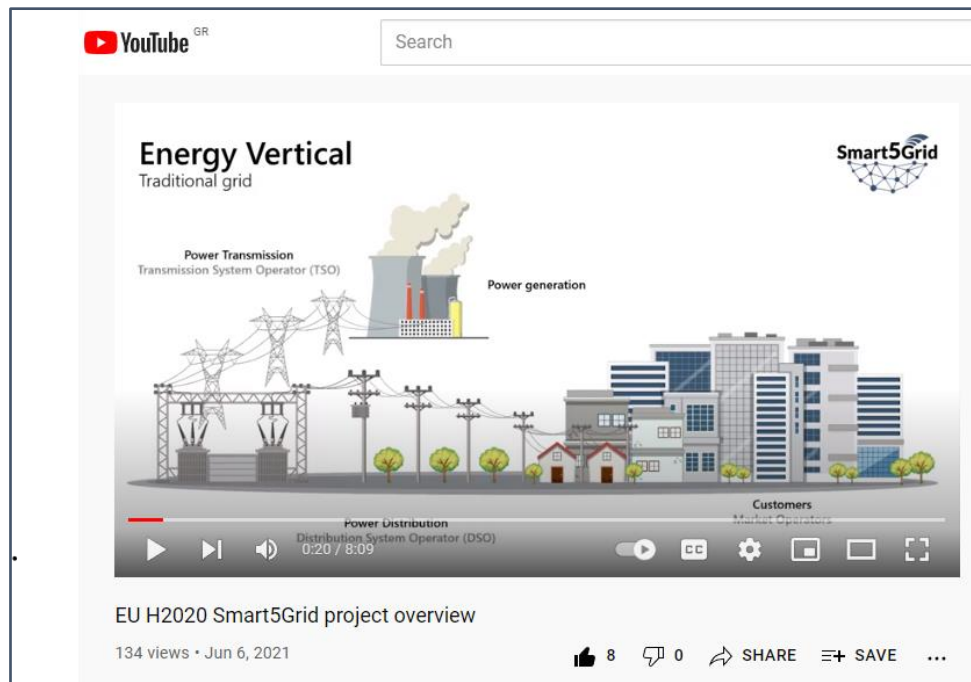


Figure 24: YouTube Smart5Grid Introductory Video

2.3.2. Dissemination Means

Hereby, we present briefly the Dissemination Means which have already been used or they will be used in the upcoming months in order to efficiently disseminate the project. For more details about first year's performed activities the reader can proceed in Section 2.5 Outreach Activities – Year 1

2.3.2.1. Publications in journals, workshops, conferences and White Papers

Research, Technical and Academia Smart5Grid partners are already active and are expected to participate with publications in workshops and in conferences along with participation in journals. In order to ensure the proper dissemination and the file preservation even after the end of the project, a Zenodo repository Smart5Grid account and its corresponding community has been created (<https://zenodo.org/communities/smart5grid/>). As per the time this report was under editing, the project has been involved in one (1) conference paper and in one (1) White paper.

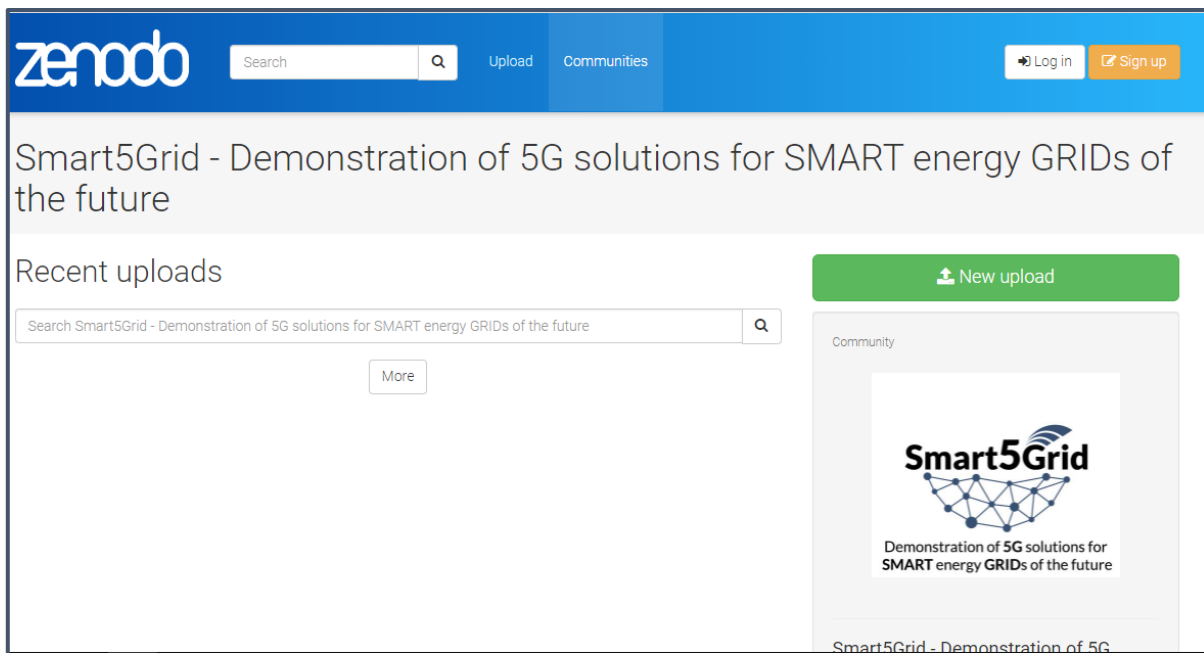


Figure 25: Smart5Grid Zenodo Account and Community

2.3.2.2. Presentations in Workshops, scientific events and fora.

Presentations at scientific events are crucial in order to raise awareness and provide valuable information about the project to targeted research and industry community, and to increase credibility to the project. Until M11, Smart5Grid partners had participated in ten (10) different kind of events where they efficiently presented Smart5Grid project.

2.3.2.3. Field Trials and Showcases

Field Trials and Showcases are scheduled to start in M13 and will be organized by the different Smart5Grid partners, when the project is mature enough to showcase, and until the end of the project, with the aim to attract potential users and to enable the dialogue among the researchers and the market.

2.3.2.4. Exhibitions in industrial and scientific events

From M13-M36 an important dissemination activity of the project will be the participation in Industrial and scientific events, to attract the interest of the wider community, including experts from industry, SMEs, academia as well as audience with technical interests. Reaching out telecom operators, technology providers, content providers, service providers, energy providers, and device manufacturers from various verticals, will increase Smart5Grid's visibility and will have the chance to showcase its achievements by demonstrating its results and assessing Smart5Grid Use Cases.

2.3.2.5. Organization of events (workshops/seminars/webinars):

Apart from spreading the word about the project, events like workshops, conferences, seminars and webinars, are crucial in order to guide all the relevant stakeholders through the Use Cases, provide training about the experimentation Smart5Grid platform and the developed NetApps Repository. During the first 11 months of the project 3 events organized by the Consortium.

2.3.2.6. Active participation in 5G-PPP and NetworldEurope activities.

Smart5Grid partners are aware of the contractual commitment of the 5G-PPP as well as the organisational structure as described in the 5G-PPP contract and its technical annex. They acknowledge the roles and commitments of the European Commission (EC), the PPP partnership board, the NetworldEurope (the previously named Networld2020 association¹) ETP², the 5G Infrastructure Association³ (5G-IA), and the 5G for Europe and commits to constructive interactions with these bodies.

2.3.2.7. Other Events, Press Articles and other publications

Contributions to several other publications and events with aim to increase the awareness about Smart5Grid project have occurred during the first 11 months of the project. Partners have contributed Articles in a variety of magazines and other media. Twenty-eight (28) articles have been published in different languages. They have also represented Smart5Grid in 3 Events.

2.4. Means for Coordinating, Monitoring, and Controlling Outreach Activities

Throughout the project lifetime, a set of tools is used for securing the efficient and continuous monitoring and evaluation of communication channels and activities and corrective actions to be applied whenever necessary. These coordinating, monitoring and controlling mechanisms are in place since the project's initiation and are constantly reviewed, adapted, and updated to the latest needs of the project and its partners.

2.4.1. MS TEAMS file sharing portal

Since M1 the Consortium employs the Microsoft team platform (Figure 26), as the online repository tool for sharing material and content. Different sections-folders and subfolders have been created and they regularly updated in order to enhance the good collaboration and the alignment among the partners. The dedicated folders were created per Work Package and Task and they include, among others, project material for public use, like Templates, Communication material etc, Task Presentations, MoM, Deliverables, files which record or inform about Dissemination and Communication Activities.

¹ For further details also see: <https://www.networldeurope.eu/>

² Also see: <https://5g-ppp.eu/etp/>

³ For further details also see: <https://5g-ppp.eu/5g-infrastructure-association/>

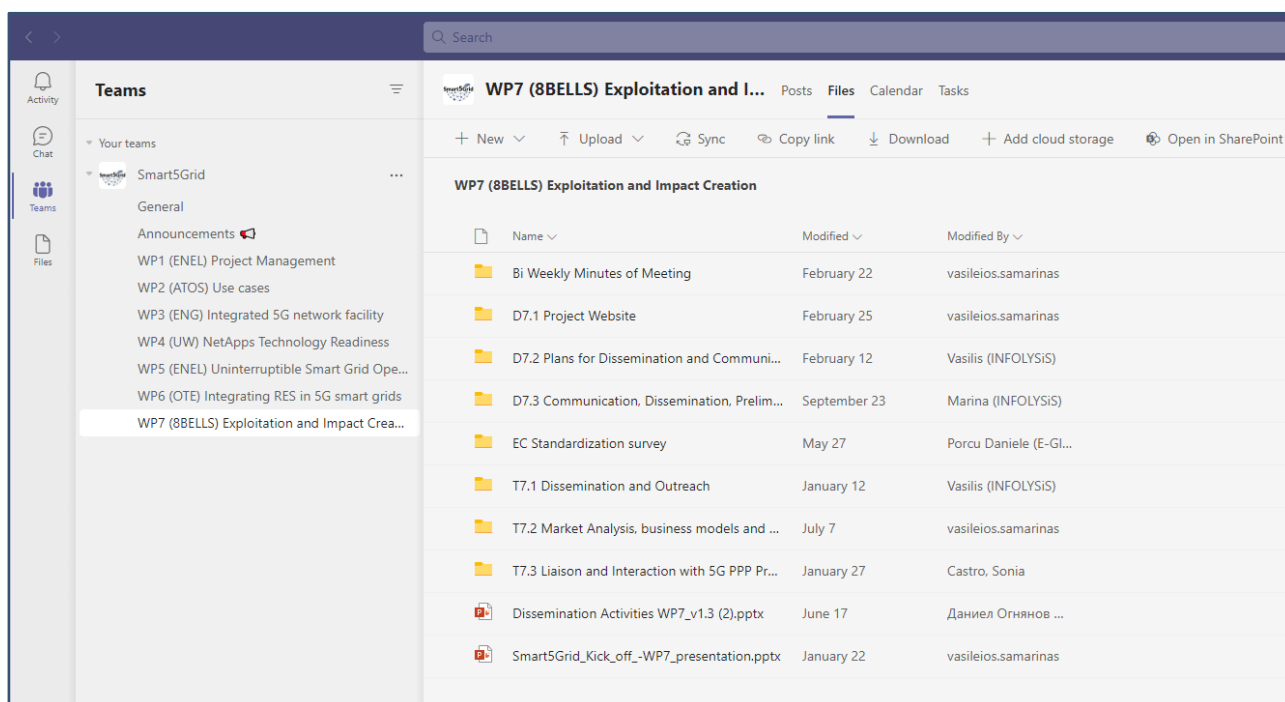


Figure 26: MS TEAMS Online repository

2.4.2. WP7 activities reporting file and Dissemination opportunities tracking file

In the WP7 folder residing in the MS TEAMS repository, the activities that the Smart5Grid partners performed or planned to perform are reported in an excel file with the distinctive title "WP7 activities Reporting". All project's partners have access to this excel file and it is updated regularly with material from presentations, conferences, and other activities in which Smart5Grid participated or plans to participate. The WP7 activities excel file contains two Tabs, one under the name 'Activities Performed' and one under the name 'Dissemination opportunities'. The piece of information of each of the documented activities contain the title of the activity, who is involved, the date and location of the activity as well as additional information regarding it (e.g., a URL link).

F38						
A	B	C	D	E	F	G
25	2021/20th July	Bulgaria	"Smart Grids Implementation – The Bulgarian Approach" Management of Transmission and Distribution Grids with F	presentation		
26	2021/22nd September	online	Text and Pilots (T&P) WG of the SG-IA	presentation		
27	2021/14th July	online	Webinar "Enabling Technologies and Requirements for Future Rail Transport Vertical"	Attendance		https://www.network4europe.eu/webinar-0
28	2021/30th Sept	webinar	SG IA Webinar "Smart Networks and Services for Verticals"	Attendance		https://sg-ia.eu/event/09-webinar-for-ve
29	2021/13-15 Oct	Montreal + Virtual	ARCHITECTURAL EVOLUTION TOWARD 5G NETWORKS as part of IEEE 5G World Forum	Papers, Workshop	Deadline for paper submission: August 14, 2021	https://sg-ia.eu/Architectural-Evolution-5
30	2021/09-12-12	Hybrid	5G+ Europe 2021	Attendance		https://www.5g-europe.eu/
31	2021/23-24/11	Conference	2021 29th Telecommunications Forum (TELFOR)	Attendance	Call for Papers Deadline: 10 September 2021	https://www.telfor.es/
32	2021/02-12-03/12	Conference	ECTP Conference, 2-3 December 2021, Madrid	presentations		http://e2b.ectp.org/news-events/events/e
33	2021/5-12-10/12	Conference	16th annual IGF meeting will be hosted by the Government of Poland in Katowice		IGF 2021 Call for Thematic Inputs open until 31 January	https://www.igf2021.org/
34	2021/20-21/10	Conference	Digital around the world 2021			https://digitalaroundtheworld.org/#
35	2021/01-12-03/12	Conference	2021 International Conference on Computational Performance Evaluation (COMPE)			https://compe2021.com/
36	2021/25-10-27/10	Online Conference	EU Sustainable Energy Week (EUSEW) 2021, "Towards 2030: Reshaping the European Energy System"	attendance		https://eu-europe.eu/info/events/eu-sus-en
37	2021/15th Nov	Online Journal	"Special Issue on Distribution Grid Management Based on the Use of 5G Communication"	paper	15 November final submission	https://www.rtdp.com/journal/eu-ecdn
38	2021/24th-26th Nov	Conference - Greece	InfoComm World 2021	presentations, Workshops		https://www.infocommworld.com/
39	2021/14-15/10	online event	8th Global 5G Event "5G Empowers the Digital Economy"	attendance		https://www.5g-for-europe.com/en/21/08/202
40	2022/8/01-11/01	Las Vegas	IEEE Consumer Communications & Networking Conference - Call for Papers Hexa-X project and Workshop "6G: visions, use cases and technologies"	Papers	Workshop Papers Due: 15 October 2021 Workshop Papers Acceptance Notification: 5 November 2021 Final Camera-Ready Paper Due: 19 November 2021	https://ccnc2022.ieee-ccnc.org/authors/6g
41	2022/07-10 June 2022	Grenoble, France	Joint EuCNC & 6G Summit	papers, Workshop, session, posters etc	KEY DATES 2022 Jan. 09 - Open submission of Papers for Regular Sessions, Workshops proposals, Special Sessions proposals, Tutorials proposals, Exhibitions proposals and Travel Grant Applications 2022 Jan. 28 - Deadline for submission of Papers for Regular Sessions 2022 Jan. 28 - Deadline for submission of Workshops proposals 2022 Jan. 28 - Deadline for submission of Special Sessions proposals 2022 Jan. 28 - Deadline for submission of Tutorial proposals Call for Papers Deadline: 22 January 2022	https://www.eucnc.eu/
42	2022/14-16/6	Conference	2022 IEEE 21st Mediterranean Electrotechnical Conference (MELECON)		Important Dates for Paper Submissions • Manuscripts Due: February 28, 2022 Submission Fees: 500€	https://melecon2022.org/

Figure 27: MS TEAMS WP7 Activities performed file and Dissemination Opportunities

2.4.3. Smart5Grid Social Media and Website Statistical Dashboards

INF, T7.1 leader, is responsible for the collection, processing and visualization of the social media and website data. Data from those sources are collected and then processed and visualized with the use of Google Data Studio in a monthly basis. The statistical dashboards are distributed internally via email every trimester to the Smart5Grid WP7 mailing list. More details on annual and trimester Smart5Grid social media and website dashboards are provided in Section 2.6 and in Annex 1 – Trimester Smart5Grid Website Dashboards and Annex 2 – Trimester Smart5Grid Social Media Dashboards

2.4.4. WP7 telcos

WP dedicated telcos are another monitoring method of the Smart5Grid activities. These telco meetings take place weekly or biweekly. Each of the work packages has its respective set of telco dates for the meeting. Meetings regarding WP7 activities take place each bi-weekly and the partners discuss the progress, dissemination opportunities, so far as well as the next steps to be taken towards their planned actions.

2.4.5. WP7 mailing list/emails

Smart5Grid has distinctive mailing lists for each of the WPs in order for the partners to be informed of the current status of the WPs of the project, as well as the upcoming activities. The WP7 mailing list is used in order to coordinate the activities of the partners as well as promote, align and coordinate various dissemination activities, such as an upcoming newsletter issue or a paper co-authored by several partners.

2.5. Outreach Activities – Year 1

This section focuses on the Activities performed, related metrics and relevant information, which took place during the first 11 months of the project.

As per Smart5Grid Communication and Dissemination plan (Ref: D7.2), three (3) Communication and Dissemination stages have been identified in order to frame the communication effort and give guidance for the dissemination activities which will lead to successful impact.

- Stage 1 (M01-M06): Awareness Creation and Marketing Foundation
- Stage 2 (M06-M12): Community Outreach and Engagement Bootstrap
- Stage 3 (M12-M36): Showcasing and Global Outreach

Furthermore, Smart5Grid's dissemination activities will differ in intensity based as the project evolves. In order to better monitor the intensity and set the corresponding goals per time period, the dissemination activities will be divided and carried out in three main annual phases:

- Phase 1: Y1.
- Phase 2: Y2.
- Phase 3: Y3 and after project ends.

As a result, a split ratio percentage of **20/30/50 approximately** is used for setting the minimum planned goals per phase and set achievable goals.

In the following Table 2 the overall project quantitative goals set the dissemination framework and form the criteria of dissemination and communication activities during the 3 years of the project (as already defined at D7.2).

PLANNED DISSEMINATION ACTIVITIES	METRICS	TARGET	TIMELINE	Y1	Y2	Y3
Publications in journals, conferences and white papers	Number of publications	>20	Publications: M06-M36 (and after the end of the project)	10%	40%	50%
Presentations in scientific events and workshops	Number of presentations	>20	Presentations: M01-M36	20%	35%	45%
Field Trials/Showcases	Number of trials/showcases	>5	Exhibitions/Workshops/Events: M12-M36	-	30%	70%
Exhibitions in industrial and scientific events	Number of exhibitions/booths	>5	Demonstrations/Showcases: M12-36	-	30%	70%
Organisation of events (workshops/seminars/training/poster sessions/webinars)	Number of events	>10	Events: M06-M36	20%	35%	45%
Other Events, Articles/Brochures etc	Number of events/publications		Publications: M03-M36 (and after the end of the project)	-	-	-

Table 2: Smart5Grid metrics for the Dissemination Activities

2.5.1. Summary of Dissemination Activities

This section focuses on reporting Smart5Grid dissemination activities performed during the first 11 months of the project. Table 3 summarizes all the successfully performed Smart5Grid dissemination and communication activities in relation with the targets set in the D7.2 and the activities are described further in the next sessions.

PLANNED DISSEMINATION ACTIVITIES	METRICS	PROJECT TARGET	TIMELINE	Y1	Activities Y1 Target (M1-M12)	Activities performed up to M11
Publications in journals, conferences and white papers.	Number of publications	>20	Publications: M06-M36 (and after the end of the project)	10%	2	2
Presentations in scientific events and workshops	Number of presentations	>20	Presentations: M01-M36	20%	4	10
Field Trials/Showcases	Number of trials/showcases	>5	Exhibitions/Workshops/Events: M13-M36		-	-
Exhibitions in industrial and scientific events	Number of exhibitions/booths	>5	Demonstrations/Showcases: M13-36		-	-

Organisation of events (workshops/seminars/training/poster sessions/webinars)	Number of events	> 10	Events: M06-M36	20%	2	3
Other Events, Press Releases, Articles etc	Number of Events/articles				-	33
TOTAL		> 60	M1-M11		8	48

Table 3: Smart5Grid metrics for the Dissemination Activities in Y1

2.5.1.1. Publication in journals, conferences and White Papers

Smart5Grid project successfully submitted a paper in the 17th *International Conference on Artificial Intelligence Applications and Innovation (AIAI-2021)*⁴, a remote live conference which took place from 25th – 27th of June.

The title of the paper is ‘5G Communications as “Enabler” for Smart Power Grids: The Case of the Smart5Grid Project’, and it was a joint effort from several Smart5Grid Partners. The paper was presented by Dr. Ioannis Chochliouros, from OTE, during the context of the Workshop on “5G – Putting Intelligence to the Network Edge” (5G-PINE 2021).

Additionally, Smart5Grid partner ATOS, was the lead partner for the project’s contribution in the 5G-PPP White paper, ‘View on 5G Architecture V0.4’ in the context of Architecture Working Group.

TITLE	JOURNAL/ CONFERENCE	Date/ Location /issue	Accepted preprint version Download Link and DOI
5G Communications as “Enabler” for Smart Power Grids: The Case of the Smart5Grid Project	17 th AIAI 2021	25-27/06/2021 Remote Live Conference	https://www.springerprofessional.de/en/5g-communications-as-enabler-for-smart-power-grids-the-case-of-t/19296202 DOI: https://doi.org/10.1007/978-3-030-79157-5_1
View on 5G Architecture v4.0	5G-PPP Architecture WG	V0.4, October 2021	https://www.doi.org/ DOI: https://doi.org/10.5281/zenodo.5155657

Table 4: Smart5Grid Submitted Papers and White Paper contribution

2.5.1.2. Presentations in scientific events and workshops

During the first 11 months of the project, Smart5Grid partners, participated in various events presenting Smart5Grid overall goals and objectives, the 4 Use Cases and the Platform. The presentations were part of various events such as workshops, industry events, conferences

⁴ <http://www.AIAI2021.eu/>

etc. The Table 5 shows all the presentations along with their date and location followed by a description of each event. Due to the COVID-19 impact, many of these presentations were delivered remotely since many events held virtually.

	EVENT	Partner	Date/ Location	Title
1	ETNO Webinar	EE	7 December 2020	Smart5Grid project – Use Case 3
2	5G-PPP webinar	ENEL	5 March 2021	5G Innovations for Verticals
3	AIAI 2021, Online conference	OTE	25-27 June 2021	5G Communications as “Enabler” for Smart Power Grids: The Case of the Smart5Grid Project
4	5G-PPP Trials WG Plenary Meeting	UCY-KIOS CoE	5 July 2021	Overall vision and goals of the Smart5Grid project
5	Annual Energy Forum in Bulgaria	ESO	7-10 September 2021	Overall vision and goals of the Smart5Grid project – Focus on UC3&4
6	5GIA-TSDSI Webinar on 5G Trials & Pilots	UCY, ENEL, ENG	22 September 2021	NRG-5 Trials to Smart5Grid
7	Sustainable Places 2021, Rome	ESO	28 Sep -1 Oct 2021	Overall vision and goals of the Smart5Grid project
8	National Energy Conference “The Smart Grids in Bulgaria: Good Practices and Perspectives”	ESO	18 November 2021	“Smart5Grid: Demonstration of 5G solutions for SMART energy GRIDs of the future” and current state
9	InfoCom Word 2021	OTE	24-26 November	“Smart5Grid: Demonstration of 5G Solutions for SMART energy GRIDs of the Future”
10	InfoCom Word 2021	OTE	24-26 November	“Smart5Grid: OTE’s Contribution to Wide Area Monitoring”

Table 5: Smart5Grid Project presentations

Below there is a more detailed description of each event.

2.5.1.2.1. ETNO WEBINAR

On the 7th of December, in the context of ‘5G Users Forum: Empowering EU Smart Cities’, as a preliminary activity, Smart5Grid Use case 3 was presented by Teodor Bobochikov, from Entra Energy partner. The aim was to demonstrate the potential usage of 5G network and IoT smart devices. In such ways, flexibility of the smarter grid and consumption management, with potential to empower the transition to smart cities of the future, is accomplished. The audience included ETNO (European Telecommunications Network Operators Association)

Members and Partners, EU Commission representatives, municipalities, and companies in the Energy sector vertical.



Figure 28: Smart5Grid Presentation at ETNO Webinar

2.5.1.2.2. 5G-PPP WEBINAR

On the 5th of March 2021, Daniele Porcu from ENEL, Smart5Grid project coordinator, participated in the 5G-PPP Webinar: “5G Innovations for Verticals”. This webinar presented the 9 new 5G Innovations for Verticals with Third Parties projects that joined the 5G-PPP in the second half of 2020 to accelerate the take up of 5G in the vertical sectors. According to 5G-PPP.eu over 120 participants attended the webinar.

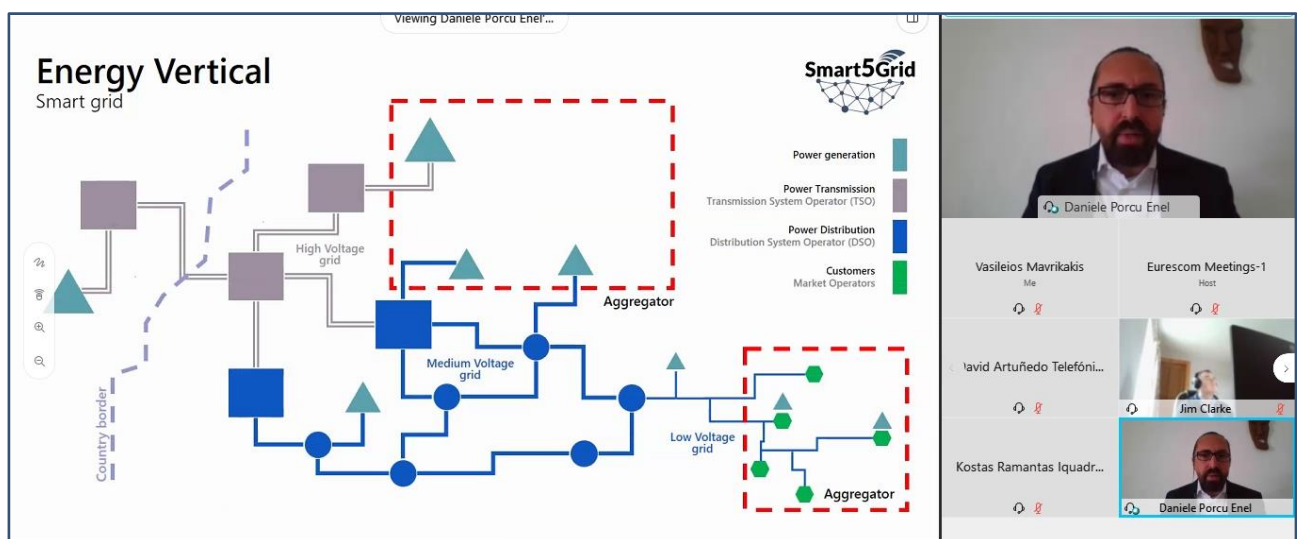


Figure 29: Smart5Grid Presentation at 5G-PPP webinar “5G Innovations for Verticals”

2.5.1.2.3. AIAI 2021

In the context of the 17th International Conference on Artificial Intelligence Applications and Innovation (<http://www.aiai2021.eu/>), a remote live conference which took place from 25th – 27th of June, the Smart5Grid paper entitled, ‘5G Communications as “Enabler” for Smart Power Grids: The Case of the Smart5Grid Project’, was presented. Dr. Ioannis Chochiourous

from OTE, led the presentation during the Workshop on “5G – Putting Intelligence to the Network Edge”. The workshop had attendees from at least 10 5G-PPP and H2020 projects.

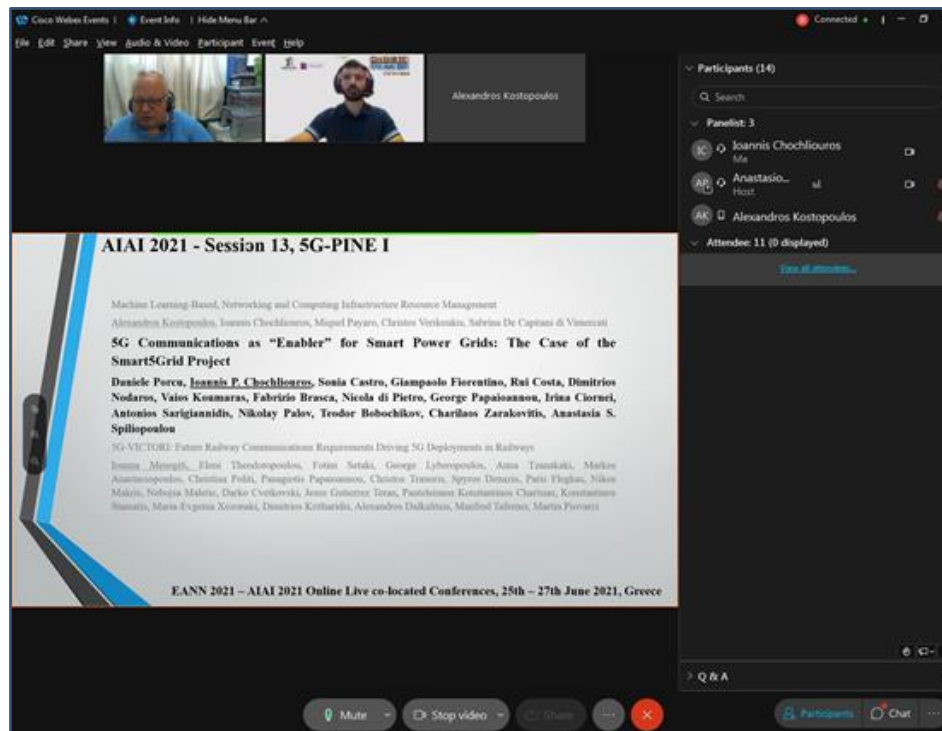


Figure 30: Smart5Grid Conference Paper Presentation

2.5.1.2.4. 5G-PPP TRIALS WG PLENARY MEETING

Dr. Irina Ciornei from UCY – KIOS CoE, participated and represented Smart5Grid project at ‘5G-PPP Trials WG Plenary Meeting’, an online event which took place on the 5th of July. The Smart5Grid presentation focused on the overall vision and goals of the project and briefly introduced the four use-cases (demos) from the business perspective.



Figure 31: Smart5Grid presentation at ‘5G-PPP Trials WG Plenary Meeting’

2.5.1.2.5. ANNUAL ENERGY FORUM

On the 7-10th September, in the context of the Annual Energy Forum in Sofia, ESO/EAD Partner represented the Smart5Grid project. Mr. Daniel Shangov and Mr. Krasimir Vlachkov, presented an overview of Smart5Grid project during the plenary session organized by the

Scientific and Technical Union of the Power Engineers. The presentation highlighted, Smart5Grid's vision and main goals, the Platform, as well as all 4 Use Cases with a special emphasis on Use Case 3 and Use Case 4, which will take place in Bulgaria and in Greek-Bulgarian cross borders respectively.



Figure 32: Smart5Grid presentation at 'Annual Energy Forum', in Bulgaria

2.5.1.2.6. 5GIA-TSDSI WEBINAR ON 5G TRIALS & PILOTS

On the 22nd of September, a joint webinar, on '5G Tests and Pilots', organized by 5G-IA, and India's equivalent organization, TSDSI. Three Smart5Grid partners, ENEL, ENG and UCY, were invited to present the vision of the project and some testing results as part of the Smart Grids panel, which was formed from only few "hot verticals" which were selected as per interest: 5G Smart Grids, 5G Smart City, 5G Broadcast, and 5G Media production. The presentation from the Smart5Grid consortium, titled "From NRG-5 Trials to Smart5Grid", and presented by Antonello Corsi (Engineering), Irina Ciornei (Kios CoE, University of Cyprus), and Daniele Porcu (Enel GI&N).

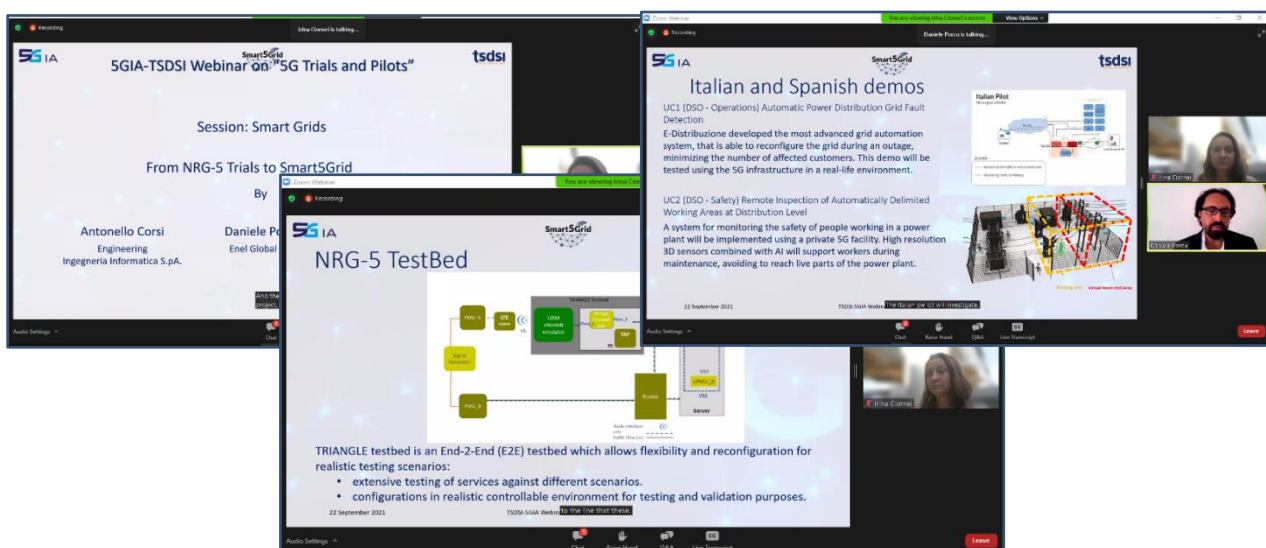


Figure 33: Smart5Grid presentation at 5GIA-TSDSI Webinar

2.5.1.2.7. SUSTAINABLE PLACES 2021

On the 29th of September, in the context of Sustainable Places 2021 hybrid event which was hosted in Rome (28th September – 1st October), Daniel Shangov (ESO EAD) presented the Smart5Grid project along with the overall platform architecture, the 4 Use Cases and the project's goals. The presentation focused on changing grid topology with growing DER and diffused RES generation, new experimentation opportunities for Flexibility Service Providers (third party SMEs, start-ups as well as stakeholders across the energy vertical), and market aspects.

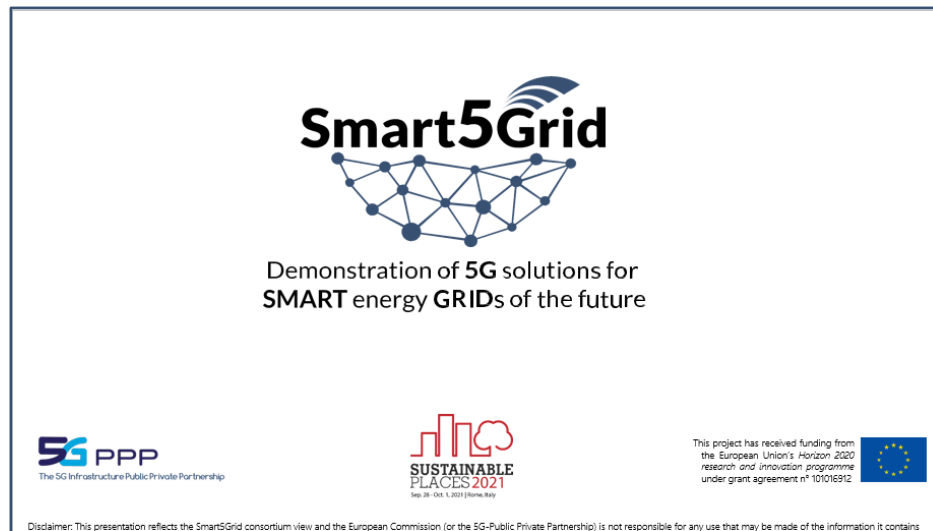


Figure 34: Smart5Grid presentation at Sustainable Places 2021

2.5.1.2.8. NATIONAL ENERGY CONFERENCE

The first National Energy Conference "The Smart Grids in Bulgaria: Good Practices and Perspectives" took place on 18 Nov 2021 at Sofia Tech Park and involved key energy sector stakeholders such as governmental institutions, TSO, DSO, NGOs, leading branch unions in the Bulgarian smart grid domain, Sofia Tech Park, as well as the STRIDE project representatives. On behalf of Smart5Grid Partner ESO EAD, Nikolay Chavdarov presented the national smart grid policies and developments while Daniel Shangov delivered a presentation on the Smart5Grid project's general concept, use cases, platform, and current status.



