D6.1 - Impact Activities Planning

Deliverable No.	D6.1	Due Date	28-Feb-2023
Type	Report	Dissemination Level	Public
Version	1.0	WP	WP6
Description	*Plan on the specific activities of T6.1, T6.2, T6.3 and T6.4 concerning the actions of communication, dissemination, standardization, IPR, innovation and exploitation.*		

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History

Date	Version	Change
18-Nov 2022	v0.1	INF, Creation of ToC
2-Dec-2022	v0.2	All WP6 partners, Agreed ToC, INF Initial contributions
27-Dec-2022	v0.3	Contributions to all sections by INF, TTC, SIEMENS, 8Bells
10-Jan-2023	v0.4	Contributions to all sections by INF, TTC, SIEMENS, 8Bells, All partners
23-Jan-2023	v0.5	Contributions to all sections by INF, TTC, SIEMENS, 8Bells,
28-Jan-2023	v0.6	Contributions to all sections by INF, TTC, SIEMENS, 8Bells, INNO, All partners
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Key Data

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Executive Summary

The aerOS project, through the D6.1 deliverable, presents the initial plan that will be applied by the aerOS consortium in the areas of communication, dissemination, standardization, and exploitation throughout the project's entire life cycle. In parallel, the initial application of these plans, along with the activities performed during the first four months of the project, are briefly presented.

The communication plan is accurately presented, emphasizing the various digital and non-digital communication channels in use, as well as the overall action plan developed for efficient project communication to all relevant stakeholders, with the goal of maximising impact. Similarly, the dissemination action plan includes all of the appropriate dissemination means that will be used to efficiently transmit the project's results and technological advances to the corresponding scientific, academic, organisational, general, and industrial target audiences.

aerOS's initial standardisation roadmap and the partners' participation, along with their planned contributions to specific standardisation organisations (SDOs), are also presented, in parallel to the exploitation plans, and results targeted both by the project consortium, at project level, as well as by the partners individually, at individual-partner level. In addition, the aerOS initial approach to intellectual property management and innovation exploitable outcomes' handling are described.

All the plans described in D6.1 will be constantly monitored and revised throughout the entire project lifetime, adapting them to the project's evolving requirements, for attaining the maximum project impact. Plan updates will also consider the continuous changes of the environment, in which the project is being executed, as well as the progress and actions of similar research projects, CSAs and associations.

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List of acronyms

Acronym	Explanation
3GPP	3rd Generation Partnership Project
5G	5th Generation
5G IA	5G Infrastructure Association
5G PPP	5G Public-Private Partnership
AI	Artificial Intelligence
AIOTI	Alliance for Internet of Things Innovation
ANSI/ISA	American National Standards Institute / International Society of Automation
BDVA	Big Data Value Association
CIS	Controls IoT Security
cPPP	contractual Public-Private Partnership
DLT	Distributed Ledger Technology
DoA	Description of Action
Dx.y	Deliverable No y of Work Package x
EC	European Commission
ENI	Experiential Networked Intelligence
ENISA	European Union Agency for Cybersecurity
ESCO	European Cyber Security Organisation
ETSI	European Telecommunications Standards Institute
FIWARE	Future Internet open-source platform
GA	General Assembly
GSMA	Global System for Mobile Communications
IEEE	Institute of Electrical and Electronics Engineers
IEEE SA	Institute of Electrical and Electronics Engineers Standards Association
IEC	International Electrotechnical Commission
IETF	Internet Engineering Task Force
IIRA	Industrial Internet Reference Architecture
IoT	Internet of Things
IRTF	Internet Research Task Force
ISG	Industry Specification Group
IT	Information Technology
ISO	International Organization for Standardisation
ITU-T	International Telecommunication Union Telecommunication
KPI	Key Performance Indicator

KVI	Key Validation Indicator
MEC	Multi-access Edge Computing
ML	Machine Learning
MS	Milestone
MVP	Minimum Viable Product
NGIoT	Next Generation Internet of Things
NFV	Network Function Virtualization
NGO	Non-Governmental Organisation
ONF	Open Networking Foundation
PC	Project Coordinator
PDL	Permissioned Distributed Ledge
PoC	Proof-of-Concept
RA	Reference Architecture
RAN	Radio Access Networks
RTO	Research and Technology Organisations
SAI	Securing Artificial Intelligence
SDN	Software Defined Networks
SDO	Standardisation Organisation
SG	Standardisation Group or Study Group
SP	Special Publication
SRIA	Strategic Research and Innovation Agenda
STF	Standardisation Task Force
Telco	Teleconference
TF	Task Forces
TIC	Terminal Industry Committee
TM	Traffic Management
TSG	Technical Specification Groups
Tx.y	Task No y of Work Package x
W3C	World Wide Web Consortium
WG	Working Group
WPx	Work Package No x

1. About this document

1.1. Deliverable context

The D6.1, as per DoA, addresses a specific aerOS objective, two milestones, follows a specific work plan and is well coupled with two WP6 upcoming deliverables.

Item	Description
Objectives	**Obj 7 - Global ecosystem creation, maximisation of impact and Open Call conduction** For impact creation, aerOS, results will be presented/promoted within publications, conferences, website, social media, and workshops. Further, several exhibitions/showcases will take place, including small demonstrations, to engage stakeholders and potential clients from diverse verticals, mobilising key actors. Moreover, business models (aligned with use cases technical capabilities, ecosystem, and functionalities) that include market and sustainability strategy, supported by preliminary value proposition and pricing policy, will be proposed, with a starting point in the Cloud Industry Roadmap. The ecosystem building will be supported by two Open Calls, allowing new partners to join the Consortium and develop applications and/or aerOS components. Furthermore, an Advisory Board will be formed, with at least 4 key members from industry and academia. aerOS will track relevant standards bodies to be compliant with, and contribute to convergence of, so far scattered, initiatives throughout Europe (indicatively: DSBA, NGI, AIOTI, BDVA, AI4EU, FIWARE or Gaia-X) to set the basis of a common, open, platform independent meta operating system for the IoT edge-cloud continuum.
Work plan	This deliverable belongs to the set of WP6 deliverables, and it is directly linked to all WP6 tasks' activities. T6.1's main goal is to establish the project's initial impact plans, as well as to develop and implement sound impact creation strategies, which are required for the action to achieve maximum visibility and impact within business and scientific communities, while also ensuring rapid communication, dissemination, exploitation, and adoption of its outputs. The aerOS project, through this deliverable introduces to its partners, targeted audience and stakeholders its initial plans, which will be applied by the consortium to actions related to project's WP6 activities of communication, dissemination, standardisation and exploitation throughout the entire life cycle of the project. In parallel, the initial activities performed during the first four months of the project are briefly presented. The use of aerOS impact channels and the communicated content address almost all tasks of the project, impacting in this way not only WP6 activities but also all aerOS WPs.
Milestones	D6.1 has an initial contribution to WP6 related milestones (as part of all WP6 activities): MS1 - Identity definition: Kick-off meeting, Web site and State of the art [M3] MS2 - Feedback: Availability of technical and business evaluations [M36]
Deliverables	D6.1 is directly linked to two upcoming WP6 deliverables, since it provides the means for the communication, dissemination, standardisation, exploitation, IPR and innovation reporting for the actions to be performed during the next period of the project until its end at M36. D6.2 - Intermediate report on impact activities [M18] and D6.3 - Final report on impact activities [M36].
Risks	This deliverable is directly linked to risks #14- Fail in the definition of the exploitation model or inappropriate business models for aerOS outcomes and #15 – Dissemination of project results and value growth is not enough. D6.1 has covered these two aspects widely. Sections 5 and Sections 2 & 3 correspondingly tackle the former and the latter. In particular, a strategy to maximise audience reach and scientific outcome has been devised. In addition, all partners have collaborated devising their individual exploitation plans and outlining a path towards innovation impact out of the results of the project.

1.2. The rationale behind the structure

This document is divided into 6 main sections, which present the different channels and mechanisms used for the efficient impact creation. In detail:

Section 1 introduces the reader to the purpose and scope of this document, its format, and its audience.

Section 2 provides a brief presentation of the aerOS communication channels that have been already set up and used while it also presents the communication plan to be applied. It also elaborates on the control, monitoring, and statistical mechanisms and tools used, as well as the initial communication activities carried out during the first months of the project.

Section 3 provides information about the aerOS dissemination means and activities, such as publications, workshops, conferences and the knowledge diffusion to scientific and academic audience through the presented dissemination plan.

Section 4 elaborates aerOS's participation in SDOs and alliances, as well as the initial standardisation roadmap. Initial performed or planned contributions to the SDOs are also being taken into account.

Section 5 describes the project's and partners' initial exploitation plans as well as the project's exploitation, IPR and innovation methodology.

Section 6 concludes this document.

2. Communication Activities

An overview of all aerOS communication channels is provided in this section of the document. The communication channels described in this section are already in use for at least 6 months (at the time of editing this deliverable) since all of them where created and used during M1 (September 2022). The communication channels extensively used so far by the project for identity and impact creation are the following:

- aerOS logo
- aerOs website
- aerOS Social Media Channels (LinkedIn, Twitter, Facebook, Instagram)
- aerOS YouTube channel
- aerOS Leaflet
- aerOs Poster
- aerOS Newsletter
- aerOS Articles, Press releases and News

2.1. Channels of Communication

2.1.1. aerOS logo

The creation of a distinctive logo was developed quite early in the project (during the proposal phase), which enabled the project to establish a preliminary well distinct and recognized branding appearance and awareness. The aerOS logo consists of a three blocks design on the left and the aerOS wording (Figure 1).

Figure 1 aerOS original logo

On the left side of the logo we can see three different blocks on vertical orientation, which fade from bottom to top. The "aerOS" word is written so that "OS" is with capital letters in order to highlight the Operating System terminology. Beneath the aerOS typing, is written "EUROPEAN IOT – EDGE – CLOUD" which clearly provides a connection with the main key words and objectives of the project and relative fields.

2.1.2. aerOS Website

The website of the aerOS project is the main channel of communication. It was created early on the project's phase, in the middle of September 2022 (M1). The official aerOS website can be accessed at: https://aeros-project.eu/. It mainly act as a portal where information on the project and its activities is shared, maintaining intense the project's reach across numerous vertical industries and different stakeholders.

The aerOS website reflects the overall visual identity and incorporates project's activities and achievements while it allows in parallel both internal and external audiences to learn more about the project's approach, objectives, architecture, use cases, news, events, activities and consortiums' main contact points (coordination team).

For stakeholders interested in the project, the website serves as a "business portal" for information, actions and impact creation. The website is focused on the Consortium's shared understanding of the project's scope and objectives, for creating impact through the efficient communication of aerOS activities, results and achievements. aerOS website will be live for the entire lifespan of the project and for at least 3 years after its completion.

In detail, the aerOS website is:

- Developed using WordPress (currently in ver.6.0) by the NCSRD and INF (WP6 and T6.1 leader) teams and its constantly updated to newer versions/releases,

- Domain name owned and hosted by the UPV (PC) for 6 years,

- Content constantly maintained and updated by the INF team as T6.1 leader,

- It has multiple menu options-buttons available for covering all types of project's activities,

- Compact and comprehensive webpages for easy navigation,

- It provides contact form, directly addressing the project coordinator, technical manager and WP6 leader,

- Google Analytics enabled for statistical monitoring of performance,

- It denotes in its footer that is part of EUCloudEdgeIoT through the corresponding tag image.

The website covers the communication requirements of the aerOS project in a condensed and comprehensive manner with enriched menu, sections and footer (Figure 2). Seven easy-to-access menu options are grouped into: Home, Objectives, Use Cases, Consortium, Dissemination, News and Contact. More details about these specific tabs (menu options) follow further below.
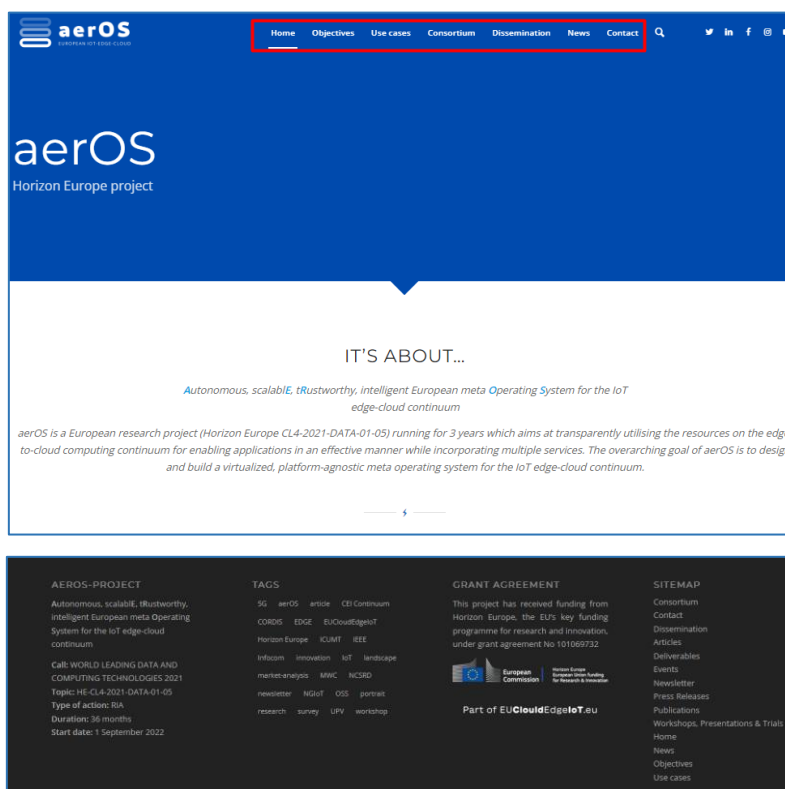
Figure 2 aerOS menu buttons and footer on home page

- **aerOS Home webpage** (https://aeros-project.eu/)

  In the home page of the aerOS website any visitor may find some fundamental information about the project. There is a short overview of the project and related information such as its duration, the funding authority, its type, Horizon Europe SNS call and the interpretation of aerOS acronym (aerOS: Autonomous, scalablE, tRustworthy, intelligent European meta Operating System for the IoT edge-cloud continuum). As the visitors scroll down the home page they can find information about the project's key concepts, the ambitions and the use cases of the project (Figure 3). Also, at the end of the home webpage there is rolling list with the members of the consortium. Each partner logo is connected with a hyperlink which leads to partner's official website (Figure 4).
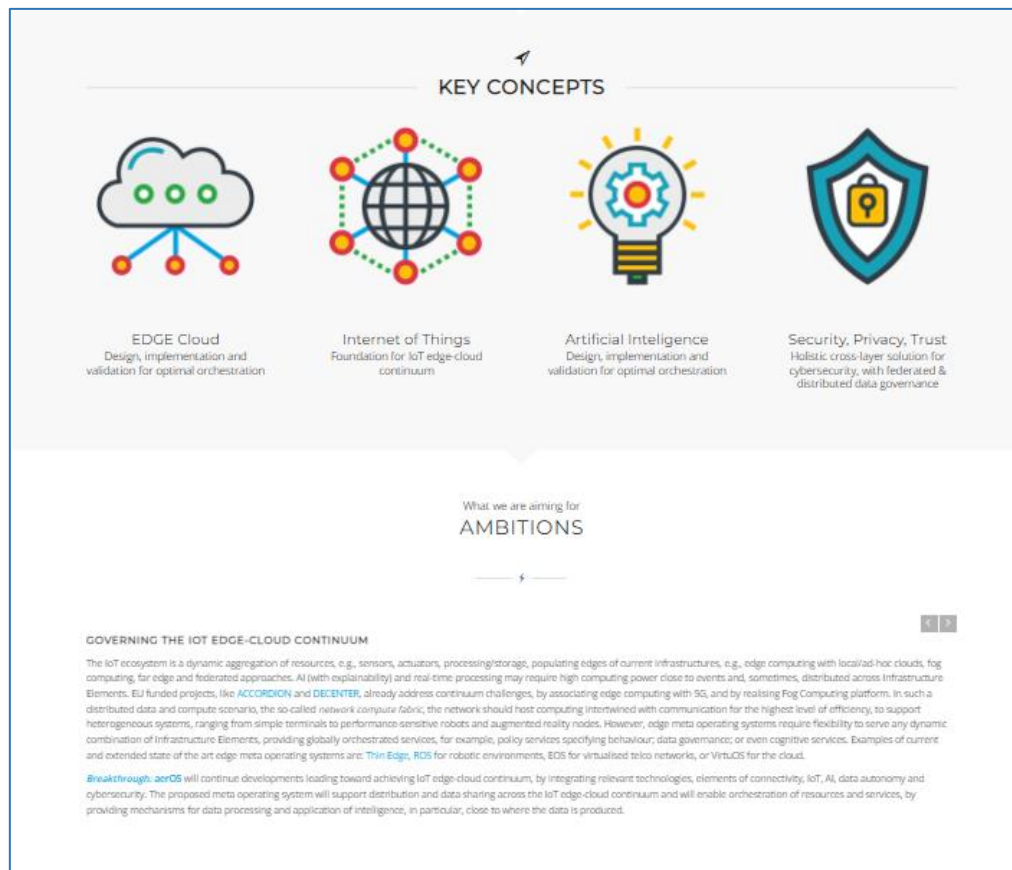
Figure 3 Home webpage

Figure 4 Partners Rolling list

Finally, on the home page is also available a direct link to the contact form of the website (Figure 5).
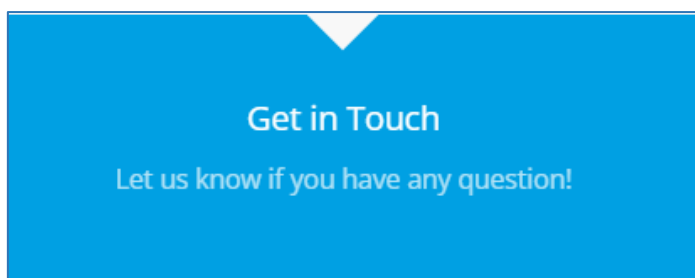
Figure 5 Get in Touch link at the Home page

- **aerOS Objectives webpage** (https://aeros-project.eu/objectives/) Information on the aerOS's goals and vision is available on the Objectives webpage (Figure 6 and Figure 7). It begins by outlining the project's primary vision before going into greater detail in each of the different objectives that must be met along with an overview of the respective initial architecture.

Figure 6 aerOS Objectives webpage 1
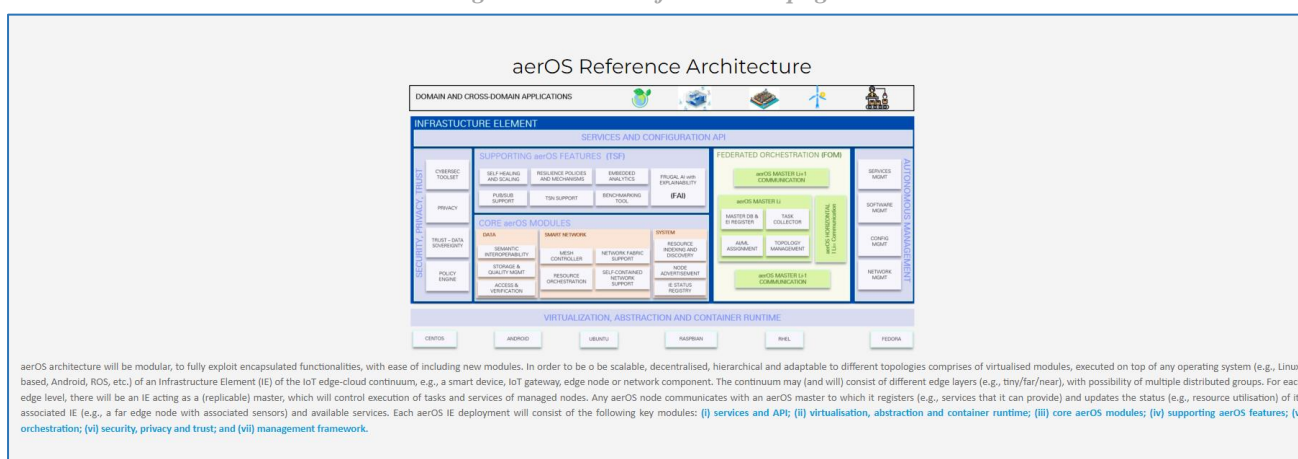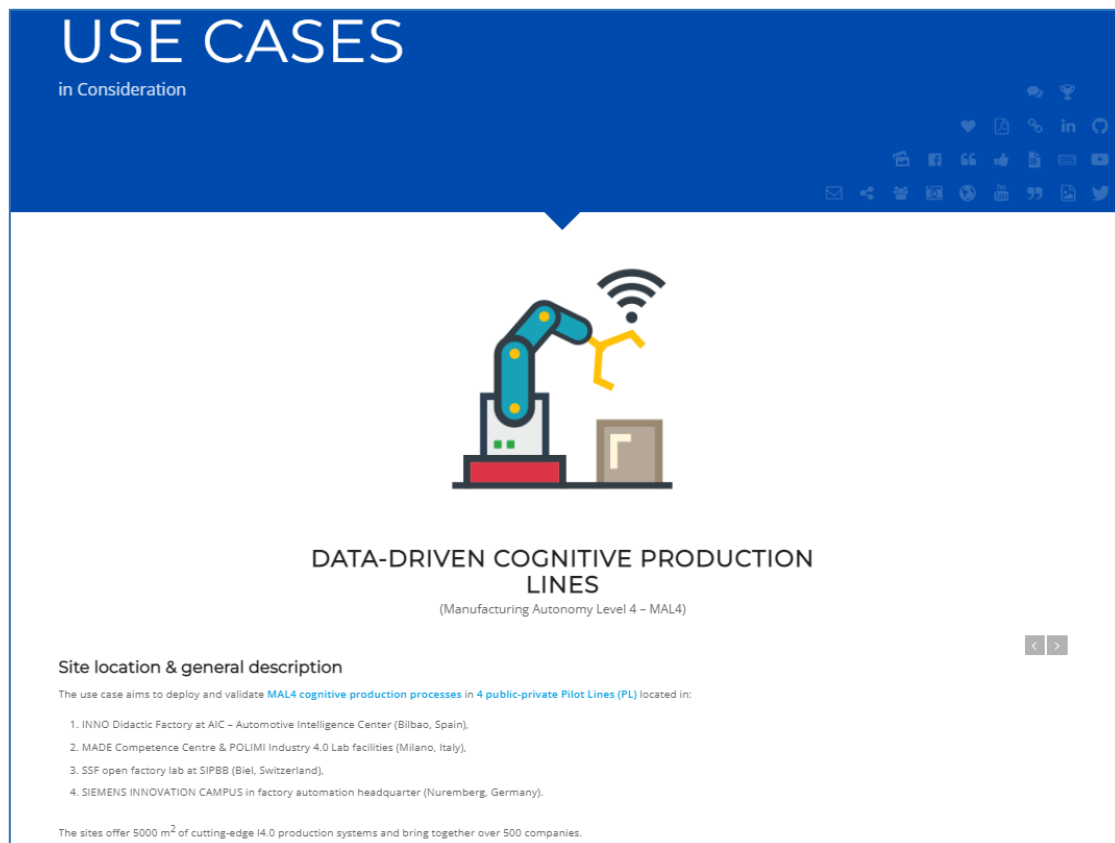
Figure 7 aerOS Objectives webpage 2

- **aerOS Use Cases webpage** (https://aeros-project.eu/use-cases/) This page provides a clear overview of the five aerOS use cases, along with respective scenarios of each pilot site and motivation. In this webpage all five use cases are being described (Figure 8). In each use case any interested visitor may

navigate into different aspects of the use case using the arrows, under the use case's image. These aspects are summarized into the following categories, as they pop out from this carrousel plugin being used:

- o Site location & general description
- o Current problem area & Motivation
- o Infrastructure & technology already in place
- o Objectives and Expected Benefits
- o Scenarios

Figure 8 aerOS use cases webpage

- **aerOS Consortium webpage** (https://aeros-project.eu/consortium/) aerOS consortium is presented on this webpage (Figure 9). aerOS project consists of 27 partners, from 11 different European countries. aerOS consortium has a well-balanced mixture of stakeholders as it includes Academia, RTO's, Industries, SME's and Telecom operators. The first part of the webpage consists of all the partners logos, with a dedicated link to direct the visitors to each partner's website.

Figure 9 aerOS partner's logo

On the second part of the webpage there is a dedicated list with the partners and a reference to the country of origin of each member of the consortium. Furthermore, each partner name is an active hyperlink leading to the partner's webpage, where the visitor can learn more about each participating partner (Figure 10).