Figure 35: ESO partner in National Energy Conference in Bulgaria

2.5.1.2.9. 23RD INFOCOM WORLD CONFERENCE "RECHARGING GREECE: REVOLUTION OF THE EVOLUTION!"

The latest 23rd Infocom World Conference that was held virtually in Athens, Greece, on November 24-26, 2021⁵, is considered as "the greatest ICT & Media Conference in South-Eastern Europe" and it is widely regarded as "the Major Annual Meeting of all the digital market stakeholders" in order to implement Digital Transformation, conformant to current market needs and/or related challenges.

The Infocom World Conference 2021, following a successful tradition of 23 subsequent years, is about the revolutionary effects coming from technology and market evolution towards new digital dimensions in a fully converged world. The pandemic measures and conditions as shaped in all specs of social and professional everyday life, changed everything and led to an awesome acceleration, in terms of utilizing digital technologies. As the entire planet tries to return to normal, Greece is also at a critical juncture, facing the great challenge of harnessing the dynamics created by the further adoption of new technologies so that using digital transformation as a means, it may lead to increased growth rates at multiple levels, regaining potential lost ground. Digital technologies, and especially telecommunications infrastructure and ICT services and solutions for citizens and businesses, are the "key" to this effort to restore and "accelerate" the process for growth.

The Infocom World Conference 2021 included, among other subjects, challenges about developing 5G infrastructures, setting up an ecosystem of applications and solutions that utilize 5G, as well as focusing on investments in new technological infrastructures and solutions, and their utilization by the public and private sectors.

The 2021 Conference was organised in three daily Workshops, each one covering specific aspects and related challenges.

⁵ <https://infocomworld.gr/en/home-en/>

The entire context of the third day event (Friday, November 26, 2021) has been about structuring a research-oriented full-day Workshop to discuss several options about “More than 5G!”.

To this aim, the Hellenic Telecommunications Organization S.A. (OTE) organised seven (7) distinct sessions, all oriented to actual 5G challenges and invited several speakers coming from ongoing EU-funded projects, most of which from the 5G-PPP framework of reference.

The proposed sessions were about:

- (i) Focus on the fundamental context of the 5G infrastructure; this also assessed appearing challenges towards “Beyond 5G” (B5G) and provided information about two among the three of the core 5G platforms, used for interoperability and testing purposes (i.e. the 5GENESIS⁶ and the 5G-EVE⁷ projects).
- (ii) Setting emphasis on the verticals by presenting not only the context and the architectural framework but also by discussing advanced validation trials (including results and assessment of respective KPIs) from multiple vertical industries. (Results from the ongoing 5G-TOURS⁸ and 5G-HEART⁹ projects presented, in parallel with the progress of Data Ports project together with MARVEL and CYRENE projects).
- (iii) Presenting the specific case of the 5G-PPP LOCUS project, assessed as platform/tool dealing with localization and analytics on-demand embedded in the 5G ecosystem, for serving vertical applications. This can be assessed an example for supporting innovation in verticals.
- (iv) Discussing 5G innovations for verticals with potential third-party services, together covering issues about the intended deployment and offering of various NetApps. In this framework, some of the ongoing research initiatives have been introduced (i.e., the cases of the Smart5Grid, 5G-ERA¹⁰, 5G-INDUCE¹¹, VITAL-5G¹², EVOLVED-5G¹³ and 5GASP¹⁴ projects).
- (v) Assessing the detailed innovative scope of the ongoing MARSAL¹⁵ project, especially focusing on the development of Machine Learning-based solutions towards B5G.
- (vi) Presenting a broader approach on concerns for the inclusion of AI and ML techniques to achieve better network management in the context of the ongoing DAEMON¹⁶ and MonB5G¹⁷ projects, within the longer-term vision, targeting the realization of pervasive mobile virtual services.
- (vii) Discussing a variety of examples and market applications, by identifying results within dedicated business or scientific scenarios. (This session comprised presentations coming

⁶ <https://5genesis.eu/>

⁷ <https://www.5g-eve.eu/>

⁸ <http://5gtours.eu/>

⁹ <https://5gheart.org/>

¹⁰ <https://www.5g-era.eu/>

¹¹ <https://www.5g-induce.eu/>

¹² <https://www.vital5g.eu/>

¹³ <https://evolved-5g.eu/>

¹⁴ <https://www.5gasp.eu/>

¹⁵ <https://www.marsalproject.eu/>

¹⁶ <https://h2020daemon.eu/>

¹⁷ <https://www.monb5g.eu/>

from the Int5Gent project, the RESPOND-A project, the C-ROADS Platform and the AEOLUS project. Other technical issues were about earth observation, the implementation of smart city applications in the municipality of Egaleo in Athens and applications for cooperative and automated mobile cross-border environments).

The entire event hosted a total of thirty-five (35) distinct lectures, representing twenty-two (22) European projects. Among the above, in the fourth Session, OTE provided two dedicated presentations about the ongoing Smart5Grid project. These took place via Dr. Ioannis Chochliouros, Head of Fixed Network R&D Programs Session of the R&D Department, also organiser of the full day Research-oriented Workshop and via Mr. Michalis Rantopoulos, R&D engineer. The first one was about the intended *“Demonstration of 5G Solutions for SMART energy GRIDs of the Future”*, where the innovative context of the Smart5Grid program has been discussed, in parallel with the four essential use cases and their expected impact and benefits on the market sector. The second presentation has been about the intended *“OTE’s Contribution to Wide Area Monitoring”*, mainly emphasizing on the related use case. Figure 36, below, provides some screen-shots from these presentations.

Within this session, other projects of the same thematic EU Call (i.e.: H2020-ICT-41-2020: 5G Innovations for Verticals with Third Party Services) have also joined.

In particular, six (6) among the ongoing nine (9) EU-funded projects (i.e.: Smart5Grid, 5G-ERA, 5G-INDUCE¹⁸, VITAL-5G, EVOLVED-5G and 5GASP) have been presented and provided information about their aims, their objectives, their proposed use cases and their intended implementation. This interactive session has offered to the participating projects the possibility for exchanging a first set of ideas/knowledge as well as for jointly assessing some initial results based on their actual progress, especially as of the context of NetApps for serving specific market needs.

¹⁸ <https://www.5g-induce.eu/>

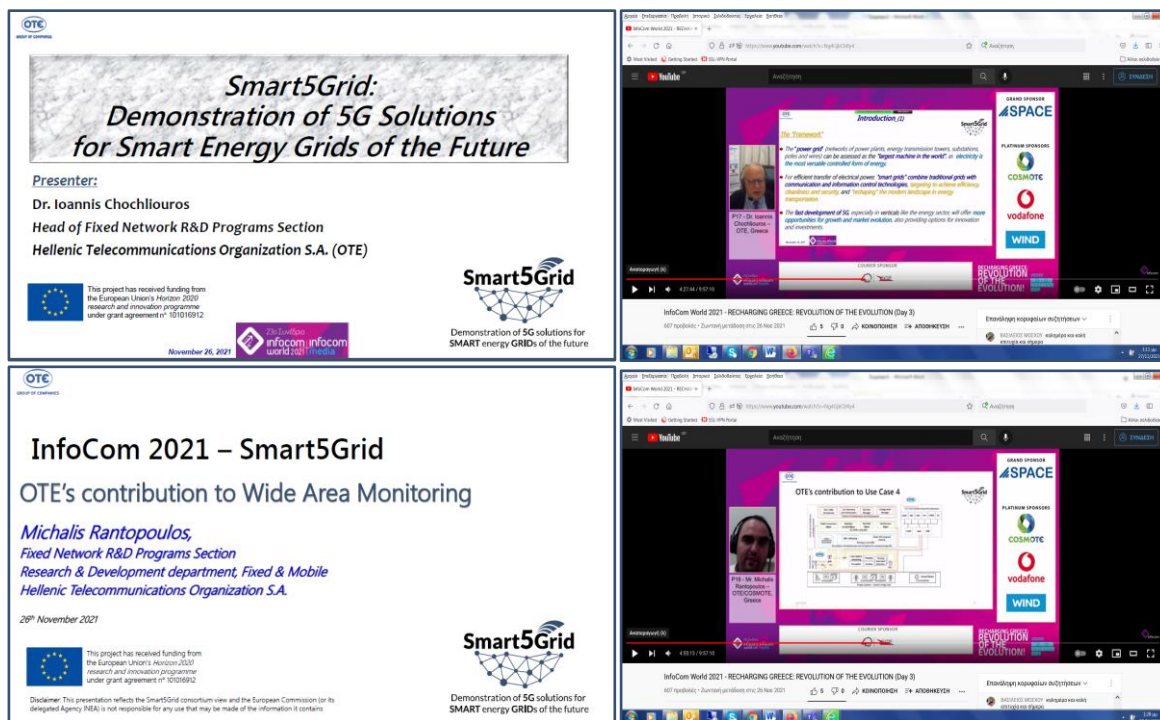


Figure 36: Smart5Grid presentations in Session 4 of the Day-3 Workshop (November 26, 2021) in the framework of Infocom World 2021

The following Figure 37 provides an overview of all 6 presentations given in Session 4, coming from the topic H2020- ICT-41-2020 and dealing with NetApps. These have set a framework for interactivity and for exchanging of ideas and knowledge between the participating projects (Smart5Grid, 6G-ERA, 5G-INDUCE, VITAL-5G, EVOLVED-5G and 5GASP).



Figure 37: Smart5Grid together with other H2020- ICT-41-2020 EU-funded projects (Session 4 of the Day-3 Workshop in the framework of Infocom World 2021)

More information can be found at: <https://infocomworld.gr/en/day-3-en/>
 Presentations of the entire Day-3 Workshop (including material from all Sessions) can also be found at <https://www.youtube.com/watch?v=Ng4GjkCbRy4>

2.5.1.3. Organisation of events (workshops/seminars/training/poster sessions/webinars)

During the first 11 months, Smart5Grid project organized 1 Kick-off Event, 1 conference on gender equality, and co-organised 1 workshop. More, organised dissemination activities are expected to come in Y2, as the technical elements, trials and research results are evolving.

2.5.1.3.1. KICK-OFF DAY

Due to the COVID-19 impact and for safety reasons, the Smart5Grid KickOff Meeting took place remotely in a virtual way using MS Teams platform. The event ran for 3 days (19-21 January 2021), and it served a double purpose; to inform internal and external stakeholders about the goals and the objectives of the project, and to give the opportunity to Consortium

members to meet virtually each other and to discuss in detail the project's next actions and take initial decisions. As a result, the first day of the KoM, was an open event and was introduced by the Project Coordinator, Mr. Daniele Porcu, from ENEL. The Consortium and other third parties joined the first day and were informed about Smart5Grid project's initiatives.



Figure 38: Smart5Grid Kick-off Meeting

2.5.1.3.2. JOINT-WORKSHOP ON “5G – PUTTING INTELLIGENCE TO THE NETWORK EDGE”

In the context of the 17th AIAI International Conference (June 25-27, 2021), Smart5Grid project has been among the core organisers of the 5G-PINE 2021 Workshop (which is the 6th, in turn, annual workshop of the 5G-PINE series) in cooperation with two other 5G-PPP projects (i.e., the 5G-DRIVE¹⁹ and the 5G-VICTORI²⁰ projects) as well as the MCSA MOTOR5G project²¹.

Smart5Grid project's partner OTE had the overall the supervision and coordination of the workshop. The whole organizational process was also supported by the Smart5Grid Project Coordinator, Mr. Daniele Porcu from ENEL. The Workshop has been established to

¹⁹ 5G-DRIVE: 5G Harmonised Research and Trials for service Evolution between EU and China (GA No.814956), <https://5g-drive.eu/>

²⁰ 5G-VICTORI: Vertical demos over common large scale field trials for rail, energy and media industries (GA No.857201), <https://www.5g-victori-project.eu/>

²¹ MOTOR5G: Mobility and Training for beyond 5G Ecosystems (GA No.861269), <https://www.motor5g.eu/>

disseminate knowledge obtained from ongoing EU projects as well as from any other action of EU-funded research, in the wider thematic area of 5G and with the aim of focusing on Artificial Intelligence (AI) in modern 5G and beyond telecommunications infrastructures.



Figure 39: Smart5Grid’s co-joint online workshop

2.5.1.3.1. DIVERSITY MANAGEMENT WORKSHOP

The Diversity Management Workshop was successfully handled by ENEL, with a wide participation of Smart5Grid Project members, on Wednesday 12 May 2021. During the workshop, organized by CoordiNet project as mitigation action for the unbalanced gender participation, some relevant members from ENEL HR team illustrated how diversity is a value within Enel Group, explaining how recruiting is facing with the challenge to offer fair and equal opportunities in balancing the shortlist (when the number of candidates allows it) for the last round of interviews. The discussion over gender balance in Energy, Telco and IT R&D environment have been very participated by both CoordiNet and Smart5Grid partners.

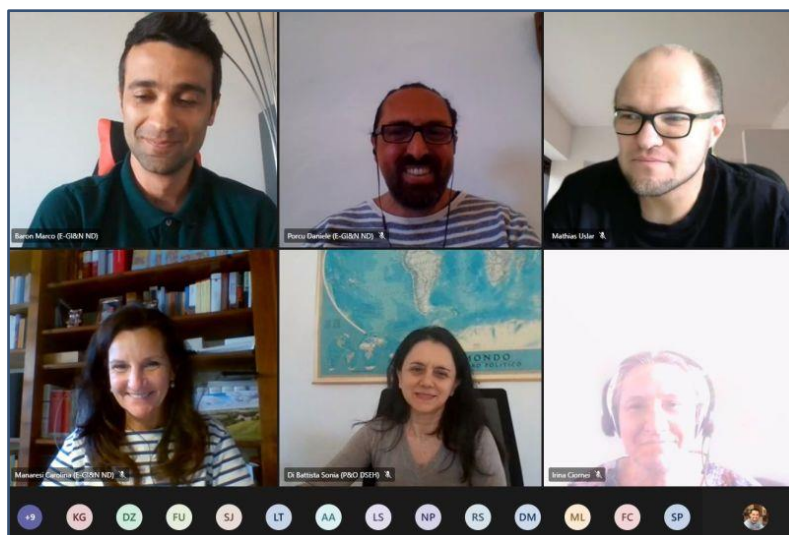


Figure 40: Online workshop, organised by ENEL

2.5.1.4. Other Events

Smart5Grid's partners participated in other Events, and they had the opportunity to successfully disseminate the Smart5Grid project.

- **UPTIME CONFERENCE**

On 27th January 2021, Smart5Grid partner Athonet, hosted the first edition of the UPTIME conference at Villa Griffone, Italy, where Guglielmo Marconi made his first wireless transmission. The conference celebrated the 10 years of the Private LTE industry. The aim of the event was to look forward to the next decade of Private #5G with abundant shared and unlicensed spectrum for deployment. The invited speakers were from end-user Industries, mobile network operators, specialist operators, cloud hyperscale's, and device manufacturers.

Smart5Grid

Served vertical: Smart grids

The project will showcase 5G-enabled scenarios related to the electric grids of the future including, e.g., monitoring distribution grids to detect faults and assisting remote inspection of power plants

GENERAL INFORMATION

THE CONSORTIUM	DURATION	TOTAL BUDGET
24 EUROPEAN PARTNERS COVERING 7 EU STATES	3 YEARS	8M€

Just started

Coordinator enel	TELCOs W3, OTE, ONEIS SAT	SMEs b, INFO LYSIS, SC, NBYCOMP
Tech Companies INGENIERING, AtoS, i2cat, etc.	Universities/Research Institutions University of Padua, etc.	DSOs e-distribuzione, e-distribución
TSOs ECO EAD, etc.	Other Partners AXON, ubiwhere, ATHONET, JETECHCO, SIDROCO, ENTRA ENERGY, UBITECH, nosia, STAI	

ATHONET

3

Figure 41: Smart5Grid at UPTIME conference

- *MOBILE WORLD CONGRESS*

NearbyComputing, participated in MWC Barcelona 2021, on the 28th of June -1st of July. MWC attracts some of the most influential decision makers in the world. Due to this year's touchless policy, where the distribution of any physical promotional material was prohibited, the project's leaflet was projected on a digital screen, attracting the interest of the visitors on the Smart5Grid Use Cases and the concept of NetApps.



Figure 42: NearbyComputing in MWC

- *5G WORLD SUMMIT 2021*

On 21st – 23rd of September, Athonet partner attended as a bronze sponsor the 5G World summit in London. Athonet was present with a booth, where it was possible to read and hear about Athonet's involvement in research and innovation projects funded by the European Commission and see the last innovations brought by Athonet to the 5G ecosystem, including solutions exploited within the framework of Smart5Grid. Athonet distributed a few dozens of Smart5Grid's flyers to the visitors of the booth, which were between 200 and 250 (consider that the attendance of the whole event was quite limited, compared to before the covid-19 pandemics). Mr. Nanda Menon, Director – Corporate development at Athonet and CEO of Athonet UK, gave a speech on the Athonet solutions for 5G and a demo session.



Figure 43: Athonet partner in 5GWorld Summit

2.5.1.5. Other Publications, Press Releases, Press Articles, etc

As per writing, thirty (30) various publications were published in media and including 2 contributions to 5G-PPP papers, Smart5Grid was successfully disseminated to a wider audience during the first year. Below, in Table 6 the reader can be informed about the two (2) 5G-PPP publications, listed by date of the publication.

	MEDIUM NAME	TYPE	DATE/LOCATION	TITLE
1	5G-European-Annual-Journal-2021	Annual Journal	May 2021 https://smart5grid.eu/wp-content/uploads/2021/05/5G-European-Annual-Journal-2021.pdf	Smart5Grid Project
2	5G-PPP Projects Phase 3 Brochure	Brochure	June 2021 https://smart5grid.eu/wp-content/uploads/2021/06/5G-PPP_Phase3_Brochure_v7.2-web.pdf	Demonstration of 5G solutions for SMART energy GRIDs of the future

Table 6: Smart5Grid in 5G-PPP papers

In the next Table 7, the reader can be informed about the twenty-eight (28) additional media publications such as articles (21) and press releases (7), listed by date of the publication.

	MEDIUM NAME	TYPE	Date/Location	Title
1	lsole24ore.com	Article	21 Dec 2020 https://www.ilsole24ore.com/radiocor/nRC_21.12.2020_12.07_28810288?refresh_ce=1	WindTre: partecipa al progetto Smart5grid per gestire reti elettriche
2	corrierecomunicazioni.it	Article	21 Dec 2020 https://www.corrierecomunicazioni.it/digital-economy/smart-city/windtre-nel-progetto-smart5grid-per-le-reti-elettriche/	WindTre nel progetto Smart5Grid per le reti elettriche
3	Ansa.it	Article	22 Dec 2020 https://www.ansa.it/innovazione_5g/notizie/tecnologia/2020/12/21/5g-windtre-aderisce-a-progetto-smart5grid-su-energia_46c4d9e8-1afe-4ea0-822c-5e13811701cd.html	5G: WindTre aderisce a progetto Smart5Grid su energia
4	5g-italia.it	Article	28 Dec 2020 https://www.5g-italia.it/2020/12/28/windtre-nel-progetto-smart5grid-della-commissione-europea-il-5g-al-servizio-delle-reti-elettriche/	WindTre nel progetto Smart5Grid della Commissione Europea: il 5G al servizio delle reti elettriche
5	Smart-energy.com	Article	28 Dec 2020/ https://www.smart-energy.com/industry-sectors/smart-grid/smart5grid-to-advance-5g-for-smart-grids-in-europe/?fbclid=IwAR3I5Q7i3deLCjgGMtB33uZ6m7vp4Os9qGtcA2NDFfVzDlicVmJgxoU6-4	Smart5Grid to Advance 5G for Smart Grids in Europe
6	worldenergytrade.com	Article	29 Dec 2020 https://www.worldenergytrade.com/energias-alternativas/electricidad/smart5grid-avanza-en-sus-planes-de-desarrollar-redes-inteligentes-en-europa	Smart5Grid avanza en sus planes de desarrollar redes inteligentes en Europa
7	World-Energy.org	Article	29 Dec 2020 / https://www.world-energy.org/article/14891.html	Smart5Grid to Advance 5G for Smart Grids in Europe
8	Zeroemission.eu	Article	29 Dec 2020 https://zeroemission.eu/windtre-partecipa-al-progetto-smart5grid-per-la-gestione-delle-reti-elettriche/	WindTre partecipa al progetto Smart5grid per la gestione delle reti elettriche
9	Borsa.corriere.it	Article	December 2020 https://borsa.corriere.it/	WindTre: participates in the Smart5grid project to manage electricity grids
10	www.impresagreen.it		31 Dec 2020 https://www.impresagreen.it/news/10589/windtre-partecipa-al-progetto-smart5grid-per-la-gestione-delle-reti-elettriche.htm	WindTre partecipa al progetto SMART5GRID per la gestione delle reti elettriche
11	Ubitech.eu	Press Release	19 Jan 2021 https://ubitech.eu/ubitech-energy-kicks-off-the-smart5grid-innovation-action-on-the-demonstration-of-5g-solutions-for-smart-energy-grids/	Ubitech Energy kicks off the Smart5Grid Innovation Action on the demonstration of 5G solutions for Smart Energy Grids
12	Okdiario.com	Article	21 Jan 2021 https://okdiario.com/economia/smart5grid-proyecto-europeo-que-pretende-mejorar-operaciones-red-electrica-6729210	Smart5grid, el proyecto europeo que pretende mejorar las operaciones en la red eléctrica
13	Ewind.com	Article	21 Jan 2021 https://www.ewind.com/2021/01/21/endesa	Endesa participa en el proyecto europeo Smart5Grid

			-participa-en-el-proyecto-europeo-smart5grid/	
14	Eixdiari.cat	Article	25 Jan 2021 https://www.eixdiari.cat/territori/doc/93845/endesa-explora-lus-del-5g-a-la-xarxa-electrica-des-del-massis-del-garraf.html	Endesa explora l'ús del 5G a la xarxa elèctrica des del Massís del Garraf
15	Smartgridsinfo.es	Article	25 Jan 2021 https://www.smartgridsinfo.es/2021/01/25/proyecto-europeo-smart5grid-explora-uso-5g-operaciones-red-electrica	El proyecto europeo Smart5Grid explora el uso del 5G en las operaciones en la red eléctrica
16	catalunyapress.cat	Article	25 Jan 2021 https://www.catalunyapress.cat/texto-diario/mostrat/2274216/endesa-participa-proyecto-europeo-smart5grid-per-explorar-lus-l5g	Endesa participa en el projecte europeu Smart5Grid per explorar l'ús del 5G
17	Europapress.es	Article	25 Jan 2021 https://www.europapress.es/catalunya/noticia-a-endesa-participa-proyecto-europeo-smart5grid-explorar-uso-5g-20210125145232.html	Endesa participa en el proyecto europeo Smart5Grid para explorar el uso del 5G
18	iotzona.hu	Article	01 Feb 2021 https://iotzona.hu/energia/smart5grid-5g-tamogatas-az-europai-okoshalozatoknak	Smart5Grid: 5G támogatás az európai okoshálózatoknak
19	energetica21.com	Article	02 Feb 2021 https://www.energetica21.com/noticia/endesa-participa-en-el-proyecto-europeo-smart5grid-que-explora-el-uso-del-5g	Endesa participa en el proyecto europeo Smart5Grid, que explora el uso del 5G
20	8bellsresearch.com	Press Release	Feb 2021 https://www.8bellsresearch.com/projects/h2020-smart5grid-2/	About Smart5Grid Project
21	Eso.bg	Press Release	March 2021 http://www.eso.bg/?did=453	Smart5Grid: Demonstration of 5G solutions for SMART energy GRIDs of the future Open 5G experimental facility – supporting integration, testing and validation of existing and new 5G services and NetApps
22	Novotika.com	Press Release	March 2021 https://novotika.com/portfolio/smart5grid	About Smart5Grid Project
23	Kios.ucy.ac.cy	Press Release	March 2021 https://www.kios.ucy.ac.cy/news-a-events/latest-news/677-two-new-eu-funded-projects-at-the-kios-coe-related-to-smart-energy-management-and-control.html	Two new EU funded projects at the KIOS CoE related to smart energy management and control
24	Engineere.com	Press Release	March 2021 https://www.engineere.com/XX/Unknown/100917828586445/Smart5Grid	Engineere: smart5grid
25	flexigrid.org	Article	14 April 2021 https://flexigrid.org/renewable-energy-in-bulgaria-and-europe/?fbclid=IwAR2t5gBqPZdAV1SeZ9l1rs_itNnnVVu5d3vkqvVmDnYufzndY_NJpPu-k1w%20	Entra Energy – pushing for renewable energy in Bulgaria and Europe
26	csim.committees.comsoc.org	Article	June 2021 https://csim.committees.comsoc.org/files/2021/07/CSIM-Newsletter-Spring-2021.pdf	"COMMUNICATIONS SYSTEMS INTEGRATION AND MODELLING TECHNICAL COMMITTEE" Newsletter, June 2021
27	Cosmote.gr	Press Release	October 2021 https://www.cosmote.gr/cs/otegroup/en/smart5grid.html	SMART5GRID Demonstration of 5G solutions for SMART energy GRIDs of the future (01/2021 – 12/2023)

28	https://nauka.bg/	Article	25 October 2021 https://nauka.bg/energiinata-transformaciya-predizvikatelstva-vazmojni-resheniya/	Енергийната трансформация – предизвикателства и възможни решения
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Table 7: Smart5Grid's other Media Publications

2.6. Statistics, Evaluation and Impact Results of the Y1 Activities

2.6.1. Quantitative Results and Evaluation of Activities

In the previous Sections 2.3 and 2.5 a summary of all the communication and dissemination activities was presented for the first year (reported period M1-11). In specific, in section 2.5, a thorough presentation of each activity was presented along with respective tables indicating additional information per activity (such as event name, activity title, etc.). Moreover in Table 3 can be found all the activities' goals set for year 1 as per the dissemination plan and the actual goals achieved. To facilitate the reader, the above-mentioned Table is also presented below (Table 8). Overall, the goals have been met. In total, the Smart5Grid dissemination activities performed count a total of 48 activities.

PLANNED DISSEMINATION ACTIVITIES	METRICS	PROJECT TARGET	TIMELINE	Y1	Activities Y1 Target (M1-M12)	Activities performed up to M11
Publications in journals, conferences and white papers.	Number of publications	>20	Publications: M06-M36 (and after the end of the project)	10%	2	2
Presentations in scientific events and workshops	Number of presentations	>20	Presentations: M01-M36	20%	4	10
Field Trials/Showcases	Number of trials/showcases	>5	Exhibitions/Workshops/Events: M13-M36		-	-
Exhibitions in industrial and scientific events	Number of exhibitions/booths	>5	Demonstrations/Showcases: M13-36		-	-
Organisation of events (workshops/seminars/training/poster sessions/webinars)	Number of events	>10	Events: M06-M36	20%	2	3
Other Events, Press Releases, Articles etc	Number of Events/articles	As many			-	33
TOTAL		>60	M1-M11		8	48

Table 8: Smart5Grid metrics for the Dissemination Activities M1-M11

Similarly, as per the detailed communication plan (D7.2), Smart5Grid website and social media channels have performed well with a constant increase in the number of followers

and visitors respectively. All the details about the impact of the communication activities during the year 1 (M1-M11) are summarized in Table 9.

ACTIVITY	Y1 Achievements (M1-11 unless otherwise stated)
Communication channels used	1 website, 4 Social Media Channels, 1 YouTube Channel
Total Number of News posted in Website (News section)	>47
Total Activities reported in Website	48
Total website visitors (M1-10)	1092
Total website sessions (M1-10)	2122
Total Number of Posts in Social Media channels (M1-10)	387
Total Number of Likes in Social Media channels (M1-10)	2855
Total Number of Followers in Social Media channels (M1-10)	664
YouTube channel	1 video
YouTube Subscribers	18
YouTube Views	147
Newsletter issues published	3
Leaflets	1
Posters	1

Table 9: Smart5Grid Communication Activities in a nutshell (M1-M11)

2.6.2. Website Performance Statistics and Dashboards

Smart5Grid website statistical dashboards are created, processed evaluated and visualized monthly by INF with the use of Google Data Studio and Google Analytics. The statistical dashboards are properly adjusted to correspond to a 3-month period and then distributed to the consortium members via email every trimester via the Smart5Grid WP7 mailing list.. In addition, they are added to a respective folder in MS TEAMS for every partner to be able to access for historical reference. Google Data Studio is used in order to graphically represent statistical information regarding the traffic of the website, its visitors (in respect to the GDPR laws) and the sources from which the website is accessed.

The figures below represent the first year's dashboard covering the period of January 2021 to October 2021. Information that can be seen in Figure 44 and Figure 45 describes the audience's behavior in number of Users, session/per user, the average time on page, page views as well as the sources from which someone accessed the website. The website

statistical dashboard may also be accessed online at:
<https://datastudio.google.com/reporting/0b865c29-84f9-4c74-aa84-e7722386f390>

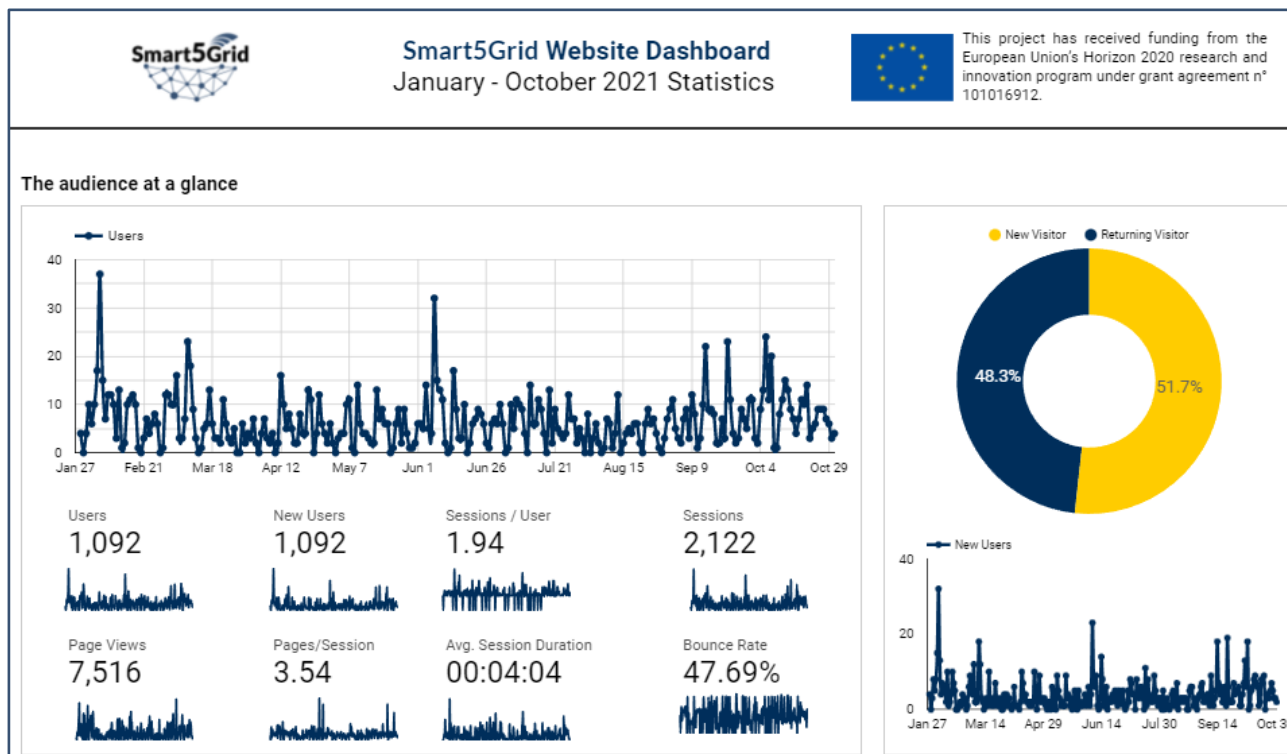


Figure 44: Smart5Grid Website Dashboard M1-M10

Google analytics have been enabled for the Smart5Grid website since January 2020. The statistical recordings of the website provide a valuable insight to the website performance and the audience's behavior.

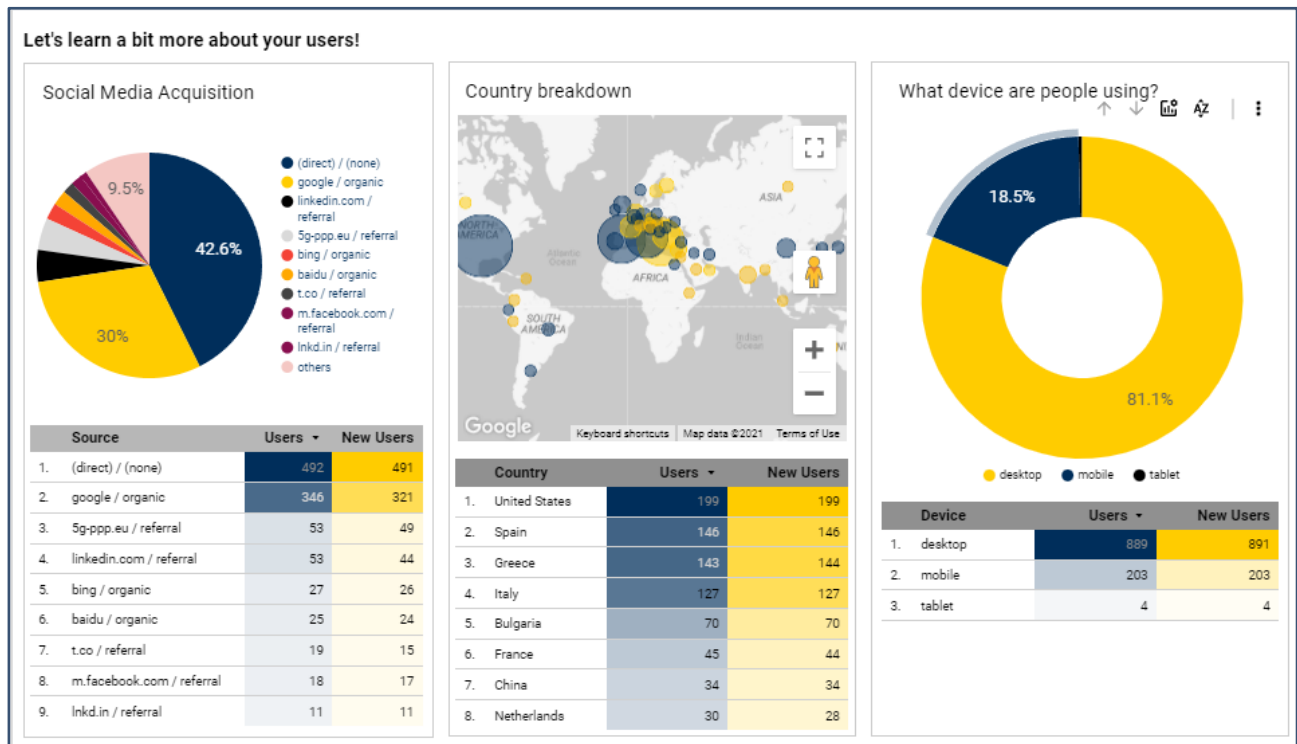


Figure 45: Smart5Grid Website Dashboard Analytics by Source, Country and Device

The figure above shows information about the source, the most important device of access and the top countries. Direct search and google are the most usual Traffic sources and the majority of the users access the website via their desktop. Moreover, the sessions by country feature United States, Spain and Greece in the top list, followed by Italy and Bulgaria.

2.6.3. Social Media Performance Statistics and Dashboards

The social media statistical dashboards are created and issued monthly with the use of Google Data Studio. These statistical dashboards are communicated with the wp7 mailing list to the Smart5Grid partners and are also added to the respective folder in MS TEAMS repository. The statistical dashboards (whether they are social media or website dashboards) can be issued for a longer period of time such as for 6 months, annual and so on, upon request. Hereby, we examine the M1-M10 period dashboards.

2.6.3.1. Smart5Grid LinkedIn Dashboards

The statistical dashboards for the first year for LinkedIn have been developed in order to evaluate the activities performed during the period of January 2021 to October 2021.

The figures below show the total number of followers and the posts during this period. There is a constant increase in the number of followers whereas the number of posts varies due to the dissemination of various events.

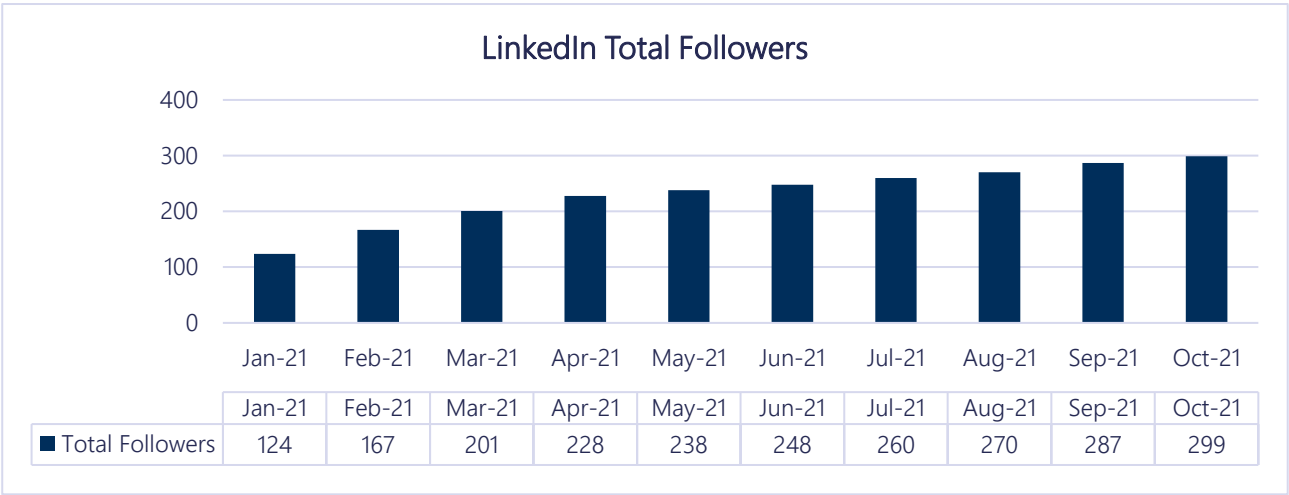


Figure 46: Smart5Grid LinkedIn Followers’ Evolution through M1-M10

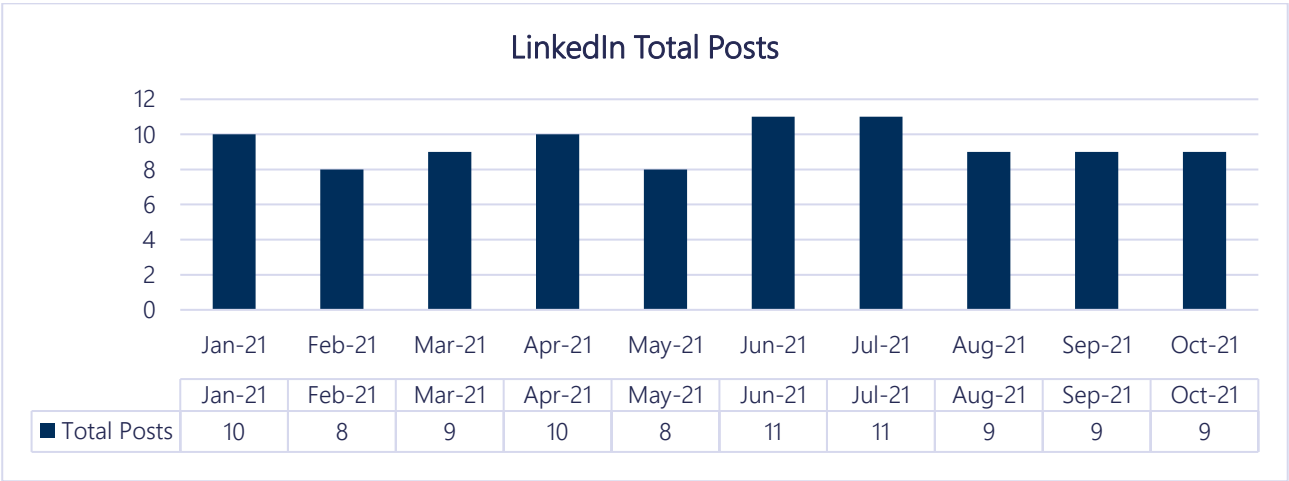


Figure 47: Smart5Grid LinkedIn Posts per month M1-M10

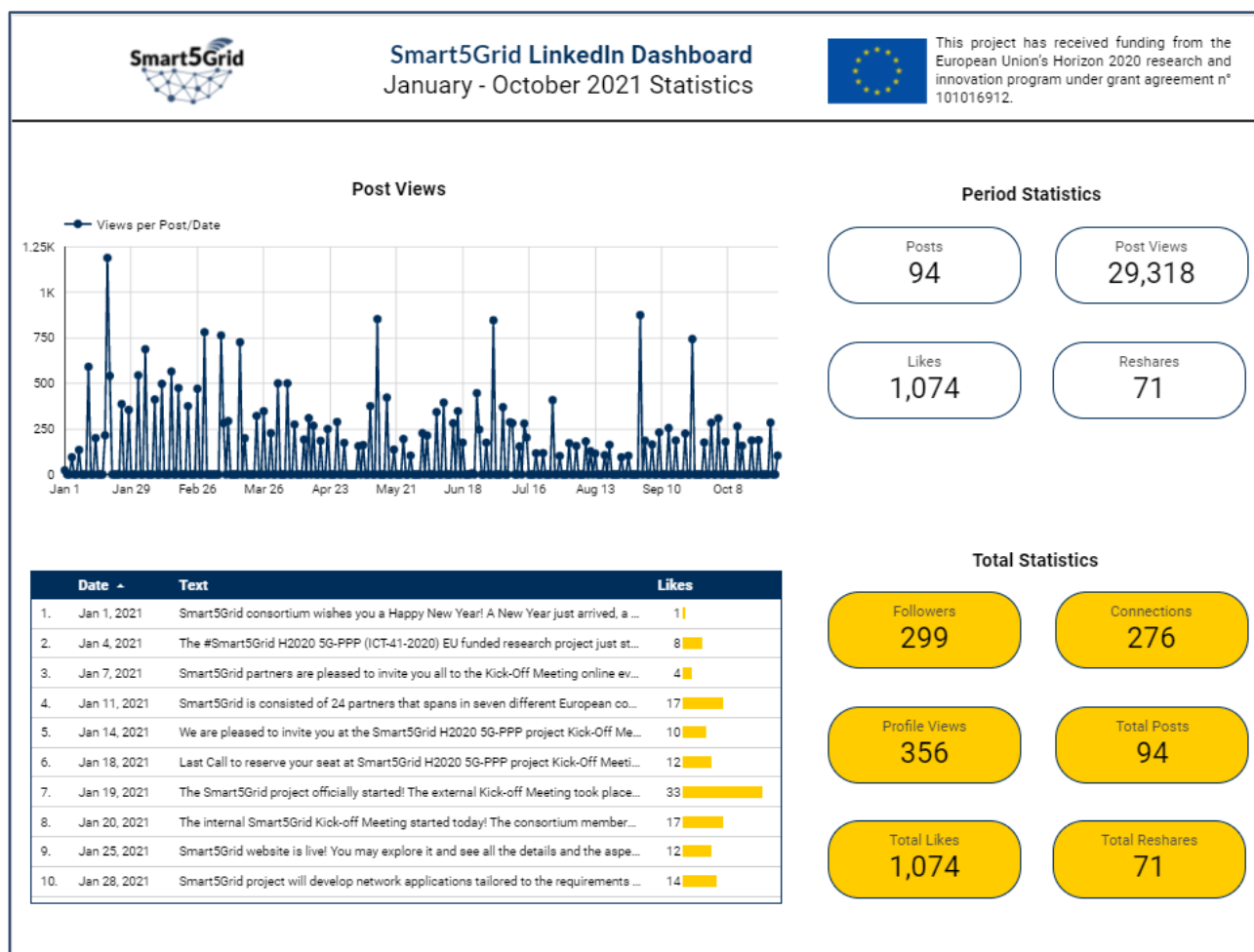


Figure 48: Smart5Grid LinkedIn Dashboard

As expected, due to the medium's more professional profile, LinkedIn is the most popular platform and has been used for communicating 94 posts and achieving 71 reshares with a total of more than 29,318 views and 1074 likes, providing up to date information of the Smart5Grid project's activities to a network of more than 299 followers. For viewing online the LinkedIn dashboard one may use the following link: <https://datastudio.google.com/reporting/943ba33e-0bc0-4394-b37a-292e26ae2ab2>

2.6.3.2. Smart5Grid Twitter Dashboards

The next more popular medium is Twitter. The table below provides information regarding the total followers and the posts per month for the 10-month period of January 2021 to October 2021.

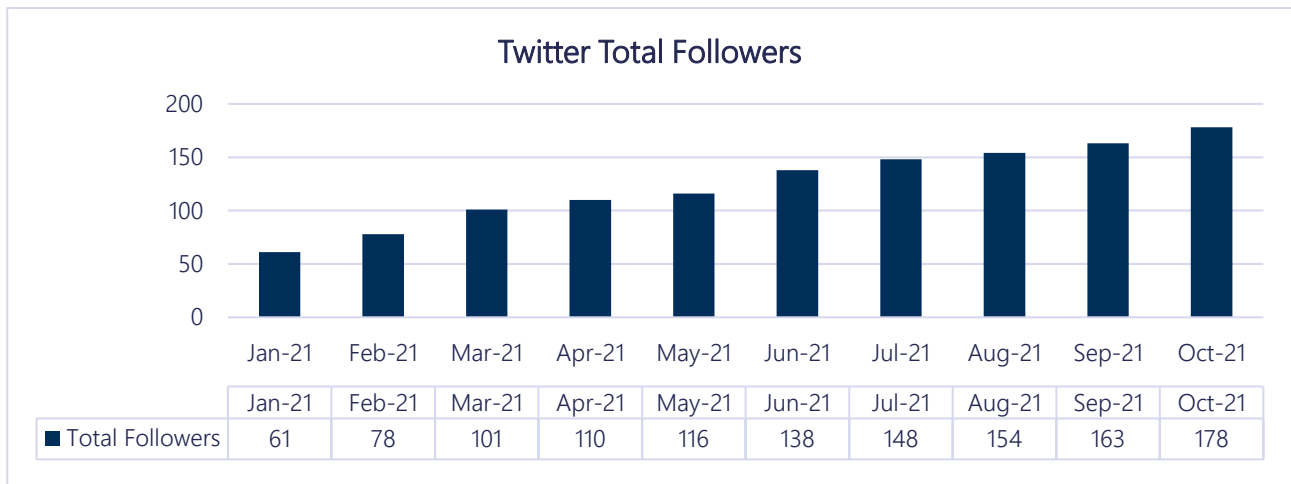


Figure 49: Smart5Grid Twitter Followers' Evolution through M1-M10

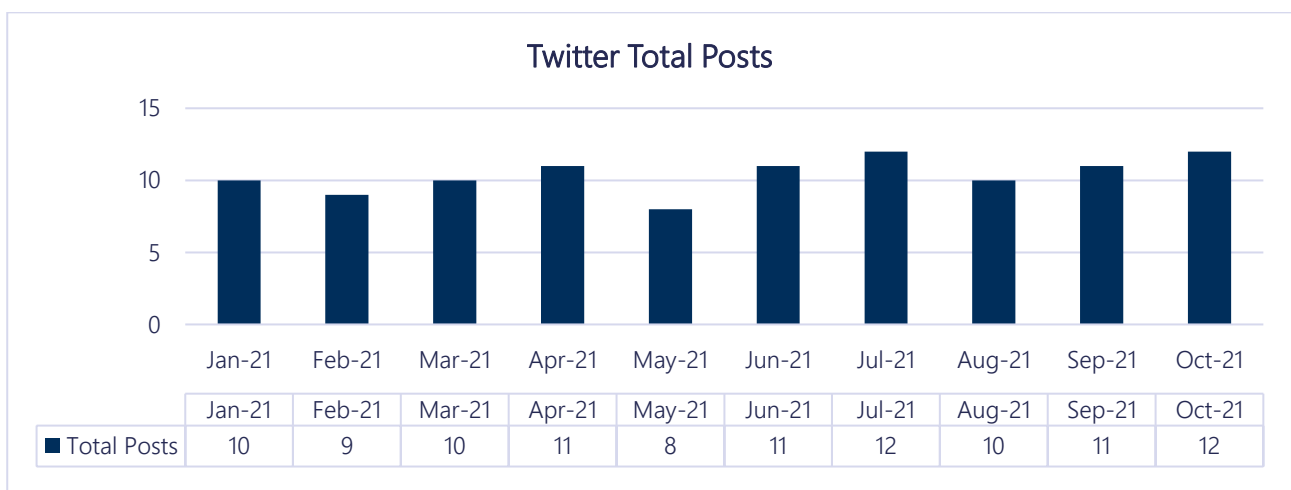


Figure 50: Smart5Grid Twitter Posts per month M1-M10

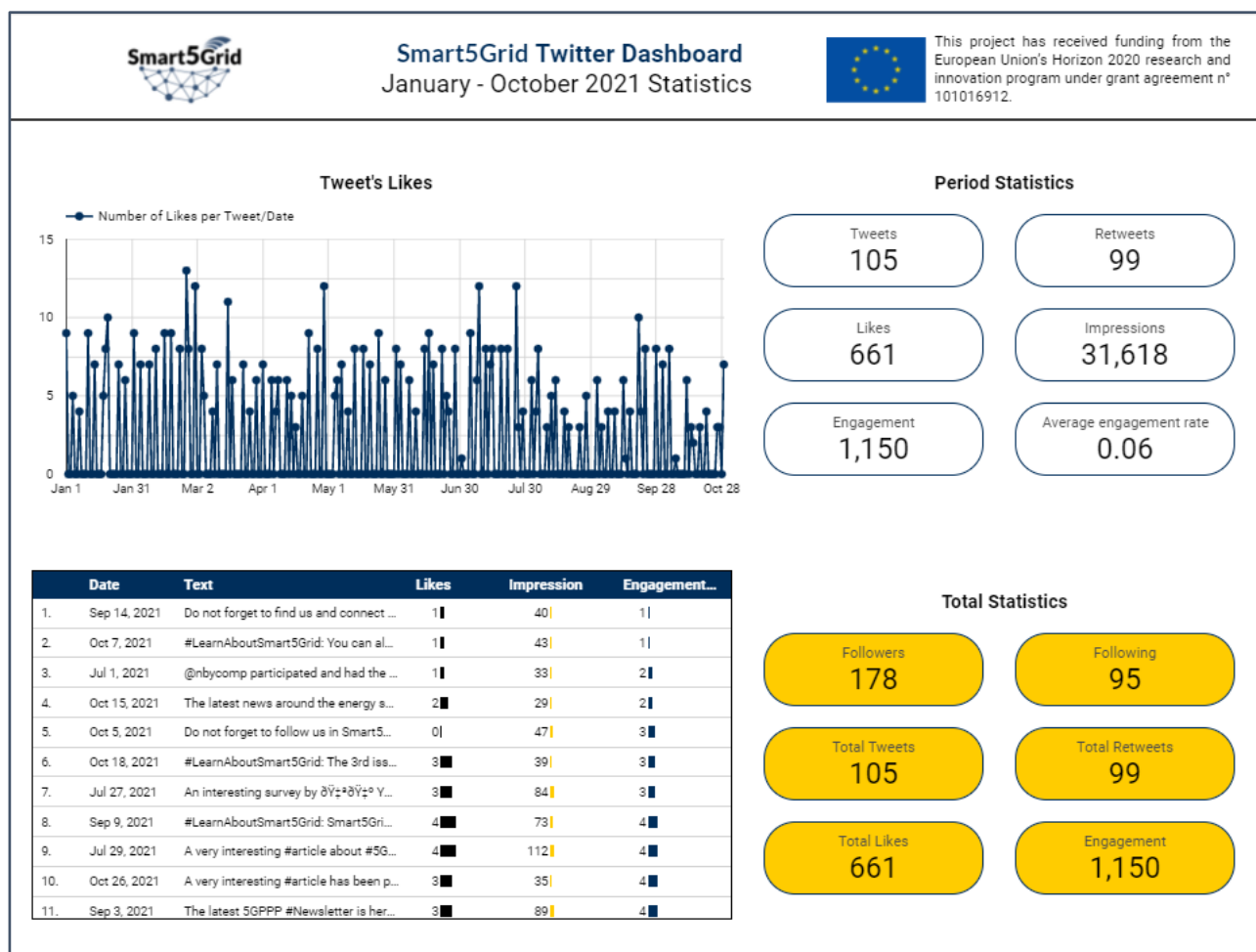


Figure 51: Smart5Grid Twitter Dashboard

Twitter channel has been used for communicating 105 tweets and achieving 99 retweets with more than 31.000 impressions, with 661 likes and 1,150 engagements. Similarly, the engagement rate of 6% confirms the active involvement of the 178 followers to the channel's activities. For viewing online the Twitter dashboard one may use the following link: <https://datastudio.google.com/reporting/d474d132-8fd9-4016-a994-613bc7de9c97>

2.6.3.3. Smart5Grid Facebook Dashboards

Facebook Statistical dashboards for year 1 cover similarly the period of January 2021 to October 2021. The figures below show the total number of followers and posts throughout the period under examination.

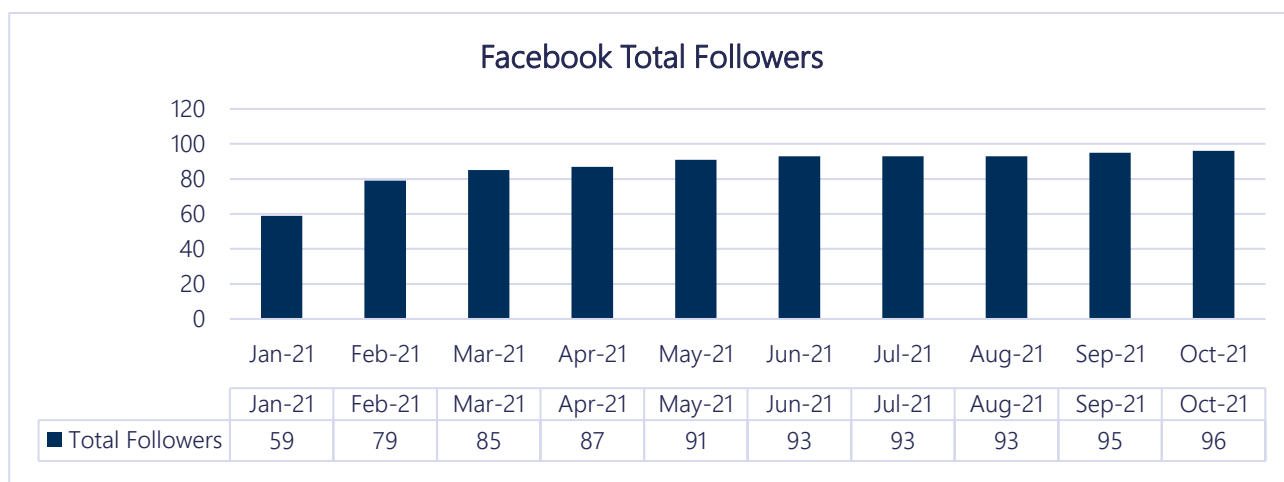


Figure 52: Smart5Grid Facebook Followers' Evolution through M1-M10

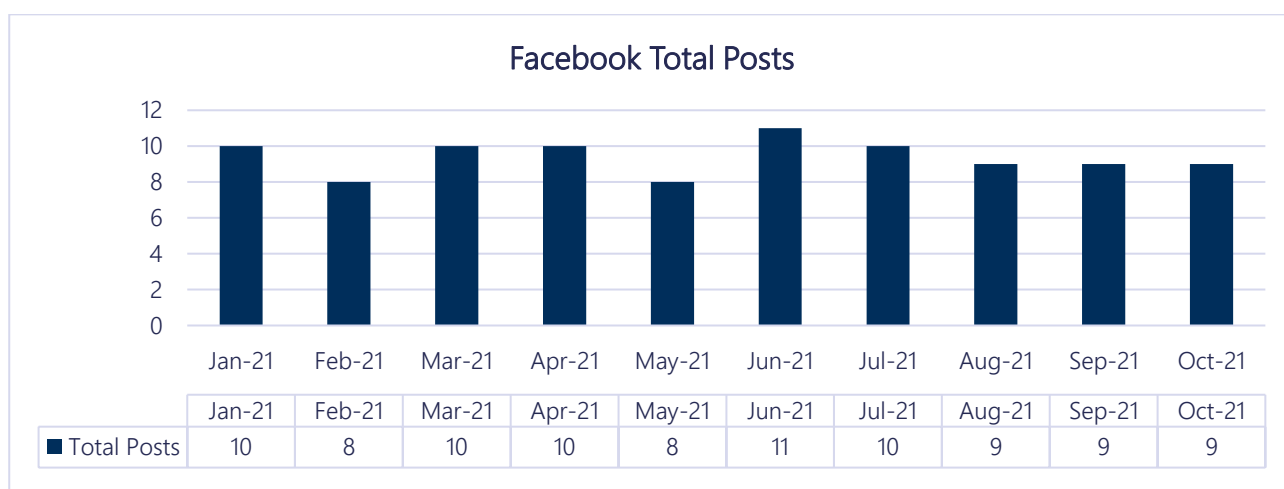


Figure 53: Smart5Grid Facebook Posts per month M1-M10

As expected, and due to the research/technical character of the Smart5Grid, Facebook and Instagram attract less followers. In any case, they are still communication platforms of high significance to reach the wider audience, and we expect to achieve higher numbers in the next year.

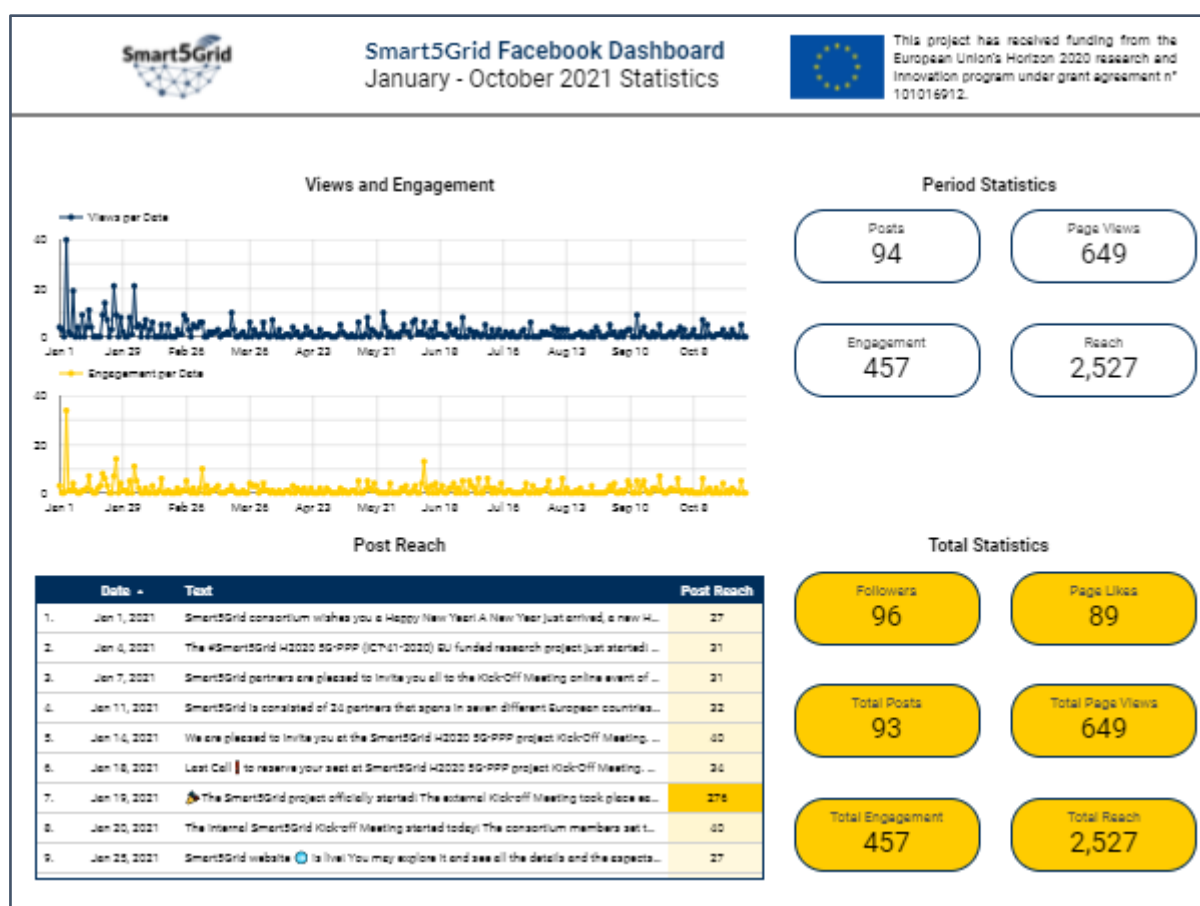


Figure 54: Smart5Grid Facebook Dashboard

Facebook channel has been used for communicating 94 posts to 96 followers, but with the use of Tags, Image posts etc the project achieved to reach more than 2500 people and get 457 actions of engagement (post interactions). For viewing online the Facebook dashboard one may use the following link: <https://datastudio.google.com/reporting/3158424a-2b37-485b-976f-9a42c9885653>

2.6.3.4. Smart5Grid Instagram Dashboards

The Instagram statistical dashboards for the covered period of January 2021 to December 2021 are shown below. This channel differs from the rest of the channels due to its nature focusing on pictures. The number of followers is equivalent to Facebook's and in both cases, there is an incremental tendency. The figures below show the evolution of followers and the posts per month. As mentioned also above, the posts vary due to the activities performed by the project's partners.

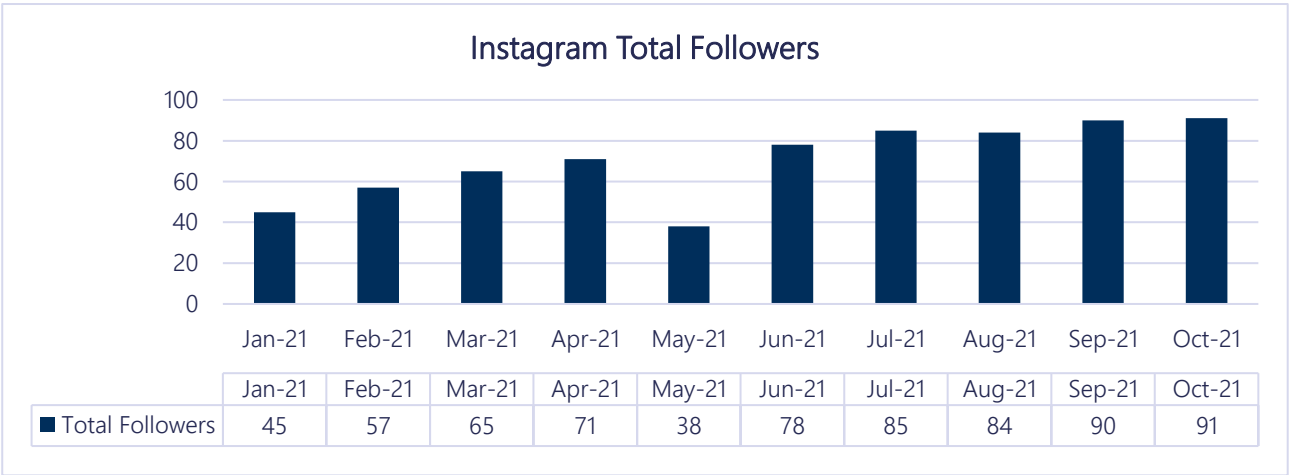


Figure 55: Smart5Grid Instagram Followers’ Evolution through M1-M10

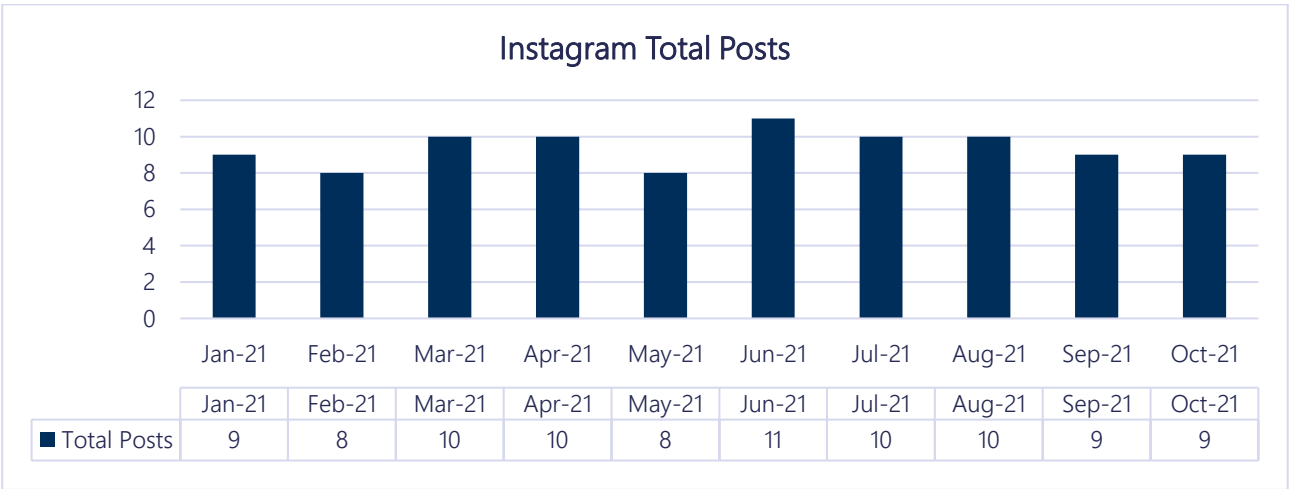


Figure 56: Smart5Grid Instagram Posts per month M1-M10

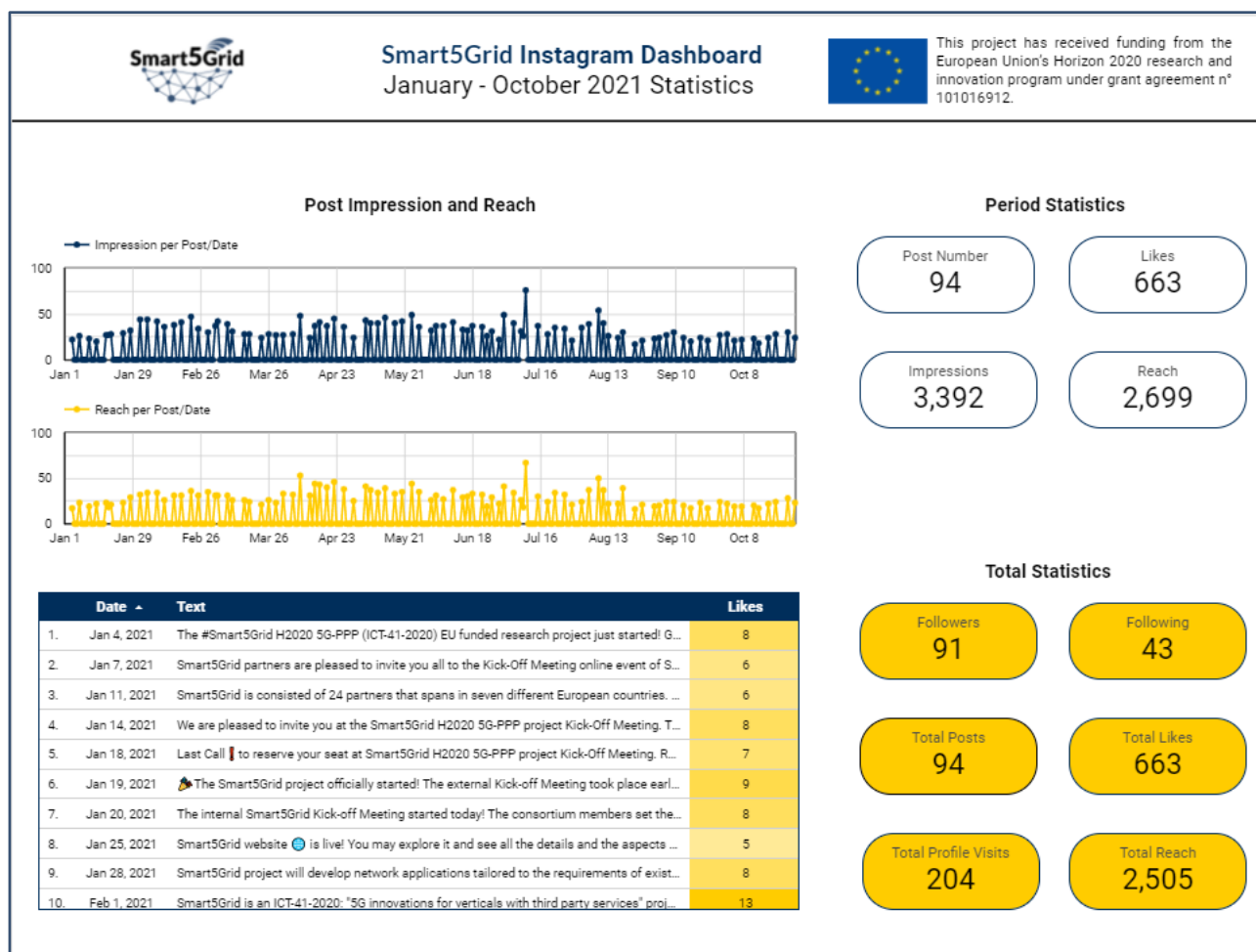


Figure 57: Smart5Grid Instagram Dashboard M1-M10

In total, Instagram has been used for communicating 94 posts to 91 followers and achieving 663 likes, more than 3,300 impressions and reaching 2,699 users. Also, there are 204 profile visits. For viewing online the Instagram dashboard one may use the following link: <https://datastudio.google.com/reporting/e5631dd0-b91c-4ba5-8603-d96a1183dc3a>.

2.6.4. Dissemination and Communication Goals for the rest of the project

Following the completion the 11 months of the project, and according to the communication strategy and plan already defined at D7.2, we summarize the quantitative goals for the rest of the project lifetime, based on a split ratio percentage of **20/30/50 approximately** that is used for setting the minimum planned goals per year and activity (based on the total quantitative figures and the timeline already set in Table 2 for the entire project lifetime). Following the above split ratio, Table 10 summarizes the targeted goals for Smart5Grid dissemination activities (almost 80% of the total project goals) till the end of the project.

PLANNED DISSEMINATION ACTIVITIES	METRICS	PROJECT TARGET	TIMELINE	Y2	Y3
Publications in journals, conferences and white papers	Number of publications	>20	Publications: M06-M36 (and after the end of the project)	8	10
Presentations in scientific events and workshops	Number of presentations	>20	Presentations: M01-M36	7	9
Field Trials/Showcases	Number of trials/showcases	>5	Exhibitions/Workshops/Events: M13-M36	2	4
Exhibitions in industrial and scientific events	Number of exhibitions/booths	>5	Demonstrations/Showcases : M13-36	2	4
Organisation of events (workshops/seminars/training/poster sessions/webinars)	Number of events	>10	Events: M06-M36	4	5
Other Events, Articles/Brochures etc	Number of events/publications	As many	M03-M36	-	-

Table 10: Smart5Grid metrics for the Dissemination Activities of Y2 and Y3

Based on the results achieved during the first 11 months, there are no spotted deviations as per initial communication and dissemination plan and set KPIs (presented in D7.2) so no need to modify or update the existing communication-dissemination planned actions at this stage. Overall, the project's publications and other organised events, workshops, webinars, demos etc will be intensified, when more project results and achievements will be available for formal documentation and dissemination to the stakeholders, SME's and 5G business, academic and scientific target audiences.