No	Participant organisation name	Short name	Country
1	UNIVERSITAT POLITÈCNICA DE VALÈNCIA	UPV	ES
2	NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS"	NCSRD	GR
3	ASOCIACIÓN DE EMPRESAS TECNOLÓGICAS INNOVALIA	INNO	ES
4	TTControl GmbH	TTC	AT
5	SIEMENS AG	SIEMENS	DE
6	FIWARE FOUNDATION eV	FF	DE
7	TELEFONICA INVESTIGACION Y DESARROLLO SA	TID	ES
8	COSMOTE KINITES TILEPIKOINONIES AE. (COSMOTE Mobile Telecommunications S.A.)	COSM	GR
9	EIGHT BELLS LTD	8BELLS	CY
10	INQBIT INNOVATIONS SLR	IQB	RO
11	FOGUS INNOVATIONS & SERVICES P.C	FOGUS	GR
12	L.M. ERICSSON LIMITED	LMI	IE
13	SYSTEMS RESEARCH INSTITUTE POLISH ACADEMY OF SCIENCES	SRIPAS	PL
14	ICTFICIAL Oy	ICT-FI	FI
15	INFOLYSIS, P.C.	INF	GR
16	PRODEVELOP, S.L.	PRO	ES
17	EUROGATE CONTAINER TERMINAL LIMASSOL LTD	EGCTL	CY
18	CYPRUS UNIVERSITY OF TECHNOLOGY	CUT	CY
19	DS TECH	DST	IT
20	GRUPO S21SEC GESTION SA	S21Sec	ES
21	JOHN DEERE GmbH&Co. KG	JD	DE
22	CLOUDFERRO Sp. z O.O.	CF	PL
23	ELECTRUM Ltd	ELECT	PL
24	UNIVERSITA POLITECNICA DI MILANO	POLIMI	IT
25	MADE scarl	MADE	IT
26	NAVARRA DE SERVICIOS Y TECNOLOGÍAS S A	NASERTIC	ES
27	SWITZERLAND INNOVATION PARK BIEL/BIENNE AG	SIPBB	CH

Figure 10 aerOS partner's list

- **aerOS Dissemination webpage** (https://aeros-project.eu/dissemination/): aerOS partners' communication and dissemination efforts are documented in detail on this page. The dissemination webpage is further broken down into seven subsections (Figure 11): publications (referring to all scientific publication such as journals, conference papers, white papers etc.), workshops, presentations and trials, articles, press releases, deliverables, newsletters and events.

  These subsections are presented below in detail.
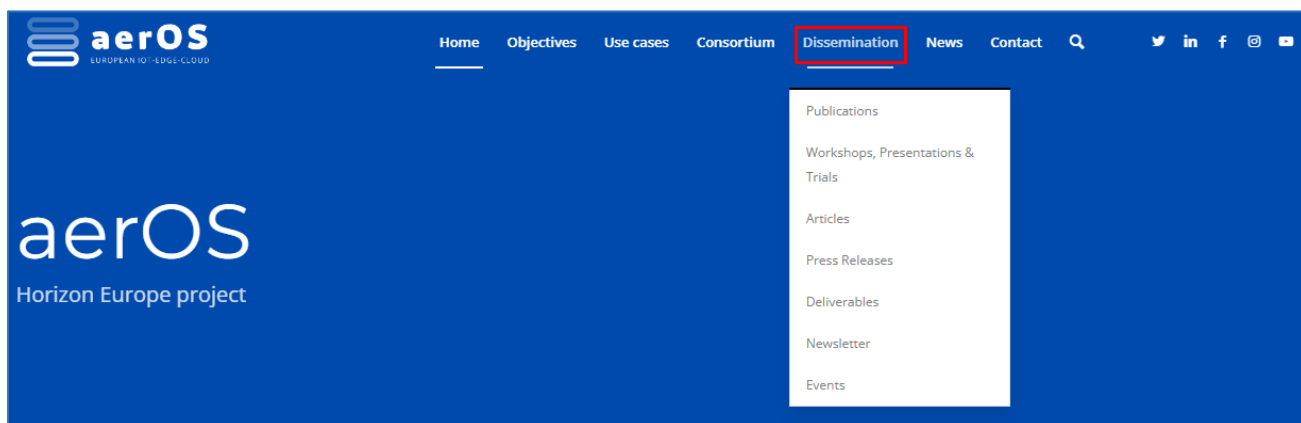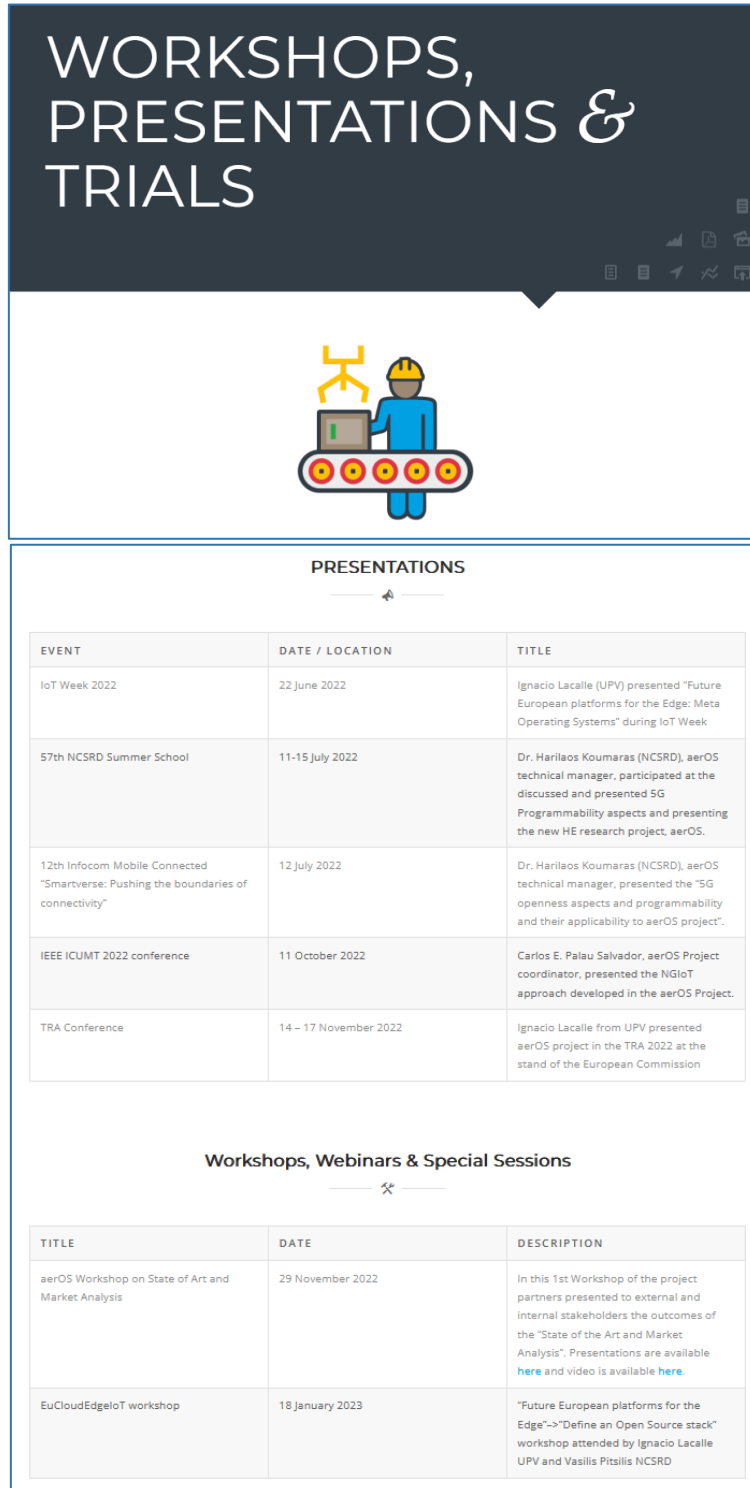
Figure 11 Dissemination subsections

  o **Publications Webpage** (https://aeros-project.eu/dissemination/publications/) : This subsection includes the webpage of scientific papers and publications in journals, conferences, workshops, book chapters, white papers and contributions in the form of events, throughout the project duration (Figure 12).
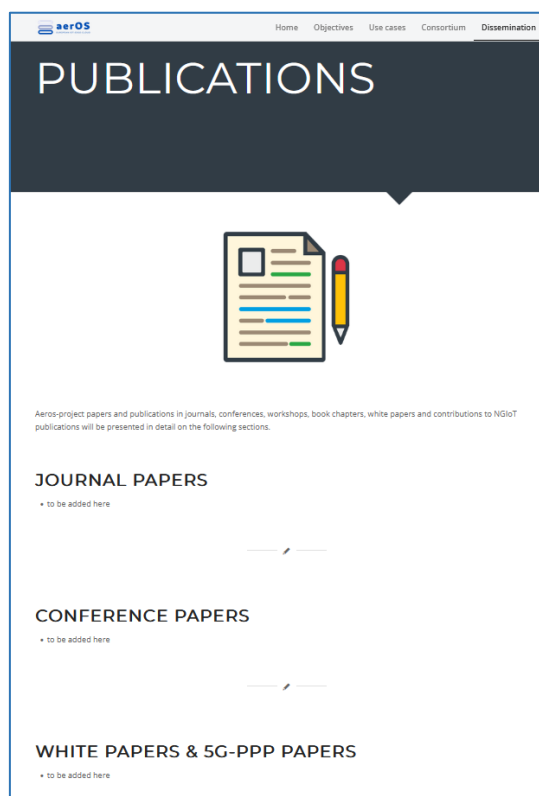
Figure 12 Publications webpage

o **Workshops, Presentations & Trials** (https://aeros-project.eu/dissemination/workshops-presentations-trials/)**:** As aerOS is expected to organize/co-organize several workshops, participate in conferences, deliver presentations in various events, perform trials and tests, as per the defined use cases, there is a need to track and document all those activities at a public location. Therefore, a dedicated webpage has been created, which summarizes all the activities described above (Figure 13).

Figure 13 Workshops, Presentations & Trials

o **Articles** (https://aeros-project.eu/dissemination/articles/)**:** All aerOS published articles of general interest in newspapers, magazines, websites, newsletters, and several other media are provided on the article's webpage (Figure 14).

Figure 14 Articles webpage

o **Press Releases** (https://aeros-project.eu/dissemination/press-releases/)**:** This page refers to all the press releases and announcements/news made online by partners, third parties, associations concerning aerOS project (Figure 15).

Figure 15 Press Releases webpage

o **Deliverables**(https://aeros-project.eu/dissemination/deliverables/)**:** The deliverables webpage provides a list of all the deliverables conducted during the project. All public deliverables will be available for downloading shortly after the submission to the EC portal (Figure 16).

#	NAME	WORK PACKAGE	LEAD BENEFICIARY	TYPE	DISSEMINATION LEVEL	DUE DATE (MONTH)	LINK
D1.1	Project management handbook	WP1	1-UPV	R – Document, report	SEN – Sensitive	1	
D1.2	Ethics, legal aspects, and data management plan	WP1	1-UPV	DMP – Data Management Plan	SEN – Sensitive	6	
D1.3	Project progress report	WP1	1-UPV	R – Document, report	SEN – Sensitive	18	
D1.4	Final project report	WP1	1-UPV	R – Document, report	PU – Public	36	
D2.1	State-of-the-Art and market analysis report	WP2	19-DS TECH SRL	R – Document, report	PU – Public	3	
D2.2	Use cases manual, requirements, legal and regulatory analysis (1)	WP2	1-UPV	R – Document, report	PU – Public	9	
D2.3	Use cases manual, requirements, legal and regulatory analysis (2)	WP2	16-PRODEVELOP	R – Document, report	PU – Public	18	
D2.4	DevPrivSecOps methodology specification (1)	WP2	20-S21SEC GES	R – Document, report	PU – Public	9	
D2.5	DevPrivSecOps methodology specification (2)	WP2	20-S21SEC GES	R – Document, report	PU – Public	21	
D2.6	aerOS architecture definition (1)	WP2	2-NCSRD	R – Document, report	PU – Public	12	
D2.7	aerOS architecture definition (2)	WP2	2-NCSRD	R – Document, report	PU – Public	21	
D3.1	Initial distributed compute infrastructure specification and implementation	WP3	14-ICTFICIAL OY	OTHER	PU – Public	12	
D3.2	Intermediate distributed compute infrastructure implementation	WP3	10-IQB	OTHER	PU – Public	18	
D3.3	Final distributed compute infrastructure specification and implementation	WP3	5-Siemens	OTHER	PU – Public	30	
D4.1	Software for delivering intelligence at the edge preliminary release	WP4	13-IBSPAN	OTHER	PU – Public	12	
D4.2	Software for delivering intelligence at the edge intermediate release	WP4	7-TID	OTHER	PU – Public	18	
D4.3	Software for delivering intelligence at the edge final release	WP4	13-IBSPAN	OTHER	PU – Public	30	
D5.1	Integration, evaluation plan and KPIs definition (1)	WP5	19-DS TECH SRL	R – Document, report	PU – Public	12	
D5.2	Integration, evaluation plan and KPIs definition (2)	WP5	19-DS TECH SRL	R – Document, report	PU – Public	24	
D5.3	Use cases deployment and implementation (1)	WP5	3-INNOVALIA	DEM – Demonstrator, pilot, prototype	PU – Public	18	
D5.4	Use cases deployment and implementation (2)	WP5	3-INNOVALIA	DEM – Demonstrator, pilot, prototype	PU – Public	33	
D5.5	Technical evaluation, validation and assessment report (1)	WP5	16-PRODEVELOP	R – Document, report	PU – Public	21	
D5.6	Technical evaluation, validation and assessment report (2)	WP5	11-FOGUS	R – Document, report	PU – Public	36	
D6.1	Impact activities planning	WP6	15-INFOLYSIS	R – Document, report	PU – Public	6	
D6.2	Intermediate report on impact activities	WP6	5-Siemens	R – Document, report	PU – Public	18	
D6.3	Final report on impact activities	WP6	9-EIGHT BELLS LTD	R – Document, report	PU – Public	36	

Figure 16 Deliverables Webpage

- o **Newsletter** (https://aeros-project.eu/dissemination/newsletter/)**:** aerOS Newsletters will be issued quarterly, summarizing the project's activities during the reported period. All aerOS newsletter issues will be available for downloading in this dedicated page (Figure 17).

Figure 17 Newsletter Webpage

- o **Events** (https://aeros-project.eu/dissemination/events/)**:** The Events page gives two additional options about accessing past and upcoming/scheduled events accordingly (Figure 18 aerOS Events webpage):
    - ▪ **Upcoming Events**: Upcoming events, such as conferences, workshops, special sessions, invited talks and presentations in which aerOS plans to participate/attend are presented on this page.
    - ▪ **Past Events**: All dissemination and communication events, in which aerOS has participated/attended are listed on the past events page.

All events such as conferences, workshops, special sessions, invited talks and presentations in which AEROS-PROJECT participated are summarized in this page.

— Upcoming

2023

- EUCNC & 6G Summit 2023, 6-9 June 2023, Sweeden
- IoT Week 2023, June 2023, Berlin

— Past

2022

- NEXUS Event, 10 November 2022, Pamplona, Spain
- TRA Conference, 14-17 November 2022, Lisbon, Portugal
- IEEE ICUMT 2022 conference, 11 October 2022. Valencia, Spain
- 57th NCSRD Summer School, 11-15 July, 2022, Ayia Paraskevi, Greece
- 12th Infocom Mobile Connected "Smartverse: Pushing the boundaries of connectivity", 12 July 2022, Athens, Greece
- IoT Week 2022, 20-23 June 2022, Dublin, Ireland

Figure 18 aerOS Events webpage

- **aerOS News webpage** (https://aeros-project.eu/blog/) The News page is regularly updated with content including project events, activities, news, trials, and other impact-generating dissemination material (Figure 19). The "NEWS" section gives a great overview of aerOS activities where the users can scroll down and click on specific posts, read all the activity details, and be redirected to events' web pages where the reported content is available in more details (e.g event agendas, videos etc.).

Figure 19 aerOS news webpage

- **aerOS Contact webpage** (https://aeros-project.eu/contact/) The contact form is an integrated part of the website and serves as a mean of interaction between the project and stakeholders. In this section emerging issues and queries by a visitor/user can be clarified/replied upon receipt since they are addressed to specific members of the aerOS administrative team. Specifically, the members responsible for maintaining the functionality and the smooth interaction of this communication are the Project Coordinator (PC), Technical Manager (TM) and the WP6 leader, which are the direct recipients of any potential query. Moreover, in the contact form page there is also a map with the country locations of the members of the consortium, highlighting the pan European character of the project (Figure 20).
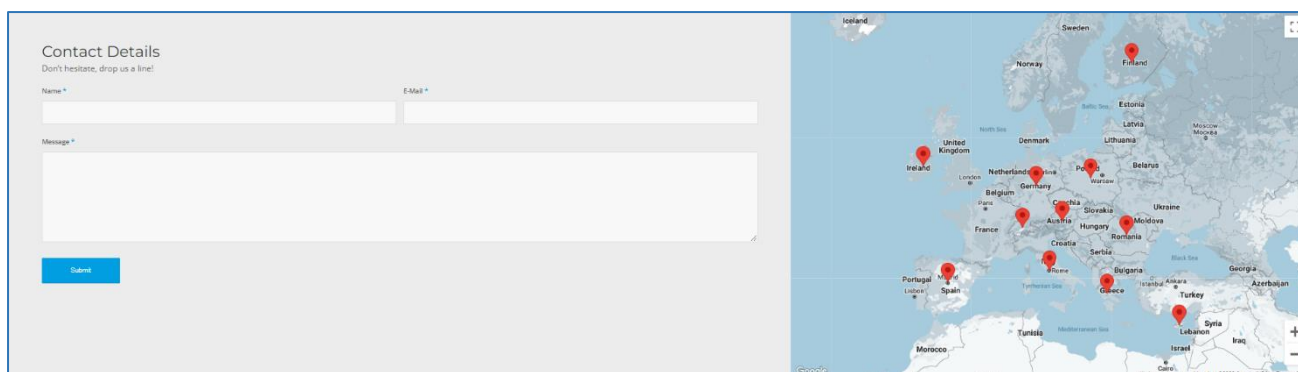
Figure 20 aerOS Contact webpage

2.1.3. aerOS Social Media Channels

The second main pillar of the aerOS communication is the social media channels (Table 1). The project's presence in a wide range of social media platforms leads to the wider exposure of the impact of the project to diverse audiences, in a cost-effective and efficient way. In other words, this is the perfect way to diffuse the knowledge from aerOS achievements and key findings as well as, increase project's visibility and impact. However, as we target the broadest possible audience, then we must manage the social media in such a way so as to enhance the communication of the project but also to efficiently address both technical and non-technical audiences.

A tentative list of the benefits of social media is the following one:

- Circulation of news, dissemination content, activities and results of the project,
- Creation of a distinguishable project identity and branding to a wide and versatile audience,
- Identification of new possible audience and new stakeholders,
- Keep the audience committed to the project though regular weekly posts,
- Monitoring the project impact,
- Relating and linking the project to other similar activities, projects, communities and associations (such as EU, Horizon Europe, NGIoT, SNS, EUCloudEdgeIoT).

In specific, aerOS social media accounts have been created and are actively used since early September 2022 in Twitter, LinkedIn, Facebook, Instagram and YouTube (with dedicated url link to aerOS channel). Table 1 provides the access links to all aerOS social media channels and YouTube.

Table 1 Social Media Channels

LinkedIn	https://www.linkedin.com/in/aeros-project/
Twitter	https://twitter.com/AerosProject
Facebook	https://www.facebook.com/aerosproject
Instagram	https://www.instagram.com/aerosproject/
YouTube	https://www.youtube.com/@aeros-project

2.1.3.1. LinkedIn Channel

LinkedIn is an online business platform that enables users to set up profiles and "connections" with each other, leading to the creation of an online social network for professionals. It works effectively for communicating accomplishments and activities relating to numerous sectors as well as for professional branding. aerOS project develops and will develop its own audience based on connections that are interested in material generated from the project. On the aerOS LinkedIn (https://www.linkedin.com/in/aeros-project/) bio there is brief information about the identity of the project, such as a short description, the call and the number of the connections (Figure 21). Also, any LinkedIn follower can quickly check the account and engage with the posted content.
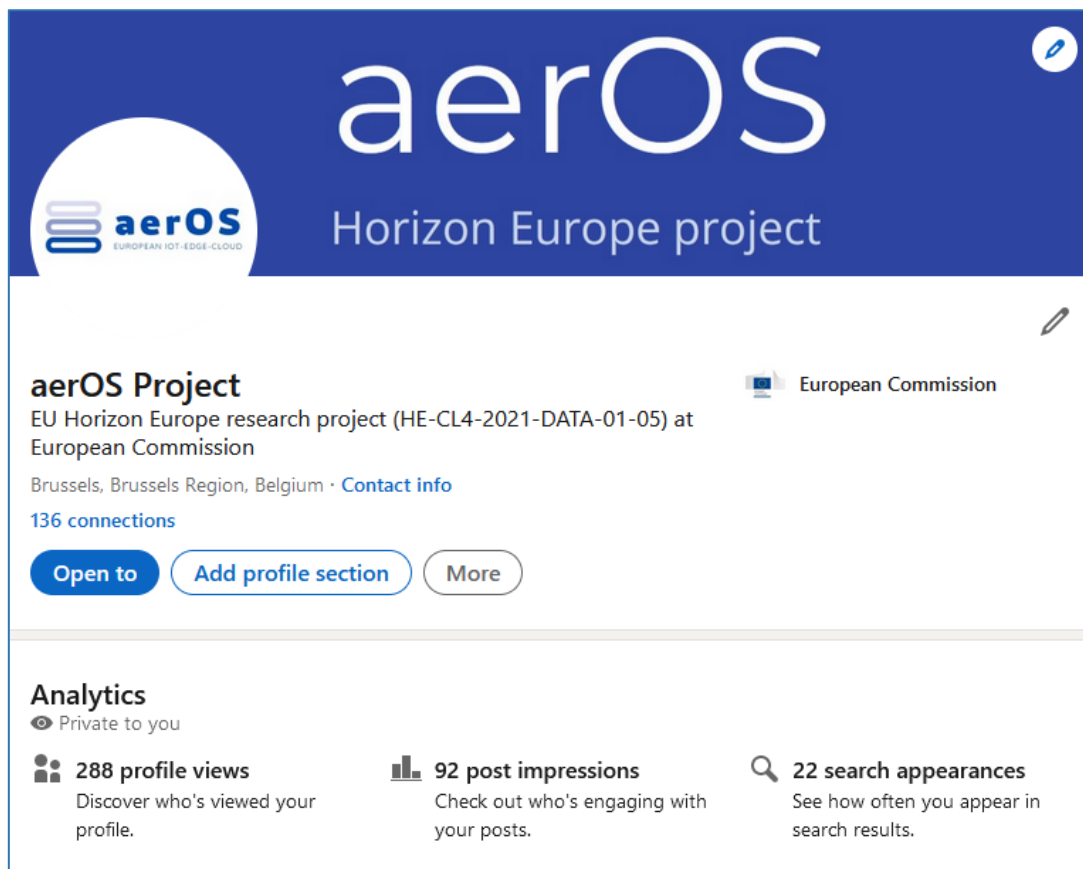
Figure 21 LinkedIn Account at M4

2.1.3.2. Twitter Channel

Twitter is another popular social media channel, that will help us to expand the aerOS network to several different audiences. The aerOS Twitter account (https://twitter.com/AerosProject), gives a short summary of the project and details on Followers, Following, etc. (Figure 22). Posts can be read by users, who can also like, reshare and comment on them. This engagement aspect of the Twitter's channel nature will improve the communication of the project, as it helps to target non-followers' audience too. Finally, the compact format and the characters restriction of Twitter posts gives the chance to utilize this mean as a news portal, where the followers can read short stories about project related activities.