However, for further enhancing the efficiency of the project communication towards the SMEs ecosystem and attracting potential SMEs as third-party experimenters to Smart5Grid, the next section introduces an updated set of actions for a more impactful communication strategy targeting mainly at the SMEs engagement.

2.7. Impact creation for SMEs Engagement – Updated action plan

SMEs from different verticals are considered as key stakeholders and key beneficiaries of the project's results, since Smart5Grid 5G-enabled energy ecosystem will give them the opportunity to benefit from the project's advancements in the NetApp development. while leveraging the new capabilities of 5G in the energy sector. In D7.2, an initial communication and dissemination approach was presented on how SMEs will be attracted for getting engaged in Smart5Grid project activities as third parties experimenters.

This section further clarifies and elaborates how the Smart5Grid consortium aims to communicate Smart5Grid project to the SMEs target audience during the second year of the project. Specific actions for attracting and engaging the interested SMEs, as third parties experimenters, to the project's activities, architecture, NetApps, use cases and trials are presented.

Please note that the actions presented below are focused only on WP7 related communication/impact activities in order to attract SMEs and raise their interest (engage them) for potential involvement within Smart5Grid project (i.e. external SMEs acting as third parties for external experimentation). However, the actual technical roadmap that the interested SMEs will then follow for getting technically involved with NetApp development and experimentation is beyond the scope of this deliverable, since dedicated technical tasks, such as T2.4 and T4.4, deal with the technical plan and development aspects of SMEs engagement as experimenters.

Within the scope of the communication plan and strategy for impact creation (as presented in D7.2), the following activities will be performed during the second year of the project, targeting at the attraction and potential engagement of SMEs to Smart5Grid experimentation activities:

- **Communications channels:** During the second year of the project, Smart5grid communication channels will play a vital role to the effective communication of the project's activities and achievements (architecture, NetApps, use cases, trials) for attracting SMEs
 - **Smart5Grid website:** The project's website will remain the main source of information for interested SMEs to learn about Smart5Grid's latest activities. The News webpage will be constantly updated with the latest project news on a weekly basis, especially focusing on communicating the expression of interest for SMEs pool targeting their engagement in the NetApp Smart5Grid ecosystem, while the Use Cases webpage will be constantly updated with the latest technical details and advances on the status of their architecture and developed NetApps (note that the latest website content update on the use cases webpage took place in November 2021).
 - **Smart5Grid social media channels:** Smart5Grid has a very dominant presence in the most popular social media channels having attracted so far more than 650 followers and having a constant activity of more than 2 posts per channel on a weekly basis. Smart5Grid social media channels will be used during the second year for a more intense and targeted promotion of the project to SMEs, startups and related associations that can act as third parties experimenters. Specific hashtags (#), mentions (@) and URL links will be used in the posts for attracting and in parallel redirecting interested SMEs to available sources of expression of interest, either in the News section of the website or the online form that will be created for collecting the necessary data of the interested SMEs.

- **SmartGrid Newsletter:** The quarterly issued newsletters will be also used for communicating the expression of interest of SME engagement in the Smart5Grid NetApp ecosystem to a poll of SMEs. INFOLYSIS partner, as Smart5Grid communication leader, has already communicated the latest Smart5Grid newsletters to SME related associations, alliances and working groups such as 5G-PPP SME WG and 5G-PPP Comms WG aiming to attract the potential interest of SMEs to the project.
- **Express of interest (SMEs pool) – Online form:** During the period M15-M24, an online form will be created (google form) and intensively communicated through all above-mentioned actions. through which, interested SMEs will provide their contact details and the Smart5Grid UC/NetApp in which they are more interested to get involved as third-party experimenters. This process of documenting express of interest will consequently lead to the creation of a pool of SMEs that have formally expressed their interest in getting involved with Smart5Grid as external experimenters.
- **Webinars:** Smart5Grid will organise a series of webinars for communicating the status of the project, use cases and NetApps as well as the opportunity/invitation for third parties to act as experimenters. Initially, internal technical webinars, open only to consortium members, will be organised by project's technical team and use case leaders for providing a detailed update of the latest technical developments to the whole consortium. Then open to the public online webinars will be organised (at least two per year) where SMEs, start-ups, other research projects and related associations will be invited to attend and express their interest for further involvement. During the first half of 2022 the first internal and external Smart5Grid webinars will be organised.
- **SMEs related associations, alliances, incubators:** As already mentioned. several Smart5Grid partners are members of SME related associations (such as NetworkEurope, European Digital SME Alliance, 5G-PPP SME WG and 5G-PPP Comms WG etc.) to which they will "promote" Smart5Grid activities and invitation for engagement and NetApp development experimentation within the framework of Smart5Grid use cases.
- **Synergies and joint events with rest 5G-PPP ICT-41 projects:** All 5G-PPP ICT-41 projects deal with NetApps development and experimentation in various 5G enabled vertical environments. In parallel, all ICT-41 projects aim to the development of an SMEs and start-ups ecosystem which will become aware of their actions and advances while they will have the chance to get involved and experiment with the activities of the corresponding project. Creating synergies and organising joint events (workshops, training sessions) with other projects for attracting and informing SMEs are among the actions to be performed by Smart5Grid during 2022. Already partners such as INFOLYSIS, 8BELLIS, ATOS and OTE that participate in other ICT-41 projects too are making arrangements for joint actions towards the facilitation of the SMEs engagement process.
- **Partners business networks and contacts:** Consortium partners will be also in charge to communicate project actions to their own network of stakeholders and

invite them through the networking/contacts, press releases, social media platforms and in general through all the means of communication that each partner has at his disposal for promoting Smart5Grid openness to third parties experimenters.

- **Publications, Workshops, Presentations, Industry Events and Trials:** Several Smart5Grid dissemination activities will be performed through which the latest activities and results of the project will be communicated targeting and attracting the interest of potential third parties experimenters to the Smart5Grid project.

All above planned actions for SMEs engagement and especially the pool collection of interested SMEs will be further exploited by T2.4 '*Smart5Grid Alignment with previous 5G-PPP phases and Roadmap for third-party experimentation*' that will provide them the next steps towards their technical involvement in the project.

3. 5G-PPP Program Liaison and Activities

3.1. Participation in 5G-PPP Steering / Technical board and WGs

3.1.1. Introduction

In the previous WP7 deliverable, D7.2, Smart5Grid reaffirmed its commitment with the 5G-PPP Programme and its intention to actively contribute to it in order to maximise its impact. During that first period, we identified those 5G-PPP and 5G IA WGs relevant to the project and representative partners for each of them were designated. Smart5Grid also committed to work with its peer 5G-PPP projects and, after analysing the involvement of the consortium partners in the on-going phase 3 projects, we identified where some kind of synergy and collaboration was possible.

In the following sections, we describe the progress that the project has done in that sense per WG and phase 3 projects.

3.1.2. Steering board

As defined in 5G-PPP rules, the Project Coordinator is called to represent the project in the 5G-PPP Steering Board. As the Coordinator comes from a different industry, this first part of the year was more spent on learning from other contributors about the activities of the board and bridging with the project partners, informing them about the incoming opportunities and/or needs for contributions. Generally speaking, the activities of the board are often focused on a general update from the Working Groups, giving to all the members a broad overview of the progress.

The first contact with all the new projects in H2020-ICT-41-2020 call has been in a dedicated workshop in early March, when all the projects have been showcased.

3.1.3. Technical board

As regard the technical board activities ENG has participated, on behalf of the consortium, in the following document:

EC H2020 5G Infrastructure PPP - PPP Projects Heritage Figure - Version 2.0

This document has been developed on the basis of the Version 1.0 released in June 2020 (<https://5g-ppp.eu/5g-ppp-heritage/>) and considering (1) ICT-42, ICT-53, ICT-52 and ICT-41 Projects and (2) potential further up-dates/grades from other Projects already included in Version 1.0. This action is developed in the context of the Vision WG – PSM SG with tight interactions with the TB.

In the documents have been reported all the main projects that created assets that were then inherited from Smart5Grid.

3.1.4. Working Groups

3.1.4.1. 5G-PPP WGs

Table 11 reports the WGs which are of interest for Smart5Grid, as well as the Smart5Grid partners responsible for representing the project and following and contributing to each initiative.

AREA	WORKING GROUP	Smart5Grid REPRESENTATIVES
5G-PPP	Steering Board	<u>ENEL</u> Daniele Porcu (daniele.porcu@enel.com) Project Coordinator
	Technology Board	<u>ENG</u> Giampaolo Fiorentino (giampaolo.fiorentino@eng.it) Technical Manager
	COMMS	<u>8BELLS</u> George Kontopoulos (george.kontopoulos@8bellsresearch.com) Communications Manager Deputy: Dimitrios Nodaros (dimitris.nodaros@8bellsresearch.com)
	Architecture	<u>ATOS</u> Borja Otura (borja.otura.external@atos.net) Deputy: Sonia Castro (sonia.castro@atos.net)
	Software Networks (SDN/NFV)	<u>ENG</u> Giampaolo Fiorentino (giampaolo.fiorentino@eng.it) Deputy: Antonello Corsi (Antonello.Corsi@eng.it)
	Test, Measurement and KPIs Validation (TMV)	<u>WI3</u> Gianluca Rizzi (gianluca.rizzi@windtre.it) Deputy: Fabrizio Brasca (FabrizioGabrio.Brasca@windtre.it)
5G IA	Trials	<u>UCY</u> Irina Ciornei (ciornei.irina@ucy.ac.cy) Deputy: Lenos Hadjidemetriou (hadjidemetriou.lenos@ucy.ac.cy)
	Vision and Societal Challenges	<u>8BELLS</u> George Kontopoulos (george.kontopoulos@8bellsresearch.com) Deputy: Dimitrios Nodaros (dimitris.nodaros@8bellsresearch.com)
	Security	<u>UBE</u> Anastasis Tzoumpas (atzoumpas@ubitech.eu) Deputy: Thanasis Bachoumis (abachoumis@ubitech.eu)
	Pre-Standardization	<u>OTE</u> Ioannis Chochliouros (ichochliouros@oteresearch.gr) Deputy: Michalis Rantopoulos (mrantopoul@cosmote.gr)
NetworldEurope	SME	<u>INF</u> Nikolaos Vrionis (nvrionis@infolysis.gr) Deputies: Vaios Koumaras (vkoumaras@infolysis.gr) George Kontopoulos (george.kontopoulos@8bellsresearch.com) Dimitrios Nodaros (dimitris.nodaros@8bellsresearch.com)

Table 11: Smart5Grid project participation in 5G-PPP / IA WGs

In the sections below, we present each of these WGS, we describe their main activities since joining and, finally, we enumerate the contributions we have made so far, or we foresee we will make.

3.1.4.2. Communications Group

WG DESCRIPTION

The Communications Group serves as a communications and dissemination related information exchange for all 5G-PPP projects. Participants on the WG's mailing list receive updates regarding all current 5G-PPP projects, as well as dissemination opportunities that might be of interest.

The WG also facilitates interactions about common presentation materials, brochures, flyers, webs, tweets, etc, as well as preparations for joint events to work efficiently between the persons responsible in the projects.

WG MAIN ACTIVITIES (IN THE LAST YEAR)

In the Communications Group meeting that took place in May 2021, the agenda focused on the 5G-PPP brand guidelines and communication tools that are available. Additional focus was on the EuCNC 2021 conference, and ensuring that 5G-PPP projects participation is well communicated. The meeting also served as forum for information exchange on activities of all currently running projects.

SMART5GRID CONTRIBUTIONS (SO FAR / FORESEEN)

Representatives from the Smart5Grid project participate in the WG meetings, activities and mailing list to facilitate the communication and dissemination of the project.

3.1.4.3. Architecture WG

WG DESCRIPTION

The 5G-PPP Architecture Working Group (WG) aims to serve as a common space for the partnership projects to collaborate, share, and unify the European view on architecture of 5G networks and beyond. The WG aims to provide a consolidated technical approach and guidelines for designing this type of architectures. This common view is compiled into a white paper and workshops and events are organized for dissemination purposes. Furthermore, in collaboration with the Pre-Standards WG, it provides support in liaising with standardization bodies. To achieve these goals, the WG holds regular meetings with representatives from the projects where the contributions from participants is discussed and the work required to achieve the common view is coordinated.

WG MAIN ACTIVITIES (IN THE LAST YEAR)

From 2016, the Architecture WG issues a White Paper with the unified view on multiple domains covered by this architecture, such as radio, edge, core and transport networks, and management and orchestration, as well as cross-domain and deployment considerations. This White Paper is updated regularly with the latest advancements and progress from the participating projects and v4.0 is its latest version. The WG has been focusing on the preparation of this version during 2021 and the document will be released at the end of the year.

In addition, to present the 5G-PPP Architecture White Paper version 4.0 and highlight the findings from projects that focus on the evolution from 5G and beyond into 6G architectures, the WG has organized a workshop that took place on the 13th and 14th of October 2021 under the scope of the IEEE 5G World Forum conference.

SMART5GRID CONTRIBUTIONS (SO FAR / FORESEEN)

Smart5Grid has been actively participating in the activities of the WG since the beginning of the project. The main contribution from the project this far, can be summarized in the following specific contributions:

- Presentation of the Smart5Grid project to the other member projects participating on the WG.
- Actively participating in the discussions held on the WG regular conference calls.
- Contribution to the 5G-PPP Architecture *White Paper version 4.0 with Smart5Grid view on NetApps as Vertical Applications*.

3.1.4.4. Software Networks WG

WG DESCRIPTION

The purpose of this WG is to analyse and address unification and applicability of key research topics related to Software Networking including software defined concepts, infrastructures, systems and components for Wire and- Wireless Networks, including Networked Clouds, IoT and Services, i.e. Software Defined Networks (SDN) and Network Function Virtualization (NFV) as developed and promoted by the 5G PPP projects.

WG MAIN ACTIVITIES (IN THE LAST YEAR)

The software networks WG organized many different conf call in which new project joining the WG has been presented. Moreover the WG was focused on the creation of a whitepaper titled: *"From VNF to API: Opening up 5G and beyond networks to verticals"*.

SMART5GRID CONTRIBUTIONS (SO FAR / FORESEEN)

ENG on behalf of the consortium of Smart5Grid has been provided in the presentation of the project as well as on the presentation to the WG of the Smart5Grid concept of NetApp. ENG & ATOS delivered the content, as regard the consortium contribution, for the WG white paper: *"From VNF to API: Opening up 5G and beyond networks to verticals"*.

3.1.4.5. Test, Measurement and KPIs Validation WG

WG DESCRIPTION

The 5G Test, Measurement and KPIs Validation (TMV) WG is bringing new services and technologies into the picture, including a heavy softwarization that is bridging the telco world with the IT one. One of the biggest challenges is how to make the softwarized network carrier-grade, resilient, reliable, and stable. While the bridging of telco and IT changes how we test, and the type of tests, there is still a gap in doing End-to-End (E2E) and NFV/VNF characterizations and performance evaluation in the new 5G heterogeneous infrastructure (cloud-RAN, MEC/fog, distributed clouds). Test and Measurements (T&M) procedures, tools, and methodologies (testing, monitoring, and analytics) need to be agreed upon, and they should serve for the verification of the performance KPIs that 5G is promising to deliver, providing confidence to Mobile Operators and Verticals on the deployed 5G capabilities and services. The purpose of the Group is to bring together the projects that have common

interest in topics related to the development of T&M and validation methods, test cases, procedures:

- Demonstration of 5G KPIs (including 5G network E2E KPIs, 5G vertical service E2E KPIs).
- Enabler for trials / pilots (ICT-19).
- Impact on standardisation addressing gaps with respect to the 5G-PPP vision.
- Leverage results from phase I and II in the scope of the WG.
- Reproducibility properties of the experimentation.
- Common and agreed methodology for integration and deployment.

The Group will identify specific areas in the relevant standards bodies (IETF, 3GPP, ETSI etc.) where the projects should contribute towards.

WG MAIN ACTIVITIES (IN THE LAST YEAR)

TMV WG organised 16 conference calls and one workshop to discuss the WG current activities, progress and identify next steps. TMV WG completed the definition of a set of core KPIs that are used as the basis for the next developments in TMV WG. TMV WG progressed the work on the testing methodologies, tools, and procedures, on KPI validation methodologies and on the testing lifecycle. During the Q4 of 2020, TMV WG initiated discussions and contributions to the ETSI INT Working Item on "Vertical Application Testing and Validation" and scheduled ad hoc conference calls to coordinate the liaison between the TMV and the ETSI INT WI.

SMART5GRID CONTRIBUTIONS (SO FAR / FORESEEN)

Smart5Grid has been actively participating in the activities of the WG starting May 2021. The main contributions from the project so far are summarized below:

- Presentation of the Smart5Grid project to the other member projects participating on the WG.
- Actively participating in the discussions held on the WG regular calls and meetings.

3.1.5. 5G IA WGs

3.1.5.1. Trials WG

WG DESCRIPTION

The 5G IA (Infrastructure Association) Trials Working Group (WG) was launched in 2016, following the 5G Manifesto of the industry in Europe²² and in line with the scope of the 5G Action Plan of the European Commission²³. The aim of this WG is to provide a neutral place of discussions for a European trial roadmap on technology trials and Pan-European trials in a wide range of use-cases and industry verticals. It also aims to define business principles which could guide further actions based on the viability of the trials. The group also considers and facilitates knowledge sharing on trials with other similar initiatives at

²² European Commission, "5G Manifesto for the industry in Europe", Brussels, July 7th, 2016 [available online: <http://telecoms.com/wp-content/blogs.dir/1/files/2016/07/5GManifestofortimelydeploymentof5GinEurope.pdf>]

²³ European Commission, "5G Action Plan", Sept, 2016 [available online: <https://digital-strategy.ec.europa.eu/en/policies/5g-action-plan>]

international level (e.g., China, India, etc.). Furthermore, in collaboration with the Pre-Standards WG, it provides support in liaising with standardization bodies. To achieve these goals, the WG holds regular meetings and organizes workshops where representatives from on-going and past projects are encouraged to share experience and lessons learned from field trials across Europe and industry verticals where the contributions from participants is discussed and the work required to achieve the common view is coordinated.

WG MAIN ACTIVITIES (IN THE LAST YEAR)

The Trials WG issues an annual Brochure on 5G-PPP Trials and Pilots (T&P). The latest is Brochure n°3²⁴, released beginning of October, 2021. The scope of such brochures is to select and showcase the most impactful trials and pilots already completed following a selection process by a panel of experts and following pre-defined selection criteria.

The Trails WG also issues an annual White Paper, summarizing the vertical and use-cases worked on by the completed H2020 5G-PPP family of projects. Further it aims to foreseeing communication challenges and opportunities which could open the road towards 6G. This White Paper is updated regularly with the latest advancements and lessons learned from the completed trials. The WG has been focusing on the preparation of this version during 2021 and the document is expected to be released in Spring next year.

The WG also contributed to the 5G Annual Journal 2021 led by stream champion of the 5G Private Trials/ Observatory stream, which has been published in June, this year.

Further, the WG Trials in collaboration with the International T&P stream has organized a bilateral webinar (TSDSI – 5GIA) between the European 5G IA and the Telecommunication Standards Development Society, India (TSDSI) on 22nd of September 2021, aiming to exchange know-how and best-practices on T&Ps (e.g., smart city and smart grids) in Europe and India, and on organization of multi-year funding programs.

SMART5GRID CONTRIBUTIONS (SO FAR / FORESEEN)

Smart5Grid has been actively participating in the activities of the WG starting April 2021, when the delegated representatives of the project were fully given access to the WG mailing and communication platform. The main contributions from the project so far are summarized below:

- Presentation of the Smart5Grid project to the other member projects participating on the WG.
- Actively participating in the discussions held on the WG regular calls and meetings.
- Presentation of Smart5Grid project and its specific use-cases fully dedicated to the energy vertical (smart grids) at the bilateral webinar TSDSI-5G IA.

3.1.5.2. Vision and social challenges WG

WG DESCRIPTION

The Vision and societal challenges WG aims towards developing a consensus in Europe on 5G systems, infrastructure and services, identifying vertical application domains which would benefit from 5G (views of other sectors on 5G requirements) and associated challenges, and

²⁴ 5G-IA Trials and Pilots, Brochure no. 3, August, 2021, [available online: https://5g-ppp.eu/wp-content/uploads/2021/10/5GInfraPPP_10TPs_Brochure2021_v1.0.pdf]

identifying the societal, economic, environmental, business and technological benefits obtainable from the realization of 5G main concepts. Additionally, the WG facilitates collection of publicly available visions and major technical trends from industry, research community and available information from other regions, and helps identify commonalities, bottlenecks and differences in visions and technical trends.

The WG also prepares input documents for Pre-Standardization and Spectrum Working Groups and International Cooperation Activity, and helps Develop H2020 call proposals for 5G-PPP in partnership with the EC.

WG MAIN ACTIVITIES (IN THE LAST YEAR)

The WG meetings of the previous months mainly focused on the preparation of a white paper on 5G ecosystems, working on the contributions, action points, and comments of the representatives.

SMART5GRID CONTRIBUTIONS (SO FAR / FORESEEN)

The project representatives follow the WG activities and evaluate opportunities for contributions.

3.1.5.3. Security WG

WG DESCRIPTION

The purpose of the group is to foster development of 5G Security Community made of 5G security experts and practitioners who pro-actively discuss and share information to collectively progress and align on the field. This while:

1. Organizing specific communications and events (e.g. Whitepaper, Workshop, etc.)
2. Interacting with other 5G-PPP and IA WGs whenever Security input is needed
3. Developing liaison with other interested/interesting Security communities (e.g. ETPs, other PPPs).

Overarching objectives are threefold:

1. Work in a coordinated manner on 5G Security with a clear focus on areas of shared concerns (e.g. 5G Security architecture, AAA, Privacy, Trust, Security monitoring ...)
2. Exchange ideas on the design of the security solutions (also relevant Standards and/or SDOs that apply) with the aim to get them agreed and made interoperable.
3. Work on validation and/or adoption of the security solutions (in terms of usage to date and or to come).

Overall objective of this to bring together the projects within the 5G-PPP that have common interest in the development and progression of topics related to security. The group will ensure, to as great extent as possible, that the projects are working in a complimentary manner towards consistent goals, exchanging ideas, minimizing the duplication of effort, contributing towards relevant standards and where possible cooperating on the development of compatible components, demonstrators, the exchange of data and results and the interworking of communication layers, where applicable.

WG MAIN ACTIVITIES (IN THE LAST YEAR)

The main activities of the Security WG in the last year were the following:

- Assessment of the work performed in 2020 and update of workplan for year 2021.
- Follow up on actions engaged in support of EC recommendation on Cybersecurity of 5G Networks and preparation of the WG for the next steps.
- Review of the progress achieved by some of the projects.
- Focus on delivery of short white papers as planned.
- Continue to cross-fertilize with other WG of interest (especially in the context of their whitepapers where the Security WG has room for contribution.
- Plans to further make use of the signed MoU to interact with ECSO (interesting WGs).

SMART5GRID CONTRIBUTIONS (SO FAR / FORESEEN)

The project representatives follow the WG activities and evaluate opportunities for contributions. The next meeting is expected end of 2021.

3.1.5.4. SME

WG DESCRIPTION

The SME WG is focused on promoting the skills and expertise of its SME members in the ICT domain and research, supporting the engagement of SMEs in collaborative projects and cooperation via networking, improve SMEs visibility and ensuring their interests. It also facilitates the exchange of information amongst SME representatives while providing a Networking place for all NetWorldEurope SME members. Last, but not least, the SME WG has strong links to the 5G Infrastructure Association (5G-IA) and 5G-PPP but belongs to NetWorldEurope association (ex NetWorld 2020).

WG MAIN ACTIVITIES (IN THE LAST YEAR)

Below are summarized the core SME WG activities for the period 1/2021-11/2021:

- SME WG virtual meeting (1st March 2021). Welcoming new members and setting up the strategy for the next months, Horizon Europe program details and the role of SMEs in it.
- The SME WG prepared and released a Position Paper related to the participation and contribution of SMEs in the upcoming Smart Networks & Services (SNS) Partnership in Horizon Europe (January to May 2021).
- NetWorld2020 association elected new governing body and also was renamed to NetWorldEurope (May 2021)
- Finalizing the new version of SMEs brochure and update of the Find your SME webpage on the new website of NetWorldEurope (June-August 2021)
- Release of SMEs brochure and SMEs webpage in the new website of NetWorldEurope (<https://www.networldeurope.eu/sme-wg/>) completed and released (August 2021).
- NetWorldEurope SME Working Group and the SME WG-European Digital SME Alliance workshop on "5G, Edge Computing and IoT" (16th September 2021)
- The latest SME WG General Assembly meeting took place online on Monday 15 November 2021. Attended by INF on behalf of Smart5Grid. Topics discussed: SNS partnership program, Feedback from HorizonEurope initial calls, Feedback from the 1st joint workshop between the SME WG and the European DIGITAL SME Alliance, proposal for new workshop on Components for 6G, discussion on the open letter

“The EU needs an effective digital markets act”. It was also highlighted that there will be no new update of the SME web page or brochure before at least mid-2022, when the new CSA supporting 5G-PPP and NetworldEurope shall be launched.

SMART5GRID CONTRIBUTIONS (SO FAR / FORESEEN)

During the reporting period, Smart5Grid members of SME WG, and INF in particular, have made the following contributions:

- Smart5Grid representation by INF in SME WG was announced (January 2021)
- During SME WG virtual meeting (1st March 2021), Smart5Grid project was introduced, and an overview of its scope/objectives was communicated by INF to all members
- INF contributions related to the update of “Find Your SME” webpage <https://www.networldeurope.eu/find-the-sme-you-need-new-page/>
- Vertical sectors of interest were updated and the Energy sector was included
- Contributions to SMEs brochure new release
- European DIGITAL SME Alliance and the NetworldEurope SME WG workshop (16 Sept 2021) attended by INF as SME WG member of Smart5Grid project

3.1.5.5. Pre-standardization

WG DESCRIPTION

The 5G Public Private Partnership has a very pro-active relationship with standards development, and provides many mechanisms to help vertical stakeholders participate in various ways in the process. The Pre-Standardization Working Group has been established as one among the essential 5G-PPP WGs, for the support of standardization-related activities, within the broader scope of the 5G-oriented EU-funded research across the three funding phases.

The main activities of the Pre-Standardization WG have been about:

- Identifying standardization and regulatory bodies to align with, such as for example ETSI, 3GPP, IEEE and other relevant standards bodies, & ITU-R (incl. WPs) and WRC (including e.g. ECC PT1).
- Tracking inputs to standards organizations coming from the progress of the ongoing 5G-PPP projects and by using inputs coming from those projects²⁵.
- Enabling projects to showcase results during the monthly calls and pinpointing success stories that can feed into the online Standards Tracker.
- Developing a roadmap of relevant standardization and regulatory topics for 5G and also; evaluating existing roadmaps at international level.
- Influencing pre-standardisation on 5G and related R&D and potentially propose where topics should be standardised.

²⁵ The great heterogeneity of ongoing EU-funded research projects and the relating objectives are reflected in a wide variety of targeted pre-standardisation and standardisation bodies, including industrial alliances, associations, foundations and consortia (e.g. NGMN, 5GAA, 5G-ACIA, O-RAN, ONAP, W3C, CEPT), as well as ETSI, 3GPP, IEEE, IETF/IRTF and ITU working groups. Probably due to the heterogeneity of activities within each project, most projects were and are actually targeting impact on multiple bodies. However, it is relevant to note ETSI and 3GPP are by far the primary targets.

- Liaising with ETSI, 3GPP specialists to keep the WG members up to speed on standardization work, and StandICT.eu²⁶ on the EU ICT standards landscape.
- Influencing timing on R&D work programs (e.g. EC WPs).
- Identifying gaps to be targeted in future EU-funding programmes.
- Fostering the development of globally harmonised standards.
- Tracking progress towards EU priority topics as defined by the EC.
- Continuing the 3GPP MRP27 (Market Representation Partners) 5G User Event Series supporting industry verticals and responding to recommended actions in the EC 2021 ICT Standardisation Rolling Plan was published in March 2021²⁸, wherever relevant.
- Collaborating with other 5G-PPP WGs and Task Forces as required.

This WG is also working on a Standardization Roadmap supporting B5G/6G under the SNS programme²⁹. The aim is to identify the **potential to impact standardization** from the expected *timeline, phases, and key areas of work* for **B5G (Beyond 5G) and 6G research** towards 2030. The idea is to collect feedback and help consolidating a **B5G and 6G research with standardization potential roadmap**; such a roadmap is expected to support activities related to the EU research ecosystem with the final aim of maximising impact on standardisation.

WG MAIN ACTIVITIES (IN THE LAST YEAR)

The 5G-PPP is working on several fronts to support the 5G standardisation process whereas the 5G IA's Pre-Standardization WG supports projects in defining and driving their inputs in relation to standardization activities. This WG reports on impact on standardization across the various phases of the 5G-PPP Initiative³⁰, on an annual basis.

As of the activities performed in the last year, the Pre-Standardization WG has contributed the chapter on Standardization Activities related to Verticals in the 5G-PPP White Paper on "*Empowering Vertical Industries through 5G Networks – current status and future trends*"³¹ (September 2020) and a technical report, "*5G-PPP Impacts on Standards Development Organizations (SDOs)*"³² aimed at improving impacts on standards by facilitating the transfer of research to research to SDOs in the next European Framework Programme (October 2020).

²⁶ For further information see: <https://www.standict.eu/>

²⁷ The 5G IA works closely with a sub-set of other 3GPP Market Representation Partners (MRPs) to help capture needs from verticals and find a way to integrate them in 3GPP. This work is coordinated by a small task force led by 5G IA, 5GAA, 5G-ACIA and PSCE, flanked by high-level 3GPP Technical Specification Group Chairs and ETSI leadership.

²⁸ For further information also see the scope discussed in: <https://joinup.ec.europa.eu/collection/rolling-plan-ict-standardisation/5g>.

²⁹ Also see: <https://5g-ppp.eu/consultation-about-the-5g-infrastructure-ppp-pre-structuring-model-psm-extended-deadline-for-inputs/>

³⁰ 5G-PPP, Progress Monitoring Report, Online: <https://5g-ppp.eu/annual-progress-monitoring-reports/>

³¹ See: <https://5g-ppp.eu/wp-content/uploads/2020/09/5GPPP-VerticalsWhitePaper-2020-Final.pdf>

³² See: <https://5g-ppp.eu/wp-content/uploads/2020/10/5G-PPP-Projects-SDO-Impact-Technical-Report-v1.0-cl2.pdf>

3GPP is the main global standards organisation for mobile communications, focusing on the design of the 5G system and supporting a variety of industry verticals. Note that 50% of the work carried out focuses on 5G functionalities applicable across diverse verticals. The 3GPP work programme covers a multitude of enablers as part of a toolbox of functionalities that verticals can use to create their own services³³. Other relevant standards organisations working on 5G standardisation include ETSI, (e.g. on MEC, Experiential Networked Intelligence – ENI, NFV, Open Source MANO, Zero Touch Network and Service Management – ZSM), the Internet Engineering Task Force – IETF, the Internet Research Task Force – IRTF, the Institute of Electrical and Electronics Engineers – IEEE, and last but not least ITU.

To “drive” inputs as close to the market as possible, input tracking has focused on tangible inputs to working and study groups, including study and work items, gap analyses, PoCs, technical reports and technical specifications rather than on meetings and presentations, which were counted at the beginning of Phase 1. Inputs that are being normalized are also tracked. This approach helps the EC understand where EU leadership in standardization is coming from while bearing in mind the focus and project lifecycles, especially for the Phase 3 projects with their diverse timelines. The figure below shows the overall inputs collected³⁴.

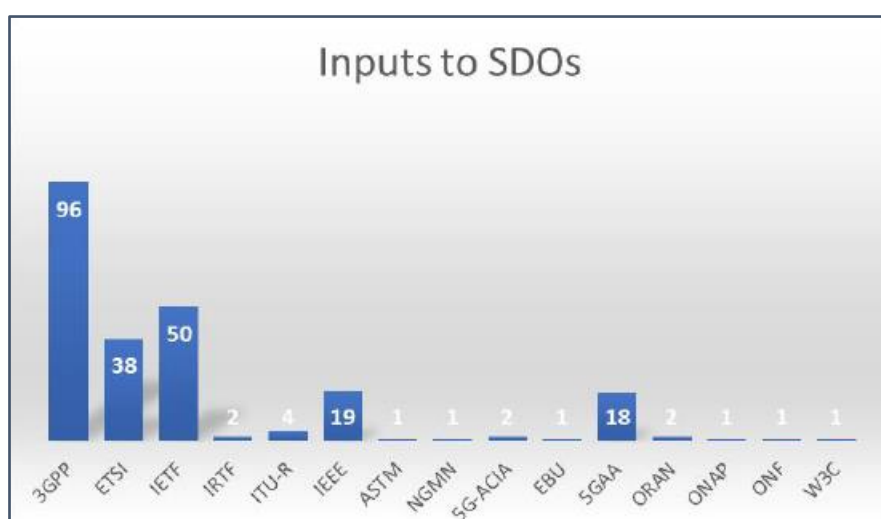


Figure 58: Inputs to SDOs (according to the 5G-PPP Progress Monitoring Report 2020)

The WG and the MRP activities are highly complementary in showcasing EU excellence in 5G standardization in a global context. Overall, the 5G-IA Pre-Standardization WG has tracked the following inputs to standardization organizations. Most inputs have been submitted to 3GPP (96), IETF (50) and ETSI (38), with increasing inputs to IEEE, and inputs to sector associations like 5GAA.

³³ 3GPP Workplan, Online: <https://www.3gpp.org/specifications/work-plan>.

³⁴ Input comes from the 5G-PPP Progress Monitoring Report – 2020. Available at: https://5g-ppp.eu/wp-content/uploads/2021/09/5G-PPP-PMR2020_Final.pdf

SMART5GRID CONTRIBUTIONS (SO FAR / FORESEEN)

OTE, as representative of the Smart5Grid project, has attended most of the scheduled activities of the Pre-standardization WG, organised on an (almost) monthly basis. In this scope, OTE had the opportunity to monitor the wider scope of this WG, to participate to the related discussions as well as to inform the other participants about the intended aims/objectives of the Smart5Grid project. Taking into account the fact that the Smart5Grid's architecture has only been defined lately (i.e., via the dedicated Deliverable D2.2, submitted by early of October 2021), more detailed presentations and/or contributions to this WG will come in the next reporting period, once a more stable framework of Smart5Grid is established and following to the technical progress of the project.

3.2. Collaboration with other 5G-PPP projects

Table 12 reports those 5G-PPP Phase 3 projects with which Smart5Grid identified some synergies and where we foresee that some potential collaboration may be possible. That table has been updated with respect to the table included in D7.2 after a deeper analysis and once the projects from the last calls are more advanced.

PROJECT	PHASE	PARTNERS INVOLVED	Partners foreseen some collaboration
5G-INDUCE	5G-PPP Phase 3, Part 6: 5G innovations for verticals with third party services & Smart Connectivity beyond 5G. H2020-ICT-41-2020: 5G innovations for verticals with third party services	WI3 8BELLS OTE UBE	WI3
EVOLVED-5G		ATOS INFOLYSIS 8BELLS	ATOS INFOLYSIS 8BELLS
VITAL5G		OTE	OTE
DAEMON	5G-PPP Phase 3, Part 6: 5G innovations for verticals with third party services & Smart Connectivity beyond 5G. H2020-ICT-52-2020: 5G-PPP Smart Connectivity beyond 5G	OTE	OTE
MARSAL		OTE	OTE
LOCUS	5G-PPP Phase 3, Part 4: 5G Long Term Evolution 5G-PPP ICT-20-2019	OTE	OTE
MonB5G		OTE	OTE
5GTOURS	5G-PPP Phase 3, Part 3: Advanced 5G validation trials across multiple vertical industries 5G-PPP ICT-19-2019	ATOS OTE	ATOS OTE
5GHEART		OTE	OTE
5GENESIS	5G-PPP Phase 3, Part 1: Infrastructure Projects 5G-PPP ICT-17-2018	ATOS INFOLYSIS ATH	ATOS INFOLYSIS

Table 12: Smart5Grid collaboration with other 5G-PPP projects

In the sections below, we provide a brief description of those projects, we analyse the synergies with Smart5Grid as well as the potential collaboration identified. We also briefly explain why collaboration with other projects previously identified has been discarded.