Figure 22 Twitter Account at M4

2.1.3.3. Facebook Channel

The aerOS project is present on Facebook as well (https://www.facebook.com/aerosproject). One of the easiest ways to boost brand value and social media presence is through Facebook, one of the most popular to the general public social media platform. For aerOS, Facebook account is used as a medium for "more general interest" material sharing. This does not mean that the project's technological and innovative content/achievements are not shared through the Facebook channel, but that they are communicated in a non-technical, easier to understand, language. Users can receive through Facebook the most recent information regarding overall project activities but also public news and articles (Figure 23). They can also interact in a variety of ways, including likes, comments, shares, and convincing potential users or other connections to spread the word about the project.
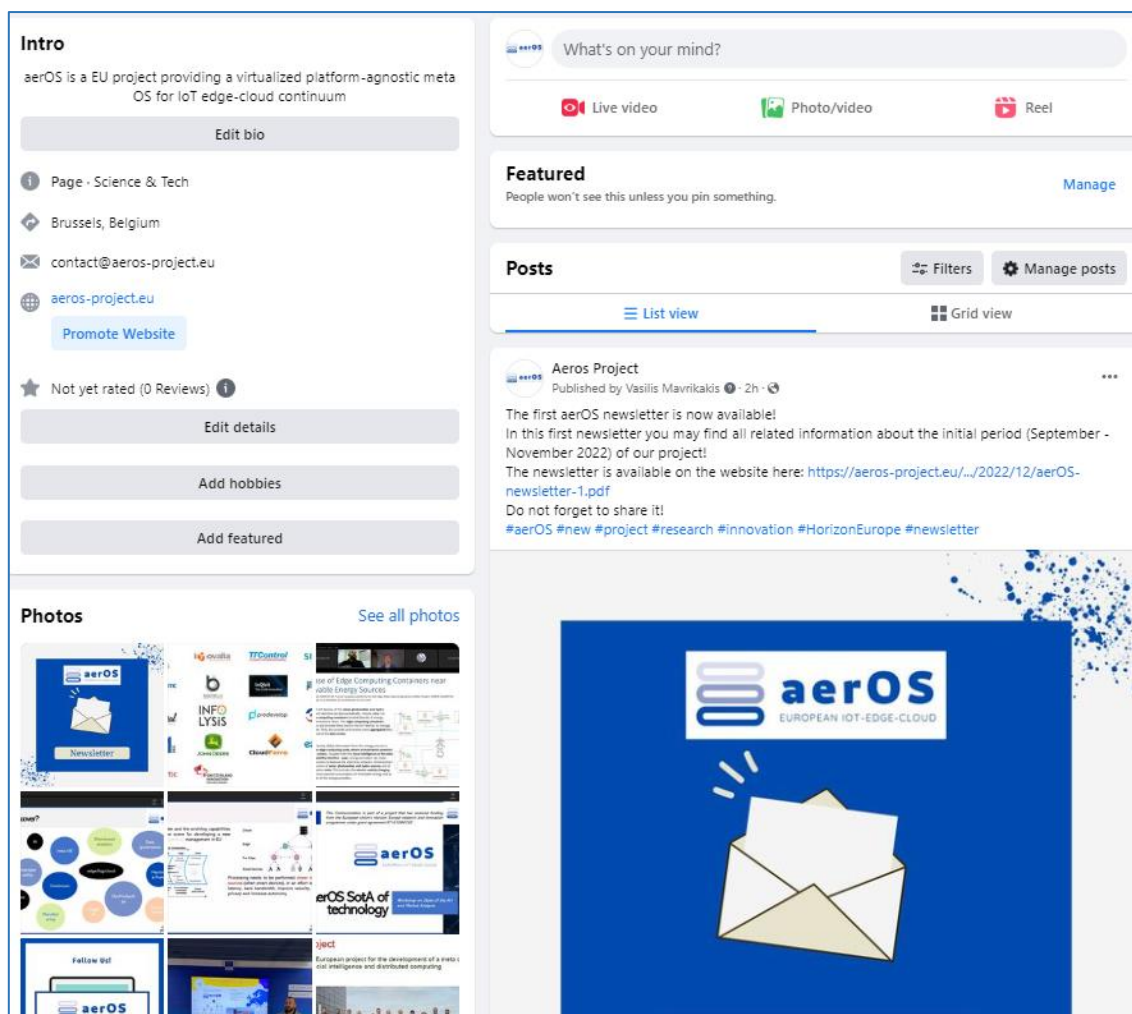
Figure 23 Facebook Account at M4

2.1.3.4. Instagram Channel

aerOS project is also active on Instagram (Figure 24). Instagram is the most widely used image and video-sharing social media platform. aerOS Instagram account (https://www.instagram.com/aerosproject/) uses this well-known network to its benefit by publishing pictures of the project's activities and accomplishments, relevant content, and reaching out to new audiences to increase the impact of the dissemination and communication operations carried out. With less text and more emphasis on the visual components (such as images and videos), postings can be made in a lighter way, more visually appealing, and more concise. Based on the communication strategy reported, we will publish less technical text on the Instagram platform, but enriched with photos, to clarify and transmit the content of projects in a more easier and visual way. In addition, in the Instagram account bio, users can access project info and the link to the website (or any related activity link that is regularly posted under the bio).
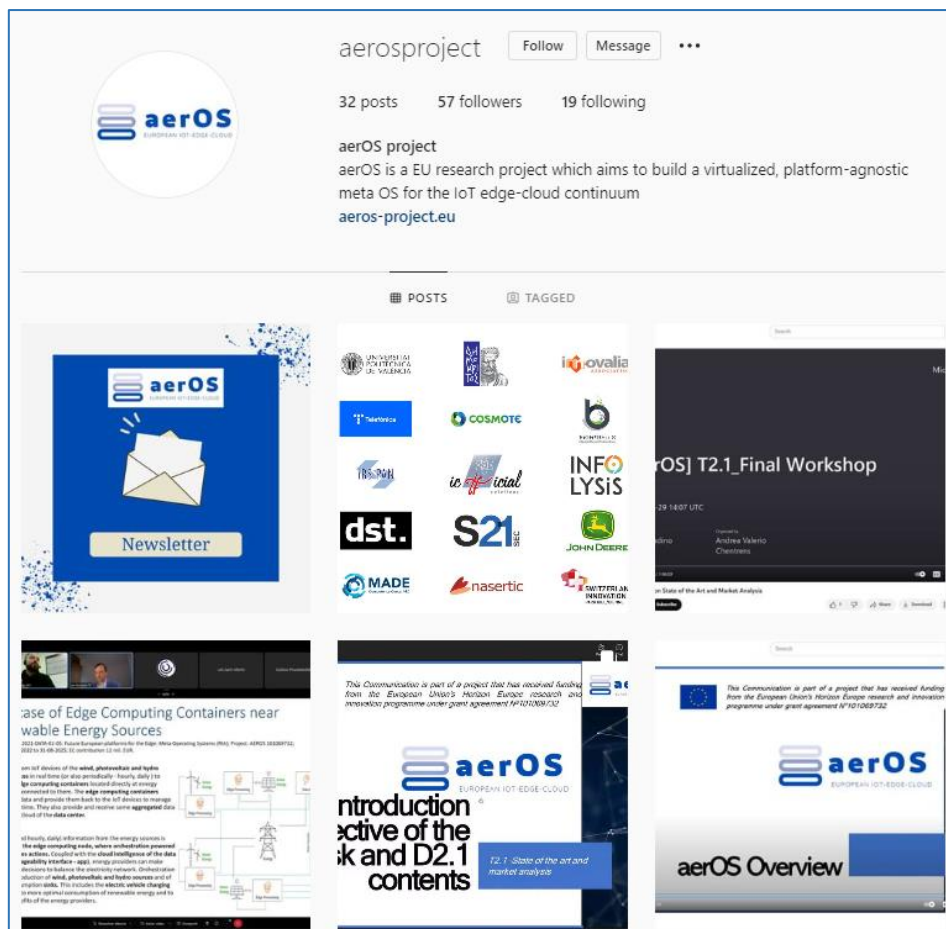
Figure 24 Instagram Account

2.1.3.5. YouTube Channel

One of the most major and well-known online video distribution platforms is YouTube. It increases audience engagement as videos are more engaging than text and images, and this situation can help us increase audience engagement with the project. aerOS will be able to reach a global audience and be searched through Google's search engine thanks to the regular and consistent production of video content, throughout the project's duration. The aerOS YouTube channel (https://www.youtube.com/@aeros-project) is updated regularly with videos (2 videos are already available at M4) since it is used for promoting and showcasing the project events (Figure 25). YouTube channel has been already used to share videos from workshops and presentations that took place during the first months of the project. It is also built using the latest YouTube policy, handles (@aeros-project), which gives us the opportunity to have a shorter personalised link (with the project name) which is more convenient to use/remember when addressing communication initiatives.
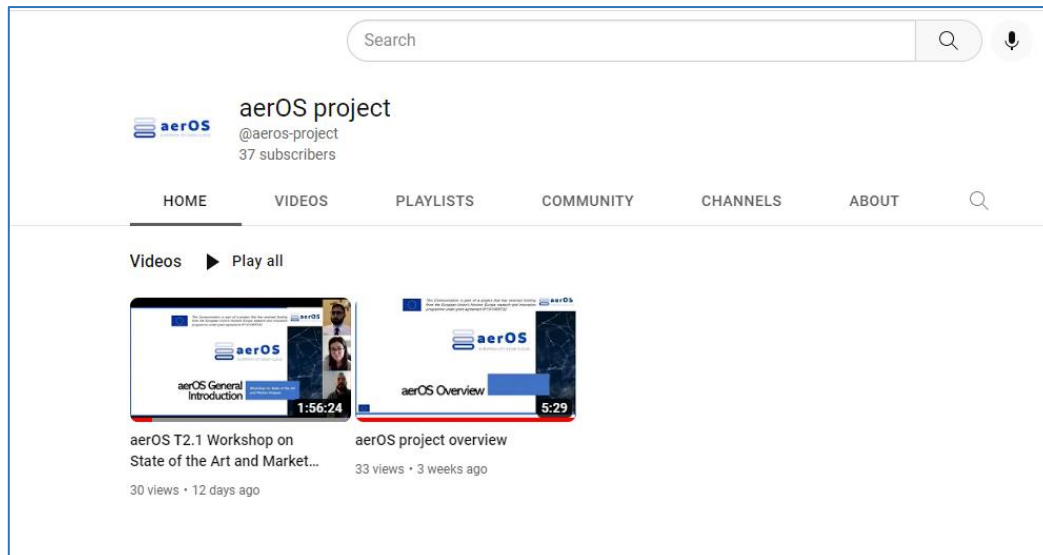
Figure 25 aerOS YouTube channel

2.1.4. aerOS Leaflet

A leaflet is a form of printed material used to communicate information and to promote aerOS project. They are usually distributed either digital or printed. They can also be handed out in public events such as conferences and workshops. Leaflets are typically used to provide concise information about a particular topic and can include details such as contact information, an overview of a product or service, or promotional offers. They are often used to draw attention to a particular issue or cause. The first version of aerOS leaflet is already available in digital format through the aerOS website (https://aeros-project.eu/wp-content/uploads/2023/01/aerOS_leafet-v0.2.pdf). It is also presented in Figure 26 and Figure 27.

Figure 26 aerOS Leaflet 1st Page

Figure 27 aerOS leaflet 2nd page

2.1.5. aerOS Poster

Additionally, to support its communications efforts, aerOS will deploy posters. Posters (first aerOS poster available at https://aeros-project.eu/wp-content/uploads/2023/01/Poster-aerOS_A0_84x118cm_WEB.pdf) will be used for a variety of dissemination and communication activities, including workshops, booths, presentations, webinars, seminars, trainings, and trials (Figure 28). The primary goal of posters is informational as they will give the audience concise and in-depth insights about the project, its goals, and pilots.

Figure 28 aerOS poster

2.1.6. aerOS Newsletter

aerOS newsletters will be published quarterly (every 3 months), starting with the first issue that has already been released (https://aeros-project.eu/dissemination/newsletter/), reporting the period September – November 2022 (M1-M3) (Figure 29 & Figure 30). Newsletter issues will be used to communicate the project's activities and accomplishments during a given quarterly period in a concise manner. Each newly issued version will be uploaded on the website and will be communicated through projects' social media channels. Stakeholders will have access, and they will be able to easily download it and read it. Also, through the internal mailing lists partners will be informed about the released issue each time.

Figure 29 aerOS Newsletter 1ˢᵗ issue - cover page

Figure 30 aerOS newsletter 1st issue - last page

2.1.7. aerOS Articles

aerOS partners have communicated the project through online articles which many of them have been circulated in several different news portals. Indicatively the following table (Table 2) presents how an overview aerOS article (in Spanish) entitled "The UPV leads an EU project for the development of a meta operating system" has been intensively communicated in various Spanish online media during the first months of the project.

Table 2 aerOS Articles

#	Media	URL link
1	upv.es	http://www.upv.es/noticias-upv/noticia-13836-proyecto-aeros-es.html
2	valenciaplaza.com	https://valenciaplaza.com/la-upv-lidera-un-proyecto-europeo-que-aplica-ia-y-computacion-para-energia-y-edificios-inteligentes
3	europapress.es	https://www.europapress.es/navarra/noticia-navarra-participa-proyecto-europeo-aeros-mejorar-gestion-datos-recursos-informaticos-ue-20220704110717.html
4	lasprovincias.es	https://www.lasprovincias.es/comunitat/lidera-proyecto-aplica-20221107004649-ntvo.html
5	gentedigital.es	http://www.gentedigital.es/valencia/noticia/3498265/la-upv-lidera-un-proyecto-europeo-que-aplica-ia-y-compu%e2%80%a6/
6	elmeridiano.es	https://www.elmeridiano.es/la-upv-lidera-un-proyecto-ue-para-el-desarrollo-de-un-meta-sistema-operativo/

2.1.8. aerOS Press Releases

Several partners announced the aerOS kick off and their participation in the project through announcements and press releases on their company websites (indicative list in Table 3).

Table 3 aerOS Press Releases

#		
1	aerOS announced at Nasertic website	https://www.nasertic.es/es/proyectos#aeros
2	aerOS announced at Prodevelop website	https://www.prodevelop.es/en/ports/idi-puertos
3	aerOS announced at NCSR "Demokritos" website	https://www.iit.demokritos.gr/projects/autonomous-scalable-trustworthy-intelligent-european-meta-operating-system-for-the-iot-edge-cloud-continuum/
4	aerOS announced at 8Bells website website	https://www.8bellsresearch.com/eight-bells-is-very-proud-to-participate-in-aeros-project/
5	aerOS announced at DST website	https://www.dstech.it/progetti-finanziati.html

2.2. Communication Control/Monitoring and Performance mechanisms

In order to carefully monitor all planned communication and dissemination operations, the aerOS consortium, and particularly WP6 and T6.1 leader, have developed specific control and monitoring systems. These tools, track and measure the project's website and social media channels' effectiveness regularly. These control methods are essential because they offer valuable input, track impact effectiveness for the consortium, and show the project's development. Additionally, these tools ensure efficient collaboration among the consortium's participants.

2.2.1. NextCloud Online Repository and Coordination Files

The aerOS partners use the NextCloud platform, as a collaborative tool for sharing material and content (Figure 31). The NextCloud platform is divided into sections – folders and sub-folders - for the smooth distribution and better organization/filing of the project's material. The NextCloud platform is vital to the consortium's members' effective communication and collaboration. There are multiple dedicated folders generated for each Work Package and Task, and there is also the option for online file editing, a feature that is very helpful for documenting communication activities.

Specifically, a procedure has been created that relies on the use of two different sheet files at the NextCloud repository for the efficient documentation of the performed impact activities by each partner. These two files offer two distinct functions. The first document, entitled "WP6 Activities reporting" is fulfilled once a partner completes a project-related impact activity and serves on informing the rest partners and especially the communication team for getting aware and communication this activity. The second one, "Social Media Posts Proposal" gives partners the chance to propose ideas for future posts at the project's communication channels and/or news for the News webpage.
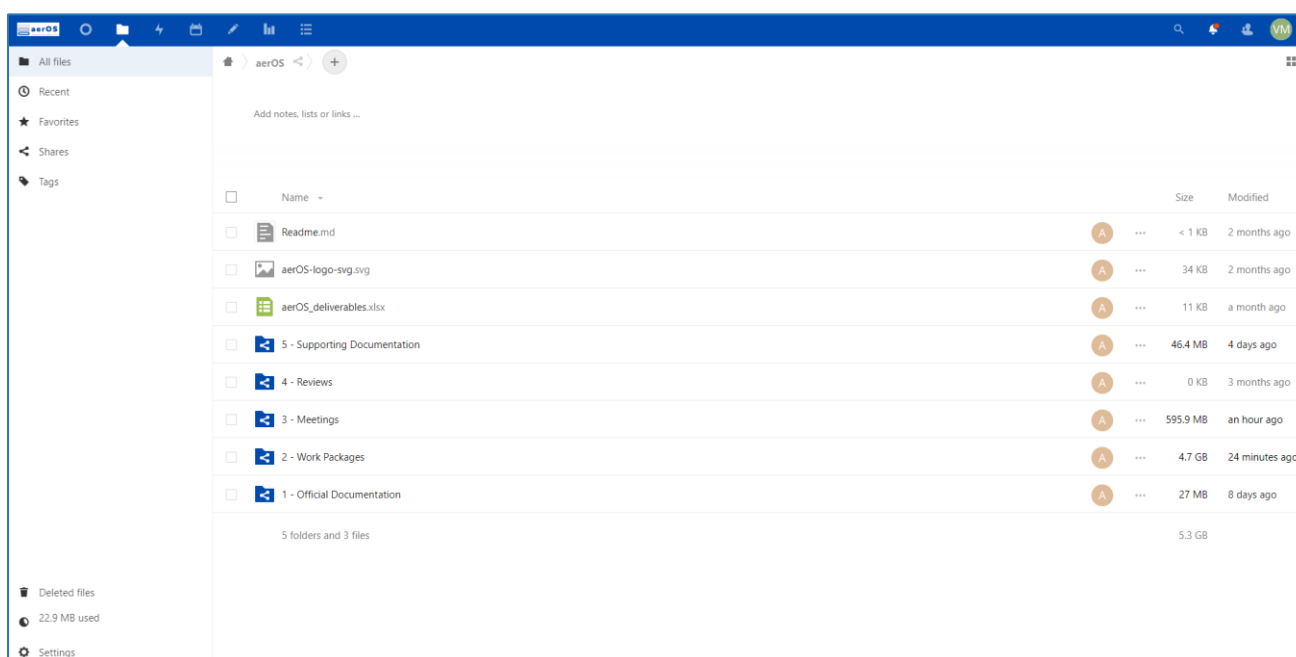
Figure 31 NextCloud Interface
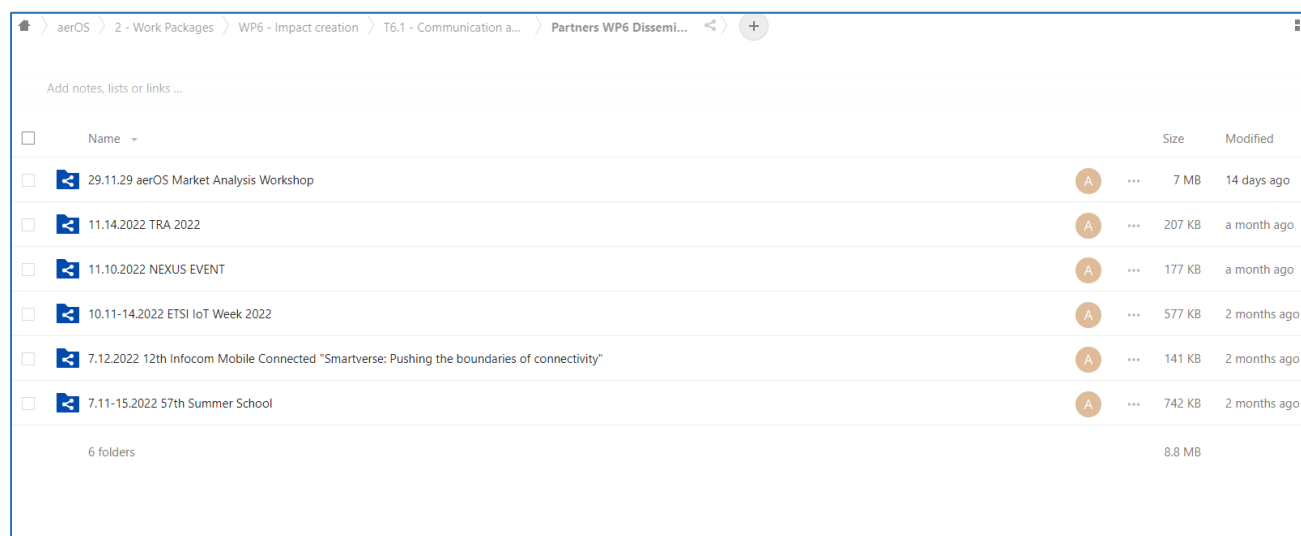
In detail, the process concerning the efficient documentation of the aerOS impact activities is very simple and extremely helpful. First, each partner who has performed an impact activity related to our projects should complete the "WP6 Activities reporting" spreadsheet which is inside WP6 and T6.1 (Impact Creation) folder. In this spreadsheet, each partner should write down information concerning essential information about the activity such as Item# - Authors/Partners – Target (Event, Location, Date) – Description (Figure 32). There are also some additional columns entitled "Posted" in which communication team marks if an activity has been

communicated/posted or not, and "Newsletter Issue" which indicates in which newsletter issue has been published.

Item #	Authors/ Partners	Target (Event, Location, Date)	Description	Posted	Newsletter Issue
1	Ignacio Lacalle (UPV)	22 June 2022, IoTWeek 2022, Dublin, Ireland	Future European platforms for the Edge: Meta Operating Systems 22 June 2022, IoTWeek 2022, Dublin, Ireland https://sites.grenadine.co/sites/iot/en/iotweek-202	✓	
2	Harilaos Koumaras / NCSRD	57th Summer School, NCSRD campus, 11-15 July 2022, Aghia Paraskevi, Greece	Dr. Harilaos Koumaras (NCSRD), aerOS technical manager, participated at the NCSRD 57th Summer School on 12th July 2022, discussing and presenting 5G Programmability aspects and presenting the new HE research project aerOS. https://www.youtube.com/watch?v=NPqdrntuLQA	✓	
3	Harilaos Koumaras / NCSRD	12th Infocom Mobile Connected "Smartverse: Pushing the boundaries of connectivity", 12 July 2022 (online), Athens, Greece	Dr. Harilaos Koumaras (NCSRD), aerOS technical manager, participated at 12th Infocom Mobile Connected "Smartverse: Pushing the boundaries of connectivity", 12th July 2022, discussing the 5G openness aspects and programmability and their applicability to aerOS project".	✓	
4	Carlos Palau / UPV	IEEE ICUMT 2022 conference, 11 October 2022, Valencia, Spain	Carlos E. Palau Salvador, from Universitat Politècnica de València, aerOS Project coordinator, presented on October 11th at IEEE ICUMT 2022 conference the NGIoT approach developed in the aerOS Project. More information available here: https://icumt.info/2022/keynotes	✓	
5	Ignacio Lacalle / UPV	ETSI IoT Week 2022, 10-14 October 2022 in ETSI's Headquarters in Sophia Antipolis, South of France.	aerOS project was introduced at ETSI IoT Week 2022		
6	Ignacio Lacalle (UPV)	Piece of news on UPV website			
7	Nasertic	Presentation in Nexus event	The aerOS Project was presented during #NEXUS Event in BALUARTE Palacio de Congresos y Auditorio by NASERTIC partner! You may learn more about the event here: https://www.aditechcorp.com/aditech-organiza-el-e	✓	
8	UPV	Presentation at TRA2022 – 14 of November	Presentation of aerOS project at the stand of the European Commission https://traconference.eu/	✓	
9	WP2 & WP9	aerOS workshop on T2.1 – 29 November 2022	aerOS 1st workshop took place on 29th of November. In this webinar aerOS partners presented the results and the outcomes of Market Analysis Survey		
10	Ignacio Lacalle UPV	"IoT, Cloud, Edge Computing Continuum from Research to Deployment" webinar 30 November	Ignacio Lacalle from Universitat Politècnica de València UPV presented the Aeros Project during yesterday's AIOTI webinar on "IoT, Cloud, Edge Computing Continuum from Research to Deployment". It was a very successful webinar with almost 100 attendants. #aerOS #newproject #AIOTI #IoT #edgecomputing #NGIoT #research #HorizonEurope		

Figure 32"WP6 Activities reporting" spreadsheet

Apart from the completion of the spreadsheet each partner is responsible for uploading material from the performed activity into the WP6 Dissemination material folder. In this folder, each partner creates a sub-folder with the name of the activity/event he/she performed/participated and uploads related material such as images, videos, communication, or presentations he used (Figure 33). Finally, the last step is to inform INFOLYSIS team, in order to promptly schedule the communication of the specific activity.

Figure 33 WP6 Dissemination material folder

Last but not least each member of the consortium is more than welcome to suggest project related posts for communication channels by completing the "Social Media Posts Proposal" corresponding file (Figure 34).

	Item #	Partners	Activity Type	Text For Posting	Social Media Channel
2	1	UPV	news in UPV website	http://www.upv.es/noticias-upv/noticia-13836-p	All
3	2	INF	Newsletter	Newsletter Issue #1	All
4	3	INF	Social Media Channels	Social media promotion	All
5	4	INF	architecture	architecture promotion	All
6					
7					
8					
9					
10					

Figure 34 Social Media Posts Proposal file

2.2.2. Google Analytics and Statistical Dashboards

Google Analytics is a must-have tool for any Digital Marketing procedure involving a website's performance monitoring. The Google Analytics tool can provide in-depth and sophisticated data, reflecting various metrics and functions of a website's performance and impact. However, it is up to the administrator to select that information that are essential to the website's goals and communication strategy at any given time. Within the framework of aerOS and through Google Analytics, the communication team will analyse the performance and impact of the aerOS website monthly and will release internally statistics on a quarterly basis. Any deviations or underperformance will be identified immediately, and corrective actions will be implemented.

In the case of aerOS project, the communication team will use Google Analytics not only for monitoring and evaluating the website's efficiency, but also as a data source for Google Data Studio. Google Data Studio (renamed to Looker Studio recently) will be used as an additional statistical tool to complement Google Analytics. INFOLYSIS partner will provide custom-made Website Statistical Google Data Studio Dashboards for more enriched data analysis and visualisation on specific metrics of website performance. In specific, this custom-made aerOS dashboard will provide a more comprehensive visual statistical overview of the website's performance on a quarterly basis to all consortium members.

The following table (Table 4) summarises some key terms/metrics of the social media and website functionality that are monitored and analysed by INFOLYSIS through the proposed statistical dashboards. This table will help every stakeholder and reader of this document to better understand the statistical dashboards analysis (presented in Sections 2.4.2.1 & 2.4.2.2).

Table 4 Social Media Terminology

Term[12]	Explanation
Engagement	Engagement is any form of interaction with your brand on social media. Likes, comments, and shares are all forms of engagement.
Handle	Your handle is your username on social media. It is usually noted as @username. (see YouTube)
Hashtag	A hashtag is a word or phrase preceded by the "#" sign. Hashtags are used on social media to tag posts as part of a larger conversation
Impressions	Impressions is a metric that counts how many times an ad or promoted posts is fetched from the server and displayed on a social network.
Reach	Reach refers to the total number of people who have been exposed to a social post or ad. This metric does not necessarily indicate that all of these people have actually

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1 https://blog.hootsuite.com/social-media-definitions/
2 https://www.hotjar.com/google-analytics/glossary/sessions/

	seen your content. They could have scrolled right past it, for instance. Reach simply indicates that the content appeared in the user's social feed at least once.
Session	Refers to the set of actions taken by a user on your website in a given time frame
User	The visitor who has initiated the session and visits the website

2.3. Communication Action Plan

The European Union (EU) is a major source of funding for research and innovation projects in Europe. To ensure the success of a European project, it is important to develop an effective communication strategy. A good communication strategy should include a clear plan for communicating the project's objectives, progress, outcomes, and impact to stakeholders and the public.

1. **Establish a clear mission and vision:** Establishing a clear mission and vision for the project is essential for successful communication. This should include a brief description of the project, its goals and objectives, and how it will contribute to the European Union's overall research and innovation goals.
2. **Define the target audience:** Identifying the target audience for the project is important for developing an effective communication plan. This includes determining who the stakeholders are (e.g. policy makers, researchers, industry, the public), what their interests are, and how best to reach them.
3. **Develop key messages:** Developing key messages that clearly define the project's purpose and value to stakeholders and the public is essential to successful communication. These messages should be consistent across all communications channels and tailored to the target audience.
4. **Select appropriate communication channels:** Selecting the right and most appropriate communication channels for addressing the targeted audience and for impact creation.

The primary communication goal of aerOS is to increase visibility and impact among the corporate and scientific communities in order to ensure successful implementation and diffusion of its outputs. To ensure long-term effectiveness and attainability, communication efforts for the project will be recorded and communicated throughout its lifespan. Furthermore, part of the communication plan and strategy is to constantly look for new communication opportunities for aerOS to get involved in, for making the impact created more powerful and effective. Thus, to complete fulfil this goal, aerOS partners have established related communication processes to be followed.

One of the fundamental elements of the aerOS project is to ensure impact on society, advances on technology and boost at the European R&D services. Through a variety of channels and activities such as the website, social media channels, newsletters, posters, leaflets, experimentation activities (trials and pre-trials) and videos communication strategy raises awareness. The goal of all communication efforts is to reach out to the widest possible audience, which includes the academic, research, business and industrial groups as well as all relevant stakeholders and the general public.

2.3.1. Communication Framework and Target Audience

All aerOS partners will work together to carry out in the most effective way the communication plan and actions. To ensure that the aerOS communication plan is implemented effectively, the T6.1 leader will coordinate the communication activities and offer guidance to all partners. Appropriate selection of targeted audience is of vital importance to "address" correctly the project's communication actions and their impact.

The aerOS communication activities will target the following audience (Figure 35):

- **Industry and stakeholders:** all groups, which have an industrial background, a technical knowledge and expertise, and which maybe working in relevant areas of IoT. This group especially includes potential technology producers, suppliers, vendors, and SMEs (e.g., application developers and third-party providers of IoT related services).
- **Academia and Research**: higher education institutions (universities and academic centres, i.e., retraining of experts in new technologies and multimedia services and applications), as well as national,

public, and private research institutes. Mainly from the ICT sector, but also from different verticals (initially, mostly related with the aerOS use cases).

- **Partnerships, policy makers and associations**: Related partnerships (indicatively: NGIoT, EUCloudEdgeIoT, 3GPP, 5GPPP, AIOTI, ALICE, FIWARE, EFFRA, DAIRO, 6GIA, NetworldEurope/SME WG), and standardisation and governmental entities fostering technological recommendations such as ETSI, ITU-T, IEE, ISO, ENISA, etc

- **IoT Open Community**: SMEs, start-ups, developers and digital technology providers rooting on IoT advances. aerOS results will be used by this TG. Open Calls are also a great opportunity.

- **Stakeholders and the broadest possible audience (General Public)**: Global public will be mainly interested on the societal impacts of the project, how it can be leveraged in their daily life (e.g., agriculture and smart building use cases) and how aerOS will help reduce pollution or other noxious factors while enhancing trust in AI and data sovereignty.

Figure 35 aerOS target audience

Within this communication framework, two types of actions will be followed by the aerOS consortium, to achieve its communication goals:

- **Online actions**: based on the use of website, social media channels, workshops, online events, and coordination mechanisms such as mailing lists, NextCloud repository and Microsoft Teams channel.

- **Offline actions**: based on on-site and face-to-face actions such as workshops, presentations, trials, and seminars. These offline actions will take place whenever the situations (e.g., COVID-19) allow as face-to-face meetings, and various types of events with physical presence. Furthermore, such activities may have also a hybrid nature (both physical and remote attendance supported).

Similarly, performed communication activities will be also different concerning their interaction and engagement character. Specifically:

- **The non-interactive activities** include communication of any related activity and information through website articles, press releases and technical and non-technical articles, magazines, and books.

- **The interactive activities** include human interaction and aim to establish trusted relationships between Consortium members and potential stakeholders, thus strengthening target audience involvement. Such activities include the use of communication and dissemination material such as posters, leaflets, presentations, workshops, special sessions, and panels at important international venues.

2.3.2. Communication Plan and Strategy

This section presents the communication action plan, which provides the major principles (timeline, phases, activities, means to be employed, etc.) for the project's successful and effective communication, per communication channel and targeted audience. aerOS will carry out a comprehensive and well-planned set of actions to enable a broad promotion and an effective communication of the developed concepts, technologies, pilots/trials, and overall results. Offline and online communications, digital presence, participation and organization of events, interaction with EUCloudEdgeIoT and NGIoT associations, and liaisons with relevant national/local initiatives, as well as other European research and innovation actions, will all be part of this.

The structure and the communication plan of aerOS activities are described in Figure 36, as a 3 stages process, where stages 2 and 3 run in parallel up to M36.
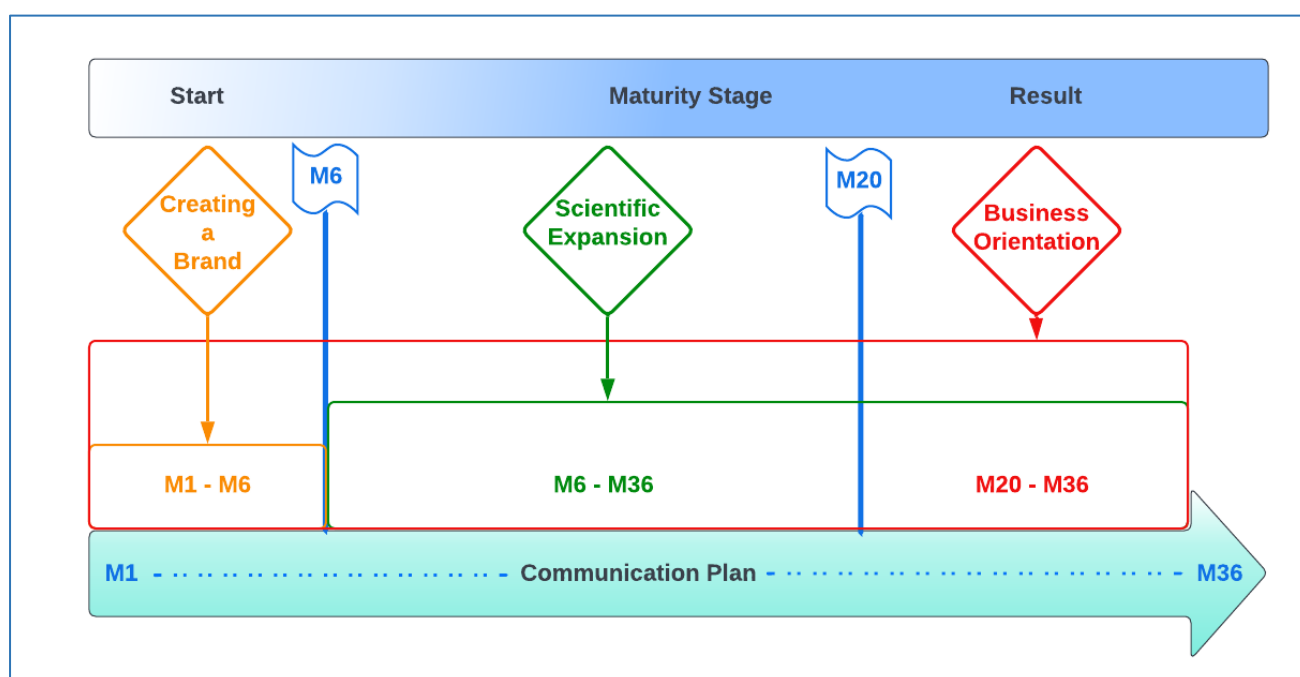
Figure 36 aerOS communication timeplan

Stage 1 - Creating a Brand (M1-M6): As it can be clearly seen from Figure 36 the main focus of the activities during the first months of the project (current period of the project) is to lay the foundation of the communication plan and establish the project's digital presence (raise awareness) by creating communication channels and performing initial impact activities. The first and most significant step in project image/branding is the establishment and maintenance of a website and social media channels, as well as the utilization of the project's logo and the definition of communication guidelines. Other activities, such as the poster, leaflet, newsletter and press release templates, have been created during this first period.

Stage 1 measures: Logo, visual and corporate identity messages and tonnes for each audience, production of digital communication materials, setup of aerOS social media channels, selection of tips and timeline for posting, aerOS webpage and presence in blogs, promotional material, templates (deliverables, presentations, newsletter, press release)

Stage 2 - Scientific Expansion (M6-M36): The main focus of the communication activities in the second period (M6-M36) shifts to actions that connect the nature of the project with the community. The primary goal is to reach the broadest possible audience and identify new essential stakeholders. In other words, the actions focus on establishing a connecting point with the community and the industry by addressing a larger audience and describing how the project may be exploited by specific communities, industry stakeholders, and society in

general. As a result, the communication material/content will be more focused on the project's preliminary technical details and results on specifications, architecture, components, use cases etc.

Stage 2 measures: Supporting the organisation and participation in conferences, networking, communication campaigns aligned with the objectives and execution pace of aerOS work packages and tasks.

Stage 3 - Business Orientation (M20 – M36): The third period of this plan focuses on communicating (in parallel to dissemination) project findings. Results from use cases and demonstrations will be revealed. As a result, the communication team's main objective will be to outline and promote them through dedicated channels using means for reaching the appropriate target audience and achieving maximum impact. For that reason, the main content that will be communicated, will be focused on the use cases final advances, tests and outcomes of the project.

Stage 3 measures: Enhances interaction with external members such as potential stakeholders and the Advisory Board, common strategy with European initiatives to promote among end users, intensify the presence in industrial events, alignment with dissemination/exploitation/innovation actions, intense communication of final dissemination events, showcasing and trials.

aerOS project will establish a strong communication policy based on its social media channels. Social media channels are a powerful tool will help us to achieve maximum visibility and reach maximum impact.

As mentioned, the primary goal of the aerOS communication plan is to promote project visibility and awareness among the broadest audience, both technical and non-technical, by distributing the appropriate material to the right target audience, at the right time, using the most appropriate channels. However, not only will the content be differentiated based on the demands and expertise of each target audience (as well as the project's communication stage), but so will the intensity of the communication. This intensity is to be derived from - and related to - the project's different phases (activities, achievements, and results), as well as the communication channels used.

All communication activities will be carried out constantly over the duration of the project, with increasing levels of intensity as the project progresses and the communication team has more project-specific communication material to spread.

Below are the communication strategy principles that will be followed throughout the project's lifespan:

- All communication channels are continuously used and updated on a regular basis,
- The project's website is constantly updated with news and up-to-day communication/dissemination content,
- Social media posts are made on a regular weekly basis,
- Higher frequency of posts during events, meetings, conferences etc.,
- Different strategy on posts/content used per communication channel, designed for addressing the appropriate audience,
- During the first six months of the project (M1-M6) an intensive communication of the project applies targeting to wider audience based on versatile content related to the project and IoT/continuum related topics for accumulating more visitors/follower,
- As the project advances the content becomes more technical and corresponding technical audience and academia thus more intensively targeted,
- In the 3rd phase, the content focuses on results and exploitation methods targeting the potential end-users and customers.

2.3.2.1. Website Communication plan

The aerOS project will share its concepts, results, and accomplishments via its dedicated project website (https://aeros-project.eu/), which was created and launched in M1. The website's content will be supported by all project partners in order to provide a unified vision of the project, and it will be updated on a regular basis to provide a good overview of the major project activities and results.

The News-Blog (https://aeros-project.eu/blog/) and Dissemination (https://aeros-project.eu/dissemination/) webpages, in particular, are being and will be updated regularly with community news, dissemination efforts, and accumulated project results and achievements.

2.3.2.2. Social Media Channels Communication Plan

Through social media, aerOS promotes its objectives, announces events, showcases its activities and inform about relevant research outcomes. Posted content plays a crucial role in achieving communication plan objectives.

The social media strategy is summarised in the following key points:

- aerOS social media channel are run and maintained by the INF communication team on a daily basis,
- Posts aew made on a regular basis (maintaining at least a 2 posts weekly average),
- Higher frequency of posts during events, meetings, conferences, etc.,
- M1–M6: More intensive posting for accumulating followers,
- From M6: Different strategy and posts per channel,
  - LinkedIn/Twitter: More Technical and project focused posts,
  - Facebook/Instagram: Non-Technical audience – posts of general interest about NGIoT, EUCloudEdgeIoT
- From M6: Special series of posts with dedicated hashtag **#LearnAboutaerOS** focused exclusively on project information and achievements.

The Figure 37 gives as an idea about the structure and the frequency of posts per social media channel. This strategy is from Hootsuite[3] which a platform that specializes on social media channels. We may use the depicted strategy for the purpose of our project; however through the course of the project we will adapt it when necessary to fit aerOS goals and planning.

	Facebook	Instagram	Twitter	LinkedIn
Captions	1-80 characters	138-150 characters	71-100 characters	25 words
Hashtags	1-2	3-5	1-2	1-2
Post frequency	1-2 per day	3-7 per week	1-2 per day	1-5 per day

Figure 37 Social Media recommended strategy[4]

The available content provided through social media channels will be differentiated starting from March 2023 (M7). Twitter and LinkedIn will be used to reach a more technical, academic, and scientific audience (related to the project objectives and goals), whilst Facebook and Instagram will transmit less technical content primarily to the general public (including administration and policymakers). These "more general public

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3 https://www.hootsuite.com/
4 https://help.hootsuite.com/hc/en-us/articles/4403597090459-Create-engaging-and-effective-social-media-content#know-your-networks-0-3

posts" will be informative, providing insights into more general features of the project, IoT ecosystem, and targeting audiences with less technical experience and edge cloud computing expertise.

- **Facebook/Instagram**: General content addressing mainly non-technical audience - Posts on aerOS topics of general interest and communication of all dissemination and showcasing activities. For the purpose of this deliverable, we have made such posts even before M7 (Figure 38).
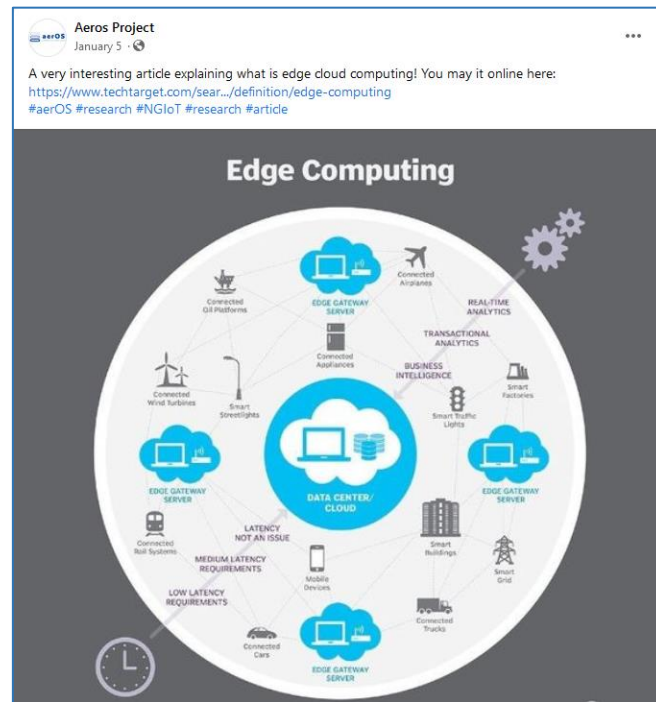
Figure 38 Facebook General Post[5]

- **LinkedIn/Twitter**: Initially general content but from M7 and on more technical and project focused posts aiming at technical and scientific diffusion of aerOS outcomes (Figure 39).

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[5] https://www.techtarget.com/sear.../definition/edge-computing

Figure 39 aerOS LinkedIn Post

- **YouTube**: Addressing all types of audiences (technical and non-technical) with videos focused on presentations, conferences, events, trials tutorials etc.

In addition to the above strategy, along with the posts content differentiation, the use of the **#LearnAboutaerOS** hashtag will be also introduced. It will be a special project focused hashtag that will be used for presenting content exclusively related to the project. For example, a post describing a project related activity of a partner (such as a publication), or an aerOS trial/demo will bear this specific hashtag. The purpose of using such a dedicated project hashtag is for addressing easier the dedicated community, gathered around the project (easily recognizable project specific posts), facilitating easier searching of project related posts and also for attracting more audience interested in project's activities and results.

Apart from the hashtags, the use of mentions (@) for attracting more audience and making aerOS more visible to specific communities and associations will be also applied. Wherever applicable, we will mention organizations related to the European Research community and programs. Such organizations indicatively are the Cordis (https://cordis.europa.eu/), the HE/Horizon 2020 (https://ec.europa.eu/programmes/horizon2020/en), NGIoT association (https://www.ngiot.eu/), SNS (https://5g-ppp.eu/ & https://smart-networks.europa.eu/) and EUCloudEdgeIoT (https://eucloudedgeiot.eu/) which are often mentioned and will be mentioned in specific posts over aerOS social media channels.

The T6.1 leader, in charge of maintaining the website and the social media update, will also use specific hashtags in order to attract more visibility and become part of different communities. Hashtags such as #research #innovation #project, #edgecloudcmputing etc. can provide connection to different research, academic and

technological activities. On the other hand, certain hashtags like #IoT, #EU or #NGIoT are expected to be very effective for our communication plan since they address certain communities and interests. Moreover, there is a specific category of hashtags that serve specific purposes concerning the funding origin of the project and its call. For instance, hashtags like #ict, #eufunded, #hadea, and #HorizonEurope express that the project is part of a specific funding program by the European Commission (Figure 40). Also due to the fact the project is still in its initial stages we use the #new and the #project hashtags, in order to state current status and become a part of the EC research project' community.

Figure 40 Hashtags on aerOS posts

aerOS social media strategy also includes the monitoring and mentioning of associations related to the project's vision. Such related associations are, for instance the Next Generation Internet of Things association (NGIoT) and the European Cloud, Edge and IoT Continuum (EUCloudEdgeIoT). aerOS has already followed both related social media accounts and started to communicate material such as newsletters and articles from their official websites (Figure 41).
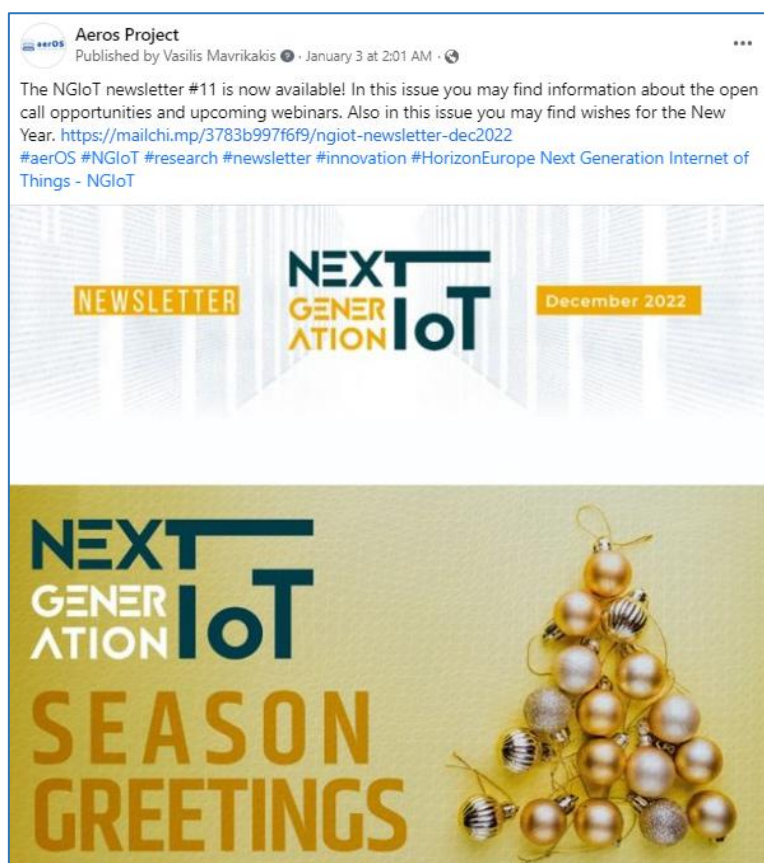
Figure 41 NGIoT post on aerOS social media

Actions like the ones mentioned in the previous paragraphs, boost the impact of the project making it more visible and distinctive through the communication channels of various communities. For instance, specific activities have been projected and featured in the NGIoT and aerOS website (https://www.ngiot.eu/aeros/ and https://eucloudedgeiot.eu/meta-os-projects/).