3.2.1. 5G-INDUCE (<https://www.5g-induce.eu>)

3.2.1.1. Project description

5G-INDUCE targets the development of an open, ETSI NFV compatible, 5G orchestration platform for the deployment of advanced 5G NetApps. The platform's unique features provide the capability to the NetApp developers to define and modify the application requirements, while the underlay intelligent OSS can expose the network capabilities to the end users on the application level without revealing any infrastructure related information. This process enables an application-oriented network management and optimization approach that is in line with the operator's role as manager of its own facilities, while it offers the development framework environment to any developer and service provider through which tailor-made applications can be designed and deployed, for the benefit of vertical industries and without any indirect dependency through a cloud provider.

The project focuses on the Industry 4.0 vertical sector, as one of the fastest growing and most impactful sectors in European economy with high potentials for application software development SMEs and with the capability to tackle all diverse cases of service requirements. The platform is integrated over three (3) 5G Experimentation Facilities in Spain, Greece, and Italy, while including links towards actual industrial sectors, for the showcasing of NetApps in a real 5G environment. The consortium includes all the required stakeholders (MNOs, Industries, System integrators and SMEs) from all the benefited business sectors evaluated within the project, while significant part of the work is conducted and exploited by innovative SMEs. It is noted that the 5G-INDUCE NetApp deployment and management framework is made available to third party NetApp developers, seeking to promote and evaluate their solutions through the 5G-INDUCE experimentation facilities.

3.2.1.2. Analysis of synergies

The aim of 5G-Induce and Smart5Grid is the development and validation of NetApps in the fields of Industry 4.0 and Energy respectively. The overall conceptual definition has many similarities mainly on the NetApps to be developed and verified under 5G-enabled infrastructures. A common principle of both projects is the technical architecture.

3.2.1.3. Potential collaboration identified

WI3 participates to both projects and collaborative works will take place. Some sort of synergies could be the joint dissemination activities either in the internal WI3's corporate framework or in international events. Interactivity and exchange of knowledge gained, within a wider 5G framework can also be promoted.

3.2.2. EVOLVED-5G (<https://evolved-5g.eu>)

3.2.2.1. Project description

The intense research work on 5G experimentation in Europe has reached the point where the evolved 5G capabilities, provided through the Service-Based Architecture (SBA), are to be exploited by third party innovators. Key enabler for this openness is the realisation of

network programmability through standard APIs. An endeavor that is expected to shape a new and dynamic ecosystem in mobile networks from both the technology and marketing perspectives. Indeed, SBA allows the exposure of network services and capabilities through the Network Exposure Function (NEF), a border function of the 5G core network. Already, 3GPP has specified the procedures and the information flows for a common API framework (CAPIF) to address applicability, duplication, and inconsistency aspects of the 5G northbound service APIs. In this context, vertical industries will be able to develop NetApps, i.e., to compose services by consuming 3GPP APIs (native APIs) as well as other telco assets (referring to business support system – BSS APIs, e.g., service orchestration APIs). For example, a NetApp could consume APIs that provide monitoring events and network slice configuration analysis to compose a service that guarantees quality of experience for latency-sensitive applications.

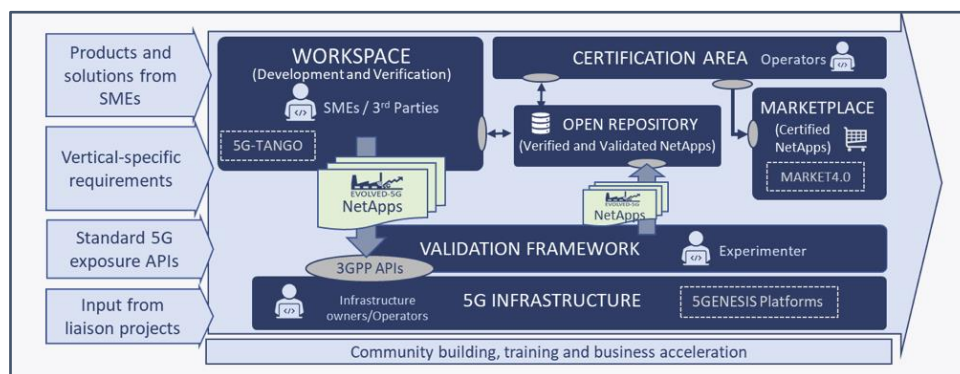


Figure 59: Abstract representation of the EVOLVED 5G approach

3.2.2.2. Analysis of synergies

EVOLVED-5G and Smart5Grid are EU-funded projects of the same EC Call (ICT-19), aiming to the development and validation of NetApps in the fields of Industry 4.0 and Energy respectively. The overall conceptual definition has many similarities mainly on the NetApps to be developed and verified under 5G-enabled infrastructures. A common principle of both projects is the community building, training and involvement of SMEs and third parties.

3.2.2.3. Potential collaboration identified

A potential collaboration is spotted on the actions of community building, training and involvement of SMEs and third parties. Commonly organised trainings and webinars might be planned for addressing third parties, SMEs, startups and stakeholders of 5G, Industry 4.0 and Energy sectors. INF as communication leader in both projects may ensure the common organisation of such actions.

3.2.3. VITAL5G (<https://www.vital5g.eu/>)

3.2.3.1. Project description

VITAL-5G intends to advance the already offered Transport & Logistics (T&L) services by engaging significant logistics stakeholders (sea and river port authorities, road logistics operators, warehouse/hub logistic operators, etc.) as well as innovative SMEs. The strategic objective of the project is to create an open, virtualised and flexible experimentation facility

comprised of an intelligent virtual platform, three distributed European 5G-testbeds and associated vertical infrastructure, so that to enable the testing and validation of T&L Network Applications (NetApps) in real-life conditions, by utilizing 5G connectivity.

NetApps in VITAL-5G are defined as packages containing NFV descriptors, software images, and configuration scripts for the service chains formed by virtualised and physical functions. Components of these NetApps are both vertical related (specific to T&L sector and Vertical agnostic) and connectivity related (i.e., VNF/PNF for 5G network services). All of these elements are chained into a Network Service (NS) for vertical-specific T&L applications and other vertical-agnostic (i.e. cross-vertical) applications. VITAL-5G's focus is on designing and validating a set of innovative Vertical T&L NetApps which are associated with an open repository and a service orchestration platform to help accelerate the growth, adoption and economic benefits in 5G exploitation for the European T&L sector. To realise this, VITAL-5G will provide an enhanced 5G-empowered experimentation facility which, with a portfolio of appropriate NetApps, will enable T&L application developers to test and validate their T&L applications in a user friendly and intuitive manner, thus significantly reducing operational uncertainties and reducing market entry barriers prior to porting their T&L services to live 5G networks.

VITAL-5G plans to showcase the added-value of 5G connectivity for the European T&L sector by adopting a multi-modal approach containing major logistics hubs for freight and passengers as well as the respective stakeholders, thus creating an end-to-end chain of connected T&L services accommodating the entire European continent.

Figure 60 provides a conceptual depiction of the proposed overall concept and of the related architecture.

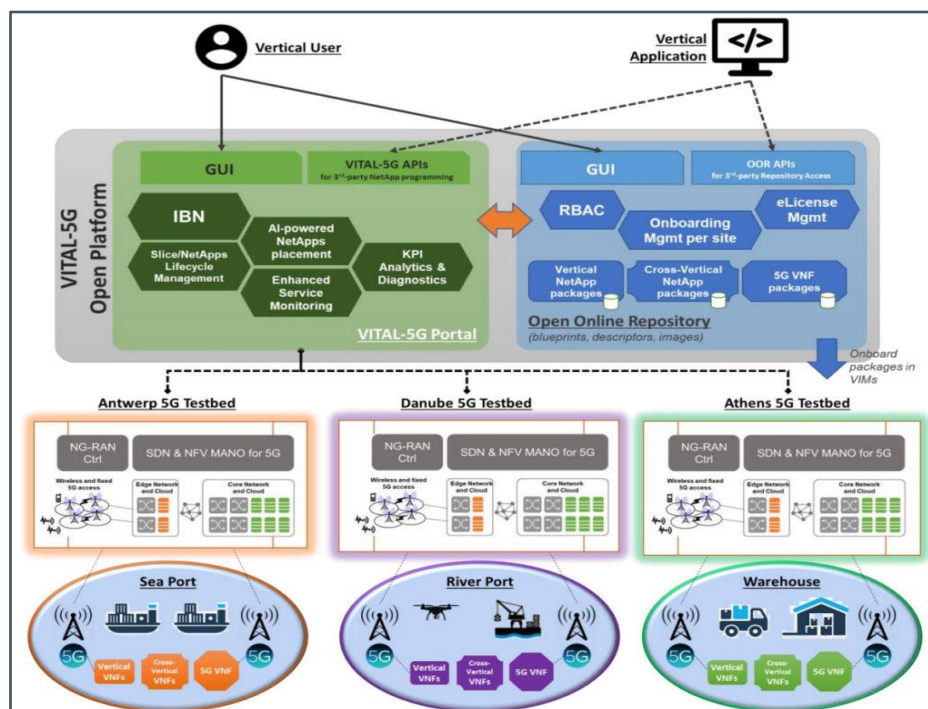


Figure 60: VITAL-5G facility overall concept and proposed architecture

3.2.3.2. Analysis of synergies

VITAL-5G's vision for NetApps will allow for the development of a strong sectoral T&L ecosystem of vertical stakeholders (internal and external), which will be facilitated via the collaborative open tools and open repository delivered by the project. In such an open format collaboration, multiple NetApps will be developed, reused, enhanced and validated owed to the complementary facilities offered by VITAL-5G infrastructure. The combination of advanced 5G testbeds with vertical specialised facilities and infrastructure through an open service validation platform will create a unique opportunity for third parties (such as SMEs) to reuse the VITAL-5G NetApps as well as to validate their T&L-related solutions and services utilising real-life resources and facilities otherwise unavailable to them, with a view to driving new SME revenues.

VITAL-5G and Smart5Grid are EU-funded projects of the same EC Call, aiming to the development and validation of NetApps. Thus, by conceptual definition have many similarities at least to the way how NetApps are to be developed and tested by using similar 5G-based infrastructures. Although the domain of applications differs, the proposed network architectures are structured under the same – or similar – principles and the involvement of third parties follows the same rules.

Apart from the above, enabling novel business models development for open, integrated and cooperative services across multiple domains is a common priority for both projects.

3.2.3.3. Potential collaboration identified

OTE participates to both projects and, as evidently, collaborative works will take place at various levels. It is so expected to consider exchange of ideas and of experiences towards offering testing and validation tools to any 3rd party experimenters as well to offering them a trusted and secure service execution environment under realistic conditions. This will allow them to further refine and fine-tune their NetApps, as well as foster the creation of new ones, while boosting the SME presence in the emerging 5G-driven ecosystem. In addition, the added value of 5G connectivity is of importance for both projects and so related results can be assessed under a joint vision. Last but not least, Smart5Grid and VITAL-5G can support joint dissemination activities for the promotion of 5G in verticals, especially around NetApps.

3.2.4. DAEMON (<https://h2020daemon.eu/>)

3.2.4.1. Project description

The DAEMON project develops and implements innovative and pragmatic approaches to Network Intelligence (NI) design that enable high performance, sustainable and extremely reliable zero-touch network system. The project will carry out a systematic analysis of which NI tasks are appropriately solved with AI models, thus providing a solid set of guidelines for the use of Machine Learning (ML) in network functions. DAEMON designs an end-to-end NI-native architecture for Beyond 5G (B5G) that fully coordinates NI-assisted functionalities.

The project aims at the following objectives:

- Designing a “NI-native architecture” for B5G (Beyond 5G) systems.

- Developing specialised NI-assisted network functionalities for B5G systems.
- Establishing fundamental guidelines for a pragmatic design of NI.
- Demonstrating the viability and performance of NI-native B5G networks.
- Industrial and scientific impact.

Figure 61, as below, provides a schematic depiction of the intended NI-native architecture.

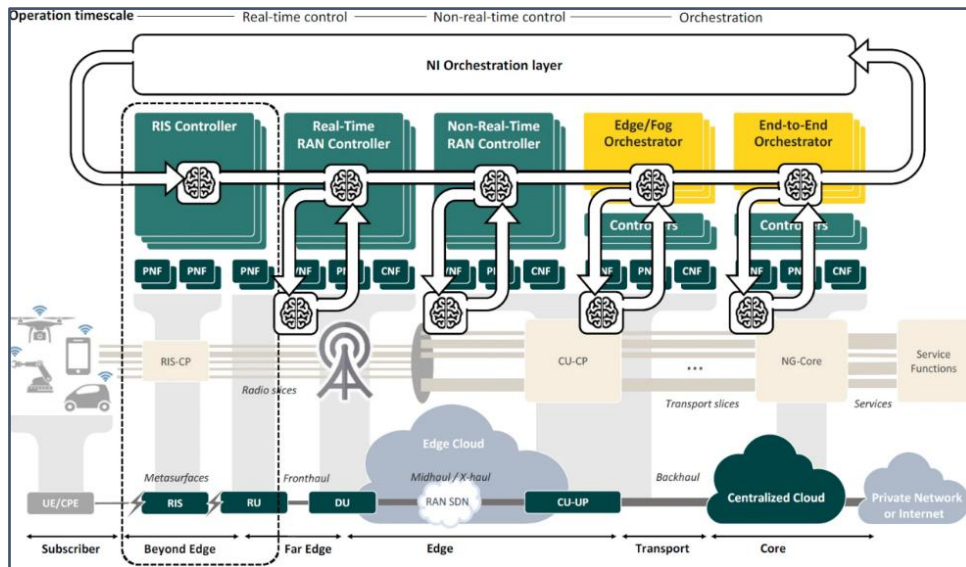


Figure 61: Concept of the DAEMON NI-native architecture

3.2.4.2. Analysis of synergies

Throughout and beyond their fifth generation, mobile networks will undergo an architectural revolution, aimed at supporting the extreme requirements set by future services that will assume performance indicators like virtually infinite capacity or perceived zero latency. The mobile network architecture is being redesigned for end-to-end softwarization and cloudification, while the atomization of the classical access-core dichotomy is paving the road for network micro-domains.

Fundamental to the optimal operation of the softwarized, cloudified and atomized network infrastructure will be the Network Intelligence responsible for managing the composite mosaic of network functions and associated resources in presence of a surging mass of services, tenants and slices. Present trends in NI for next-generation network orchestration that are promoted by major standardization bodies pivot on the notion of closed-loop Artificial Intelligence.

Advances to NI devised by DAEMON will be applied in practical network settings to: (i) deliver extremely high performance while making an efficient use of the underlying radio and computational resources; (ii) reduce the energy footprint of mobile networks; and (iii) provide extremely high reliability beyond that of 5G systems. To achieve this, DAEMON will design practical algorithms for eight concrete NI-assisted functionalities that will be evaluated in real-world conditions via four experimental sites.

The detailed focus towards NI as promote by the DAEMON scope can be beneficial to multiple networks of the future, serving a great variety of applications in diverse sectors, also including those of the Smart5Grid original effort. Any potential progress due to NI advances including aspects as those mentioned just above, could also be assessed for the Smart5Grid purposes. It is expected that possible updates/enhancements to the network infrastructure, as instructed by DAEMON, could also be implemented in Smart5Grid networks. This concept may be beneficial for future network implementations.

3.2.4.3. Potential collaboration identified

OTE is involved in both Smart5Grid and DAEMON projects and so is expected that any sort of potential collaborative work can be realised in common, in the framework of the corresponding evolution of effort. For the time being, there is plan for collaborative activities in joint events as well as for exchanging knowledge and experiences for matters affecting the underlying 5G-based network infrastructure. Both projects are also expected to contribute to joint events, especially to those that are market oriented.

3.2.5. MARSAL (<https://www.marsalproject.eu/>)

3.2.5.1. Project description

MARSAL targets the development and evaluation of a complete framework for the management and orchestration of network resources in 5G and beyond, by utilising a converged optical-wireless network infrastructure in the access and fronthaul/midhaul segments.

MARSAL proposes a new paradigm of elastic virtual infrastructures that integrate – in a transparent manner – a variety of novel radio access, networking, management and security technologies, which will be developed to deliver end-to-end (E2E) transfer, processing and storage services in an efficient and secured way. MARSAL focuses on three pillars to enable a new generation of ultra-dense, cost-efficient, flexible and secure networks, that is: network design pillar, virtual elastic infrastructure pillar, and network security pillar.

For the network design pillar, MARSAL targets the development of novel cell-free based solutions towards the distributed processing cell-free concept, and enables wireless mmWave solutions, which will be implemented and integrated with existing vRAN elements, while being in-line with the O-RAN Alliance. This will allow for a significant scaling up of the wireless Access Points (APs) in a cost-effective manner, by exploiting the application of the distributed cell-free concept and of the serial fronthaul approach, while contributing innovative functionalities to the O-RAN project. In parallel, in the fronthaul/midhaul segments MARSAL aims to radically increase the flexibility of optical access architectures for Beyond-5G Cell Site connectivity via different levels of fixed-mobile convergence.

MARSAL's second pillar is built based on the Elastic Edge Computing notion, targeting to optimize the functionality of the Mobile Edge Computing (MEC) and the network slicing management systems via a hierarchy of analytic and decision engines. The aim is to provide a comprehensive framework for the management of the entire set of communication and computational network resources. Thus, at the network and service management domain, the design philosophy of MARSAL is to provide a comprehensive framework for the

management of the entire set of communication and computational network resources by exploiting novel Machine Learning (ML) based algorithms of both edge and midhaul Data Centres by incorporating the Virtual Elastic Data Centres/Infrastructures paradigm.

Under its third pillar, MARSAL will develop novel Machine Learning (ML) based mechanisms that guarantee privacy and security in multi-tenancy environments, targeting both end-users and tenants. This will allow applications and users to maintain control over their data when relying on the deployed shared infrastructures, while AI (Artificial Intelligence) and Blockchain technologies will be developed, to guarantee a secured multi-tenant slicing environment.

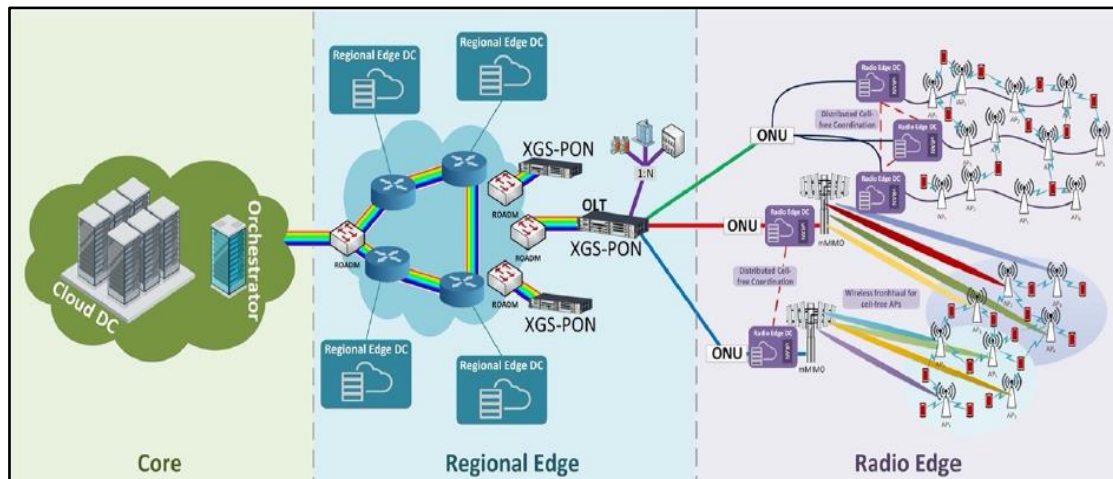


Figure 62: Main concept of MARSAL project with a complete system set-up from access to the core networks

The overall architecture and the structure of the envisioned Beyond 5G (B5G) MARSAL is depicted in the generic schematic above and includes all the main infrastructure elements that are deployed within MARSAL project. MARSAL adopts an evolved 3rd Generation Partnership Project (3GPP) Next Generation RAN (NG-RAN) which is extended with emerging Cell-Free technologies for network densification. Moreover, MARSAL contributes with innovations at the optical transport domain and significantly evolves the MEC system towards fully elastic Edge Computing. MARSAL will deploy a distributed Edge infrastructure with Data Centres (DCs) structured in 2 tiers, featuring Regional Edge and Radio Edge nodes. Radio Edge DCs will host the Network Functions of the (virtualized) RAN, which fully aligned with the O-RAN specifications.

3.2.5.2. Analysis of synergies

MARSAL aims to provide an evolved architecture towards Beyond 5G (B5G), offering unprecedented degrees of flexibility and closed-loop autonomy at all tiers of the infrastructure, and significantly improved Spectral Efficiency via Cell-Free Networking. Its overall concept is structured over three main pillars that have been discussed in the previous section. As MARSAL focuses on B5G aspects, it is expected that it will influence the development of future communications infrastructures, also including those that are intended to serve the Smart5Grid solutions, developed around the four corresponding use

cases. In addition, as MARSAL aims to develop ML-based solution for the management of network and service domains, this could potentially affect infrastructures serving Smart5Grid as well. Furthermore, apart from synergies at pure technical level, both projects can promote collaborative works for dissemination purposes.

3.2.5.3. Potential collaboration identified

OTE is involved in Smart5Grid and MARSAL projects and, consequently, potential synergies could be feasible in the course of both projects. Some sort of synergies have already taken place in the scope of joint dissemination activities either in the internal OTE's corporate framework or in international events (such as, for example, in the scope of the 5G-PINE 2021 Workshop in the AIAI-2021 International Conference). Interactivity and exchange of knowledge gained, within a wider 5G framework can also be promoted. However, as MARSAL is still developing the necessary architectural framework and the related recommendations, it is essential to reach to an adequately "mature" level of its respective technical solutions for network and service management, before any reliable effort for collaboration.

3.2.6. 5GMETA (<https://5gmeta-project.eu>)

5G Meta focused on a platform for the Automotive sector with the ultimate goal of enabling self-driving cars. Enabling technologies include 5G New Radio, V2X (vehicle to everything) and multi-domain. Therefore, there are no similar goals or innovation focus.

3.2.7. AFFORDABLE5G (<https://www.affordable5g.eu>)

After a deeper analysis, we do not foresee any way of collaboration with Affordable5G. This project focuses on creating a complete 5G network for private and enterprise networks, its innovation revolves around Open RAN, CPU-GPU hardware accelerators, AI/ML optimization in MANO and MCPTT services and its use cases include Emergency Communication, Smart Cities and Manufacturing. Therefore, there are no similar goals or innovation focus.

3.2.8. 5GMED (<https://5gmed.eu/>)

Something similar happens with 5GMed. This project focuses on Cooperative Connected and Automated Mobility (CCAM) and Future Railway Mobile Communications System services (FRMCS). Topics include cross-operator service orchestration, supporting high-speed vehicles and trains, speed up roaming transitions across MNOs, high-speed access network architectures for railways, AI enabled functions executing at the edge of the network. Use cases are related to remote driving, Road infrastructure digitalization, FRMCS applications and Follow-ME Infotainment. Therefore, there are no similar goals or innovation focus.

3.2.9. LOCUS (<https://www.locus-project.eu/>)

3.2.9.1. Project description

LOCUS aims to develop an extended location management layered infrastructure not only capable of improving localization accuracy and security, but also to extend it with physical analytics, and extract value.

Context-awareness is essential for many existing and emerging applications. Context information greatly relies on location information of people and things. But, navigation satellite systems are denied in indoor environments, current cellular systems fail to provide

high-accuracy localization, other local localization technologies (e.g. WI-FI or BT) imply high deployment / maintenance / integration costs. Raw spatiotemporal data are not sufficient by themselves and need to be integrated with tools for the analysis of the behaviour of physical targets, to extract relevant feature of interests. LOCUS will improve the functionality of 5G infrastructures to: i) provide accurate and ubiquitous location information as a network-native service, and; ii) derive more complex features and behavioural patterns out of raw location and physical events, and expose them to applications via simple interfaces. Localization, together with analytics, and their combined provision “as a service”, will greatly increase the overall value of the 5G ecosystem, allowing network operators to better manage their networks and to dramatically expand the range of offered applications and services. The current freedom to act on 5G system design and availability of software network paradigms and AI techniques uniquely combine to make it possible to radically improve the future network by endowing it with accurate on-demand localization and analytics.

LOCUS will showcase its solutions in three scenarios, that is: (i) Smart network management based on 5G equipment localization; (ii) Network-assisted self-driving objects, and; (iii) People mobility & flow monitoring, including emergency services. The LOCUS consortium gathers a diverse blend of high-profile partners from Telco and IT industries that can make its vision a reality. LOCUS will be an enabler of a myriad of applications for the 5G ecosystem and beyond, boosting vertical industries and creating new business opportunities also for telcos.

The following Figure 63 provides a more generalised view of the intended LOCUS-based scope.

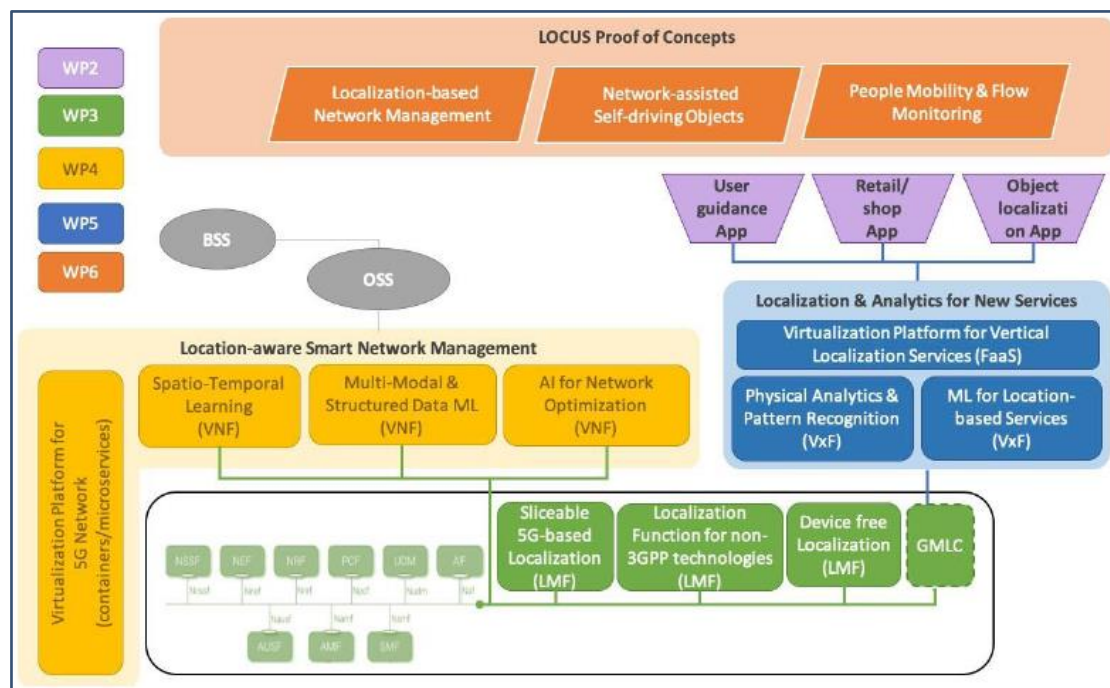


Figure 63: The LOCUS-based scope for implementation

3.2.9.2. Analysis of synergies

LOCUS aims at harnessing the ongoing 5G opportunity to natively incorporate, in the 5G network infrastructure, hooks, technologies and application programming interfaces devised to enable, and significantly foster, location/context-based services together with powerful business analytics. Based on novel paradigms such as Multi-Access Edge Computing (MEC) and network softwarization technologies, LOCUS intends to take a holistic approach to research key architecture and technology building blocks, as well as to provide versatile, flexible, secure, privacy-preserving and efficient operations of heterogeneous technologies and services. This can be achieved through accurate and ubiquitous localization and insightful context feature extraction using analytics technologies. LOCUS intends to provide results applicable to real-world scenarios of relevance to both academia and industry.

The accurate 5G localization and the intended integration with non-3GPP technologies set specific ambitions for LOCUS that can potentially be relevant to Smart5Grid use cases, especially within indoors applications. In this scope and for some of the Smart5Grid scenarios that are relevant to the remote inspection of energy installations, LOCUS may be useful for the remote inspection of automatically delimited working areas at distribution level (use case 2), if such areas involve indoors premises.

Another common element between the two projects (LOCUS and Smart5Grid) is the fact that they both consider a 5G core service-based architecture which follows both 3GPP specifications (e.g. according to ETSI GS MEC 003 V1.1.1 approach³⁵), so there are many conceptual similarities as of the intended use of the related networks functions.

3.2.9.3. Potential collaboration identified

OTE participates to both LOCUS and Smart5Grid projects. In this scope, collaborative works can take place for the support of dissemination activities as both projects are based upon 5G innovative features. Although the scopes of these two projects differ, under a pure conceptual assessment, it is possible to have some sort of interactivity as of the use of 5G infrastructures for both cases. The accurate 5G localization promoted by LOCUS may be useful in Smart5Grid's potential evolutions.

3.2.10. MonB5G (<https://www.monb5g.eu/>)

3.2.10.1. Project description

MonB5G is designed around a hierarchical approach that allows the flexible and efficient management of network tasks, while introducing a diverse set of centralization levels through an optimal adaptive assignment of monitoring, analysis and decision-making tasks. MonB5G proposes a hierarchical, fault-tolerant, automated data-driven network management system that incorporates security as well as energy efficiency as "key" features, in order to orchestrate a massive number of parallel network slices and, *significantly*, more diverse types of services in an adaptive and zero-touch way.

³⁵ ETSI (2016). ETSI GS MEC 003 V1.1.1, "Mobile Edge Computing (MEC); Framework and Reference Architecture", March 2016. Available at: http://www.etsi.org/deliver/etsi_gs/MEC/001_099/003/01.01.01_60/gs_mec003v010101p.pdf

MonB5G reuses standards-based MANO and MEC frameworks, extending them with embedded cognitive capabilities. It further provides trust mechanisms tailored to the targeted multi-stakeholder environment, for secure and trustworthy cross-domain operations.

MonB5G has selected two use cases that will be trialed over the partners' 5G testbeds, featuring automated, zero-touch slice management and orchestration across technical and administrative domains, enabling network operators to ensure end-to-end cross-domain SLAs (service-level agreements), as well as AI-assisted policy-driven security monitoring and enforcement.

The first intended PoC is about zero-touch network and service management with end-to-end SLAs: This use case leverages the highly distributed MonB5G mechanisms (i.e., the MS, DE and AE) to provide automated, zero-touch service management across domains, enabling Network Operators and MVNOs to avoid domain silos and ensure end-to-end cross-domain SLAs.

The second intended PoC is about AI-assisted policy-driven security monitoring & enforcement: The main purpose behind this use-case is to show both the efficiency of MonB5G when relying on AI to ensure legacy/new security threats detection in addition to their respective mitigations actions, and the proper enforcement of the AI-based techniques through novel trust-based evaluation mechanisms.

The following Figure 64 provides an overview of the intended MonB5G's decentralised management for network slicing purposes.

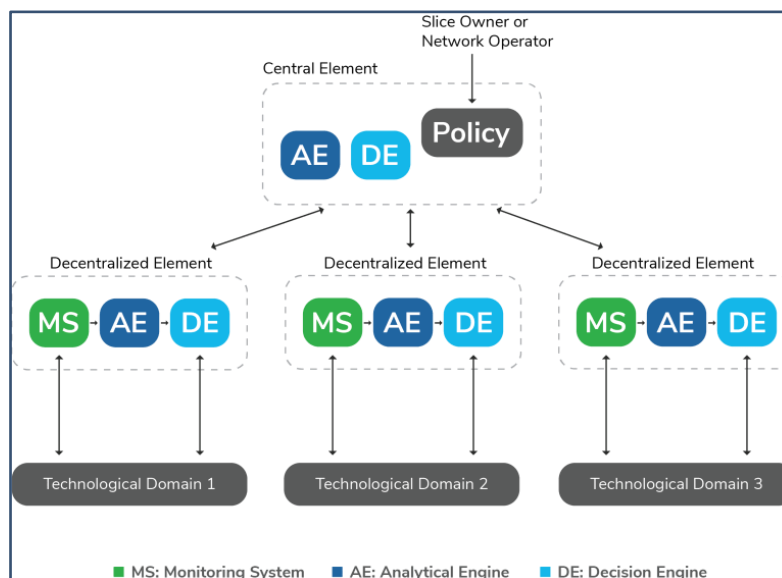


Figure 64: The MonB5G vision of a decentralized management system for network slicing

3.2.10.2. Analysis of synergies

MonB5G will split the centralized management system into several management sub-systems, distributing both the intelligence as well as the decision-making across various

components, as described earlier. Each technological domain may have one or several distributed management elements. The fundamental aim of the project is about the development of a zero-touch management and orchestration in the support of network slicing at massive scales for 5G LTE and beyond. MonB5G proposes a novel autonomic management and orchestration framework, heavily leveraging distribution of operations together with state-of-the-art data-driven AI-based mechanisms.

The main scope of MonB5G is so about promoting new and innovative methods for the distributed management of network slices in B5G infrastructures, which implies for potential applicability in diverse infrastructures. Although the original effort is aligned to the two selected PoCs, it is expected that either zero-touch network and service management with end-to-end SLAs or AI-assisted policy-driven security monitoring & enforcement could find ground for implementation in other use cases as well. In any case, the project will provide innovative findings for better network management, which shall be a “key” issue for the networks of the future. In particular, as of the B5G infrastructures, network slicing is expected to remain at the forefront of requirements for implementing market-oriented solutions, so any related experience will be of great value. In this framework, it is expected that potential findings/results from the MonB5G effort may be useful for network slicing applications serving the Smart5Grid framework as well.

3.2.10.3. Potential collaboration identified

OTE participates to both projects. It is expected that both Smart5Grid and MonB5G shall collaborate towards supporting dissemination and communication activities in future events relevant to 5G-oriented research. It is expected that exchanges of experiences and/or knowledge about network slicing issues will be a challenging opportunity for both contexts. Furthermore, as both projects consider as “basis” for their current network deployment the corresponding MANO and MEC frameworks, the proposed potential extension with embedded cognitive capabilities – as currently proposed by MonB5G – creates potential opportunities for further collaboration. MonB5G’s extra focus for secure and trustworthy cross-domain operations can be examined in future Smart5Grid’s implementations and trials as well.

3.2.11. 5G-TOURS (<http://5gtours.eu/>)

3.2.11.1. Project description

5G-TOURS will deploy to bring 5G to real users for 13 representative use cases.

The project aims to provide efficient and reliable close-to-commercial services for tourists, citizens and patients in three different cities: (i) Rennes, where e-health use cases will be demonstrated; (ii) Turin, the city focused on media and broadcast use cases; and (iii) Athens, the city that brings 5G to moving users as well as to transport-related service providers. These services will not only improve the quality of life for citizens and tourists, but also represent an important business opportunity. The ambition is to fully demonstrate pre-commercial 5G technologies at a large scale, showing the ability of the 5G network to meet extreme and antagonistic KPIs while supporting very diverse requirements on the same infrastructure. 5G-TOURS’ proposed architecture is shown as Figure 65 in below:

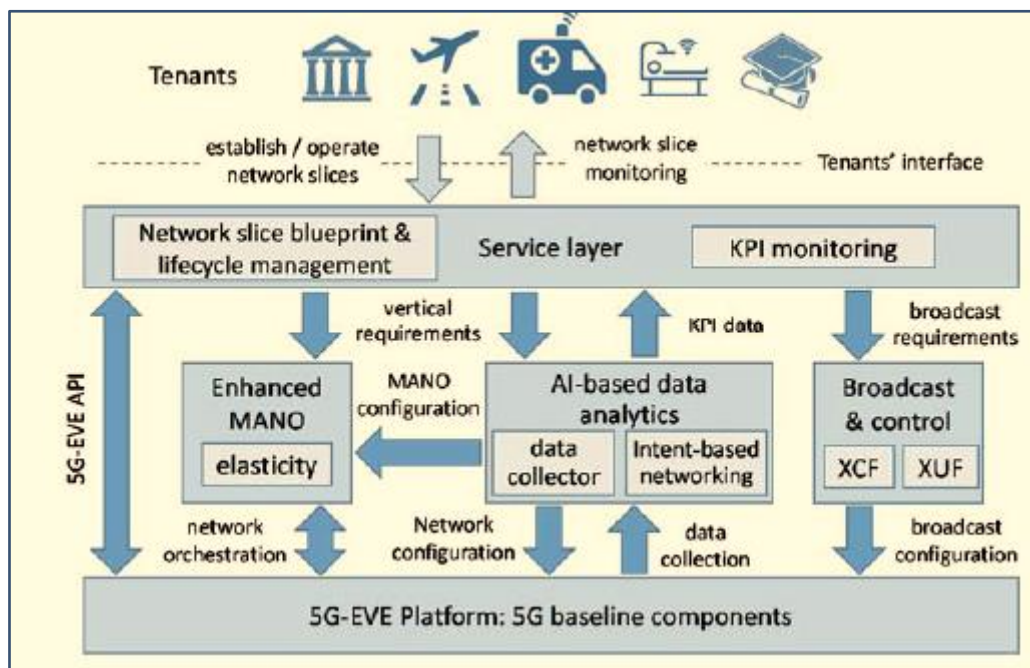


Figure 65: The proposed 5G-TOURS architecture

3.2.11.2. Analysis of synergies

The goal of 5G-TOURS is to get the European 5G Vision of “5G empowering vertical industries” closer to commercial deployment with highly innovative use cases involving cross-industry partnerships. 5G-TOURS vision is to improve the life in the city for the citizens and tourists, making cities more attractive to visit, more efficient in terms of mobility and safer for everybody.

5G-TOURS will enable different capabilities such as network slicing, virtualisation, orchestration or broadcasting as well as additional features developed by the project to bring more flexibility and improved performance. The ambition is to fully demonstrate pre-commercial 5G technologies at a large scale, showing the ability of the 5G network to meet extreme and conflicting KPIs while supporting very diverse requirements on the same infrastructure. The above concept has also similarities with ambitions set by the Smart5Grid project and, consequently, benefits can rise for both projects.

The 5G-TOURS mobile network system will integrate strategic components of the ecosystem, including the network infrastructure, terminals and end-devices, the vertical solutions enabled by 5G, and the vertical customers receiving the services. 5G-TOURS has devised a thorough evaluation plan to scrutinise the viability of the use cases, addressing technical performance by analysing both network service KPIs and application-level KPIs, economic impact by analysing the estimated generated revenues and, ultimately, the satisfaction of the vertical customers. This scope, around verticals, can also bring acquired knowledge for the benefit of Smart5Grid, especially within the intended context of involving market actors for developing and testing/validating NetApps.

3.2.11.3. Potential collaboration identified

Smart5Grid has already benefit from the experience acquired by ATOS and OTE participation in 5G-TOURS project. ATOS leads the 5GTOURS “WP2 – Use Cases Design” and its task “T2.1 – Definition of Use cases Functionality”, while OTE is responsible for “T2.2 – Derivation of technical requirements”. The methodology used by Smart5Grid for the collection of requirements from the use cases has been partially based on the one defined by 5GTOURS, in particular with respect to the analysis of technical requirements.

Apart from that, as the fundamental feature of the 5G-TOURS concept is the dynamic use of the network to seamlessly provide different types of services adapted to the specific needs of individual use cases, this can offer benefits to the Smart5Grid’s use of the underlying network, as well.

Apart from this option, both projects can collaborate for the promotion of 5G-based findings and related innovations, as well as for the support of dissemination activities in various sectors. As mentioned in the previous section, market-orientation aspects for the involvement of market actors can be a common task for both projects, in future activities.

3.2.12. 5G-HEART (<https://5gheart.org/>)

3.2.12.1. Project description

5G-HEART is one of 5G-PPP Phase 3 projects that aims to demonstrate innovative digital use cases involving healthcare, transport and aquaculture industry partnerships. In the health area, 5G-HEART aims to validate pillcams for automatic detection screening of colon cancer and vital-sign patches with advanced geo-localization, as well as, 5G AR/VR paramedic services. In the transport area, 5G-HEART’s focus is about validating autonomous/assisted/remote driving and vehicle data services. Regarding food chain safety, the main objective is on 5G-based transformation of aquaculture sector. Figure 66, as given below, provides a schematic depiction of the 5G-HEART ecosystem.

The infrastructure shared by the verticals will host important innovations such as: slicing as a service and resource orchestration in access/core and cloud/edge segments with live user environments. 5G-HEART KPIs validation ensures improved healthcare, public safety, farm management and business models in a 5G market, that stimulates huge business opportunities within and beyond the project.

The consortium includes major vertical players, research/academic institutions and SMEs. Partners have proven knowhow in 5G, vertical applications, standardisation, business modelling, prototyping, trials and demonstrations.

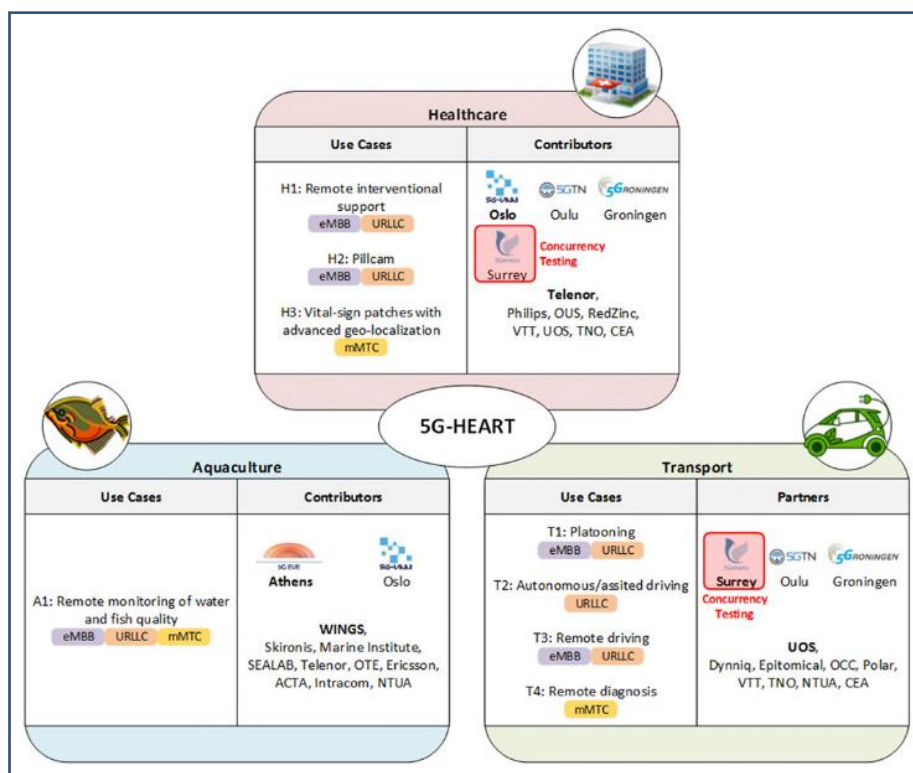


Figure 66: The 5G-HEART ecosystem

3.2.12.2. Analysis of synergies

The overall objective of the 5G-HEART is to define and validate the cost efficient 5G converged network concepts, which enable an intelligent hub supported by multiple vertical industries. Figure 67 as depicted below, provides an illustration of the intended objective.

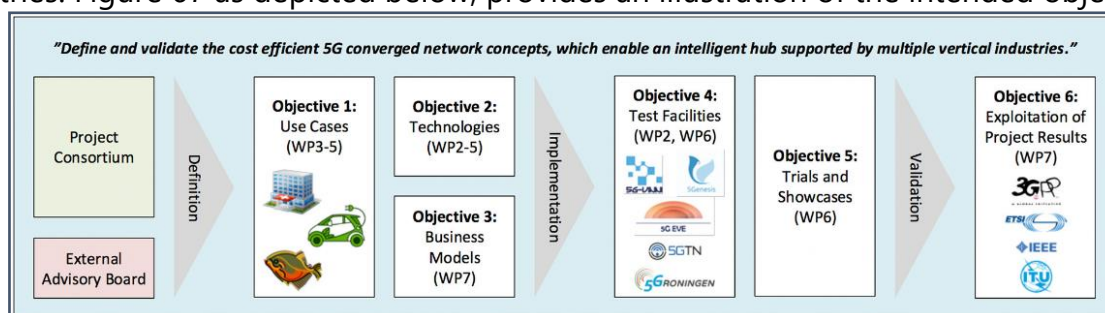


Figure 67: 5G-HEART project overview and its objectives

As the 5G-HEART project aims to define and validate some cost efficient 5G converged network concepts being able to enable an intelligent hub supporting multiple vertical industries, it is evident its strong relationship to actual market activities and needs, coming from diverse sectors. The project is around detailed market-oriented scenarios and it is expected to offer viable and applicable solutions, tailored to the involved market actors.

In this scope, any sort of potential collaboration between 5G-HEART and Smart5Grid can be mutually beneficial, especially about proposing solutions to serve requirements/needs set by multiple market players as well as about using 5G infrastructures for offering direct benefits to the involved market actors.

In addition, as the implementation of the 5G-HEART's trials investigates an extended variety of matters about enhanced mobile broadband (eMBB), ultra-reliable low-latency communications (URLLC) and massive machine-type communications (mMTC), this can provide extra knowledge that can be useful for other 5G implementations, potentially including those of Smart5Grid.

3.2.12.3. Potential collaboration identified

OTE participates to both projects. It is expected that experiences gained from market-oriented activities in the scope of 5G-HEART could potentially be useful for related market activities that are to take place within the Smart5Grid effort. Thus, both projects are expected to exchange knowledge, especially about market implementation issues. Apart from that, however, the projects can also collaborate and support joint dissemination events.

3.2.13. 5G CARMEN (<https://5gcarmen.eu>)

5G CARMEN focused on a platform for the Automotive sector with the ultimate goal of enabling self-driving cars. Enabling technologies include 5G New Radio, C-V2X (Cellular vehicle to everything), and multi-domain, and cross-border service orchestration. Use Cases are related to Cooperative Maneuvering, Situation Awareness, Video Streaming and Green Driving. Therefore, there are no similar goals or innovation focus.

3.2.14. 5GENESIS (<https://5genesis.eu>)

No potential collaboration foreseen from a common impact perspective given that 5GENESIS concludes its activities by the end of 2021.

However, an initial analysis has been made to verify if some of their developments, concepts or ideas could be reused by Smart5Grid as this project has implemented a validation framework for Network Services (NS), something that we plan to do with NetApps in Smart5Grid. The problem we found is that they use a commercial solution for it (OpenTAP from Keysight), which makes difficult to reuse it. On the other hand, in 5GENESIS architecture, there is a component, the dispatcher, which is responsible for the verification and that was contributed to OSM. We may explore if some of its functionality could be exported to the Smart5Grid V&V framework as well and, at the same time, open the door to new contributions to the OSM community.

4. Market Aspects and Preliminary Exploitation Activities

4.1. Initial Market Analysis and Aspects

The first step in the exploitation effort is to perform a market analysis, focusing on the targeted markets related to the Smart5Grid solutions. This market analysis will also reveal the main competitors, market shares, strengths and weaknesses.

Initial work is focused towards identifying the project's innovations, exploitable elements and relevant markets. In addition, we are studying the applicability of these in other verticals and markets, so as to fine tune the exploitation strategy.

The market for smart grid systems is defined as the sum of revenues generated by global companies from the sale of smart grid components. Software, hardware, and services are considered under smart grid components. Hardware and software components are used in the electric delivery system for the transmission, generation, distribution, and consumption applications.

A market segmentation of the supply-side could be based on component and communication technology (Table 13):

SUPPLY MARKET SEGMENTATION	
By Component:	<ul style="list-style-type: none"> • Software <ul style="list-style-type: none"> ○ Advanced Metering Infrastructure ○ Smart Grid Distribution Management ○ Smart Grid Network Management ○ Grid Asset Management, Substation Automation ○ Smart Grid Security ○ Billing & Customer Information System • Hardware <ul style="list-style-type: none"> ○ Smart Meters ○ Sensors ○ Programmable Logic Controllers ○ Others (networking hardware, energy storage systems) • Services <ul style="list-style-type: none"> ○ Consulting ○ Deployment and Integration ○ Support and Maintenance
By Communication Technology:	<ul style="list-style-type: none"> • Wireline (fiber optic, Ethernet, and powerline) • Wireless

Table 13: Supply side Market Segmentation

The **demand-side** market segmentation is usually based on application and region (Table 14):

DEMAND MARKET SEGMENTATION	
By Application:	<ul style="list-style-type: none"> • Generation • Transmission • Distribution • Consumption/End Use
By Region:	<ul style="list-style-type: none"> • Asia Pacific • North America • Europe • Middle East & Africa • South America

Table 14: Demand side Market Segmentation

According to a Markets and Markets report³⁶, the global Smart Grid market is expected to grow from an estimated USD 43.1 billion in 2021 to USD 103.4 billion by 2026, at a CAGR of 19.1%. Software segment is dominating the component type, followed by hardware segment, in the smart grid market. Furthermore, the software segment is expected to grow at the highest CAGR in this period.

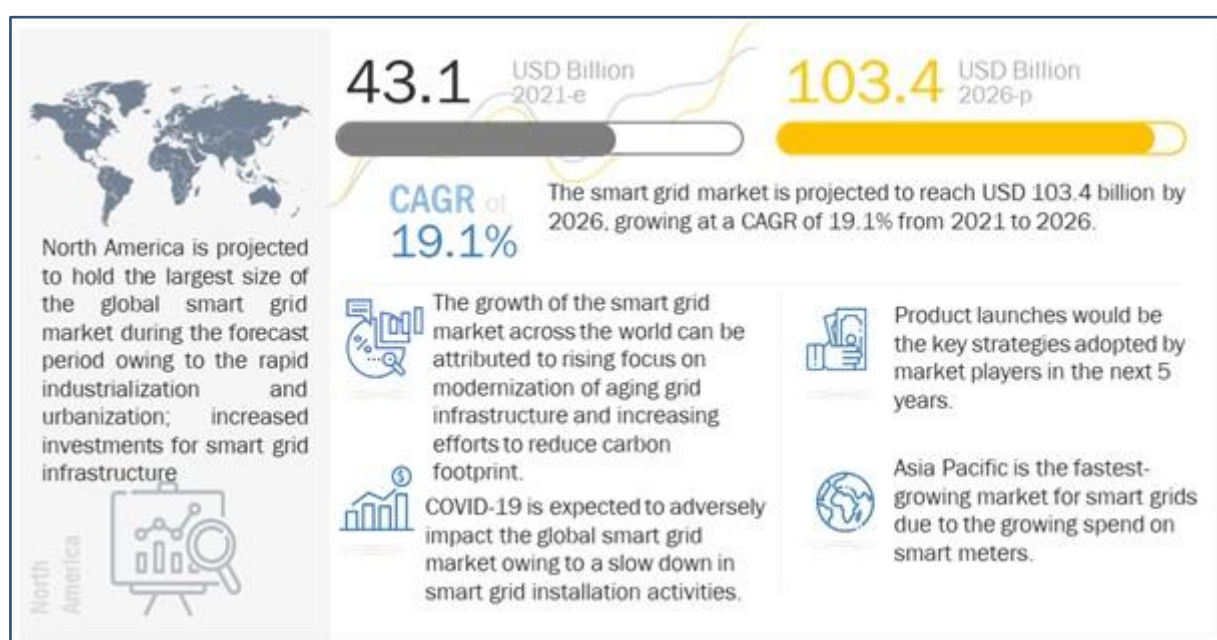


Figure 68: Smart Grid market dynamics (source: Markets And Markets)

³⁶ <https://www.marketsandmarkets.com/Market-Reports/smart-grid-market-208777577.html>

According to an Allied Market Research report³⁷, the Smart Grid market size is projected to reach \$169.18 billion by 2025, growing at a CAGR of 12.4% from 2018 to 2025.

According to a report published by Next Move Strategy Consulting, the global Smart Grid Market size was valued at USD 62.09 billion in 2020 and is predicted to reach USD 248.63 billion by 2030, with a CAGR of 15.2% from 2021-2030³⁸.

The European Smart Grid market is expected to grow at a CAGR of 8.6% from 2015 to 2025 according to a Frost & Sullivan report³⁹.

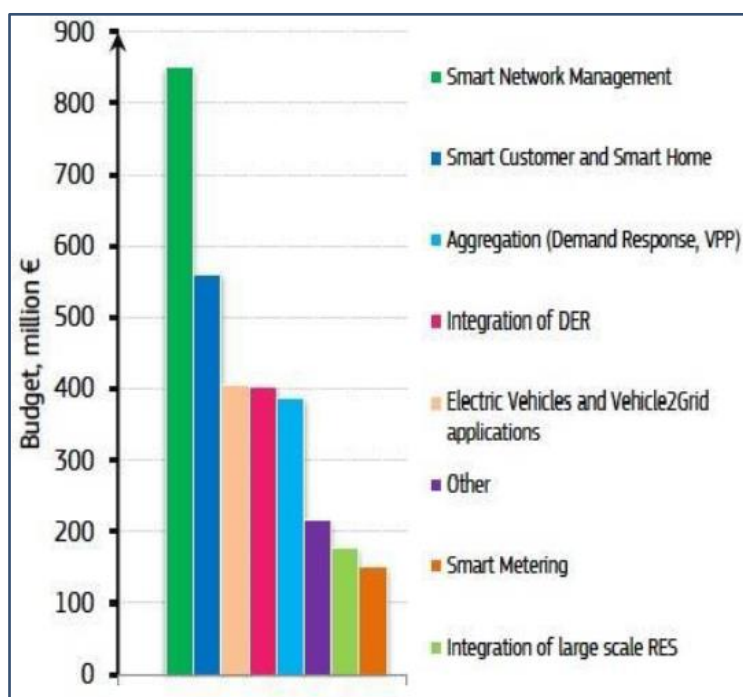


Figure 69: European investment per Smart Grid application (source: Joint Research Center, Frost & Sullivan)

³⁷ <https://www.alliedmarketresearch.com/smart-grid-market>

³⁸ <https://www.nextmsc.com/report/smart-grid-market>

³⁹ Frost & Sullivan European Smart Grid Market Overview, https://www.frost.com/files/2314/7151/3698/European_Smart_grid_market.pdf

In Table 15, are included all Influencing factors for the Smart Grid market and the corresponding trends and dynamics:

INFLUENCING FACTORS	DYNAMICS
Drivers	<ul style="list-style-type: none"> • Supportive regulatory framework from governments worldwide to promote deployment of Smart Grids • Improved Grid reliability and efficient outage response • Increased awareness about carbon footprint management
Restraints	<ul style="list-style-type: none"> • High installation cost of Smart Grids • Low awareness & maturity of protocols and interoperability standards
Opportunities	<ul style="list-style-type: none"> • Increased adoption of renewable sources with special production characteristics (seasonality, time of day) • Ongoing Smart Cities projects in developing countries • Increasing numbers of electric vehicles become major load in the Grid • Vehicle to Grid (V2G) technology • Need to modernize aging energy transmission & distribution networks promotes use of Smart Grid technology • Requirements to increase operational efficiency of utilities sector • Creating opportunity for existing utility vendors and emerging players
Challenges	<ul style="list-style-type: none"> • Proper storage and management of complex data generated by Smart Grid infrastructure • Cybersecurity and vulnerability issues faced by Smart Grid networks

Table 15: Influencing factors for the Smart Grid market

Major companies in the Smart Grid vendor ecosystem include GE, ABB, SIEMENS, SCHNEIDER ELECTRIC, ITRON, CISCO, IBM, ORACLE, HONEYWELL, EATON, TECH MAHINDRA, TANTALUS, MITSUBISHI ELECTRIC, SAP, WIPRO, TRILLIANT HOLDINGS, GLOBEMA, KAMSTRUP, XYLEM. Partly, due to the fact that USA is both the biggest and most mature market for Smart Grid technology, most of the key players have their headquarters in the US. An additional tailwind is that the US government is supporting and committing funds towards smart city initiatives and encouraging utilities to upgrade their old power equipment and rollout plans for smart meters.

The “GRID 2030” is a US national vision, first described in 2003, capturing recommendations helping to implement the call to “modernize America’s electric delivery system” by President Bush. It is used to guide the development of the electric delivery technologies roadmap and actions leading to the construction of the 21st Century electric system, and envisions transactional power transfers, real-time consumption analysis, diminishing power outage and disturbance costs.

According to a 5G Deterministic Networking Alliance (5GDN) white paper⁴⁰, 5G and Smart Grid Typical Use Cases are the following (Table 16).

SEGMENT	5G+Smart Grid Use Cases
Power Generation	Integrated Application of Micro-Energy Grid (Photovoltaic Monitoring)
	Integrated Application of Micro-Energy Grid (Breezy Power Generation)
	Integrated Application of Micro-Energy Grid (Photothermal Energy Supply)
	Small Hydroelectric Power Station Access
	Intelligent Power Station Production System
	Intelligent Power Station Management Monitoring System
	Intelligent Power Station Time-Space Positioning and Visual Operation
Transmission	Online Monitoring and Video Monitoring of Transmission Line Status
	Tunnel Inspection and Fire Fighting Robot
	Status Monitoring of Tunnel
	Amphibious Electrified Operational Robot
	UAV Inspection of Transmission Line
	Monitoring and Early Warning of Debris Flow and Other Geological Hazards Along the Transmission Line
	Monitoring and Early Warning of Wildfires Along the Transmission Line
Substation	Monitoring and Early Warning of Icing Along the Transmission Line
	Online Monitoring of Substation Equipment
	Intelligent Video and Environmental Monitoring in Transformer Substation
	Inspection Robot in Transformer Substation
	Operational Robot in Transformer Substation
	Intelligent Safety Equipment Management and Wearable Operation
	Energy Quality Monitoring
	Voltage Quality Monitoring
	One-Key Sequential Control
	Inspection UAV in Transformer Substation
Distribution	Status Monitoring of Substation Equipment in Converter Station (Intelligent Sensor)
	Distribution Automation (Remote Measure, Remote Communication and Telecontrol)
	Distribution Network Protection and Control (Distribution Network Differential Protection)
	Intelligent Switch Room
	Intelligent Distribution Region
	Intelligent Pipe Rack
	Electrified Operational Robot in Distribution Network
	Synchronized Phasor Measurement in Distribution Network
Power Consumption	Micro Sensing Control Transducer in Distribution Network
	Measurement Automation
	Electric Vehicle Charge and Discharge Optimization Control
	Wisdom Lamp Post
	Intelligent Power Consumption of Low-Voltage User

⁴⁰ <https://pmo32e887-pic2.yujianzhan.cn/upload/the5GDN@SmartGridWhitePaper.pdf>

	Intelligent Power Consumption in Industrial and Commercial Zones
	Intelligent Power Consumption in Commercial Buildings
	Demand-Side Response of Power Load
	Distributed Energy-Storage (Bedrock Energy)
	Distributed Energy-Storage (Electrical Energy-Storage)
	Distributed Energy-Storage (Solid Oxide Energy-Storage)
	Distributed Energy-Storage (Distributed Region Energy-Storage)
	Distributed Energy-Storage (Large Chemical Energy-Storage)
	Grid-Load Interactive System
Integrate	Emergency Maintenance and Power Supply Guarantee (Satellite Communication + UAV, 5G Cluster Communication)
	Wisdom Site
	Management of Office Property and Intelligent Building (Zone)
	Intelligent Vehicle Management
	Cloud Desktop
	Intelligent Quality Control
	Intelligent Warehouse
	Emergency Applications for Communication Channel in Transformer Substation

Table 16: 5G and Smart Grid Typical Use Cases

4.2. Preliminary Exploitation Activities

The exploitation strategy of Smart5Grid is based on three complementary paths:

- (i) A **cooperative exploitation path** aimed at ensuring the sustainability and wider uptake of the Smart5Grid solutions, leveraging interested and committed stakeholders,
- (ii) Development of **exploitation plans by each individual partner**, in-line with each partner's business and research strategy; and
- (iii) **Exploitation of the NetApps** produced by the project. The open-source platform and the demonstrated Use Cases are also exploitable assets targeting specific vertical market segments, such as energy, telecom, and ICT sectors.

After the 1st year of the project, the individual partner exploitation strategies have been revised as follows:

4.2.1. Exploitation plans for Telecom Operators

WI3 is interested in further evaluation of the proposed solutions to offer a more "green" ultra-broadband access evaluating the profits and benefits of applying Smart5Grid vision to enable control over communications of the critical electrical infrastructure and guarantee the eco-friendly development. WI3 will exploit knowledge coming from the proposal and will focus most of its efforts on specifically exploited solutions to introduce the new models to achieve better management of the smart grids using the 5G network and the new available NetApps. This innovative pro-active approach will allow to manage systems more and more complex, according to the evolution of the new model applied to the Energy context. An important incremental market is expected for this sector for this vertical;

furthermore, it could be possible to extend the new approach to another vertical context such as the smart cities (e.g. to improve the number of the solutions for sustainable mobility using electric vehicles, etc.). The outcomes of the Smart5Grid will be important for WI3 to explore other potential markets and how to deal with slicing management for different services to be offered by physical infrastructures and by cooperation between different involved actors.

OTE member of DT Group of Companies, is the dominant telecommunications operator in Greece, and along with its subsidiaries one of the largest telecom groups in South-eastern Europe. OTE has been very much involved in wireless (e.g. WiFi, WiMAX, LTE, TETRA) and wireline (e.g., xDSL, fiber optic, FTTx, etc.) broadband technologies. As of that, OTE has long ago identified the growing need for investing in 5G technology since this has been proven one of the fields which is very promising for OPEX and CAPEX reduction while, at the same time, offering demanding and advanced services to the end users. Based upon technical and market-led priorities, OTE is expected to gain a variety of innovative advantages originating from the project results/outcomes, so that to further increase its market strength and extend the corporate portfolio to cover energy verticals' needs. Due to the specific focus of the project upon 5G Smart-grid applications, the challenges become greater for OTE so that to really promote expected findings, properly adjusted to the corporate market offerings, within a broader converged framework, where telecoms and IT solutions fulfill certain energy transmission and distributions needs. In particular, OTE aims to exploit the expected Smart5Grid concept by initially verifying the proposed platform and then coming with a plan of "how to promote it" into its existing and/or future solutions, thus strengthening customers' confidence and enhancing its competence in the field of telecommunication networks and offered solutions, simultaneously serving actors from the energy verticals. Moreover, Smart5Grid exploitable assets will be demonstrated to the exhibitions that OTE representatives will participate and anticipated customers will be further engaged with Smart5Grid-based developments and products. The innovative features of the expected findings will also help to design and promote new business models, conformant to the specific nature and profile(s) of the corresponding use cases.

NIS is interested in exploiting the 5G paradigm, as enabled by the Smart5Grid in such a way that it becomes beneficial to the company's Network Department besides considering the project needs. This will allow for exploitation of the development for improving network control. Also, through Smart5Grid, NIS will be in position to gain more awareness on 5G-based network control & management. Based on the project's outcomes the R&D department will frequently set internal meetings with the Network Department for presenting the proposed technologies and associated advantages for deployment as compared to existing methods and mechanisms used.

4.2.2. Exploitation plans for DSOs/TSOs

ENEL has a unique opportunity for E-GI&N and its linked third parties, through the Smart5Grid, to exploit the expertise of Consortium partners and ensure that 5G capabilities meet the requirements of the vertical energy use cases, i.e. device density, data rate,

availability of the communication and latency. Starting from the activities foreseen in this project, E-GI&N can be able to extend field trials to additional 5G use cases, while gathering expertise in using such novel technologies. The experimentation can open the way to a new way of data quality monitoring, ensuring the adequate reactivity of the involved field devices for ensuring the expected technical quality of the electricity distribution service and, consequently, providing of a better service for the citizen thanks to the reduction in the number and duration of interruptions. Last but not least, the collaboration with strategic partners from both energy (ENEL, EDI and EDE), Information Technology (ENG, ATOS), telco (OTE, W13 and NIS) and a plethora of SMEs can derive fruitful partnerships in jointly extending, deploying and offering the Smart5Grid NetApps as a commercial offer in the European and Latino-American market.

IPTO is responsible for the operation of the electricity transmission grid in Greece with over 11 thousand km of system covering the whole of mainland Greece and an increasing portion of the Greek Islands. According to Law 4001/2011, IPTO undertakes the role of TSO for the Hellenic Electricity Transmission System and as such performs the duties of System Operation maintenance and development to ensure Greece's electricity supply in a safe, efficient, and reliable manner. In this context, IPTO's exploitation plan includes assessing the feedback of the pilot projects, with main focus on the Greek-Bulgaria use case and make concrete use of the results in its operation functions, and more specifically, to the backbone of the Greek power system which consists of 11,510 km Transmission Lines and 328 High and Extra High Voltage Substations connected to the System. Furthermore, IPTO plans to assess the scalability and financial feasibility of the Smart5Grid pilot projects and communicate the results to the respective stakeholders mainly policy makers, industry partners and other TSOs. This would be conducted via internal reports, scientific and media publications.

ESO is responsible for the common operational planning, coordination and control of the Bulgarian power system and its parallel synchronous operation with neighbouring systems. Its purviews include transmission grid operation, maintenance and reliable functioning, auxiliary network servicing, as well as maintenance and repair services in the energy sector. It also manages the power transit through the national grid and runs the electricity market. ESO will use the Smart5Grid project's results after an evaluation in its daily operations activities and in coordination and control of cross-border electricity flows.

4.2.3. Exploitation plans for ICT Industrial Partners

ATOS is a global leader in providing digital services, help customers in their digital transformation journey and ICT system integrator. ATOS has multiple telecom products and concretely Air-Lynx solution provides innovative 4G LTE/5G private network that is offered as solution in a box and targeting cases such as mission critical applications. With over hundred telecommunications companies among its clients and key operators in Telefónica, Orange, Vodafone, MasMovil, ATOS will use Smart5Grid knowledge and results pursuing a direct commercial benefit. The activities that ATOS will develop in Smart5Grid will allow not only to preserve the current business, but also extend and provide our clients with lower

cost end-to-end 5G solution for private networks combining alternative products and open platforms. Smart5Grid purposes regarding extending 5G radio and edge computing elements, link to 5G core and align perfectly with the ATOS commitment to support its virtual operators in their move to NFV, virtualising technologies and architectures for network management and making a seamless transition from a traditional infrastructure to a virtual one without loss of service, reputation or revenue.

ENG offers energy utility market services such as Billing and Back-end for gas and electricity sales, Operation Management for gas and electricity distribution, Business Intelligence Systems, Real Time Meter Data Management for Enhanced Analytics and Drones Integration and Management to support WorkForce Automation and O&M for utilities. The exploitation plan for Smart5Grid would include: i) to include and to integrate a large extent of the Smart5Grid services and technology platform in order to enlarge its own commercial offer towards the utilities, which could be interested to integrate Smart5Grid value added, and ii) the team involved in Smart5Grid is directly in charge of infusing and transferring technological bricks to the business lines of ENG. These offerings will thus benefit from the technology developed in Smart5GRID. The NFV-oriented development and NetApps deployment will leverage NFV chaining and orchestrate to customise network services and rationalise their management in manner to enrich the 5G portfolio of the business ENG units.

4.2.4. Exploitation plans for Universities / Research Institutes

i2CAT vision is to achieve a leading ICT research and innovation role with a special focus on market needs. Our ambition is to become an internationally recognised strategic partner driving Internet initiative across economical, industrial, and social sectors and boost the innovation and technology transfer competitiveness. Experience and knowledge gained in the European funded projects is an essential element to earn the required intellectual capital. i2CAT, as a research centre, collaborates closely with the universities. This collaboration helps us to make sure a continuous knowledge transfer to the next generations of experts via offering workshops, courses, and scholarships to university students. i2CAT's private foundation has built a good industry footprint from key players in the telecom industry specially via its board of trustees (Juniper, Cisco, Orange, and Vodafone, among others). Presenting project outcomes is a regular exercise to raise awareness among important industrial partners and to impact technology evolution. i2CAT considers this project of crucial importance, as it is aligned with the 5GBarcelona initiative of which i2CAT is a core partner. The goal of 5GBarcelona is to establish an incubator for the 5G ecosystem in the region, revolutionise the regional economy, and promote the innovation of small and medium enterprises. i2CAT will exploit the project's results to become a key ICT technological partner and help SMEs build an advanced integrated 5G ecosystem in the Barcelona innovation hub.

UCY (KIOS CoE) exploitation goals are on the scientific and technological development of the solutions with applications on power systems operation, stability and control, energy-communities and microgrids, green energy supply to integrated critical infrastructures, cyber-physical systems. UCY (KIOS CoE) will facilitate and support both the academic and

research widening of the project results, promote them to the local stakeholders and sustainable energy promoters; adapt and advance the scientific knowledge gathered within the project development for educational and research purposes within the local network and the industry partners, define new research directions that could be exploited by PhD or Master programs.

UoA's main goal is to improve the education, work on up-to-date research questions which are emerging from the field and provide support for the power systems and energy player via consultancy capacity as well as with its accredited laboratories. This will be achieved by gathering information about the topic which later will be integrated into the curriculum. In the other side convince promising young engineers to choose these areas for their BSc, MSc thesis work or PhD thesis topic. Furthermore, meet the international solution providers and test their products to provide state-of-the-art knowledge to the power systems and energy players during consultancy services.

4.2.5. Exploitation plans for SMEs

ATH is an Italian SME focused on developing software-only 4G and 5G core networks, tailored to use cases and vertical deployment needs. With its globally awarded BubbleCloud solution, Athonet achieved to deploy a 4G EPC and 5G CN in Amazon Web Services (AWS), available as SaaS through the AWS marketplace to customers. As a well-established solution provider for 4G private networks, Athonet expects to benefit from the results of Smart5Grid not only to promote top level 5G products, but also to accelerate the market growth, and, to a broader extent, to increase the awareness and business opportunities of private cellular networks for industrial applications.

INF is an innovative SME company, established in Athens, Greece, specialising on the design and development of chatbots, either as custom-made standalone applications or as subscribed-based services (Chatbot as a Service) via the privately owned chatbot platform, operating also in 5G and IoT enabled environments. Chatbots are applications that simulate human conversation, based primarily on conversational flows and occasionally enriched with DL/NLP technologies for more sophisticated automation of use-cases. INFOLYSiS, in parallel to its commercial activities, is committed to driving research results forward by experimenting with novel technologies and infrastructures, such as 5G, SDN/NFV at the network edge and container-based virtualization in IoT areas (mainly of IoT interoperability) in order to advance the chatbot capabilities and expand its applicability in novel ICT use-cases such as 5G and IoT enabled environments, smart home solutions and smart cities. INFOLYSiS through Smart5Grid project will further exploit Smart5Grid results by increasing INFOLYSiS's presence and penetration in the respective area of 5G research and will facilitate the processes to make the project achieve maximum visibility and to maximise its impact within the business and scientific communities, as well as within the chatbot apps commercial market and SMEs ecosystem, so as to guarantee a fast adoption of the project outputs and easier commercialization of its future chatbot based services. INFOLYSiS participation to the Smart5Grid project, as communication and dissemination leader, and in conjunction with the participation and outcomes of relevant 5G related projects (5GENESIS and EVOLVED-5G) will further

- Foster INFOLYSiS IoT and 5G R&D activities coupled with chatbot technologies
- Encourage the development of chatbot based applications using the 5G network capabilities.
- Enrich the know-how and the research expertise of the company in 5G technologies in the energy sector.
- Potentially create new chatbot based products and services targeting new markets and sectors.
- Exploit Smart5Grid results within related scientific and industry communities as well as in the evolving SMEs ecosystem and chatbot apps markets.
- Use expertise gained in the research activities of ongoing 5G related projects in which INFOLYSiS participates for further enriching and promoting Smart5Grid activities and achievements.

UBE exploitation intentions are aligned under the UBITECH ENERGY Research and Innovation Strategy defined in the company, which aims at providing innovative tools and technology stacks to improve smart grid integration and digitalisation in the energy sector. As highly competent in the energy services sector, UBITECH ENERGY is well positioned to exploit its strong image and connections to promote the project's outcomes both internally (targeting its more than 100,000 business technologists worldwide) and externally (through its wide client base and associated partners). To do so, and as a part of its internal dissemination strategy, a broad range of dissemination assets will be generated (posters, flyers, videos). Through its wide network of business and academic institutions that is cooperating will hold customer innovation events, customer specific innovation workshops or internally in the company through established technical innovation mechanisms such as R&I organisations and Scientific Communities.

8BELLS recognised early the emerging decoupling of software and hardware via NFV and whitebox networking technologies, and the introduction of successful, open-source software stacks for telecom networks that leverage on MEC solution. The participation of 8BELLS in the Smart5Grid proposal is fully aligned with the company's strategic decision to investigate and to focus on the market research about the software-driven telecom segment in various verticals. In this context, 8BELLS is interested about Smart5Grid outcomes through enhancing the technology, the developed NetApps and economic enablers in Europe and internationally.