The same applies to the YouTube channel. In the YouTube channel, videos will be communicated, but only when there is availability from the equivalent activities (conferences, presentations, workshops, etc.). Since YouTube is a communication channel that gives the option to host videos and image-based communicative material, it is of utmost importance for it to be well maintained, and appropriately populated with related to the project's activities content (e.g., activities from events, meetings, use cases, overviews, pilots and demonstrations, etc.) and hashtags (for easier searchability). For that reason, YouTube can serve as an additional information portal with audio-visual content which can provide additional information about aerOS project.
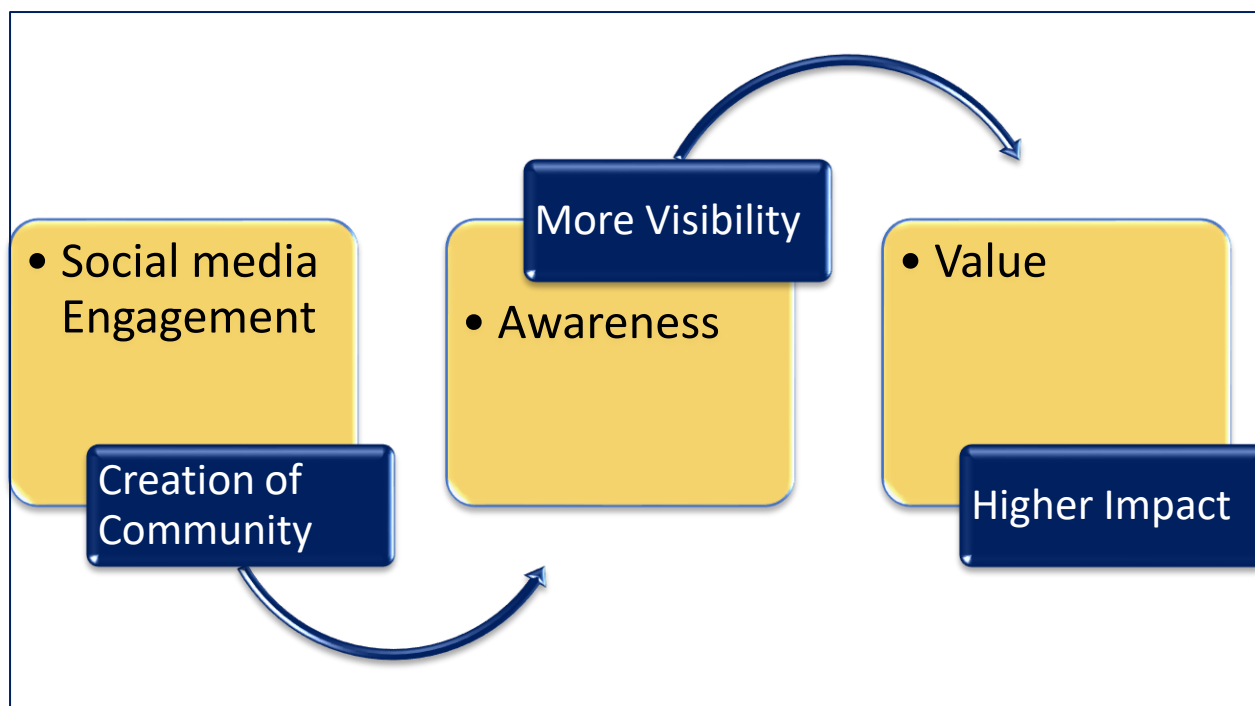
Figure 42 aerOS social media channels' communication goals

As it is shown in Figure 42 aerOS social media channels' communication goals, aerOS social media communication goal for the creation of a community is of greatest importance for gaining higher impact for the project. A successful project is a seminal project. Activities such as likes, comments and reshares will boost the visibility of the project creating a buzz around it. A community is essential to the success of a digital marketing campaign. As a research project, aerOS may not have the same goals and features as a marketing campaign for a business organisation, but at this level creating a community would be helpful for its effective communication.

A community around the aerOS project will assist us in reaching a larger audience, establishing good relationships with stakeholders, increasing online traffic, and, last but not least, contributing to a higher engagement rate. Engagement rate is the number of the audience that is involved in aerOS social media channels. It is a particularly important index because it shows how our audience interacts with the project communication channels. Higher engagement will lead to higher awareness. Awareness is the fact that shows how visible and recognizable will the project be. All these will lead to additional value. The more valuable the project will be the more impact will have.

In general, both the website and social media channels are crucial means for empowering the project's communication impact and reach the respective audience targets, via the corresponding digital channels. The fundamental element of the website and social media communication strategy is the regular update of these channels, on a weekly basis, targeting a weekly average of at least one news posted at the News page of the website and of two posts communicated through the remaining social media channels. This approach will be adapted accordingly throughout the project lifetime. For instance, we would promptly, differentiate it according to any related special circumstances such as events, meetings, trials etc., where more intense communication is required. Moreover, in "slow interest times", like late July and August, we may reduce the intensity of

communication, to avoid messages being lost in the flood of other messages upon return to work of the target audience. Any accumulated messages and activities will resume and communicated right after the potential short slow down period. aerOS also considers different groups of persons to be targeted through different social media channels.

Through aerOS social media channels, the consortium targets to:

a) address relevant experts in the R&D areas and sectors that deals with, such as IoT and Edge cloud experts and projects from the European R&D community,

b) involve additional professional and industry users ranging from stakeholders, researchers, academia, administration and NGO's and end-users – to the general public – as well.

To sum up, the impact actions communicated over the website and social media accounts will indicatively cover the following subjects, events and areas:

- News and updates on the aerOS activities (coverage of activities coordinated by aerOS or activities that partners participate representing the project),
- Publications and presentations originating from workshops, conferences, journals, etc.,
- White papers and Technical Reports,
- Project showcases/demonstrations pf use cases,
- Publications of articles in online sources/magazines/newspapers,
- Upcoming events calling stakeholders for papers (CfP) and events participation,
- Videos and photos of aerOS partners on related activities and achievements,
- aerOS public deliverables,
- aerOS Newsletter issues,
- News of related associations and actions such as EUCloudEdgeIoT, NGIoTaddressing mainly the general public,
- Exclusive content explaining the nature of aerOS project (technical and non-technical), addressing various stakeholders and sectors (scientific, academic ad industrial),
- Consortium plenary meetings (announcement, dates, texts, pictures, etc.).
- Open Call related material and actions,
- Exploitation and Standardisation material along with related publications.

The approach to communication via the website and social media will not only be consistent with the project's overall communication plan and policy, as described in this document, but will also supplement parallel communication activities carried out through other channels of communication and dissemination. It is also worth mentioning that the appropriate content is already being spread extensively and consistently across all of the project's social media channels (especially, within the first six months of the project). This methodology will be utilized for informational purposes in order to attract a broader audience while also increasing knowledge of the project (branding), its nature, accomplishments, and overall goals to the broadest possible public audience.

The following sections describe how additional communication channels and tools will be utilised as part of the aerOS communication plan.

2.3.2.3. Newsletters

Newsletters will be distributed periodically to bring all stakeholders up to date on the project's activities and outcomes. The consortium will use the newsletter on a regular basis to effectively communicate project information/activities to the general audience. Newsletter issues will be used to communicate the project's activities and accomplishments for the reported quarterly period in a concise form. Each newly released version will be posted to the website and communicated via the projects' social media platforms. Stakeholders will have access to it and will be able to download and read it conveniently. In the newsletter, the reader can also find

links to the associated website with more information of the activities mentioned. The newsletter issues will be available in public through a dedicated newsletter webpage (https://aeros-project.eu/dissemination/newsletter/) of the aerOS official website.

2.3.2.4. Leaflets

Leaflets are designed to provide a brief overview of the project objectives to all external and internal stakeholders, as well as to attract readers to take a deeper look and provide them with the most important project innovations. Besides the previous communication actions, the aerOS project will heavily rely on leaflets during events (printed or digital format). Leaflets will be utilized for both physical and digital events and actions. Their principal role is to be used during conferences, presentations, workshops, webinars, and event booths. However, this does not prohibit their continued use wherever appropriate and necessary, whether in printed or digital media. The first leaflet version of the project can be found in the Dissemination section of aerOS website at: https://aeros-project.eu/dissemination/

2.3.2.5. Posters

Similar to leaflets, posters will be used to communicate the project at conferences and other similar events. Their main goal is to briefly explain the project concept, define its objectives, and visualize the overall architecture and which technology developments will be integrated as the project evolves. The first aerOS poster version can be found in the Dissemination section of the website at: https://aeros-project.eu/dissemination/

2.3.2.6. Press Releases

Press releases will share summarized information concerning specific activities and results of the project that need to be formally communicated/announced in specific targeted audiences in parallel to the deliverables. Press releases will have either the form of News-Announcements released on partners' websites and presented also in Press Releases dedicated aerOS webpage, or they will be formally communicated to target aerOS audience/stakeholders and mass media (via email) using the aerOS press release template.

2.3.2.7. Additional Material

All above mentioned channels/actions will be supplemented/supported with additional material such as:

- **Social Media Custom aerOS Images**

  To support all the above-mentioned activities communication team has created a set of additional custom per event images in order to ensure better communication of the activities and easier recognition (identity recognition). Each image represents a different activity such as newsletters, publications, presentations, call for papers etc. (Figure 43).
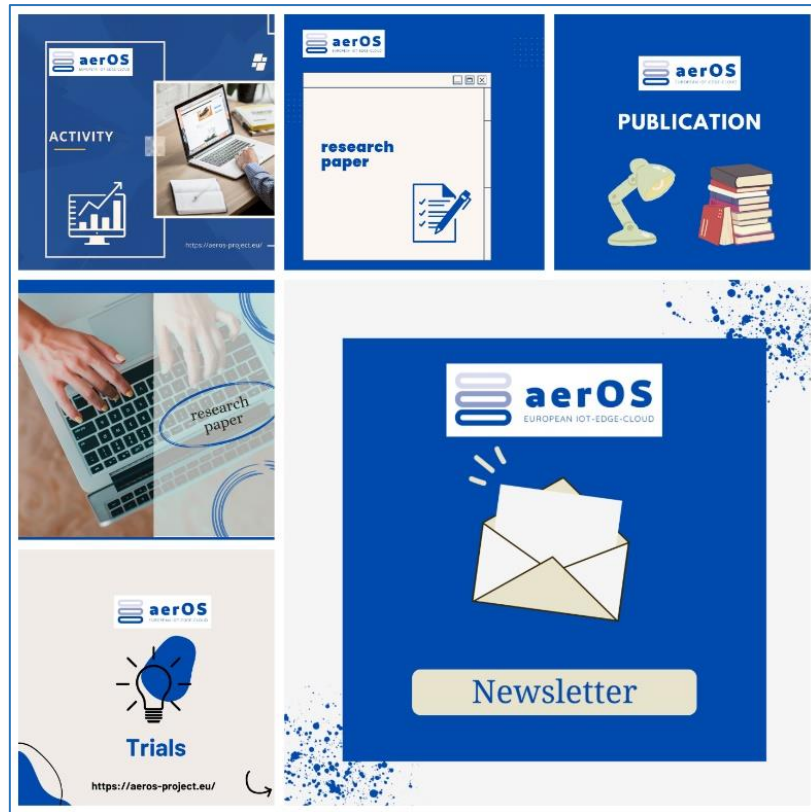
Figure 43 aerOS additional images

In order to further promote our social media channels to external stakeholders we have also created an image Figure 44 dedicated for this purpose.

Figure 44 aerOS social media channels

- **Logo Stickers**

  An additional mean to promote aerOS project is the production and distribution of stickers with the aerOS logo for better branding and identity building during the first months of the project (Figure 45). This activity (production and cost) was carried out by INFOLYSIS partner and stickers have been

distributed to all partners. Approximately 500 stickers were printed and distributed up to M5. More stickers will be produced for upcoming events as the project progresses over time.

Figure 45 aerOS logo stickers

- **T-shirts**

    aerOS project since the 1ˢᵗ plenary meeting, that took place in DS Tech premises end of Jan 2023, has its own custom T-shirt (Figure 46). The responsible partners for this activity were DS Tech, UPV and INFOLYSIS for providing guidelines, t-shirts design, production and feedback. The T-shirts have a simple but comprehensive design pointing out the purpose of the project. The color of the T-shirt is royal blue (ID code: #4169e1). In the front side there is the logo of the project along with the slogan of it. On the back of the shirt we can see a graph with words related to the project's nature such as continuum, data and orchestration. Also, right down of the graph we have placed the European flag with information about the project's call. As an initial action, 40 t-shirts were produced and distributed with the production cost been fulfilled by INFOLYSIS as communication leader. Additional partners had the chance to order additional t-shirts for their team members.

Figure 46 T-Shirts Design

2.3.2.8. aerOS and other associations/projects interaction

Project's consortium will also deploy a plan to promote project' nature and result to a selected multitude of audiences, networks and stakeholders beyond the narrow limits of the project's own community. Such associations are StandICT.eu, AIOTI, other project's of the same call and other Horizon's funded projects. A tentative list highlights the objective of such collaborations:

- Reach wide public raise awareness about aerOS' outcomes, and impacts within defined target groups,
- establish aerOS official sited as reliable source of updated advance and sectorial news,
- keep a continuous stream with the outside world, allowing external actors to engage with the project (e.g. Open Calls, external advising or observation)

Overall, aerOS project consortium members have a reputable track record of past projects and contacts to related initiatives, therefore we will use this valuable network for cross-fertilisation. This means that on the one hand aerOS will actively seek opportunities to be part of other initiatives' events, present at their workshops, webinars, or appear in their newsletters. The activity will be reciprocal and aerOS will gladly offer synergies to other projects to co-organise or promote an event, co-author a publication, share a booth or similar.

The following figure (Figure 47) shows an initial example of synergies and cross-fertilisation possibilities with related projects NEMO, ICOS, FLUIDOS, NEBULOUS and NEPHELE. All of them, together with aerOS, address compute continuum, some of them from supply side, others from demand side. Also various technical aspects of edge are addressed, like HPC, cloud edge, 5G network edge, operations edge or device edge, but all of these aspects are complementary and as a whole provide an attractive source of information.

We are aware that cross-fertilisation among projects is a key to boosting individual project impact, and therefore we will continue to actively seek and use such opportunities.
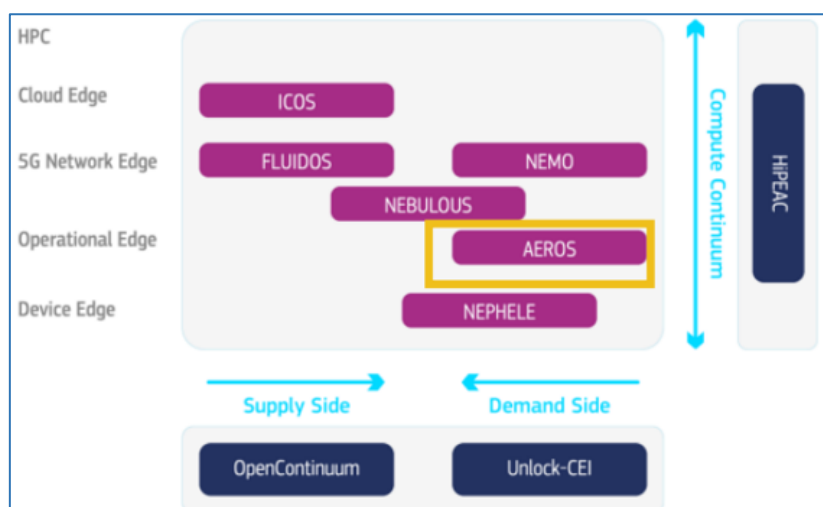
Figure 47 Surrounding ecosystem

For the purpose of this deliverable, we are going to analyse the two most important associations related to the project. These organisations organizations and communities are EuCloudEdgeIoT and NGIoT that our project has joined and is attending.

The European Cloud Edge IoT Continuum (Figure 48) aims to realise a pathway for the understanding and development of the CEI Continuum by promoting cooperation between a wide range of research projects, developers and suppliers, business users and potential adopters of this new technological paradigm. This aim will be accomplished by contributing to the coordination of a portfolio of projects in the CEI Computing Continuum funded under the Meta-Operating Systems for the Next Generation IoT and Edge Computing and ensuring consistent exploitation of their outcomes to help regain European competitiveness in core internet infrastructures. You may access more information about the association here: https://eucloudedgeiot.eu/the-eu-vision-on-the-cei-continuum/

Figure 48 EuCloudEdgeIoT logo and tagline

The Next Generation Internet of Things (NGIoT) initiative is a community of projects and related initiatives at work to maximise the power of IoT made in Europe (Figure 49). NGIoT works to lower the barrier for adoption and development of IoT-empowered solutions, by supporting business models, innovation and skills. In a "network of network" ecosystem, NGIoT consists of ongoing projects and upcoming funding opportunities at work for a human-centric and sustainable digital transition. NGIoT projects are working to achieve H2020 goals while Horizon Europe already brought new opportunities to launch research and innovation projects across Europe and beyond. NGIoT works in close collaboration with related technology networks including cloud, Edge, Artificial Intelligence, 5G telecommunications networks and services, cybersecurity and blockchain. You may find more information here: https://www.ngiot.eu/

Figure 49 NGIoT Logo

A tentative list of aerOS involvement in equivalent organizations and liaison activities with other projects of the cluster are shown below:

- EUEdgeCIoudIoT workshop on 18 November 2022
- Official launch of the EUCloudEdgeIoT community meeting on 8 February 2023
- aerOS project is announced at NGIoT website (https://www.ngiot.eu/aeros/)
- aerOS project is promoted through EUEdgeCIoudIoT website (https://eucloudedgeiot.eu/meta-os-projects/)
- Participation of WP6 partners in NGIoT Communication Task Forces (September, October, November, December 2022 and January 2023)

During February, following the official launch of EUEdgeCIoudIoT, aerOS will become member and closely attend through specific representatives all six formed task forces (https://eucloudedgeiot.eu/cooperation-mechanisms/).

2.4. Initial Communication Activities

The sections that follow concentrate on the communication actions carried out on each communication channel throughout the first few months of the project. Indicatively, the 4-month period initial activities (September – December 2022) are reported. For the website and social media channels also the corresponding 4-month Google Data Studio Statistical dashboards are provided. (Please note that since the editing of this deliverable was finalised in January 2023 and reviewed in early February it was not feasible to include also the January 2023 activities since their statistics would be processed and produced by the second half of February).

2.4.1. Communication Targets/KPIs

The following table (Table 5) summarises the set KPIs and the targeted numbers per time period. It is of utmost importance to highlight at this point that the KPIs depicted are cumulative up to M36.

Please note that on the last column the recorded activities up to M4 (Dec 2022) are depicted in summary, highlighting once more the efficient use of all communication channel and the high impact creation during the first months of the project lifetime. More details on initial communication activities are presented in Section 2.4.2.

Table 5 KPIs Timeline

Key Performance Indicator and Target numbers per period	M12	M24	M36	Current Status at M4
# of Website unique visitors / page views	750/2000	1500 / 5000	4000/10000	**606 visitors/ 2729 page views**
# of aerOS posts in social networks/ #of newsletters issued	300/4	650/8	1000/12	**154 posts/ 1 newsletter issues**
# of aerOS social-media community members across all-sites	300	700	1000	**372 followers**
# of videos delivered about aerOS technical and global advances / webinars-workshops organised	5/1	12/3	20/6	**2 videos / 2 workshops**
# of interviews/articles/press releases with external relevant dissemination targets	5	10	30	**1 article 4 press releases**
# of liaison with other projects of the cluster including CSA events	5 actions	20 actions	35 actions	**8 actions**

2.4.2. Initial Communication Activities and Statistics

Table 6 summarises in more detail the overall communication impact created through aerOS communication channels, as per the defined aerOS communication plan and strategy, for the first four months of the project.

Table 6 Communication Activities

Mean	Channel - Section	URL	Activity (M4)
Website	News	https://aeros-project.eu/blog/	Website Posts > 17
	Publications	https://aeros-project.eu/dissemination/publications/	-

Social Media	Workshops/ Presentations / trials	https://aeros-project.eu/dissemination/workshops-presentations-trials/	5 presentations 2 workshops
	Press Releases	https://aeros-project.eu/dissemination/press-releases/	4 press releases
	Events	https://aeros-project.eu/dissemination/events/	6 events attended
	Facebook	https://www.facebook.com/aerosproject	39 posts and 18 followers
	LinkedIn	https://www.linkedin.com/in/aeros-project/	37 posts and 246 followers
	Twitter	https://twitter.com/AerosProject	42 tweets and 48 followers
	Instagram	https://www.instagram.com/aerosproject/	36 posts and 60 followers
	YouTube	https://www.youtube.com/@aeros-project	2 videos and 38 subscribers
Leaflets		https://aeros-project.eu/dissemination/	1 leaflet
Posters		https://aeros-project.eu/dissemination/	1 poster
Newsletters		https://aeros-project.eu/dissemination/newsletter/	1 issue
Stickers			500 stickers
T-shirts			40 t-shirts

2.4.2.1. Website Statistical Dashboards

The Website Statistical Dashboards (Figure 50 and Figure 51), were created using Google Data studio, reveal detailed information about the website functionality and performance, during the initial period September 2022 - December 2022. Figure 50 provides information related to the number of sessions (1.294), the new users, the average session duration (1m 37 sec) and the total amount of views. It also provides the path that each visitor followed to reach our website. For instance, 295 visitors came directly to the website, 192 came through the Google search engine, while 36 visited via the LinkedIn profile. The dashboards created for the project's Website can also be really enlightening (Figure 51) concerning the geographical origins of the users. Most of our visitors came from Spain (118) and Greece (110). However, visitors came also from USA (62) too. It also provides information about the devise that visitors use to enter the Website. Most of the aerOS visitors used desktops (56,8%) while 40,8 % of the users preferred mobile devices. Finally, only a small percentage of around 2,7% prefer the tablet devices.

One may access online the specific Website Google Data Studio dashboard (first 4-months period) in the following link: https://datastudio.google.com/reporting/45a7d8e4-4e5a-45a3-b438-fc44019091dc/page/pmtsB
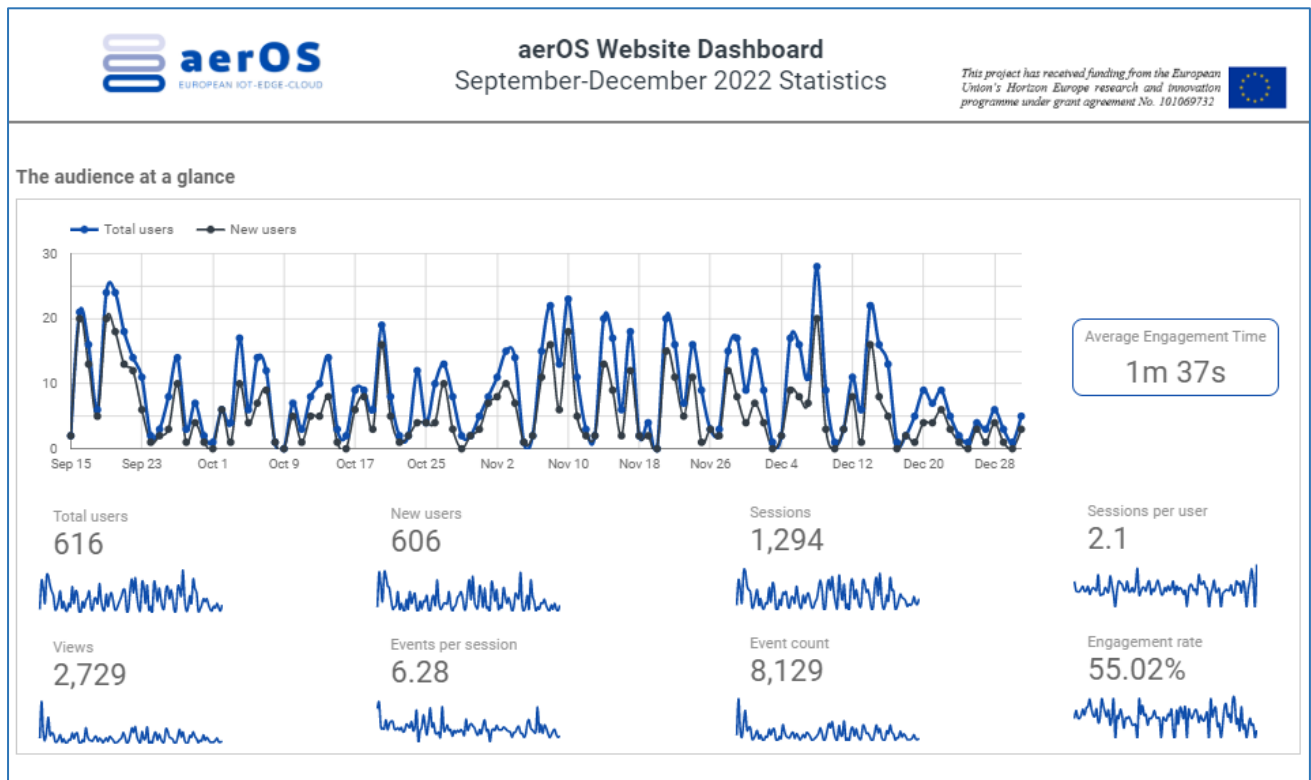
Figure 50 Website Dashboard 1
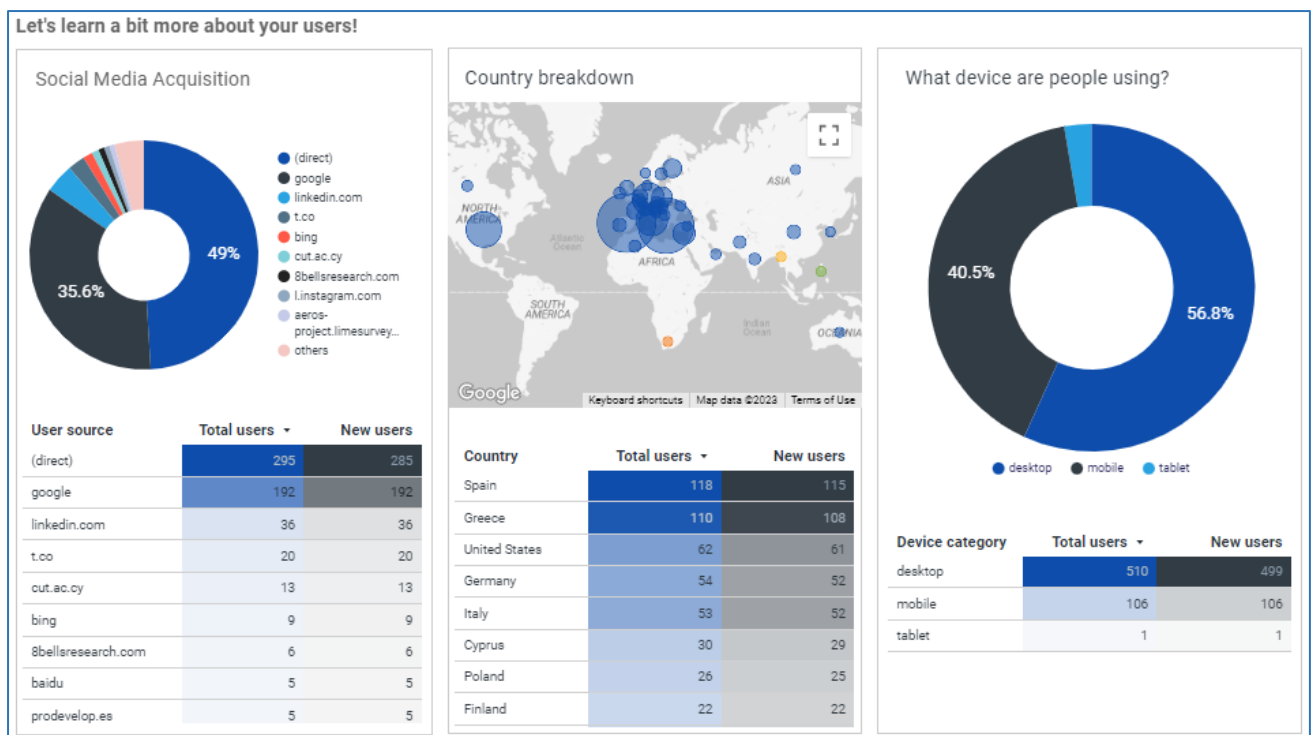
Figure 51 Website Dashboard 2

2.4.2.2. Social Media Statistical Dashboards

- **LinkedIn Dashboard**

Using Google Data Studio INFOLYSIS team has created a LinkedIn Dashboard (Figure 52) to be used for the visualization of the statistics needed for the evaluation of the LinkedIn account. More specifically, the dashboard consists of an infographic describing the post views, a dropdown list with the posts of the recorded in which each interested stakeholder can browse to different posts. Finally on the right side of the dashboard we have the Period and Total Statistics sections. The last two sections include information according to the total number of posts, post views, likes, reshares, followers and connections with respect to the examined period of time. It is of utmost importance to refer at this point that all social media dashboards follow the same rationale of presenting the most important metrics of interest. You may find the link to this LinkedIn Dashboard here: https://datastudio.google.com/reporting/0727570e-110e-4c60-9a8a-ebac3cdb6f03/page/1SSqB
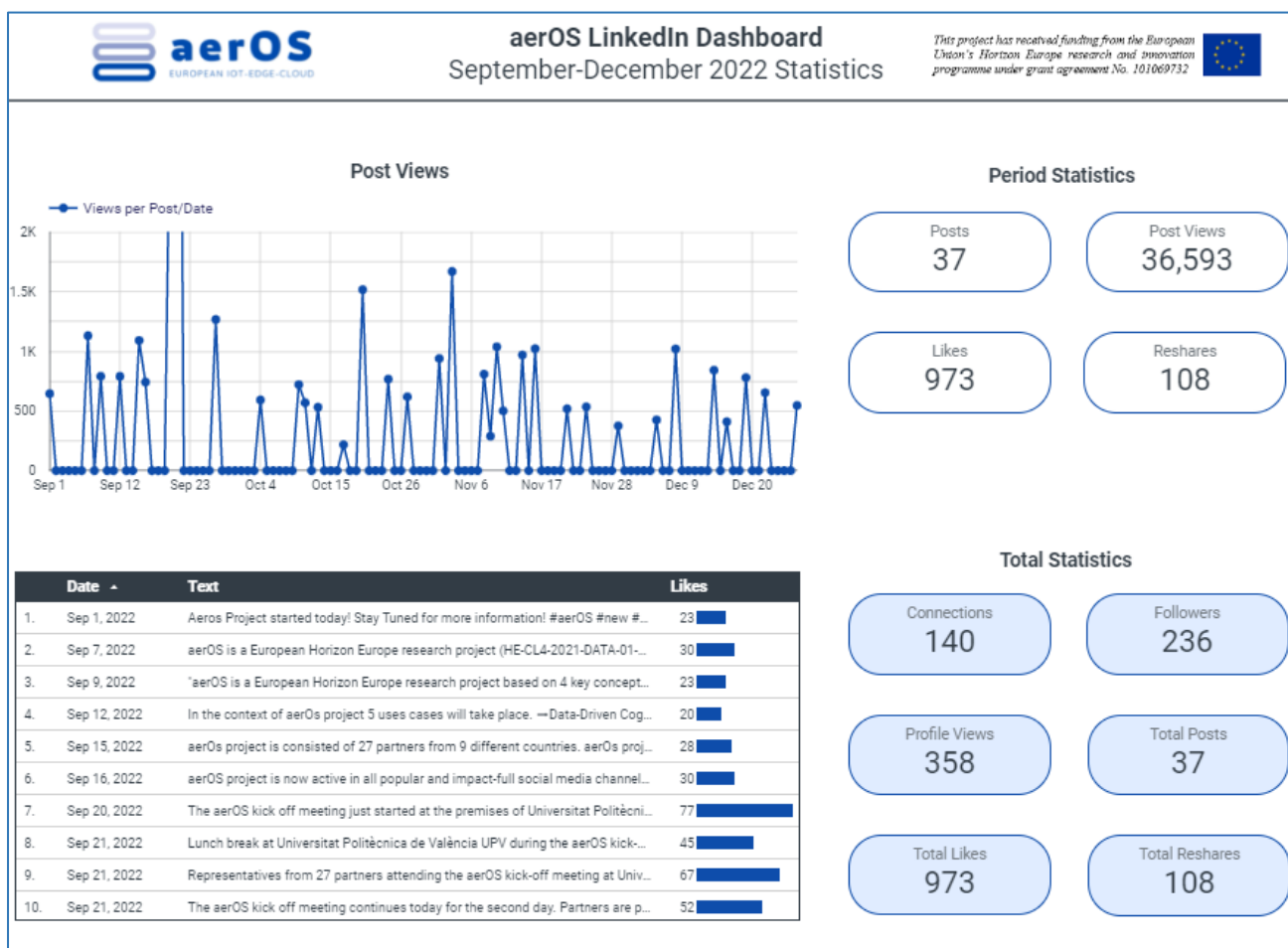
Figure 52 LinkedIn Dashboard

As it can be seen from the LinkedIn dashboard, during the first 4 months of the project, LinkedIn has acquired 236 followers in 37 total posts. Also, the LinkedIn channel has reached 973 total likes and 108 reshares. The following table summarises the activity of aerOS LinkedIn channel.

Table 7 LinkedIn Stats

Posts	37
Connections	140
Followers	236
Profile Views	358
Likes	973

- **Twitter Dashboard**

A Twitter Dashboard was created using Google Data Studio, containing not only the statistics mentioned in the previous paragraph but also many additional KPIs for the period. Specifically, we can find the number of tweets (42) and retweets (67) among other information. Lastly, we can also find the section of "Total Statistics" which refers to statistics gather from the beginning of the project and gives a brief overall of the Twitter account with information such as the number of followers (48) and following accounts (68).

In the following link you may access the Twitter Dashboard of aerOS for the period of September – December 2022: https://datastudio.google.com/reporting/7fc57ed7-5d30-4eb9-b5e1-e1a478a329f2/page/4YFqB
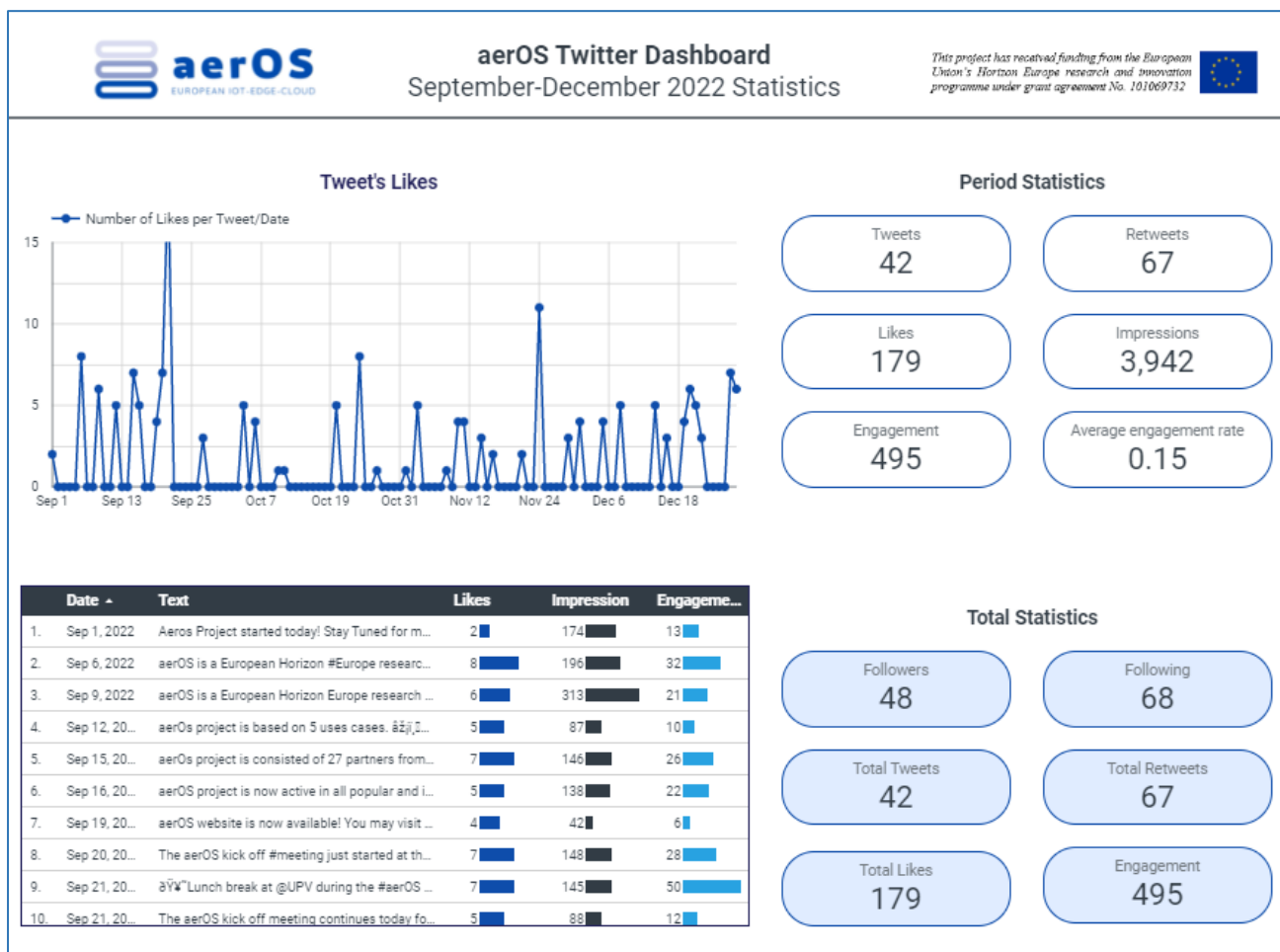
Figure 53 Twitter Dashboard

Table 8 summarises the activity of aerOS Twitter channel.

Table 8 Twitter Stats

Tweets	42
Followers	48
Retweets	67
Likes	179

- **Facebook Dashboard**

In the Facebook Dashboard one can view data examined period. Period statistics are also provided giving information about several KPIs with respect to the specified timeframe. For instance, the number of posts (39)

and page reach (1095) are two of those KPIs. Additionally, in the section of Total Statistics, which refers to the whole duration of the project and mentions information such as the page followers (18) and the total post likes (141). The facebook dashboard for the September – December 2022 period is can be found online here: https://datastudio.google.com/reporting/f0018e89-88e7-4d19-acea-27f6ab042f73/page/j5mpB
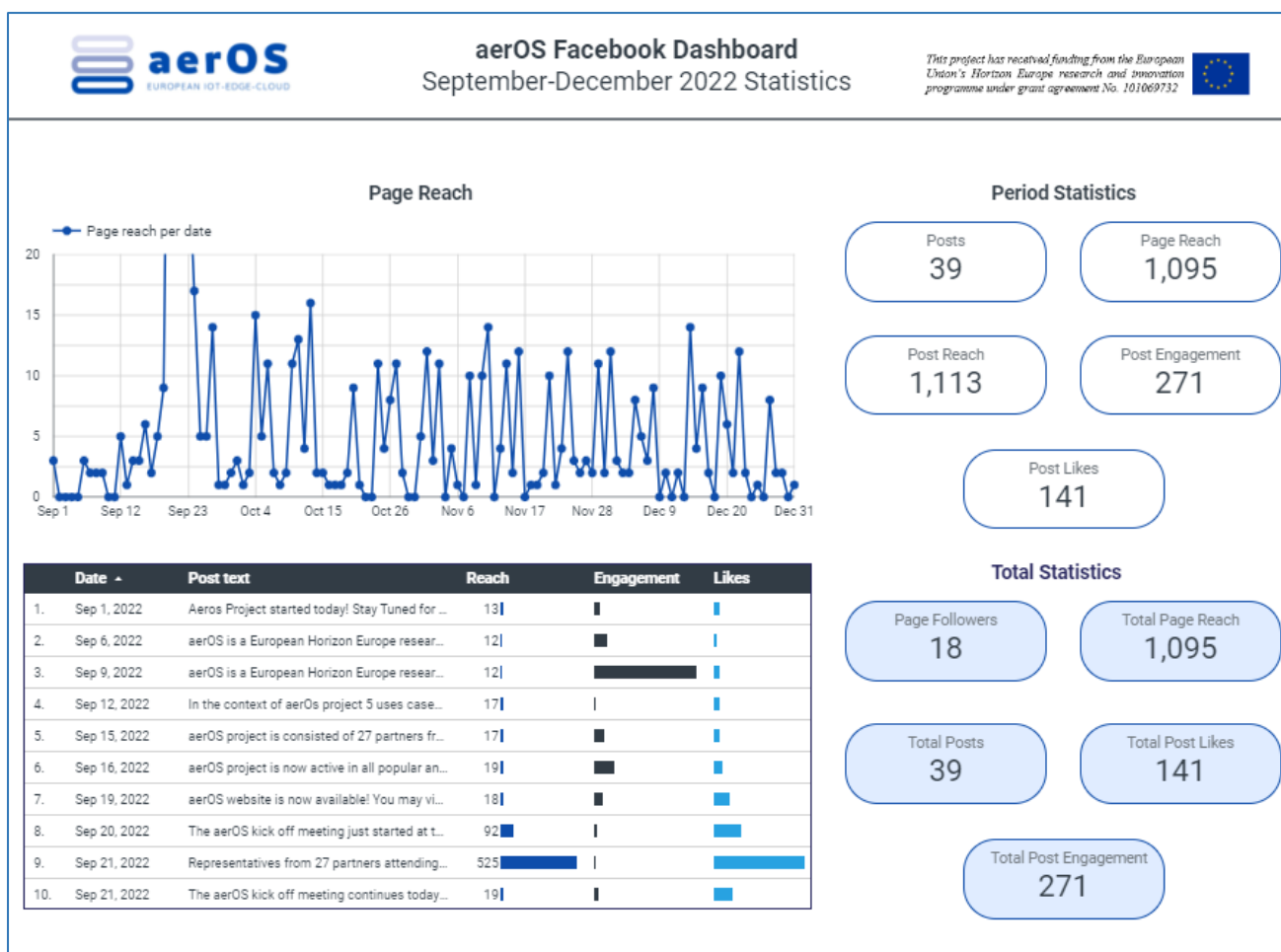
Figure 54 Facebook Dashboard

Table 9 summarizes the Facebook activity for the initial months of the project.

Table 9 Facebook Stats

Posts	39
Page Followers	18
Page Likes	141
Total Page Reach	1095

- **Instagram Dashboard**

The Instagram Dashboard also provides relevant information. The dashboard also includes a line chart with the impression and reach per post and also a table with the number of likes per post over time. In the following link one may access the AerOS Instagram Dashboard for the period of September – December 2022: https://datastudio.google.com/reporting/06cc4646-6b79-4423-8a04-476014ad4a8b/page/rKQqB

During the reporting period (M1-M4), the aerOS Instagram account has collected 218 total likes, from total of 36 posts. It has gained at these four months 78 followers and 192 profile visits. It has also a total reach of 1236.
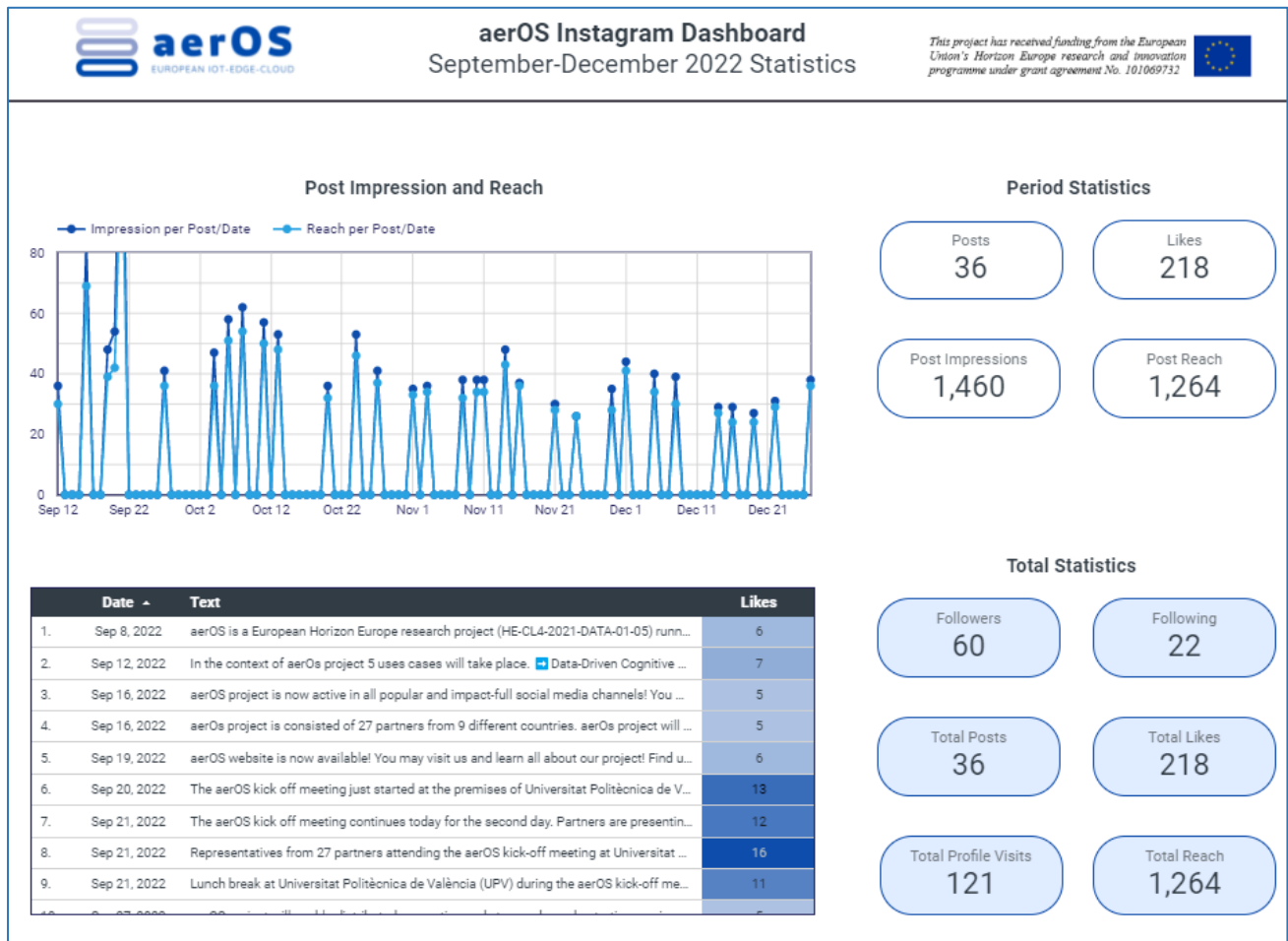
Figure 55 Instagram Dashboard

Table 10 summarises the Facebook activity for the reporting period.

Table 10 Instagram Stats

Total Posts	36
Total Likes	218
Total Reach	1264
Followers	60
Total Profile Visits	121

3. Dissemination activities, project showcasing and industrial demonstrations

3.1. Dissemination Strategy, Initial Activities Report & KPIs

As already mentioned in Section 1, this deliverable is the first out of three reports covering among others the dissemination activities carried out by the aerOS consortium. This first report refers to the planning of WP6 impact activities and gives testimony of the initial efforts done by the consortium to increase the awareness and impact of the project. The purpose of this report concerning dissemination is to provide a dissemination plan for upcoming project periods with regards to planned scientific research publication activities, dissemination events and cross-fertilization.

Dissemination activities per definition focus on **sharing project results, once they are available**, with relevant audiences. Therefore, at the beginning of the aerOS project the requirements for the dissemination task have been defined, its scope has been fine-tuned and tools established. The consortium has agreed that the central tool of the dissemination task will be the so called **"Dissemination Register"** (for details see below).

The dissemination task is embedded within the work package "Impact creation" and has a strong link to the task covering communication activities of the project (T6.1). The communication task supports the dissemination task through its communication channels – all dissemination materials and events generated within the aerOS project will be communicated to our target groups via these channels. Furthermore, it is a common understanding within the consortium that the dissemination task has to be supported by all partners, providing timely information about planned dissemination activities and by following procedures, especially for planned publications (for details refer to next sections).

Dissemination in aerOS will be performed through publications, events and educational activities to transfer knowledge/results and to enable their uptake. The workflow focuses on informing researchers, industry, potential customers and other professional stakeholders (e.g. device or software end-users) about the technical achievements of aerOS and about the benefits from their implementation in different applications.

As we have five different use cases in the aerOS project, we put a strong focus in this task on industrial demonstrations. Our goal is to link all project showcasing activities with one or more industrial demonstrations (one or more use cases to be presented). As a research and innovation action, aerOS will put extra efforts into scientific publications – all research partners will be encouraged to write project-related scientific publications, preferably with Open Access, or alternative, according to their possibilities.

For this reason, we have broken down the dissemination task into the following core activities:

- **LEADING-EDGE (RESEARCH) MATERIAL** suitable for publication in high-impact scientific journals, and web-based media or white papers;

- **DEMONSTRATION EVENTS** to demonstrate results e.g., promoting aerOS concept and methodology, use cases, acquired knowhow, incl. also talks/panels at relevant international conferences, workshops, technical events, industrial forums, and cooperation with EU stakeholders;

- **EDUCATIONAL ACTIVITIES** such as university courses, lectures, activities for PhDs.

3.1.1. Dissemination strategy in aerOS

The dissemination strategy in the aerOS project can be summarised in the following 6 points:

1. **Dissemination Register:**
   The dissemination register is the central tool of this task. It is a collaborative form based on dissemination requirements of the EC from the portal. The dissemination task lead has transformed it

into a shared excel sheet which has been introduced and approved by the entire consortium. The register is stored in aerOS SharePoint, every partner can access and edit. The task leader backs up the register on monthly basis to prevent unintentional deletions/overwritings. The register consists of the following tabs:

- Publications
- Dissemination Activities
- Status of KPIs for Dissemination

In addition to these three main tabs we have included a collector of conferences, industrial events and journals to help partners with selection of dissemination outlets.

2. **Achievement of KPIs:**

The dissemination strategy is reflected in the KPIs below (Table 11) and will be refined during the project using specific dissemination actions/measures and comparing to the previous funded projects. The dissemination task leader will check progress in achieving these KPIs regularly and will remind partners of their commitments to avoid underperformance. The progress of the KPIs will be reported yearly:

Table 11 Dissemination monitoring KPIs (the numbers are cumulated in the table)

Key Performance Indicator / Target number	M12	M24	M36
# of scientific papers published in conferences / Q1-Q2 journals	3 / 1	10 / 3	20 / 8
# of presentations and other activities in events/conferences/fairs by aerOS partners	4	20	35
# of workshops organised / average participants in each workshop	-	1 / 30	3 / 60
# of activities towards Education institutions (courses, lectures, PhDs)	3	9	15

3. **Monthly internal updates:**

As there will be monthly WP6 telcos, the dissemination task lead will remind all partners one week prior to the meeting to update the dissemination register with their planned or carried out activities. Each partner is responsible for keeping the dissemination register up to date for their part.