SID will exploit the results of Smart5Grid by extending and expanding its products and solutions with cutting-edge tools for enabling security on critical infrastructure exploiting 5G capabilities. The integration of 5G capabilities into the drones' technology will be a technological leap for the enterprise allowing to expand its portfolio on domains that have a great market value and market potential. Lastly, SID will highlight events and private domain in Cyprus, the European and international market in order to promote the development and sales of Smart5Grid exploitable components.

NBC is a start-up in the area of Edge Orchestration. NBC will provide their NearbyOne Solution, that addresses the problem of NFV and Application orchestration at the Edge of the Network. NBC will use the achievements of the project to improve their solution and to extend the number of Nearby Blocks (applications and NFVs) available in their catalogue

with specific focus on Smart Grid technologies. This is a sector that is of special interest for NBC due to its market size and importance. Hence, progress and results will be shared with the consortium and discussed with selected customers in innovation venues.

EE is an independent producer of renewable energy that owns and operates small wind and hydro power plants. EE targets to reach potential energy shareholders (i.e. Smart Grid Operators, Independent System Operators, Energy Aggregators, Regional Distribution Organisations and ESPs) and existing stakeholders that will be interested on the Smart5Grid outcomes, utilising the extensive experience gained from various EU projects participation and through the partners' networks.

STAM focuses its exploitation plan on leveraging on the acquired expertise and research experience from Smart5Grid project. Starting from the experience of the field pilot, STAM will be able to develop additional applications addressing future energy scenarios and their impact on DSO operation issues. In that respect, STAM, as an innovative SME focusing on security solutions and wireless communications, will apply the knowledge gained and the technologies explored in the whole range of its products.

SC is a Bulgarian private firm that specialises in software development, offering a wide range of high-quality services in the development, delivery, and maintenance of software in Europe and USA. Through the large range of our customers, Smart5Grid develop services, applications and tools will be exploited in the operational environment of power systems players (producers, TSOs, DSOs, etc.), that SC is already in contact.

SETECHO is an innovative technology and service provider company that develops novelties and delivers smart energy solutions. Through its international partnerships and alliances with global players in the sector of energy and smart technology, SETECHO will exploit the Smart5Grid NetApps to existing energy stakeholders and new entries to the distribution and transmission grids.

UW aims to transfer the knowledge acquired during the project to current flagship products, such as the Smart lamppost and in possible new products in the Energy sector, exploring the recent partnership (H2020 POCITYF and FTI 5GaaS projects) with the major Portuguese energy producer Energias de Portugal (EDP). Ubiwhere firmly believes that Smart5Grid will expand market opportunities in the Energy and Telecommunication sectors and will contribute for the company to position itself as an international reference in these two areas acting not only as a technology provider and integrator but also as an enabler.

AXON aims to directly exploit project's results to enhance its technical and scientific capabilities. After the completion of the project AXON will provide relevant software modules to its existing customers, while continuing at a much faster pace to further expand the existing suite of solution offerings to other SMEs, Enterprises and Public administrators, reaching over 50% of the customer base. Therefore, AXON is highly interested in exploiting all the acquired competences for the development of new markets and businesses. Smart5Grid provides such an opportunity to reinforce AXON's current services portfolio in the security and data integrity fields, within the national and international market. Furthermore, the project will offer to the company valuable intellectual property (IP), new expertise to application and security services in the fields of security performance assessment, evaluation and optimisation, and the opportunity to develop initial and unique

functionalities. These outcomes will benefit the company's business strategy by advancing consultancy material and know-how in these domains.

NOSIA Smart5Grid presents an ideal opportunity to exploit the significant expertise and the tools that NOSIA has developed and in addition to significantly expand them and adapt them for their analytical requirements set forth by the energy context. Moreover, NOSIA wants to develop early analytical expertise in the domain, which will exploit in different settings ranging from scientific development and the expansion of the current state of the art, up to further developing methods and tools that answer real problem requirements.

As we move into the 2nd year of the project, the consortium is focusing on identifying relevant industry events for targeted exploitation opportunities to potential customers.

In addition, we are planning to design and launch a survey identifying the factors and their relevant importance for 3rd parties that will be invited to use the experimentation platform for NetApps development. The findings of this survey will also be used in designing the road mapping that will be conducted among 5G and energy experts providing deeper knowledge of the barriers, advantages and acceptance of Smart5Grid NetApps.

5. Standardization Activities

Standardization combines processes, procedures and visual work instructions in such a way that allows involved entities to perform a task or job to the best of their abilities. Using a standardized approach often involves following prescribed standards and related certification requirements. Standardization generally focuses on consistency, achieved by applying a clear set of guidelines and best practices. Another aspect is about predictability, which provides assurance about the expected results and their nature as well as about the corresponding framework for the realization of the actions to get the results.

The Smart5Grid project within the context of the related topic *ICT-41-2020 ("5G-PPP – 5G innovations for verticals with third party services")* is expected to focus on the NetApps applications within the 5G ecosystem. More specifically, the evolution of 5G networks to address verticals' needs is having a strong impact on standardization activities. So far, ongoing 5G-PPP projects have provided a number of concepts and solutions to SDOs. This work is expected to further continue during the following years as the full digitization of vertical industries will be one of the drivers for the evolution of 5G specifications.

5G standardisation for verticals is a multi-stakeholder effort across different standardisation organisations. Moreover, verticals' industry associations have set up specific working groups to collect and define requirements for verticals. Many of these associations are market representation partners in 3GPP, (e.g., GSMA, Next Generation Mobile Networks (NGMN) Alliance and Global Suppliers Association (GSA)) on the telecommunications and the industry vertical sides.

3GPP is the main global standards organisation for mobile communications, focusing on the design of the 5G system and supporting a variety of industry verticals. Note that 50% of the work carried out focuses on 5G functionalities applicable across diverse verticals. In this direction, the 3GPP work programme covers a multitude of enablers as part of a toolbox of functionalities that verticals can use to create their own services⁴¹. Other relevant standards organisations working on 5G standardisation include ETSI, (e.g. on MEC, Experiential Networked Intelligence (ENI), NFV, Open Source MANO (OSM), Zero Touch Network and Service Management (ZSM)), the Internet Engineering Task Force (IETF), the Internet Research Task Force (IRTF), the Institute of Electrical and Electronics Engineers (IEEE) and last but not least the International Telecommunication Union (ITU).

The 5G-PPP is actually working on several fronts to support the 5G standardisation process whereas the 5G IA's pre-standardization Working Group (WG) supports projects in defining and driving their inputs in relation to standardization activities. This WG reports on impact on standardization across the various phases of the 5G-PPP Initiative⁴².

⁴¹ For more details also see: <https://www.3gpp.org/specifications/work-plan>

⁴² See: 5G-PPP, Progress Monitoring Report, Online: <https://5g-ppp.eu/annual-progress-monitoring-reports/>

5.1. SDOs Attended

In the previously issued Smart5Grid deliverable D7.2 (*"Plans for Dissemination and Communication, Standardisation, and Interaction with 5G-PPP"*) and following to its core objectives, the project consortium has identified the important role of standardisation-related activities for the support as well as for the promotion of the intended project aims, especially based on the technical progress of the ongoing use cases. The consortium has identified the importance of monitoring relevant standards within the project evolution and, where possible, the option of contributing to dedicated standardisation activities. Some Standards Developing Organisations (SDOs) and/or related fora have been identified as potential candidates for both monitoring and contributing, depending on the technical progress of the Smart5Grid effort. As the Smart5Grid project has lately (i.e., since early of October 2021) defined its main architectural context (i.e., within the scope of the related deliverable D2.2 (*"Overall Architecture Design, Technical Specifications and Technology Enablers"*)) and further progress in other technical WPs is ongoing, it shall be expected that "concrete" contributions to SDOs shall be provided in the next period, in parallel with work in WP3-WP6.

For the period covered in the present deliverable, most of the standardization-related effort has been about monitoring the 3GPP SA WG2 Architecture, ETSI ISG MEC and the ETSI ENI ISG. More detailed contributions have taken place in the scope of the Open Source MANO.

5.2. Activities and Contributions

The 3rd Generation Partnership Project (3GPP) is the primary body for developing technology specifications for cellular networks. It self-organises through its Working Groups coordinated by the Chairs of the Technical Specifications Groups (TSGs).

3GPP has further evolved the 5G radio and network related architectures, introducing modern generic service enabling technologies and integrating more requirements from different industrial sectors ⁴³.

The **SA WG2** Architecture is in charge of developing the Stage 2 of the 3GPP network⁴⁴. Based on the services requirements elaborated by SA WG1, SA WG2 identifies the main functions and entities of the network, how these entities are linked to each other and the information they exchange. Within the 3GPP Technical Specification Group Service and System Aspects (TSG SA), the main objective of 3GPP TSG SA WG2 (SA2) is to develop the overall 3GPP system architecture and services including User Equipment, Access Network, Core Network, and IP Multimedia Subsystem. The Radio Access Network architecture is under TSG RAN's responsibility. SA2 has a system-wide view and defines the main entities

⁴³ Now, as Release 17 is nearing its completion, there are new ideas, technologies and requirements on the horizon which ask not only for a straight evolution of the existing 5G system but need special focus. With this in mind, 3GPP decided to take an important next step in the succession of mobile communication generations by making Release 18 (Rel-18) the first "5G Advanced" branded release.

⁴⁴ Also see: <https://www.3gpp.org/specifications-groups/sa-plenary/sa2-architecture>

of the system architecture, and how these entities are linked to each other. SA2 also defines the main functionality and the information exchange between these entities.

SA2 is currently responsible for the 5G System and Evolved Packet System (EPS) Architectures including the 3GPP enhancements for multimedia services (including emergency services), IoT, and other market sectors/vertical industries related use cases. SA2 coordinates with other 3GPP WGs and all relevant Standards Developing Organizations (SDOs), industry fora, and Market Representation Partners (MRPs) for its specification work.

The 3GPP TSG SA WG2⁴⁵ (SA2) is responsible for the definition, evolution, and maintenance of the overall system architecture including the assignment of functions to particular subsystems (e.g. RAN, CN, Terminal, USIM, IMS) and associated high-level functional interactions. In co-operation with the other WGs, SA2 defines required services, service capabilities and network capabilities offered by the different subsystems.

SA2 is in charge of developing Stage 2 technical specifications of the 3GPP system architecture and services. SA2 considers Stage 1 service requirements as input for its work. The output of SA2 is used as input by the groups in charge of protocol specifications in Stage 3, or by the groups in charge for specific domains (e.g. Security, Codecs, Management, Orchestration, Charging, Application layer etc.). SA2 is actually responsible for developing Stage 2 technical specifications that comprise of the following areas:

- Architecture model and concepts. Examples are (but not limited to): (i) Roaming and non-roaming architecture; (ii) Network Functions and entities; (iii) Reference points between network entities; (iv) Service-based architecture and communication framework, and; (v) Data Storage Architecture.
- Control and user plane protocol stacks.
- End-to-end Procedures. Examples are (but not limited to): (i) Network Access Control; (ii) Registration and Connection Management; (iii) Mobility Management; (iv) Paging and UE Reachability; (v) UE capability handling; (vi) Session Management; (vii) QoS Model; (viii) Policy and Charging Control; (ix) User Plane Management; (x) Network Slicing; (xi) Network Sharing; (xii) Congestion and Overload Control; (xiii) Network Capability Exposure; (xiv) Data collection and storage; (xv) Network Data Analytics and Automation; (xvi) 3GPP Services (e.g. SMS, Multimedia Services, Emergency Services, Multicast-Broadcast Services, MPS, MCS, LCS, etc.) and; (xvii) Support for non-3GPP Access Networks.

SA2 WG's activities have been monitored via the various reports notified and being freely accessible on the respective part of the 3GPP portal⁴⁶. There is a variety of approved reports that provide interesting feedback towards future developments of technology⁴⁷.

⁴⁵ A detailed list of documents coming from SA WG can be found at: https://www.3gpp.org/ftp/tsg_sa/WG2_Arch/

⁴⁶ These can be found at: <https://www.3gpp.org/DynaReport/Meetings-S2.htm>

⁴⁷ These can be found at: https://www.3gpp.org/ftp/tsg_sa/WG2_Arch/Approved_Reports

In WG SA2, the Architecture Working Group of TSG SA, over 40 proposals for Rel-18 items are currently under discussion. An initial rough estimation of the required time for those items would require more than twice the amount of time available based on the agreed timeline. As the architectural decisions strongly influence the Rel-18 work in other 3GPP WGs, it was decided to go through a prioritization process of the WG SA2 items. For that purpose TSG SA will hold another 2 day workshop in December 2021, during which the proposed items will be further modified and streamlined.

The ongoing SA WG2'S work upon defining future architecture model will affect deployment of future 5G systems as well as those "Beyond 5G" (B5G), via the promotion of various innovative aspects. OTE has monitored the activities of the above SA WG2 Architecture.

Atos has been an active contributor to **Open-Source MANO** as the reference open-source solution in the NFV ecosystem and on the Orchestration domain in particular⁴⁸. Atos contribution to OSM has been promoted by its participation in 5G-PPP projects such as SONATA⁴⁹ (phase 1), 5GTANGO⁵⁰ (phase 2) or 5GENESIS⁵¹ and 5G-TOURS (phase 3) and as a member of the OSM Technical Steering Committee for the Releases SEVEN and EIGHT.

In a continuous effort to enrich its contributions from results of the 5G-PPP programme projects, Atos is an active member to OSM community and a frequent attendee to the regular meetings that are organized, as well as an eager participant to special events such as the OSM Hackfests. The last ones celebrated during 2021 took place on 08-12 March and 31 May-04 June 2021. This tight participation constitutes as a two-way interaction, creating communicating vessels where there is a reciprocal influence between the two communities, generating a mutual benefit.

In Smart5Grid, it is a key activity to align the NetApp definition with the Information Model produced by OSM (at the same time aligned with ETSI NFV SOL-006 specification for YANG based NFV descriptors⁵²) such as to extend the NFV ecosystem from the perspective of the project, ensuring interoperability with OSM and other standard-based orchestrators.

Atos is committed to facilitate this alignment and cooperation between organizations by sharing the findings, suggestions, and results from each community into the other, ensuring a fluid communication and maximizing the outreach and impact of both Smart5Grid and OSM Communities.

⁴⁸ <https://osm.etsi.org/>

⁴⁹ SONATA: Service Programming and Orchestration for Virtualized Software Networks, www.sonata-nfv.eu

⁵⁰ For more details see: 5Gtango: 5G Development and Validation Platform for global Industry – specific Network Services and Apps. <https://www.5gtango.eu/>

⁵¹ 5GENESIS: 5th Generation End-to-end Network, Experimentation, System Integration, and Showcasing, <https://5genesis.eu/>

⁵² Also see, among others: <https://www.etsi.org/newsroom/blogs/entry/sol006-nfv-descriptors-based-on-yang-specification>

The **ETSI ISG MEC**⁵³ is committed to produce timely and high-quality specifications allowing the implementation of interoperable MEC solutions. In order to gain time to market, to validate the specifications that are being developed, and to demonstrate the use cases that have served to extract the technical requirements, it is important to demonstrate the MEC concept as feasible and valuable to all the stakeholders in the value chain.

ISG MEC has developed the MEC PoC Framework to coordinate and promote multi-vendor Proofs of Concept (PoC) illustrating key aspects of MEC technology. Proofs of Concept are an important tool to demonstrate the viability of a new technology and provide feedback to the standardization work. The MEC PoC framework⁵⁴ describes the process and criteria that a Proof of Concept demonstration must adhere to. A PoC proposal can be submitted by a PoC team consisting of at least one Mobile Network Operator, at least one infrastructure vendor and at least one content or application provider. PoC proposals are expected to be scoped around PoC Topics identified by ISG MEC, as specific areas, often related to a Work Item, where feedback from the PoCs is required.

ATH has monitored the activities of the above ISG.

The **ETSI ENI ISG** (Experiential Networked Intelligence Industry Specification Group) develops specifications for a Cognitive Network Management system with the aim of introducing a metric for the optimization and adjustment of the operator experience over time by taking advantage of Artificial Intelligence (AI) techniques (like machine learning and reasoning⁵⁵). This ISG is open to ETSI members and non-ETSI members alike. The focus is upon improving the operator's experience so that to be able to more quickly recognize and incorporate new and changed knowledge, and hence, make actionable decisions, in day-to-day-operations. ETSI ENI ISG also uses context-aware policies to adjust offered services based on changes in specific user needs, environmental conditions and business goals. It therefore fully benefits the 5G networks with automated service provision, operation, and assurance, as well as optimized slice management and resource orchestration. ENI has also launched Proof of Concepts (PoCs) aiming to demonstrate how AI techniques can be used to assist network operation including 5G. The use of AI techniques in the network will solve problems of future network deployment and operation⁵⁶.

ETSI ENI ISG's approach employs the "observe-orient-decide-act" control model which enables the system to adjust the offered services based on changes in user needs, environmental conditions and business goals. Therefore, it fully benefits the 5G networks with automated service provision, operation, and assurance, as well as optimized slice management and resource orchestration. In the context of the performed activities, it has

⁵³ See: <https://www.etsi.org/technologies/multi-access-edge-computing/mec-poc>

⁵⁴ For further details see: ETSI GS MEC-IEG 005 V1.1.1 (2015-08): Mobile-Edge Computing; Proof of Concept framework.

⁵⁵ Also see: <https://www.etsi.org/technologies/experiential-networked-intelligence>

⁵⁶ For example, an interesting scope has been proposed in the framework of the document ETSI GR ENI 010 V1.1.1 (2021-03): "Experiential Networked Intelligence (ENI); Evaluation of categories for AI application to Networks".

been specified a set of use cases and the derived requirements for a generic technology independent architecture of a network supervisory assistant system.

The introduction of technologies such as SDN, NFV and network slicing means that networks are becoming more flexible, powerful and configurable. Thus, ISG ENI's work is expected to make the deployment more intelligent and efficient.

ENI has published the first version of the System Architecture and Context Aware Policy Management and three versions of the Use Cases, Requirements, two versions of the Terminology, and the PoC Framework in Release 2⁵⁷. The System Architecture is being specified, with a new draft version 2 including a high-level architecture using details of AI decision techniques⁵⁸. Since early of July 2021, ETSI ENI ISG has opened new work-items to collect version 3 of the Use cases, Requirements, and terminology, and a new work item on categorization for AI application to Networks. ENI is also working on reports on the measuring of Evaluation of Classification, Intent knowledge within the Architecture and Data mechanisms, Data telemetry. Two Specifications on Mapping between ENI architecture and operational systems, also on Inference, semantics and ontologies are being developed. OTE has monitored the activities of the above ETSI ENI ISG.

⁵⁷ A detailed list of specifications can be found at: <https://www.etsi.org/committee/1423-eni>

⁵⁸ The Architecture is summarise as two control loops using AI modelling. Data Gathered is passed via an optional API, normalised and processed in a number of AI Analysis Functional Blocks, which may be recursive and interactive using an inner loop. The Actionable decision is then de-normalised and passed back to the network using the same optional API in reverse.

6. Conclusion

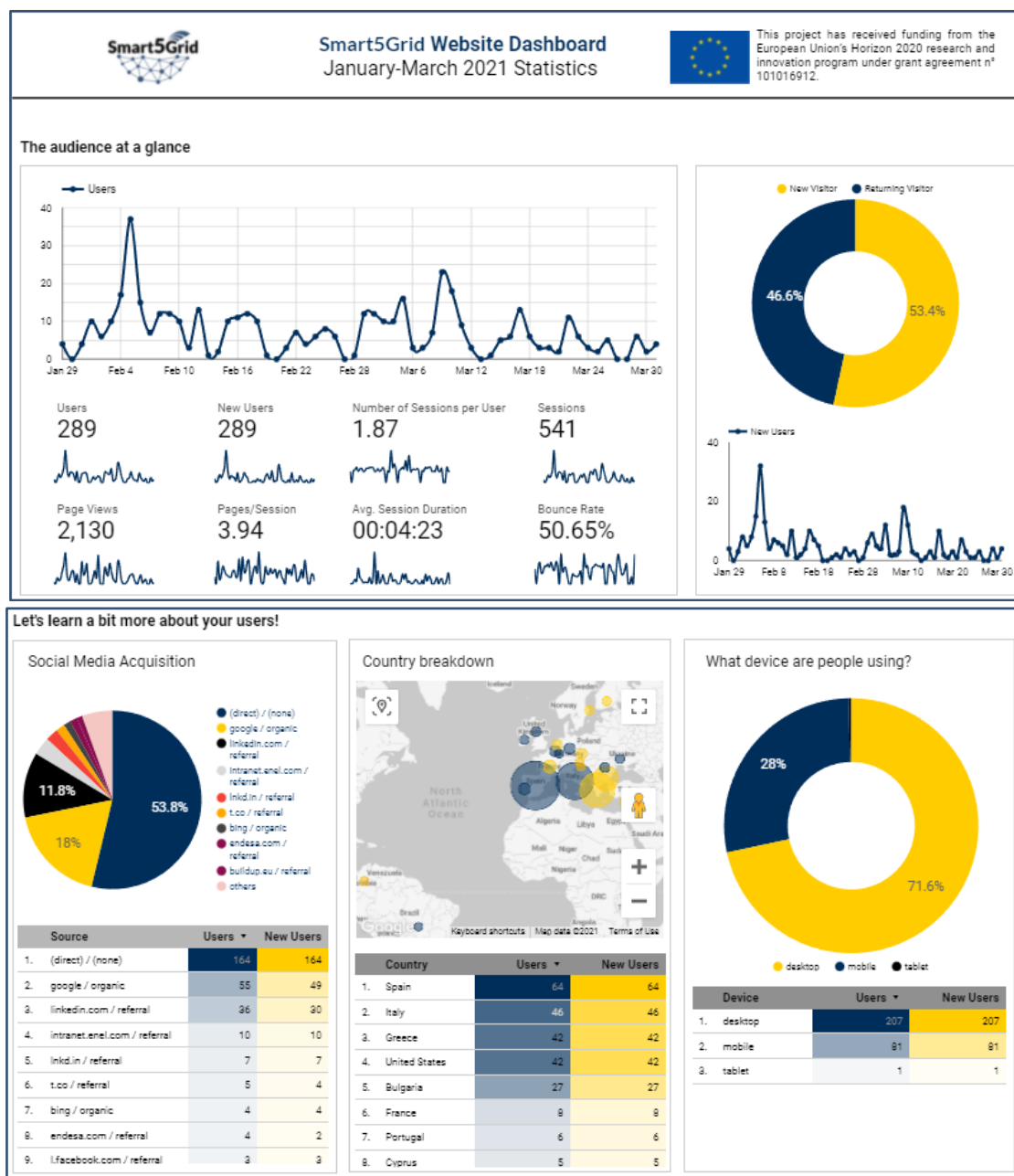
This deliverable presented the WP7 progress of Smart5Grid project in Y1 as per the Impact Plan and the KPIs presented in D7.2 ("Plans for Dissemination and Communication, Standardisation, and Interaction with 5G-PPP"). All the Communication and Dissemination activities performed during the first year have been reported in detail while the key KPIs set in D7.2 for Y1 have been met. Moreover, an initial Market Analysis and a Preliminary Exploitation Plan were presented and further actions planned for the next period and further analysed in the future WP7 deliverables were highlighted. Synergies with other 5G-PPP projects and WGs contributions were reported and updated as per the Smart5Grid's technical advances and use cases. Finally, the Standardization activities and contributions to various SDOs have been reported considering the current stage and advances of the project.

Annex 1 – Trimester Smart5Grid Website Dashboards

The Smart5Grid Website statistical dashboards are issued and distributed internally on a trimester basis, via the WP7 mailing list to all the WP7 members, forming a vital mechanism of the project for monitoring their monthly performance and impact to the public.

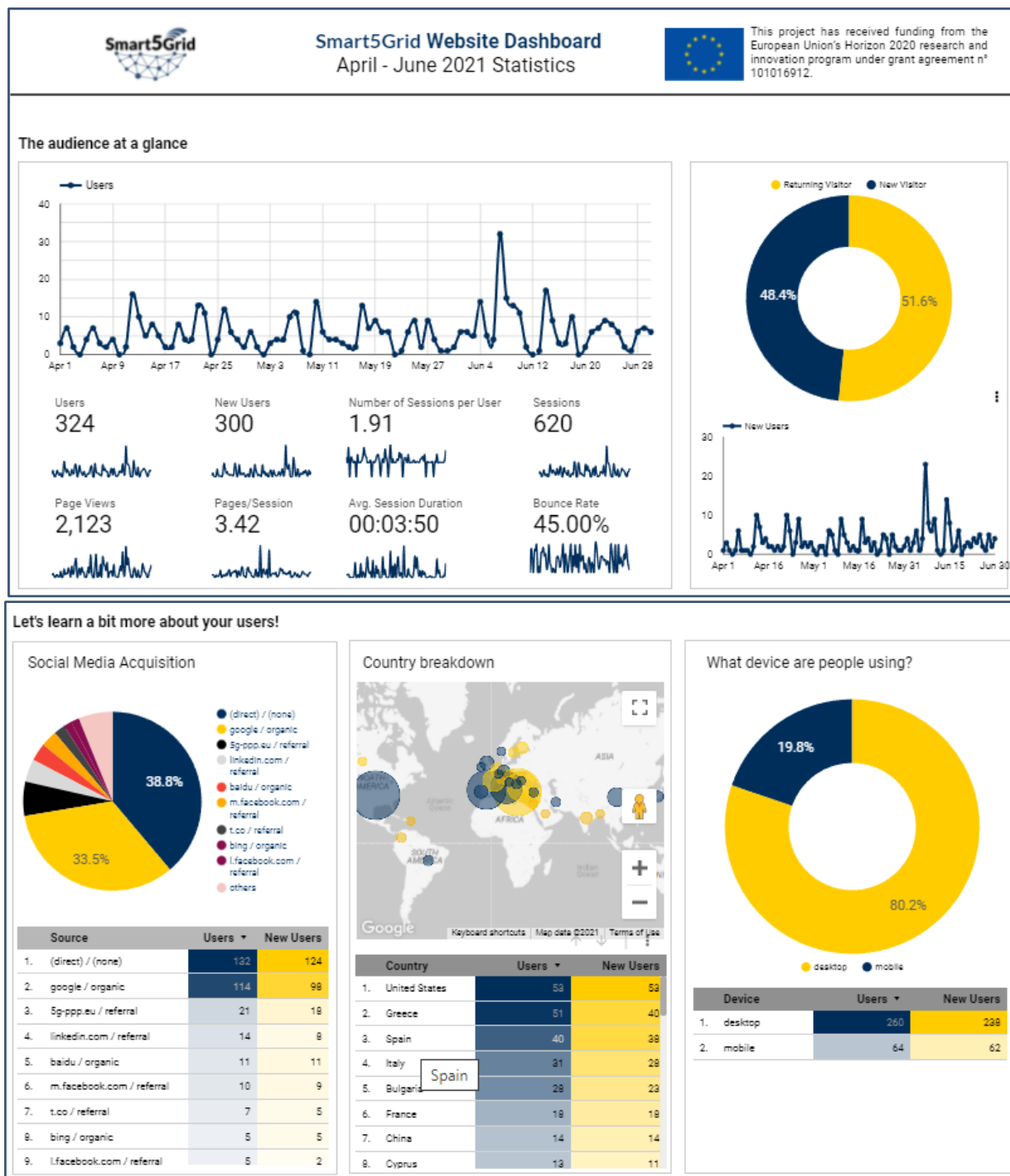
Website Statistical Dashboards Jan-March 2021

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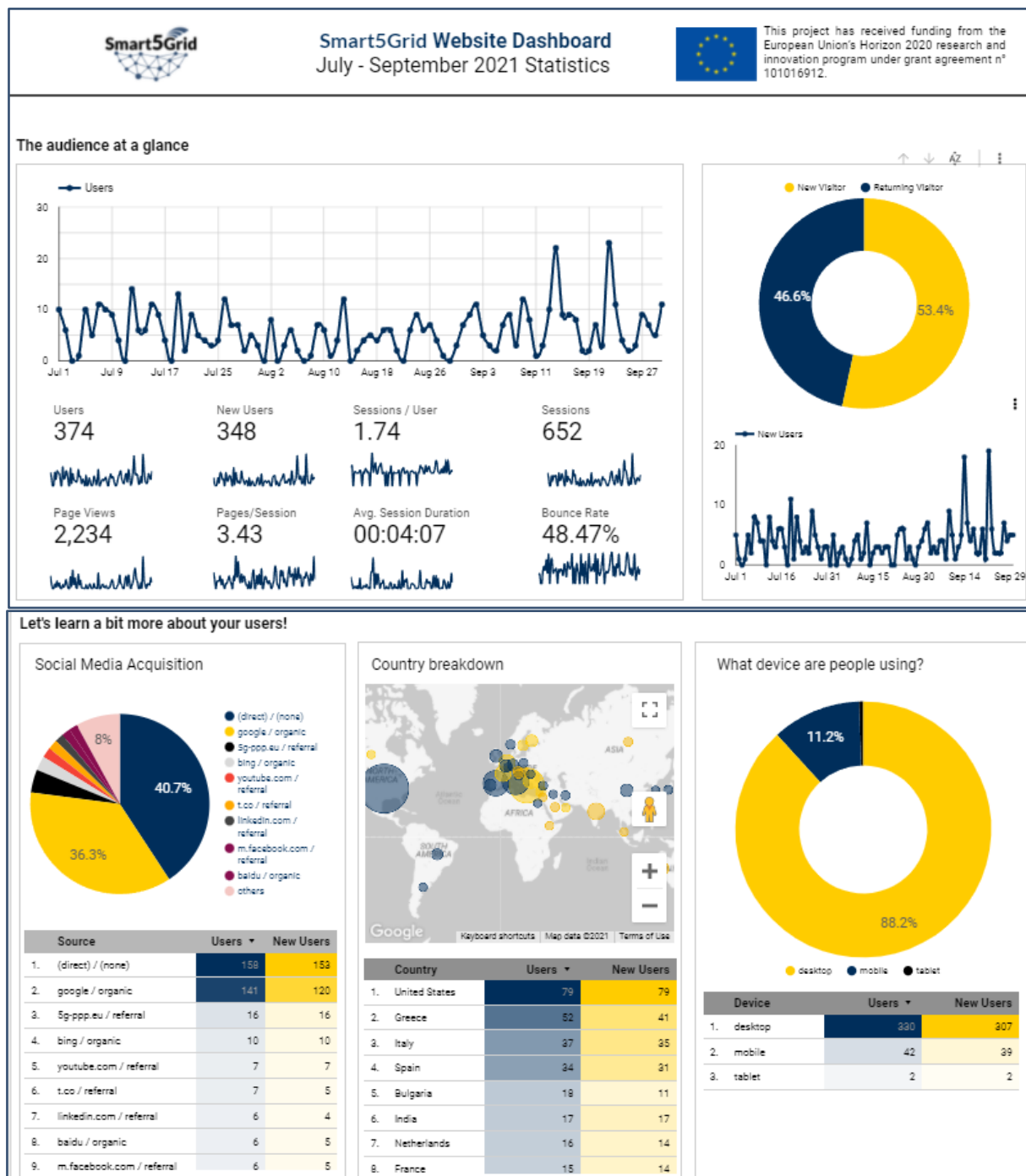
Website Statistical Dashboards April-June 2021

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Website Statistical Dashboards July-September 2021

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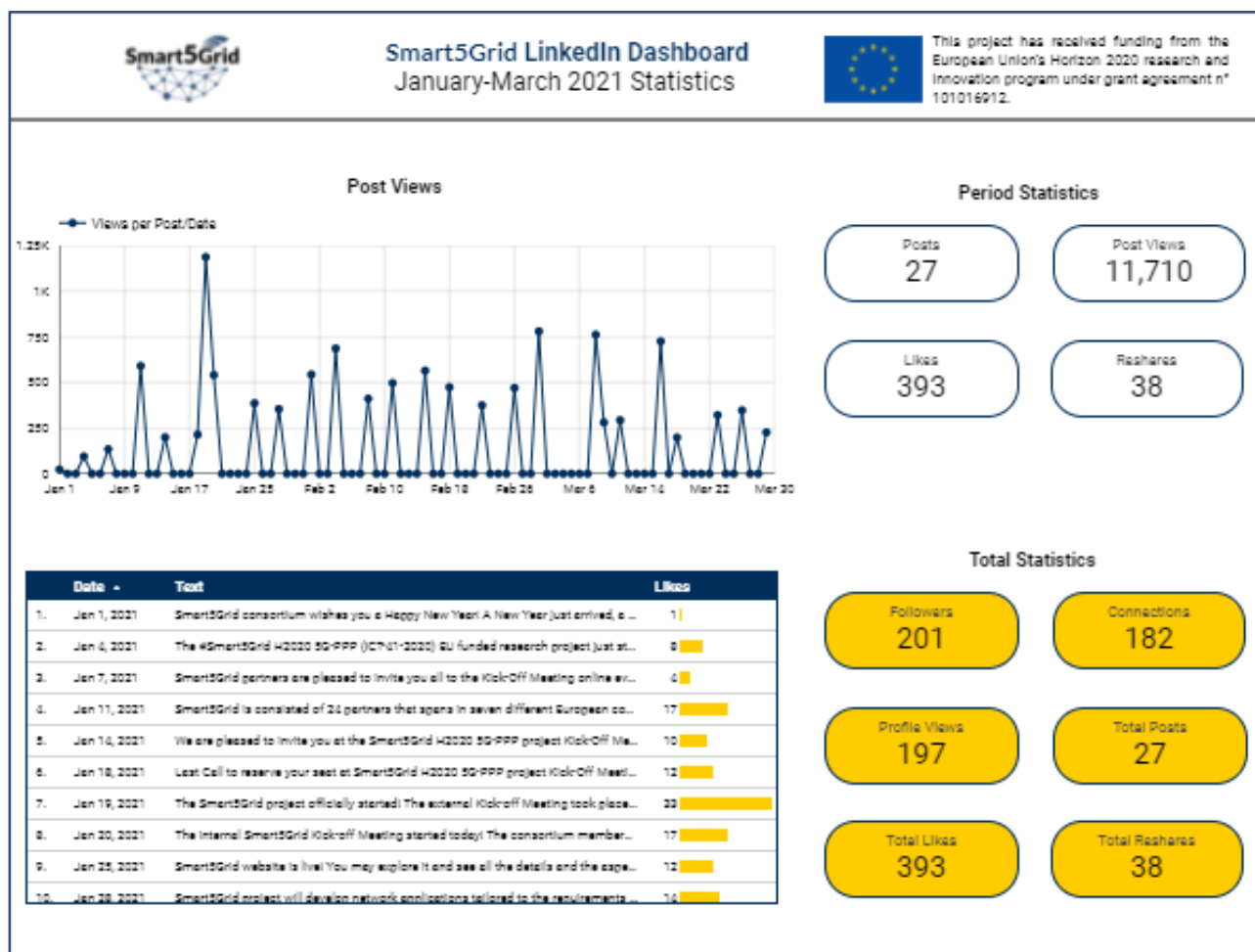


Annex 2 – Trimester Smart5Grid Social Media Dashboards

The Smart5Grid Facebook statistical dashboards are issued and distributed internally on a trimester basis, via the WP7 mailing list to all the WP7 members, forming a vital mechanism of the project for monitoring their monthly performance and impact to the public.

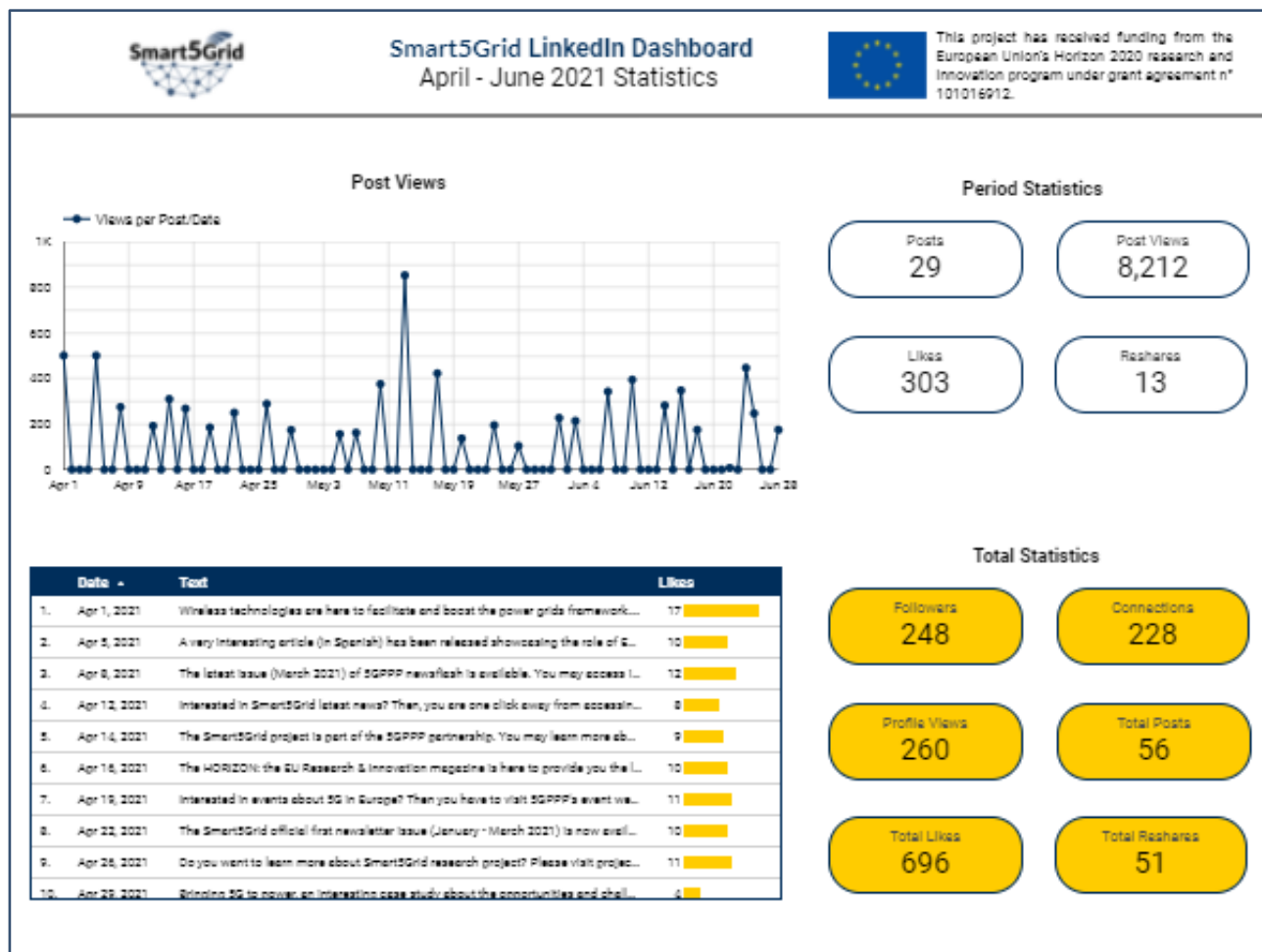
LinkedIn Statistical Dashboards Jan-March 2021

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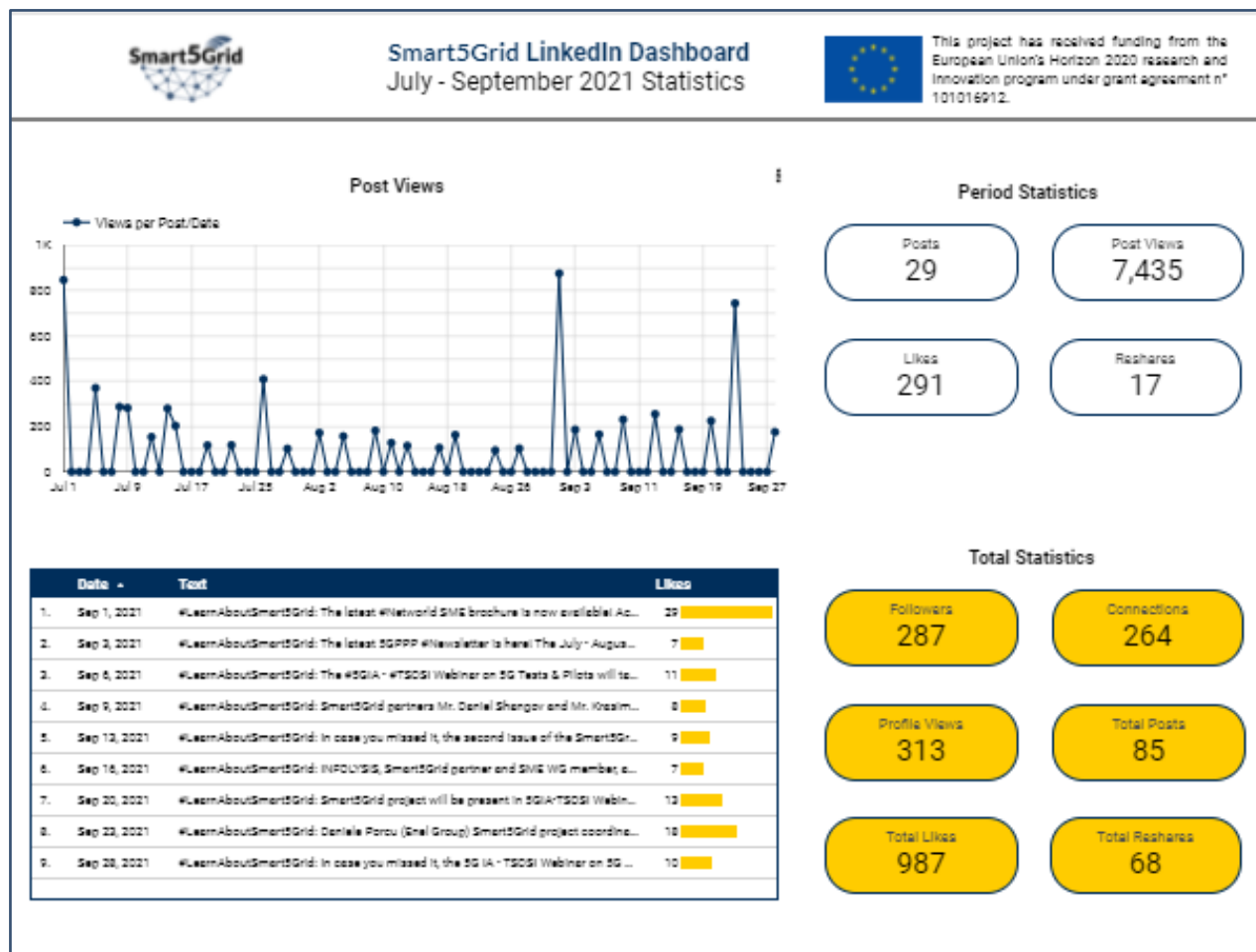
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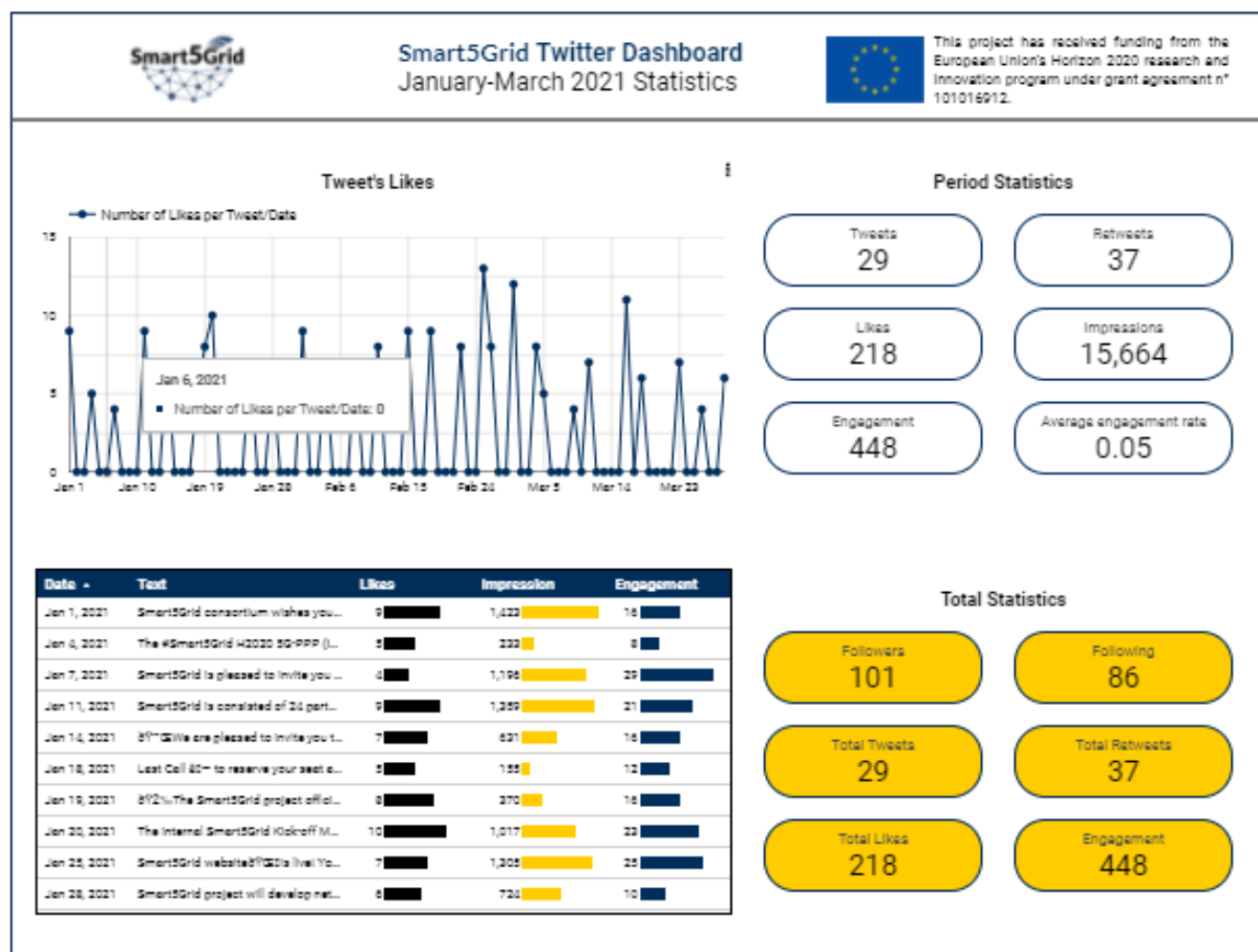
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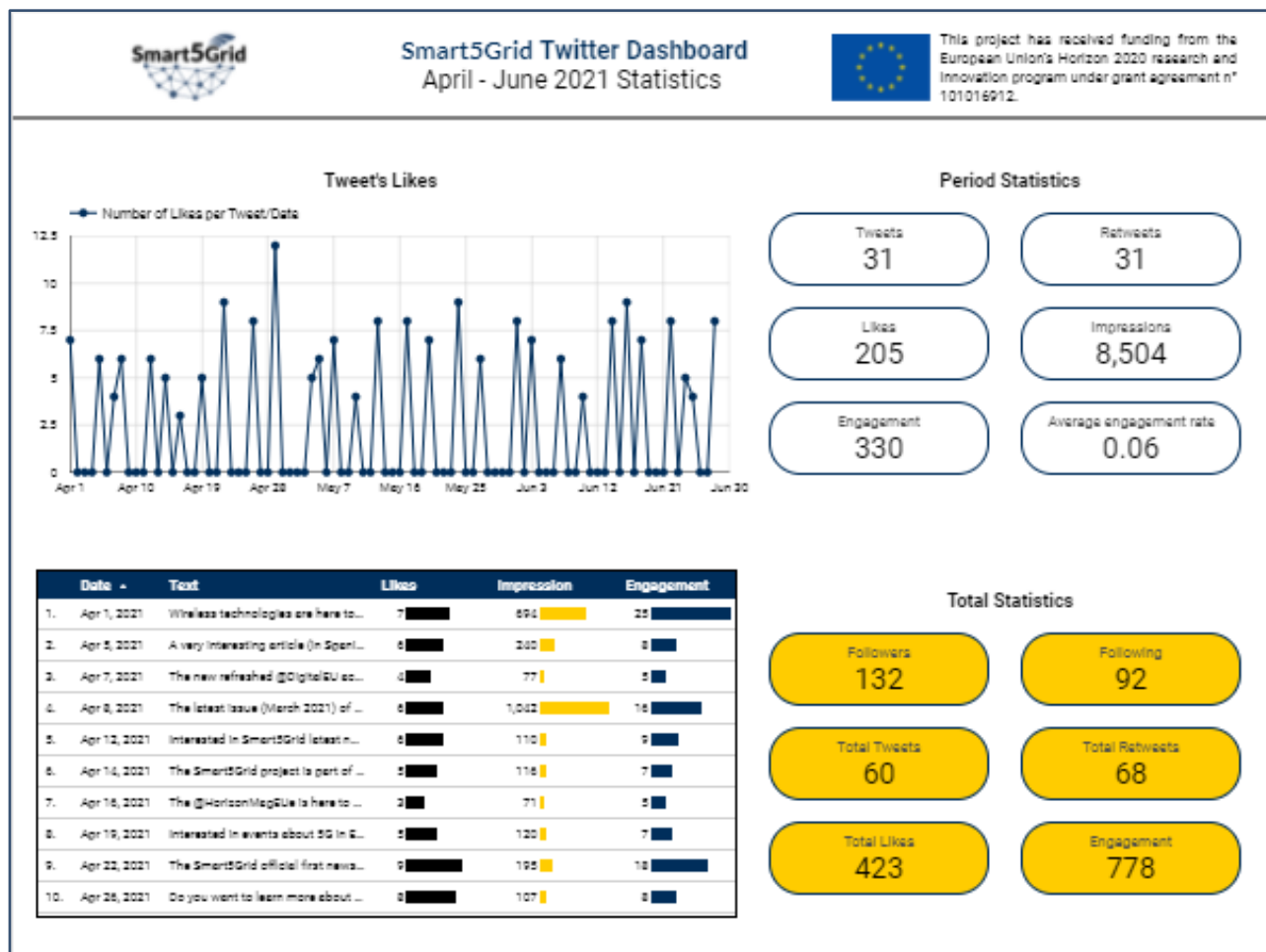
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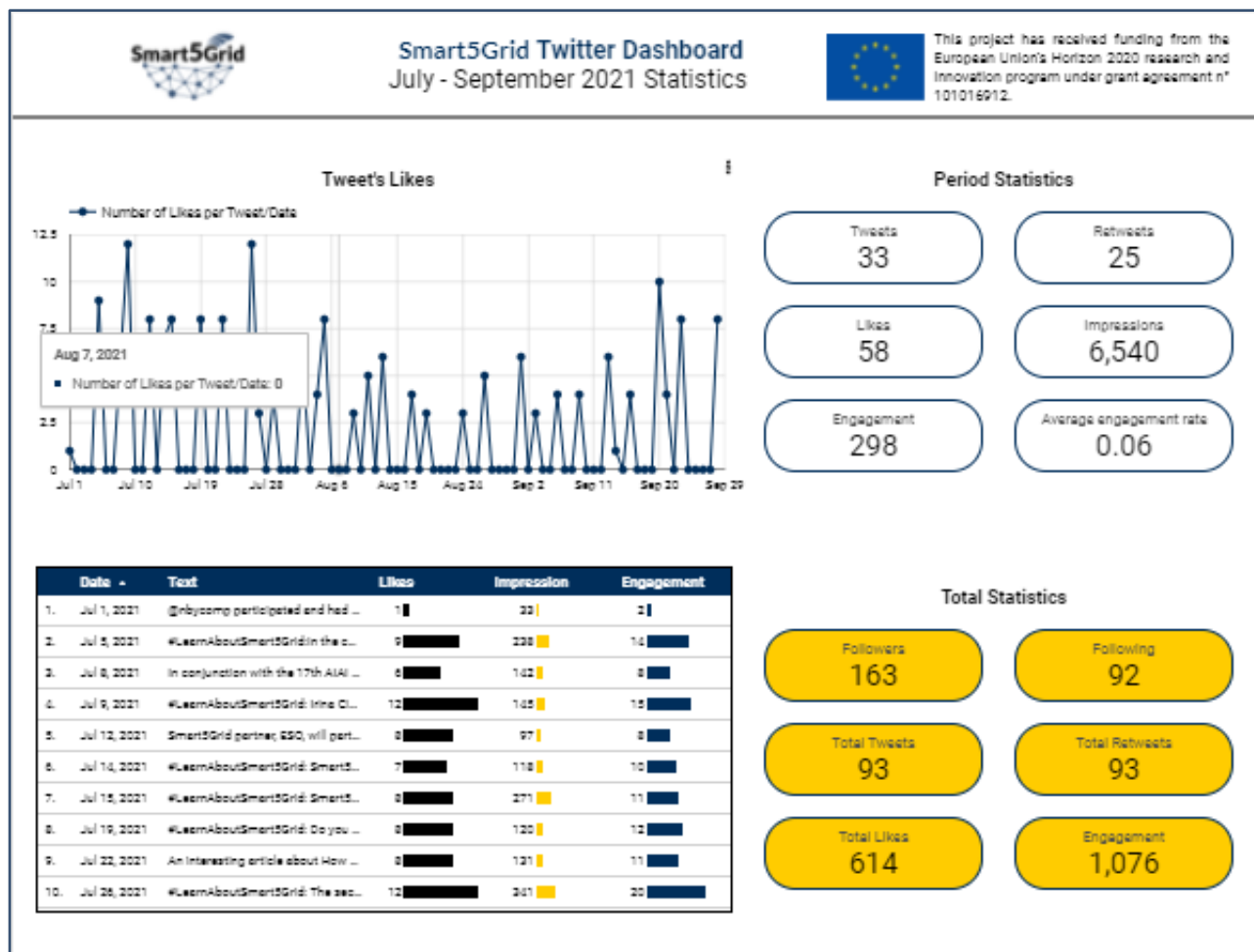
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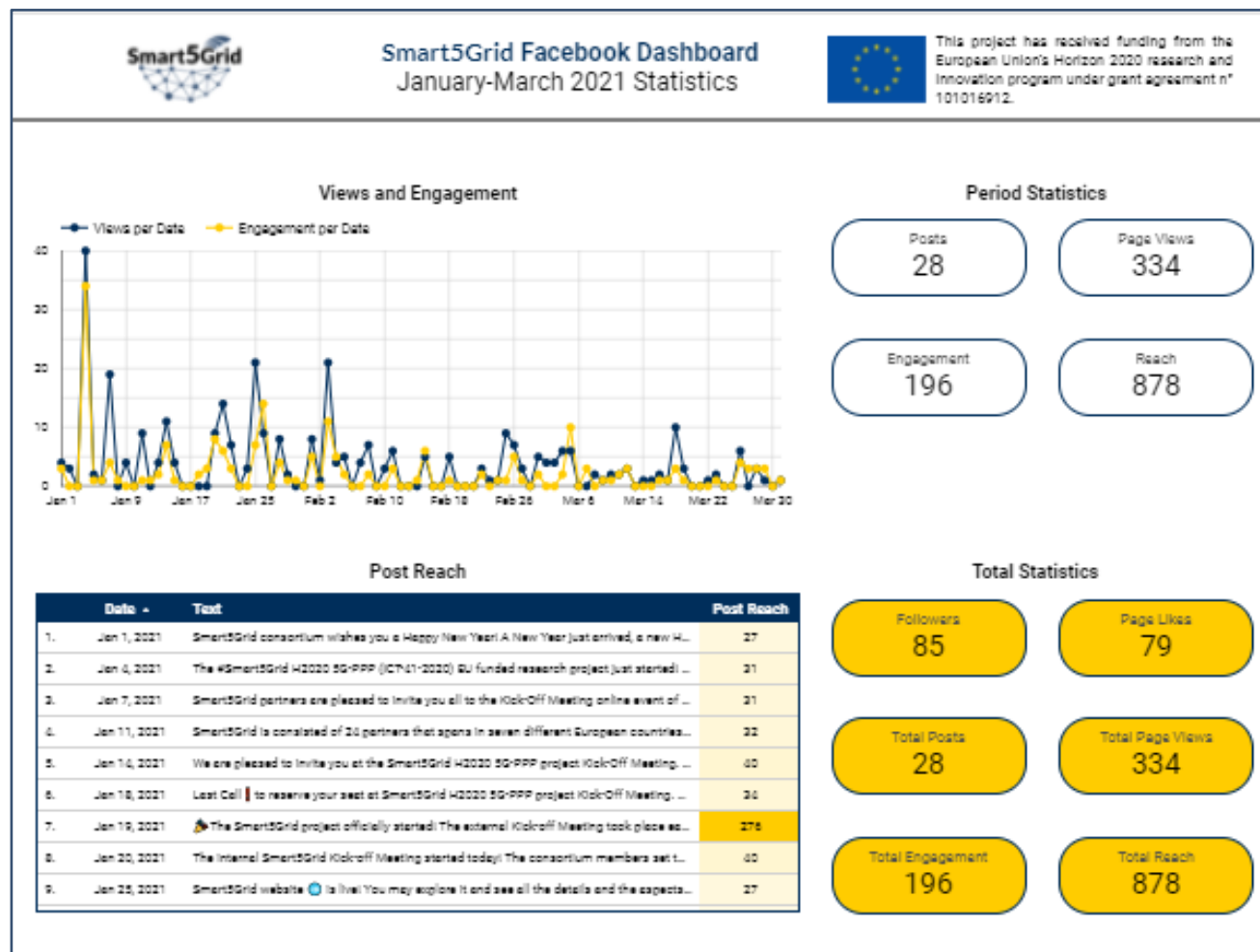
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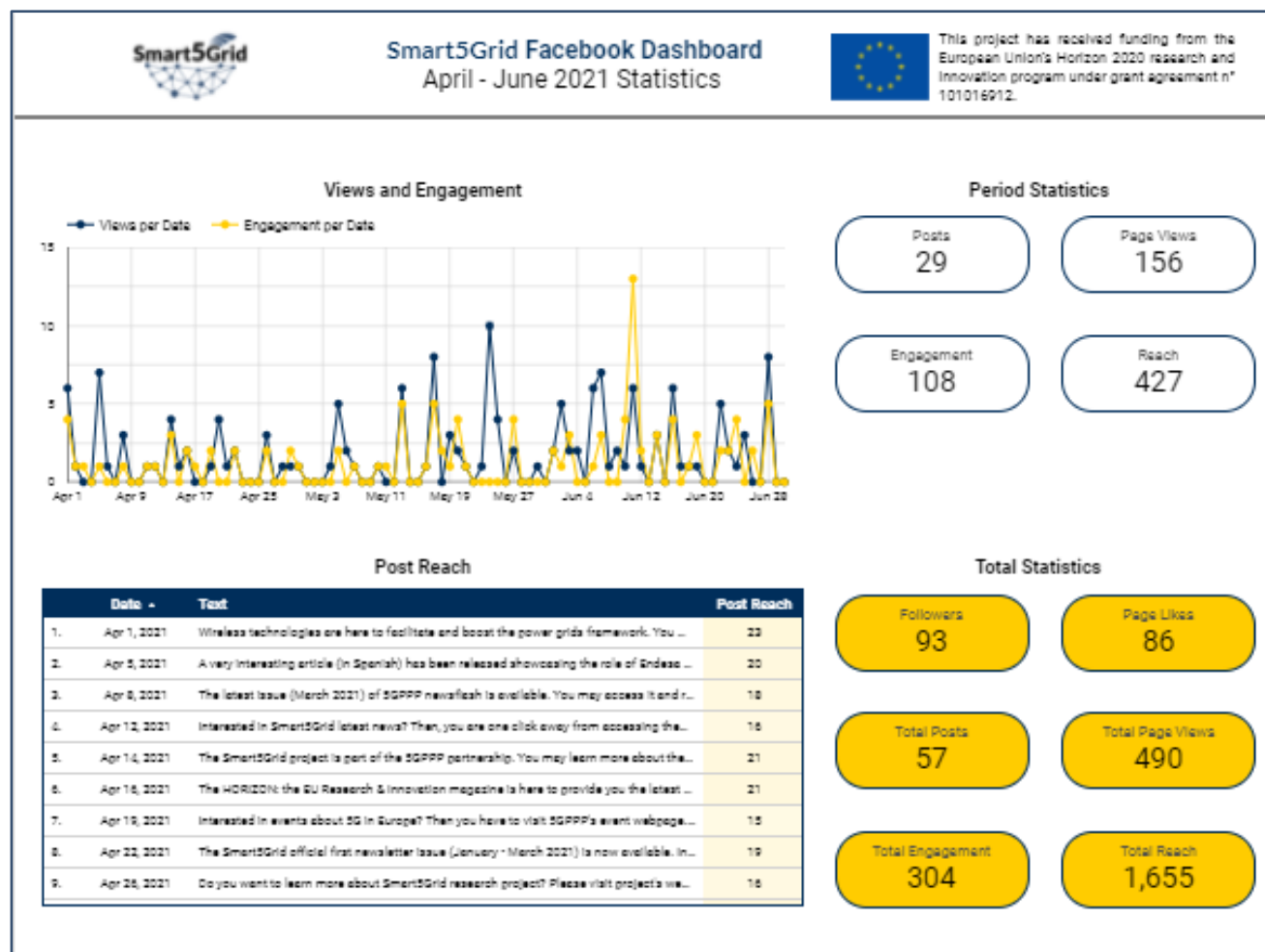
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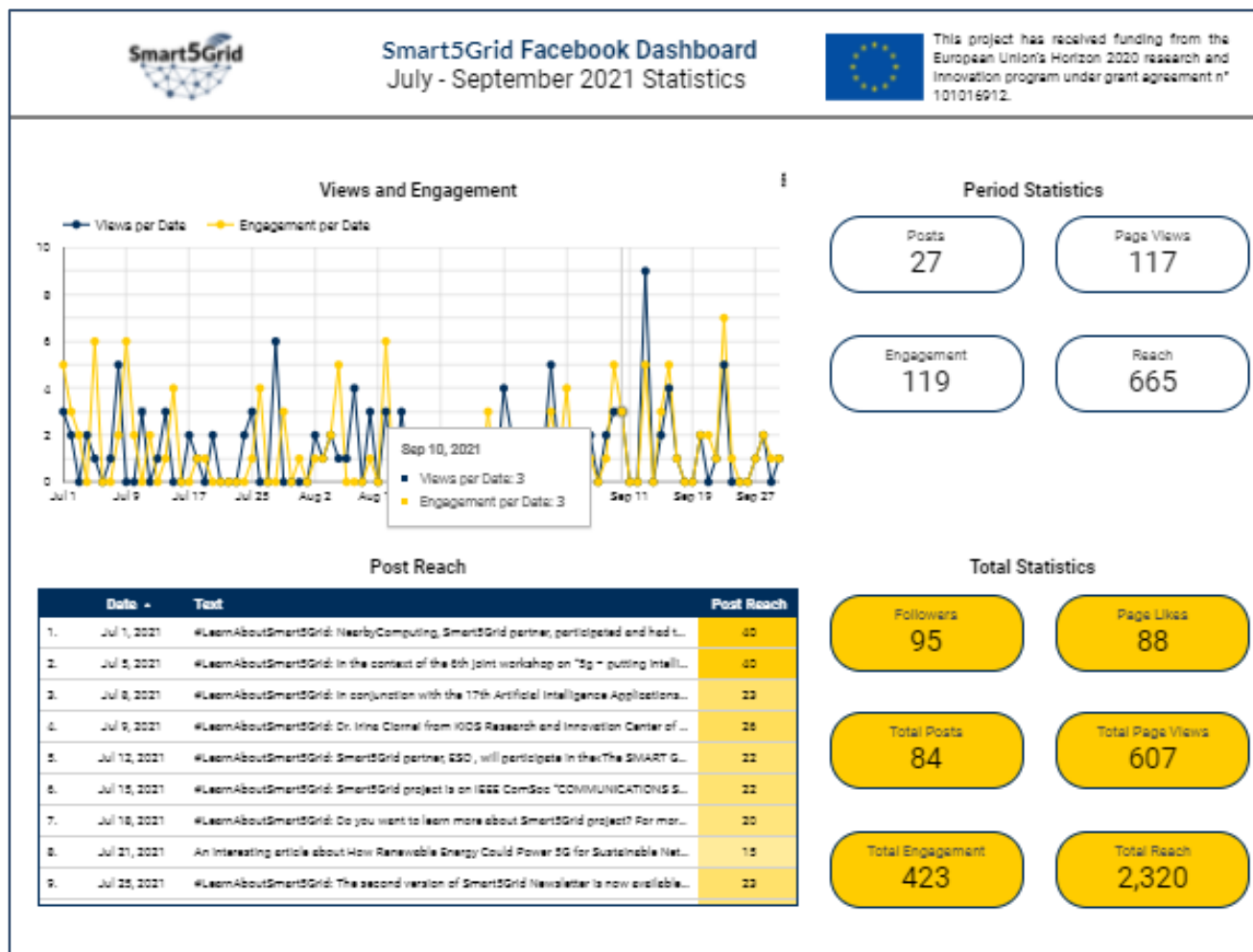
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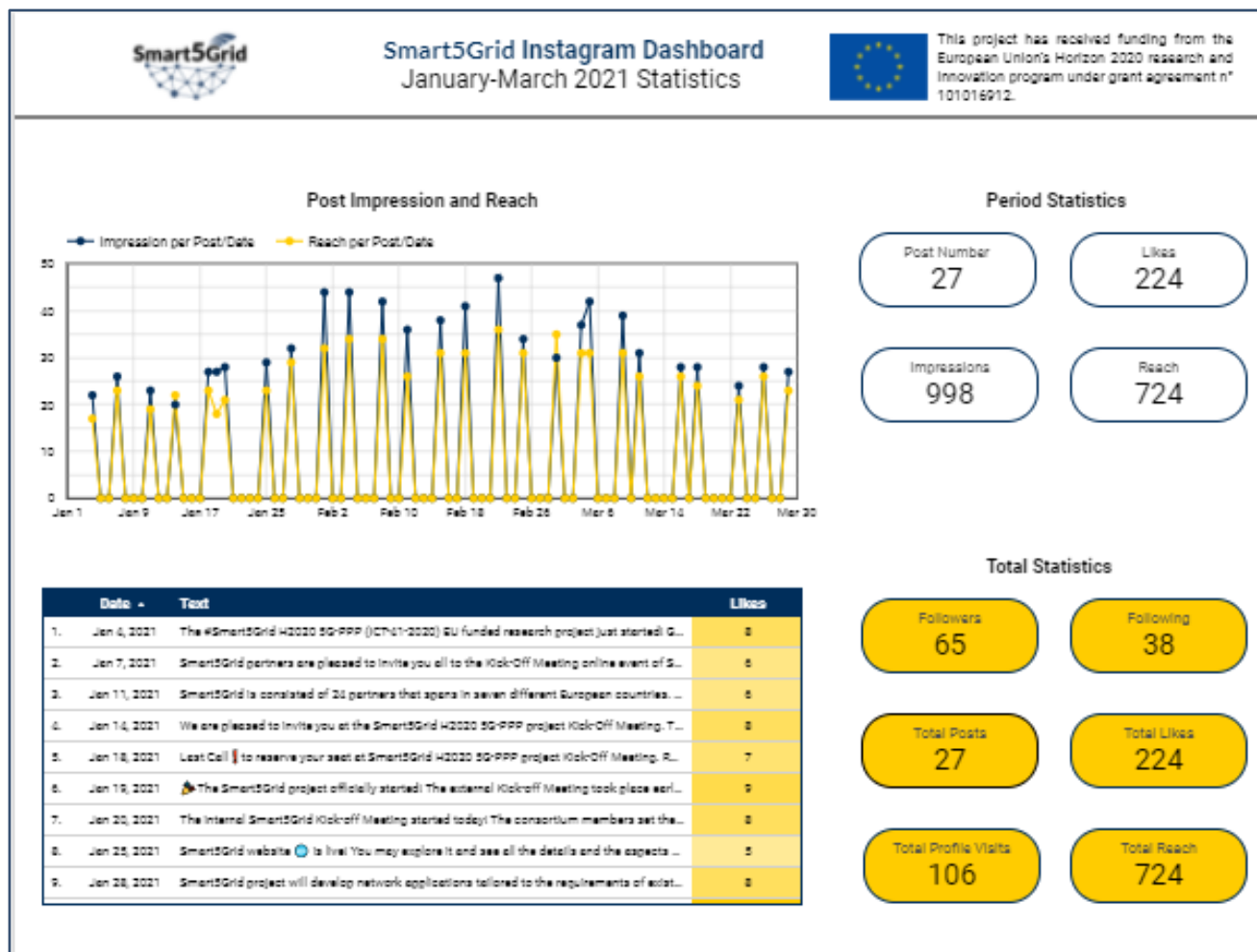
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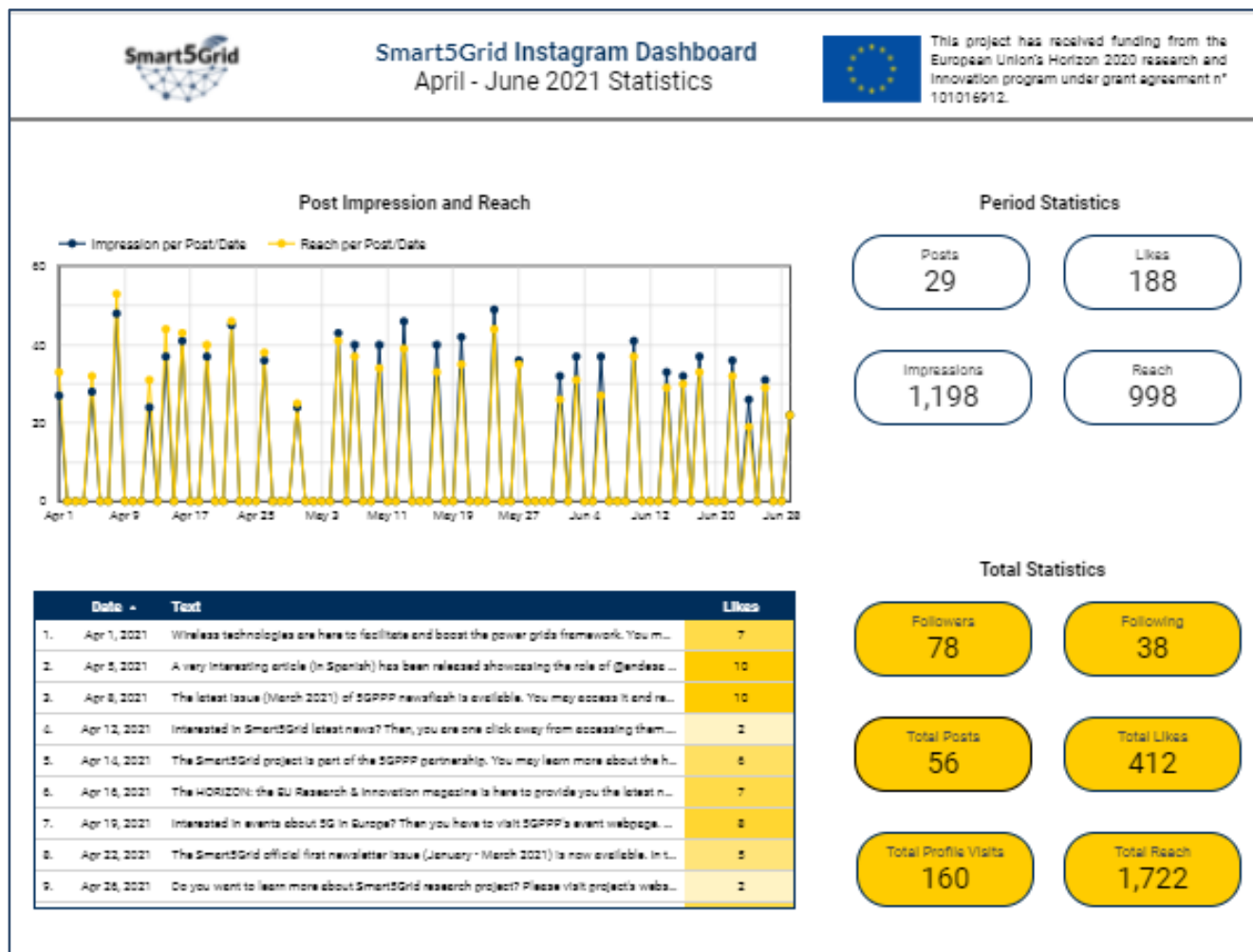
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Instagram Statistical Dashboards July-September 2021

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