The T6.2. slot in WP6 monthly telcos will be used also for the following purposes (examples):

- If support of more partners is needed for a dissemination activity (such as an eyent)
- If permission is needed for a planned publication
- Taking decisions about participation at major events for showcasing the project (using the information from collector of candidate conferences and industrial events)
- Alignment with the communication task leader about appropriate communication actions to be taken.

4. **Procedure for announcing planned (joint) publications:**

If a project partner plans a publication, they have to inform the rest of the consortium in written (email) at least 45 calendar days before the publication, so that other partners can comment and object to the planned publication. Any objection to the planned publication shall be made in accordance with the Grant Agreement by written notice to the coordinator and to the partner(s) proposing the dissemination within 30 calendar days after receipt of the notice. If no objection is made within the time limit stated above, the publication is permitted.

5. **Scientific publications:**

The dissemination lead collects the information about planned scientific publications and oversees that the above procedure (point 4 above) has been observed. When the publication is published, the respective partner informs the dissemination task lead and provides the public link, where the publication can be accessed. The task lead informs the communication task lead so that the output can be placed on the aerOS website and the other channels.

6. **Project showcases, industrial demonstrations and other dissemination events:**

The dissemination task lead has created a shared collector of candidate conferences and industrial events in the Dissemination Register according to best effort. The task lead will collect suggestions also from other partners and discuss participation at selected dissemination events with the aim of creating synergies with other initiatives and maximizing the impact.

3.1.2. Initial Dissemination activities carried out

Even though the aerOS project has no results to be disseminated yet, some partners have already used several opportunities to inform about the project – even before the official start - and thus can be reported as initial dissemination activities (Table 12 and Table 13),

Up to the time this deliverable was under editing, 8 aerOS presentations at various events have been made by aserOS partners (Table 12).

Table 12 Initial Presentations

Presentations			
#	Partner	Event – Time	Description
1	Ignacio Lacalle (UPV)	22 June 2022, IoTWeek 2022, Dublin, Ireland	Future European platforms for the Edge: Meta Operating Systems 22 June 2022, IoTWeek 2022, Dublin, Ireland
2	Harilaos Koumaras (NCSRD)	57th Summer School, NCSRD campus, 11-15 July 2022, Aghia Paraskevi, Greece	Dr. Harilaos Koumaras (NCSRD), aerOS technical manager, participated at the NCSRD 57th Summer School on 12th July 2022, discussing and presenting 5G Programmability aspects and presenting the new HE researh project aerOS (https://www.youtube.com/watch?v=NPqdrntuLQA)
3	Harilaos Koumaras (NCSRD)	12th Infocom Mobile Connected "Smartverse: Pushing the boundaries of connectivity", 12 July 2022 (online), Athens, Greece	Dr. Harilaos Koumaras (NCSRD), aerOS technical manager, participated at 12th Infocom Mobile Connected "Smartverse: Pushing the boundaries of connectivity", 12th July 2022, discussing the 5G openness aspects and programmability and their applicability to aerOS project".
4	Carlos Palau (UPV)	IEEE ICUMT 2022 conference, 11 October 2022, Valencia, Spain	Carlos E. Palau Salvador, from Universitat Politècnica de València, aerOS Project coordinator, presented on October 11th at IEEE ICUMT 2022 conference the NGIoT approach developed in the aerOS Project. More information available here: https://icumt.info/2022/keynotes

5	Ignacio Lacalle (UPV)	ETSI IoT Week 2022, 10-14 October 2022 in ETSI's Headquarters in Sophia Antipolis, South of France.	aerOS project was introduced at ETSI IoT Week 2022
6	Nasertic partner	Presentation in Nexus event	The aerOS Project was presented during NEXUS Event in BALUARTE Palacio de Congresos y Auditorio by NASERTIC partner You may learn more about the event here: https://www.aditechcorp.com/aditech-organiza-el-evento-nexus-para-potenciar-los-proyectos-europeos-en-navarra/
7	Ignacio Lacalle (UPV)	Presentation at TRA2022 – 14 November 2022	Presentation of aerOS project at the stand of the European Commission https://traconference.eu/
8	Ignacio Lacalle (UPV)	"IoT, Cloud, Edge Computing Continuum from Research to Deployment" webinar 30 November 2022	Ignacio Lacalle from Universitat Politècnica de València UPV presented the Aeros Project during yesterday's AIOTI webinar on "IoT, Cloud, Edge Computing Continuum from Research to Deployment". It was a very successful webinar with 100 attendants approximately.

In parallel, aerOS has organised a workshop and also participated in the one organised by EuCloudEdgeIoT workshop in Toulouse, France (18 Jan 2023), for all the projects of the call (Table 13).

Table 13 Workshops - Webinars Table

Workshops-Webinars			
#	Partner	Event – Time	Description
1	All partners	aerOS Workshop on State of Art and Market Analysis - 29 November 2022 (online)	In this 1st Workshop of the project partners presented to external and internal stakeholders the outcomes of the "State of the Art and Market Analysis".
2	UPV/ NCSRD	EuCloudEdgeIoT workshop - 18 January 2023, Toulouse, France	"Future European platforms for the Edge"–>"Define an Open Source stack" workshop, organized by EuCloufEdgeIoT and aerOS sister projects (same call). It was attended by Ignacio Lacalle UPV and Vasilis Pitsilis NCSRD

Additionally, at the time of writing of this report, UPV partner has reported that it is working on two concrete articles for scientific journals.

3.2. Dissemination Action Plan M7-M18

3.2.1. Leading-Edge (Research) Material

As research and innovation action it is our utmost priority to generate, publish and disseminate high-quality research material. The dissemination lead provides in the Dissemination Register a list of candidate scientific journals and conferences which project partners can consider for their publication activities. The initial list shall be extended by all partners with good knowledge and experience in this field.

The following candidate conference and journals are considered by the aerOS Consortium (Table 14). Please note that this is just a tentative list that will be constantly updated as the project progresses.

Table 14 Candidate conferences and journals list

Name	Type
ISORC (International Symposium On Real-Time Distributed Computing)	Conference
LCTES (Languages, Compilers, and Tools for Embedded Systems)	Conference
PLDI (Programming Language Design and Implementation)	Conference
ECRTS (Euromicro Technical Committee on Real-Time Systems)	Conference
SafeComp (Computer Safety, Reliability and Security)	Conference
SIES (International Symposium on Industrial Embedded Systems)	Conference
DAC (Design Automation Conference)	Conference
EDCC (European Dependable Computing Conference)	Conference
DSD (Digital System Design) [Mixed-Criticality System Design, Implementation and Analysis (MCSDIA) special session]	Conference
CASES (Compilers, Architectures, and Synthesis for Embedded Systems)	Conference
EMSOFT (International Conference on Embedded Software)	Conference
CODES+ISSS (International Conference on Hardware/Software Codesign and System Synthesis)	Conference
DSD (Euromicro Conference on Digital System Design)	Conference
FDL (Forum on specification & Design Languages)	Conference
RTSS (Real-Time Systems Symposium)	Conference
SafeComp workshops	Workshop
CGO (Code Generation and Optimization)	Conference
RTAS (Real-Time and Embedded Technology and Application Symposium)	Conference
DATE (Design, Automation and Test in Europe)	Conference
DSN (Dependable Systems and Networks)	Conference
ICCAD (International Conference on Computer-Aided Design)	Conference
ESWEEK (Embedded System Week)	Conference

3.2.2. Demonstration Events

We are constantly looking for and evaluating opportunities for appropriate demonstration events for aerOS project and its use cases. We collect the candidate events in our Dissemination Register and discuss with partners, which events can provide the highest impact for reasonable costs. The demonstration events will, however, make more sense in the second half of the project, when the use cases are ripe enough and possibly when they were joined by new partners selected in the open calls. The start of participation in the first round of experiments is scheduled from M20 and on. Nevertheless, for the first period of the project, the following candidate dissemination events are considered by the aerOS consortium (tentative list, work in progress, concerning future editions of these events) (Table 15):

Table 15 Candidate event list M7-M18

Tentative list of events targeted for future aerOS demonstration activities
European Transport Conference, 6-8 September 2023, Milan, Italy
GSVF - Grazer Symposium VIRTUAL VEHICLE, 13-14 September 2023, Graz, Austria
AgEng-LAND.TECHNIK - VDI Konferenz
AgriTechnika, 12-18 November 2023, Hannover, Germany
IAA Mobility, 5-10 September 2023, Munich, Germany
Smart Cities and Mobility Forum

IEEE Vehicular Technology Conference
IEEE Intelligent Vehicles Symposium
International Conference on Models and Technologies for Intelligent Transportation Systems (MT-ITS)
IEEE World Forum on Internet of Things (WF-IoT)
IEEE International Symposium on Industrial Electronics (ISIE)
ICAIVA: International Conference on Automation, Intelligent Vehicles and Applications
Mobility re-imagined (MOVE)
FISITA World Automotive Congress
IEEE International Intelligent Transportation Systems Conference (ITSC)
ITS WORLD CONGRESS
Intelligent Transport Conference

3.2.3. Educational Activities

Several aerOS project consortium members have a strong outreach into the superior educational sphere, being university professors, lecturers or PhD candidates. Therefore, they have the capacity to introduce aerOS topics into their educational activities. These can be university courses, lectures, practical workshops such as hackathons, but also activities with/for PhD candidates and master students.

For instance, the concepts elaborated in the course of the project will be used for the Dependable Systems lectures at TU Wien supporting the education of students informing them about recent advances in Embedded Systems applications such as e.g. the pilot by TTC and JD, and potentially other pilots.

4. Standardisation and policies alignment

4.1. Objectives

The Task 6.3 in the aerOS project, monitors the activities of several Standard Developing Organizations (SDOs) and other associations working on policymaking in areas related to the project. The aim is to use project outcomes and resources to propose new contributions to standards or pre-normative activities. This will provide aerOS with another vector of long-term impact. The task started in the third month (M3) of project development and will span until its conclusion (M36).

4.2. Overview of Standards Developing Organizations (SDOs)

aerOS is intended to become a reference of a brand-new architecture for the cloud-edge continuum. Therefore, the project must take a proactive role in standardization initiatives both in the European region and internationally if it is to realize its full impact potential in the field and promote adoption of its proposed technologies and concepts. To achieve that, the aerOS partners will actively contribute the project's outcomes to SDOs and alliances where they act as participants in several working groups. A list of those SDOs is presented in section 4.2.1. Additionally, a continuous effort will be made by the participants of Task 6.3 to target new SDOs of interest and high impact on the field. A preliminary list of those organizations is shown in section 4.2.2.

4.2.1. SDOs with entry points in aerOS

In the following sections, specific SDOs are presented in which aerOS partner(s) participate.

4.2.1.1. 3rd Generation Partnership Project (3GPP)

Entry point: Siemens (Member - Monitoring)

3GPP is the most prominent international standard development organization for cellular technology. 3GPP leads the development of 5G over releases with the aim to provide a harmonized architecture for various verticals.

4.2.1.2. International Organization for Standardization (ISO)

Entry point: Innovalia (Member – Actively contributing)

ISO is an independent international organization that brings, through its members, consensus-based, market relevant International Standards that support innovation and provide solutions to global challenges.

4.2.1.3. Internet Engineering Task Force (IETF)

Entry points: Telefónica Investigación y Desarrollo (Actively contributing), S21 Sec (Monitoring)

IETF is one of the leading standards organizations for internet technologies. It is responsible of maintaining, among others, the TCP/IP protocol suite. The organization does not have a membership system, anyone can participate and contribute as an individual volunteer. IETF does not control or police the internet, it limits its activities to technological standardization and advancement.

4.2.1.4. 5G Alliance for Connected Industries and Automation (5G ACIA)

Entry point: Siemens (Member - Actively contributing)

5G ACIA is the central global forum for shaping 5G in the industrial domain. On one platform, various industries from all over the world jointly create a new ICT and OT ecosystem and set the frameworks for a highly attractive emerging market.

4.2.1.5. World Wide Web Consortium (W3C)

Entry point: Siemens (Member - Actively contributing)

W3C is the international community that develops open standards to ensure the long-term growth of the Web. The W3C Web of Things Working Group (WoT WG) aims to accelerate the development of IoT applications by defining a description format for Things and APIs to interact with them.

4.2.1.6. Alliance for the Internet of Things Innovation (AIOTI)

Entry points: Prodevelop (Member – Actively contributing), Siemens (Member – Actively contributing)

Alliance for IoT and Edge Computing Innovation. Gathers main EU research, Industrial and standard promotion actions in the field of IoT and EC. The AIOTI was launched by the European Commission and various key IoT players, to give EU the lead in the IoT field by creating a European IoT ecosystem. Its IoT Standardization Working Group aims to address existing IoT standards, analyze gaps, and develop strategies and use cases for consolidation of architectural frameworks and (semantic) interoperability.

4.2.1.7. OPC Foundation (OPC)

Entry point: Siemens (Member - Monitoring)

OPC Foundation is an industry consortium, which creates and maintains standards for open connectivity of industrial automation devices and systems, such as industrial control systems and process control. The OPC standards specify the communication of industrial process data, alarms and events, historical data and batch process data between sensors, instruments, controllers, software systems and notification devices.

4.2.1.8. OPC Field Level Communication (FLC) Initiative

Entry point: Siemens (Member - Monitoring)

The Initiative has the goal to deliver an open, cohesive approach to implement OPC UA including TSN on field devices for all relevant industry automation use cases. The working groups in this initiative work on harmonizing and standardizing application profiles for IO, motion control, safety and system redundancy, information models for field level devices and mapping of OPC UA application profiles related to real-time operation on Ethernet networks (including TSN).

4.2.1.9. GAIA-X

Entry point: Innovalia (Member – Actively contributing)

Gaia-X is a project initiated by Europe for Europe and beyond which involves representatives from business, politics, and science to create a federated and secure data infrastructure.

4.2.1.10. International Data Spaces Association (IDSA)

Entry point: Innovalia (Member – Actively contributing)

IDSA is a coalition of more than 130 member companies that share the vision of realizing the full value of their

data in secure, trusted, and equal partnerships.

4.2.1.11. World Economic Forum (WEF)

Entry point: Innovalia (Member – Actively contributing)

The World Economic Forum is the International Organization for Public-Private Cooperation. The Forum engages the foremost political, business, cultural and other leaders of society to shape global, regional and industry agendas.

4.2.1.12. ETSI

Entry points: FIWARE Foundation (Member – Actively contributing), Telefónica Investigación y Desarrollo (Member – Actively contributing)

ETSI is an independent non-profit standardization organization in the telecommunications industry in Europe. It shapes in its MEC-related standards an open environment, which allows the efficient and seamless integration of applications from different providers across multi-vendor Multi-access Edge Computing platforms. Also ETSI NFV and ETSI OSM activities are closely monitored by aerOS entry point Telefonica.

4.2.1.13. Smart Data Models Program

Entry point: FIWARE Foundation (STC member – Actively contributing)

This is a collaborative initiative contributing to data models. These data models are open licensed allowing free use, free modification, and free sharing of modifications.

4.2.1.14. TIC 4.0

Entry point: Prodevelop (Member – Actively contributing)

TIC 4.0 promotes, defines, and adopts standards that will enable cargo handling industry to embrace the 4th industrial revolution.

4.2.1.15. Digital Container Shipping Association (DCSA)

Entry point: Prodevelop (Associate partner – Monitoring)

DCSA aspires to be the de facto standards body for the container shipping industry, setting the technological foundation for interoperable IT solutions.

4.2.1.16. European Cyber Security Organization (ECSO)

Entry point: S21 Sec (Member – Actively Contributing)

ECSO was established in 2016 to carry out Europe's distinctive Public-Private Partnership in Cybersecurity (cPPP). ECSO is now the first cross-sectoral, independent membership organization in Europe for cybersecurity that brings together, represents, and promotes cooperation among European public and corporate cybersecurity stakeholders.

4.2.1.17. Data, AI and Robotics (DAIRO)

Entry point: Prodevelop (Member – Actively Contributing)

The private side of the H2020 partnership Big Data Value cPPP, it is a private member of the EuroHPC JU and is also one of the founding members of ADRA.

4.2.1.18. International Data Spaces Association (BAIDATA)

Entry point: Navarra de Servicios y Tecnologías (Partner – Actively Contributing)

BAIDATA is an association that promotes the growth of the data economy and data sovereignty. BAIDATA, which was established in partnership with the International Data Spaces Association (IDSA), carries out research, development, and training initiatives to support the development of the public-private data ecosystem. BAIDATA fosters data space connectivity and interoperability with other regional and national data spaces, with the single European data market associated with this effort, and with regional shared data space pilot operations.

4.2.1.19. Agricultural Industry Electronics Foundation (AEF)

Entry point: TTControl (Indirect Member, via HYDAC, – Actively contributing)

AEF e.V. is a foundation for agricultural equipment manufacturers and associations, currently including more than 150 worldwide members. It is registered under German low but acting worldwide as a global international organization which started to take over the role of many smaller distributed organizations and initiatives such as the Implement Group ISOBUS (IGI) in Europe (mainly Germany) and the NAIITF (North American ISOBUS Implementation Task Force) as well as some smaller initiatives that were coming up in other parts of the world. The AEF initiative has become the central, independent, international organization and platform which is accessible to all interested groups from the field of electronic systems in Agriculture. TTControl is contributing e.g. in the ISOBUS-related working groups and plans also to join the security-related group.

4.2.2. Summary of current entry points to SDOs

Table 16 summarizes the SDOs attended by aerOS partners (in total 19 SDOs are attended so far).

Table 16 SDO's Summary

SDO	aerOS partner with entry point	Role of the partner in SDO
3GPP	Siemens	Monitoring
ISO	Innovalia	Actively Contributing
IETF	Telefónica I+D	Actively Contributing
	S21 Sec	Monitoring
5G ACIA	Siemens	Actively Contributing
W3C	Siemens	Actively Contributing
AIOTI	Siemens	Actively Contributing
	Prodevelop	Actively Contributing
OPC Foundation	Siemens	Monitoring
OPC FLC Initiative	Siemens	Monitoring
GAIA-X	Innovalia	Actively Contributing
IDSA	Innovalia	Actively Contributing
WEF	Innovalia	Actively Contributing
ETSI	Telefónica I+D	Actively Contributing
	FIWARE	Actively Contributing

Smart Data Models	FIWARE	Actively Contributing
TIC 4.0	Prodevelop	Actively Contributing
DCSA	Prodevelop	Monitoring
DAIRO	Prodevelop	Actively Contributing
ECSO	S21 Sec	Actively Contributing
BAIDATA	NASERTIC	Actively Contributing
AEF	TTControl	Actively Contributing

4.2.3. Other SDOs to potentially target

Throughout the project lifetime, aerOS partners will continue checking new potential opportunities and SDOs they might attend. In the sections below, potential SDOs for attendance/participation in the future are spotted.

4.2.3.1. Institute of Electrical and Electronics Engineers (IEEE)

With more than 430.000 members, IEEE is the most prominent and largest association of electronic and electrical engineers (and related disciplines) in the world. It comprises 40 technical societies that foster research and host top tier academic conferences in different areas of technology. Though its standard association (IEEE SA), it also maintains an important number of technology standards in different industries, including power and energy, artificial intelligence systems, internet of things, consumer technology and consumer electronics, biomedical and health care, learning technology, information technology and robotics, telecommunication, automotive, transportation, home automation, nanotechnology, information assurance, emerging technologies, and many more.

4.2.3.2. Industrial Internet Consortium (IIC)

Created in 2014, the IIC was established to hasten the creation, uptake, and widespread application of intelligent analytics and networked machines and devices. It catalyses and organizes the goals and enabling technologies of the Industrial Internet. The organization's goal was revised in August 2021 to bring transformative business value to business, organizations, and society by speeding the use of a reliable internet of things. After that revision the organization was rebranded to Industry IoT Consortium.

4.2.3.3. Other relevant SDOs in the fields of the pilots

4.2.3.3.1. Industry 4.0

- Digital Factory Alliance (DFA)
- European Factories of the Future Research Association (EFFRA)
- Mechanical Engineering Industry Association (VDMA)

4.2.3.3.2. Agriculture

- Comité Européen des groupements de constructeurs du machinisme Agricole (CEMA)

4.2.3.3.3. Maritime Logistics

- International PortCDM Council (IPCDMC)

4.3. Initial Standardisation Action Plan

The initial standardisation action plan to ensure and maximize the standardisation impact of aerOS comprises several aspects:

- A curated and focused aerOS project presentation
- Exploitation plan for every current entry point to SDOs
- Finding and exploiting new entry points to target SDOs

Those aspects are detailed in the coming sections.

4.3.1. aerOS presentation for SDOs

Partners participating in task 6.3 will create a presentation template specifically curated for showcasing the most relevant aspects of aerOS to SDOs. This action will begin in M6 of the project and the presentation will evolve iteratively until M12. The contents and specifics of the presentation will be discussed with partners participating in other tasks of WP6 and WP2, involving communications, exploitation, and legal aspects; to ensure that the best resources of the project are leveraged to promote the standardization effort.

4.3.2. Exploitation plan for every current entry point to SDOs

The current list of entry points to SDOs, shown in section 4.2.1 (Table 16), contains very diverse organizations that govern technology in different areas. For that reason, specific exploitation plans are necessary to approach every SDO and look for potential impact actions in their activities. To create such a plan, every partner with entry points will be asked to select a representative that will work together with the leaders of task 6.3 to draft the corresponding exploitation plan for their respective SDO. Such exploitation plan must contain:

- Details of the effort inside the SDO where the entry point is located (E.g., working group, task force, initiative)
- Analysis of intersection areas between aerOS and the effort inside the SDO (E.g., use case requirements, architecture design, implementation specifics)
- Resources needed for maximizing the impact potential (E.g., participation of different aerOS partners, cooperation actions, elevation to project coordinator or technical manager)

With this information, the representatives, and leaders of task 6.3 will arrange specific time schedules to perform the plan and guarantee the success of the impact action in the SDO.

4.3.3. Finding and exploiting new entry points to target SDOs

Partners participating in task 6.3 will continuously monitor possible new entry points to new SDOs, considering advances in the implementation of the project, enrolment of the partners in new standardization efforts, or other contact scenarios.

Additionally, in cooperation with the partners managing the dissemination efforts of aerOS (task 6.2), the participants of task 6.3 full leverage scientific/commercial dissemination spaces where aerOS has presence to promote standardization activities.

4.4. KPIs

There are 2 basic KPIs foreseen for task 6.3: The number of SDOs whose entry points have been exploited (with a successful outcome or not), and the number of significant contributions made to their efforts.

The following are understood in this context as significant contributions:

- Amendments or additions to drafts
- Providing use cases or specific application scenarios

- References by SDOs as showcase for their standards

The expected evolution of those KPIs during the development of the aerOS project is shown in the table below (Table 17) as cumulative values from left to right for each year.

Table 17 Exploitation KPIs

KPI	M12	M24	M36
Entry points exploited	5	15	25
Significant contributions	--	2	5

The results are expected to correlate with the maturity of the technological development of aerOS and the implementation of the pilots.   For that reason, the expected values accelerate with the time.

5. Exploitation Activities, IPR management and innovation

Focusing on optimal return on investment and maximizing the impact of interventions, this field of intervention concerns the ways to exploit results and outcomes of the project and presents the initial approach for this purpose, demonstrating partners' intentions, business analysis tools and methodology to be followed, building upon the baseline exploitation plan included in the Description of the Action.

5.1. Exploitation, strategy in aerOS IPR

5.1.1. Project's Results Exploitation Methodology

This Section explains the methodology to be followed in order to define the project's exploitation strategy. It starts by clarifying the definition of an exploitable outcome and presents a generic classification approach of the project's results. Building on these constructs, it then introduces in plan to identify exploitation opportunities and challenges by utilising the appropriate value position models.

Various types of partners may participate in a R&D EU funded project -universities, research centres, commercial companies and SMEs-, and depending on their expertise and areas of interest, the exploitation strategy and activities vary accordingly. Universities and Research Centres focus on exploitation activities regarding research items, while commercial companies and SMEs are mainly involved with the exploitation of commercially oriented products. In the light of this diversity, we can identify five major categories of exploitable outcome (Figure 56):

- **Product development**, which includes the introduction of new products/features (together with a roadmap definition) and the product validation that increases the technology readiness level (TRL) towards a successful deployment. This outcome category is related mostly to commercial companies and SMEs.
- **Business development**, which includes enhancement of existing processes/services and/or the creation of new services/activities. This outcome category is also related mostly to commercial companies and SMEs.
- **Research achievements**, including publications, IPRs and prototypes and can be produced by all partners.
- **Standardisation** is a process tool through which the commercialization and sustainability of a project's results can be supported. Partners that are actively involved in standardization and regulatory activities may promote the results of the project to provide technical contributions to relevant standards bodies.
- **Start-Up companies**. These are established mainly by Universities and Research Centres in order to exploit one or more of the project's exploitable outcomes and as such indirectly pursuit a Product development outcome.
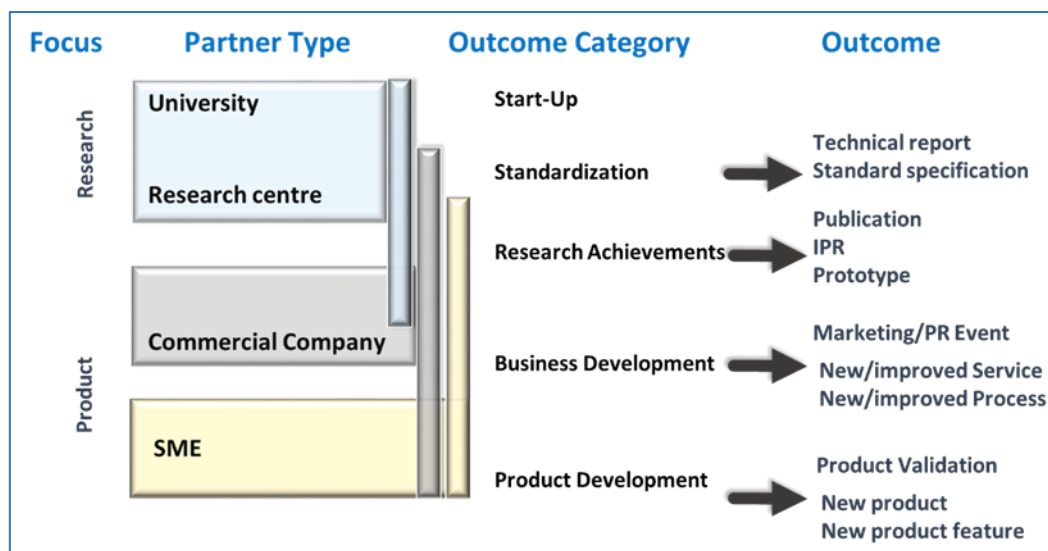
Figure 56 Partner Type and Project Outcome Categories

Furthermore, the contributions from partners are of varying focus and type, and the results can be identified as follows:

- **Demonstrators** – Demonstrations of one or more aerOS results/products in the field or in lab environment; either as Proof of Concept (PoC) or as Solutions addressing specific end-user needs. Demonstrators are usually joint results of more than one partners and partner types.
- **Prototypes** - Stand-alone, modular products which have been either developed or enhanced in the context of the project. Prototypes may be developed by commercial companies and SMEs or by academic or research initiatives with no direct commercialization capability.
- **Validation Activities** – Activities aiming at validating the functionalities of specific products; these can be considered as exploitation activities aiming at increasing the technology readiness level of the associated products.
- **Contributions to standardisation and publications** – Indirectly exploitable results delivered to the industry through standardization and dissemination paths.
- **Other Achievements** – Activities/Tools aiming at enhancing processes/services related to the introduction/deployment of the project results (ex. studies, algorithms, techno-economical tools, knowledge transfer etc.).

The five pilots that will be conducted during aerOS project are expected to give us a variety of results. Trial Handbook (internal process of T1.1 running throughout project lifetime addressing all technical WPs and tasks) describe the Use Cases and their functional requirements, defining in full detail the whole process carried out throughout each trial case and the outcomes and results of the developed activities.

Project outcomes such us demonstrators, validation activities and technical reports can arise from all the chapters of the Trial Handbook, even the first "Overview of the trial" where the general description, partners, roles, scenario, bottlenecks and expectations are described. In this first chapter, expected results from each pilot are introduced. The second handbook chapter "Details on objectives and outcomes of the trial" includes the use case scenario, the demonstrator framework and exploitation plan of the results of the trial, where innovative elements, key exploitable results of the pilot, protection to the results and business models are explained. Subsections 2.3 and 2.4 of the second handbook chapter, economic and exploitation framework respectively, refer directly to Task 6.4. "Data sources, software and equipment" are described in the homonym chapter 3 and "implementation plan and status check" in the homonym chapter 4. These chapters, together with chapter 5 "Development and results", will contribute to the definition of exploitable results such us prototypes and products.

Especially in Handbook chapter 5, subsection 3.1 refers to "Pilot sustainability plans" and describes the plans or possibilities to continue using some components after the project, using the Table 18 below.

Table 18 Template for Pilot sustainability plans

Pilot sustainability plans		
Pilot #	…	
Does the pilot owner and the component owner/s have plans to collaborate on the component/s after the project? Please enter "X" in the right answer	Yes. The pilot owner plans to improve the component and achieve a Minimum Viable Product.	
	Yes. Pilot owner plans to use the component/s in some operation at some extent, whether in a production line or extend it to another facilities.	
	Potentially. The pilot owner is interested in using some component/s but it has not been discussed or agreement has not been reached yet with the component owner.	
	No. Agreements or plans to use the components after the project are not expected.	
If the answer is yes, identify the component/s and provide details of the plan	…	
If the answer is no, can you explain the reason? Please enter "X" in the right answer	The technical concept of the component/s (an MVP) was not achieved	
	The performance of the component/s was not satisfactory	
	Critical technical barriers to production	
	Financial barriers: no positive profit potential	
	Other	…

Apart from joint exploitation plan which is described below in Section 5.1.2, individual exploitation plans are also described in Section 5.1.3. The next months, per-KER a competitor analysis will be conducted, together with target market and clients specification. Regarding IPR management, the registry of ownership and IPRs are described in a separate subsection below. In "Exploitation Plan" subsection, some of the exploitation-support material that will be used is indicated (e.g. KER analysis tables, BMC per exploitable result, Llava Matrix, Porters' 5 forces analysis, Plan-Do-Check-Act (PCA) approach).

5.1.2. Exploitation Plan

aerOS product will be composed of individual Key Exploitable Results (KERs) that might be owned individually or jointly by project partners. As early as the proposal preparation phase phase, 5 crucially important KERs had already been identified and are presented in the table below.

Table 19 Key Exploitable Results already defined in DoA

KER code / IPR protection*	Description	Target audience and exploitation route
KER1: aerOS Trademark +, License	Operating system as a whole. This KER entails the essential, bare minimum software modules that any aerOS compliant deployment must have.	**TG1-5** – Covers the need of a unified, abstraction tool to manage IE nodes in the continuum to achieve modern needs. Spin-off and joint v. to commercialise.
KER2: aerOS FOM License +	Orchestration module, integrated in R1 but with separate planned protection and exploitation. Ground-breaking European product.	**TG1,3,5**–Base for MSc, PhD programmes, candidate for certification and incorporation to standards, flagship for further funding. Assoc. to continue work.
KER3: aerOS FAI Trademark, License	Frugal AI- This result will be a combination of methodology and software, elaborating an actionable framework to deliver XAI in IoT/Edge.	Short-term (**TG5**) to base studies and PoCs upon. Long-term (**TG1**) become standard for XAI in Europe. Clustering and policy makers will be key.
KER4: aerOS TSF Design rights License	A series of supporting features to deploy on top of R1, that will increase the performance and technical traits of an aerOS deployment.	**TG1** -Industries adopting R1 will be showcased with potentially tailored additions to purchase. Modularity will open the path for future enhancements.
KER5: DevPricSecOps Design rights Trademark	Process and data flow, including techniques and open source technologies that, combined, improve current DevSecOps de-facto standards.	**TG1,3,4** -More agile deployment of IoT services will allow citizens to enjoy better QoS and QoE
TG1: Industry stakeholders **TG2**: Partnerships, policy makers and associations **TG3**: IoT Open Community **TG4**: Citizens and general public **TG5**: Academia and research		

Other/different/grouped results and outcomes are expected to appear during the project. In order to identify them, a list is conducted, where each project member proposes potential project exploitable outcomes, classified accordingly: associating them with Project Result Category and Type, in accordance with the above mentioned.

Among this list, the consortium prioritizes the list and selects a set of high potential outcomes:

- The main focus is on project-wide results, but partner-specific exploitation outcomes can exist in the list.

- Partner-specific exploitation outcome can be documented in the individual exploitation plan section – it is recommended to use the proposed methodology for this.

For each exploitable/business outcome, a detailed analysis including TRL, Gap Analysis will be performed.

For the list of exploitable outcomes with promising results, a more in-depth analysis (e.g., Business Value Proposition or Lean Canvas) can be filled, to pave the way towards the formulation of a Business Case.

Innovation	Owner(s)		TRL M03	TRL M36
aerOS				
Type of commercial/business exploitation		**Exploitation potential**	**Conflicting IP**	
TG1 TG2 TG3 TG3 TG4 TG5				

Strengths	**Weaknesses**	**Opportunities**	**Threats**
What We do Well	*Are we competitive?*	*New stakeholders, Market trends*	*What are the risks*

Competition
Other competitive technologies/ products/ solutions

Targeted market	**Time to market estimate**	**Expected ROI**
Who are the customers?		*Initial estimation*

Path to market
How do you plan to embed results in your organisation (i.e. extend the company's product portfolio, develop new products, etc.)

Figure 57 Template to be used categories of product and business development

5.1.3. Individual exploitation plans

The consortium aims to maximize the technical and economic impact of the project (and finally the value of the resources invested) and, by taking advantage of its heterogeneity, to exploit results according to the type of partner: industrial, clustering and telco partners, SMEs, digital technology providers and end users.

To materialize the global and per-asset exploitation routes, aerOS will develop individual and joint exploitation strategy. This chapter focus on initial exploitation plans per partner, recording an update of the interests and expectations of each member of the Consortium, now that the project is running for some months.

5.1.3.1. Industrial, clustering and telco partners

5.1.3.1.1. INNO

Innovalia Association is a private and independent technological center that was created by Innovalia Group in order to articulate a critical mass capable of successfully achieving its long-term research ambitions and strategic objectives. Innovalia is an alliance for technology-based SMEs with headquarters in Spain. It has international

presence with offices in Basque Country, Madrid, Catalonia, Canary Islands, Europe, Asia, the Middle East, and Central and South America. Since its foundation, Innovalia Association has developed a special sensitivity for and awareness of the particular characteristics of technology-based SMEs. Today, it has become a leader in the R&D area by and for SMEs in Spain. It also offers solutions for facilitating international innovation processes aimed at SMEs. As a technological agent of the Basque Country Technology Network (Innobasque), Innovalia brings together the skills, laboratories and resources of the companies that founded the association. Innovalia Association specializes in the development of ICT, Innovation Management and Meso, Micro & Nano-Technologies, parameterized according the needs of each of the business units. In addition, Innovalia takes part in industry 4.0 and data spaces initiatives. aerOS will be exploited in following:

- Digital Factory Alliance (DFA). DFA was established in 2021 by BDVA Boost 4.0 and FoF (EFFRA) Qu4lity (big) data-driven digital transformation lighthouse initiatives. It is already at the crossroad of data and I4.0 and gathers a community of over 2000 stakeholders participating to the community open innovation activities "data open to all". The DFA already provides 4 pillars to support both open and market driven innovation for accommodating the project assets and support market opportunity development. The DFA as a non-for-profit neutral stakeholder has already in place the necessary framework for immediate use by the community. It provides the manufacturing focused open innovation catalogues and partnership programmes to engage with the data space stakeholders (incl. DIHs and AI TEFs) and data space alliances for sharing knowledge (body of knowledge), ecosystem building assets (innovation campus), digital solution finding (flagship initiative) and engagement in business (business networks) at EU level; complementing national industry 4.0 initiatives activities and assets.

  In this regard, aerOS will provide the framework for use reference models, certifications and provide effective data-sharing among the alliance.

- BAIDATA. The BAIDATA Association, leaded by Innovalia, is helping to drive the development of data sovereignty and the data economy. Founded in collaboration with the International Data Spaces Association (IDSA), BAIDATA implements research, development and training activities to help build the public-private data ecosystem. BAIDATA stimulates and supports regional shared data space pilot actions and promotes data space connectivity and interoperability with other regional and national data spaces and with the common European data market linked to this initiative.

  Baidata aims at connect and provide an interface between European and Regional Data Spaces and their public-private ecosystems, bring stakeholders together to improve and accelerate the use of data through pilot actions and training, assessment, internationalization and promotional activities and designing new data-driven business models to improve business productivity, sustainability and efficiency.

  aerOS will provide a blueprint for an effective and secure data sharing, providing a infrastructure for promoting and expanding BAIDATA technical activities.

On the other hand, Innovalia will exploit aerOS for its internal advanced metrology products:

- Using a low latency big data solution to acquire and process information in real time from production lines.
- Contribute to the improvement and innovation of advanced metrology systems within contactless measurements and virtual pieces for the industry 4.0.
- Deliver business innovation and advanced digital tools through aerOS, enabling IoT solutions, big data management, cloud and AI.
- aerOS will help in the development of technologies related with embedded systems and device integration, contributing to the overall behavior of cyber physical systems.

5.1.3.1.2.   FF

The FIWARE Foundation is the legal independent body providing shared resources to help achieve the FIWARE mission by promoting, augmenting, protecting, evolving and validating the FIWARE technologies as well as the activities of the FIWARE community, empowering its members including end-users, developers and rest of stakeholders in the entire ecosystem. The FIWARE Foundation is open: anybody can join contributing to transparent governance of FIWARE activities and rising through the ranks, based on merit. FIWARE Foundation is a non-profit organisation that drives the definition and encourages the adoption of open standards (implemented using Open Source technologies) that ease the development of smart solutions across domains such as Smart Cities, Smart Energy, Smart AgriFood and Smart Industry, based on FIWARE technology. Founded in 2016, the foundation has Atos, AWS, Engineering, Madinah, NEC, Red Hat, Telefónica, and Trigyn Technologies among its Platinum members. Only by truly eliminating the existing technical and commercial obstacles hindering the effective usage of meaningful data, smart digital solution providers will be able to move forward and drive the market up, based on FIWARE technology. Using FIWARE technologies, organisations can capture the opportunities that are emerging with the new wave of digitalisation brought by combining the Internet of Things with Context Information Management and Big Data services on the Cloud. Using FIWARE technologies, developers can gather context information at large scale from many different sources. FIWARE also helps to easily process, analyse and visualise managed context information, easing the implementation of the smart behaviour and the enhanced user experience required by next-generation Smart Applications.

Over the years of its existence and development FIWARE built a strong community presence in these three different consistent and strong programs FIWARE Marketplace, FIWARE iHubs, FIWARE Accelerators.

- FIWARE Marketplace helps users and their customers find innovative and the best open-source-based products and services and grow revenue by identifying customer needs and repeatable solutions leveraging FIWARE technologies and FIWARE partner ecosystem, at scale.

- FIWARE iHubs focus on building communities that will, in turn, enable local digital businesses to thrive not only at a regional but on a global level. They support companies, cities, and developers in their innovation and digitalisation journey by offering easy access to Open Source technologies, business development support, and community building.

- FIWARE Accelerator Program supports Incubators, Technology Parks, Venture Capital Companies and Digital Innovation Hubs with training and coaching services. It offers technical assistance and business opportunities to highly innovative SMEs and Startups with scalable business models.

- FIWARE is active in standardisation bodies like ETSI and is the core maintainer of the agile standardisation initiative Smart Data Models (https://smartdatamodels.org/). In ETSI, the NGSI-LD API is continuously evolving to support the interoperability of smart solutions. FIWARE is a de facto standard in domains like Smart Cities, and gaining adoption in other ones, like Manufacturing, Energy or Mobility.

There are few main ways in which FIWARE will be able to exploit the results of the project:

- Implementing new core functions to Orion-LD Context Broker for distributed operations which will be available not only for FIWARE Foundation itself but for all FIWARE's users worldwide.

- The Marketplace is FIWARE's business tool, it currently hosts 200 solutions. AerOS pilots can be added to FIWARE Marketplace as will be powered by the FIWARE technology. It will also be an added value for the project itself. The pilots will have global promotion, a visibility that will help position the solutions developed in the public administrations, but not limited, market more easily.

- Enhancing and extending FIWARE's Smart Data Models with new open and free models for Cloud, Edge, and telemetry domains. More than 1000 data models are currently in the smartdatamodels.org repository, contributed by more than 80 organisations and more than 120 contributors. New models will enlarge this common database of models widely used by the community.

- Hopefully improve or add new Generic Enablers in data Continuum, distributed security, and multi-plane analytics both in FIWARE's IoT enablers implementation and FIWARE Lab cloud federation.

- Building Blocks that could be incorporated to the catalogue of components that the Data Spaces Support Center is collecting for the deployment of data spaces in different domains in Europe.

- This is a great chance to gain Know-how and experience in Data Continuum, AI, Cybersecurity and data governance which will benefit our FIWARE adopters.

5.1.3.1.3. TID

Telefonica has set the initiative of Autonomous Networks as one of the priorities in its innovation roadmap. With this new initiative the management of networks will become more efficient and will require less intervention from humans. In this sense, Telefonica is heavily researching in new network paradigms like Digital Twins and closed-loop automation that will enable networks to work autonomously. But these paradigms require a data infrastructure that can integrate network monitoring data collected from different data sources while ensuring the governance over data by also integrating its metadata.

Following up on the results achieved in previous European projects like 5GROWTH, 5G-CLARITY, or PALANTIR, Telefonica will leverage the scope of the aerOS project to further evolve the Semantic Data Aggregator (SDA) as an implementation of a data infrastructure. The aerOS project, which targets the creation of a meta-operating system throughout the IoT-Edge-Cloud continuum, imposes challenges that will enable Telefonica to gain experience in managing highly distributed data. To cope with such challenges, Telefonica will extend the SDA to align with new data management approaches like data fabric or data mesh. The outcome of this research will be shared as contributions to standards ETSI CIM or IETF OPSAWG.

In addition, the wide variety of use cases addressed in aerOS, present a great opportunity for validating the novel data mesh paradigm, where one of its main principles is the ownership of data based on domains. In this regard, Telefonica, as Data Manager of the project as well as leader of the data governance task, will gain expertise in defining data domains and governance policies for the different use cases of the project. The lessons learned in the process will be applied to use cases which are specific to Telefonica business, and, in particular, to the initiatives related to the Network-as-a-Service (NaaS) paradigm .

In summary, the experience in data management gained with the aerOS project, will help Telefonica in developing a data infrastructure aligned with trends like data fabric and data mesh.

5.1.3.1.4. COSM

COSMOTE, the leading Mobile Network Operator of Greece launched in April 1998, is a member of OTE Group, and since March 2009 a member of Deutsche Telekom Group. COSMOTE holds the top market position in Greece since 2001, and today accounts for more than 50% of the Greek mobile network subscribers' base exceeding 7 million (Q3/2021). By constantly developing its networks, it has achieved an impressive record of very important firsts, including the launch of 5G network in December 2020. By the end of 2021, COSMOTE has offered the largest 5G coverage in the country (48 cities, 97% population coverage in Athens, >60% countrywide coverage), winning the Speedtest AwardsTM of the independent network metrics company Ookla ®, as "the fastest mobile network in Greece" for 8 consecutive times. In chorus, OTE Group is the largest telecommunications provider in Greece, offering a full range of telecommunications services: from fixed-line and mobile telephony, broadband services, to pay television and ICT solutions, while it is also involved in payment services, maritime communications, real estate, energy, insurance services and professional training. Furthermore, OTE Group has a strategic interest in supporting sustainability through many initiatives, both research and commercial. OTE Group's performance in matters of environment, society and corporate governance (ESG) have contributed -among other things- to the participation of OTE in six international indicators of Social Responsible Investments: FTSE4Good, VIGEO-EIRIS Best Emerging Market Performers, "Prime" Corporate ESG Performance by ISS-ESG, MSCI ESG Research, CDP, and 2020 Bloomberg LP Gender-Equality Index (GEI). OTE Group is the largest telecommunications investor and one of the largest overall investors in Greece, accounting for 10% of the capitalisation of the Athens Stock Exchange and contributing 2.7% of GDP.

It is evident from the above company profile that OTE Group is a pioneer in technological advances and by far the largest investor in telecommunications infrastructure in Greece. COSMOTE, capitalising on its 5G technological superiority has a clear business objective to expand and exploit the 5G potentials for verticals with special focus on the Industry 4.0 and IoT domain, where services cloudification and the deployment of

private networks is gaining momentum. This strategy is aligned with the market reports[6] that see the enterprise use cases as a significant, incremental opportunity for network operators to gain revenues and at the same time rationalize the substantial financial investments necessary for 5G deployments. Nevertheless, private networks, and the business services' cloudification hype as mandated by the enterprises' digital transformation trends, is quickly becoming a multi-stakeholder game with strong competition from many players outside the telecom business to lead the market, such as the infrastructure/hardware vendors and the cloud providers. Indicatively all three major hyperscalers, Amazon (AWS), Microsoft (Azure) and Alphabet (Google Cloud), taking advantage of their cloud computing capabilities, have expanded their portfolios with their own flavours of private 5G, and most have completed strategic acquisitions and hired from the mobile industry. Against this treat, operators, and consequently COSMOTE, are preparing to respond with slicing and edge computing, capitalising on the 5G SA (5G Stand Alone) network architecture to offer versatile, hybrid, context-aware networks. Through the Service-based Architecture and cloud-native functions of the 5G Architecture, as well as advanced functionalities such as network slicing, Massive Machine type Communication (MMTC), Multi-Access Edge Computing (MEC), the MNOs have the means to become a key enabler for the enterprise edge and IoT solutions.

In this respect, COSMOTE has already implemented a number of relative projects and pilots such as the first 5G Campus Network in Greece for the Athens International Airport[7] in 2021, the Hellas Gold 300 meters underground campus[8] and Calpak's fully automated solar water production smart manufacturing campus[9]. It is worth noting that OTE Group specializes in the provision of IT support services, having already undertaken several projects in both private and public sector, not only in Greece, but also in many European Countries and the European Commission[10]. COSMOTE, as part of the OTE Group of companies, has been recognised as the ICT Company of the Year for a second year in a row, at the Impact Business IT Excellence Awards 2020, and has gained more than nine awards in the ICT business[11]. COSMOTE is constantly developing its NB-IOT systems, and has taken upon the commercial implementation of smart cities paradigms[12] in Chania and Monemvasia. This background stands as an evident proof of COSMOTE's interest, commitment and strong skillset to explore and lead the emerging enterprise IOT edge-cloud market.

In this perspective, COSMOTE has a strong interest to explore the AerOS prototype, and get early access to niche technologies that can enhance the company's commercial service offerings through the project's core developments and lessons learnt, with special focus on the platform-agnostic, distributed intelligent edge that can accommodate federated, flexible, scalable IOT deployments building upon AI and the IOT-cloud technologies. It is noteworthy that in the edge-cloud ICT enterprise product offerings, COSMOTE seeks to assess new business models, expanding its role beyond the public/private/hybrid network product offerings, to explore new revenue sources not only from building and operating networks but also profiting from the managed services to deliver and operate the enterprise applications.

Simultaneously, as most telecom providers, COSMOTE has a firm plan towards its own digital transformation and transition from physical network infrastructure to cloud-based architectures, investing in an NFV network, based on cloud technology such as OpenStack, VMWare among other best practices. Owning and operating systems in various locations, including the radio access sites, poses a lot of challenges in the digital transformation and costs reduction policies, and the AerOS best practices and meta operating developments, can become a helpful blueprint towards this transformation.

6GSMA Intelligence, 9/2022, "5G for the enterprise: headway, hurdles and the horizon for operators", https://data.gsmaintelligence.com/research/research/research-2022/5g-for-the-enterprise-headway-hurdles-and-the-horizon-for-operators
7   https://www.cosmote.gr/cs/otegroup/en/5g_campus_network.html
8   https://www.cosmote.gr/cs/otegroup/en/campus_network.html
9   https://www.cosmote.gr/cs/otegroup/en/smart_manufacturing.html
10https://www.cosmote.gr/cs/otegroup/en/cosmote_global_solutions.html
11https://www.cosmote.gr/cs/otegroup/en/psifiakos_metasxhmatismos.html
12https://www.cosmote.gr/cs/otegroup/en/smart_cities_monemvasia_chania.html

At the same time, COSMOTE has set strong targets for sustainability[13], and has Energy Management a top priority in the Energy Efficiency pillar[14]. Reducing emissions, increasing energy efficiency and contributing to the reduction of the carbon footprint is a clear objective the company's sustainability strategy, and as such the implementation of the pilot #5 Smart Buildings, becomes a valuable mechanism to achieve further energy savings in a smart, health-safe manner under the new mobile office, working norm.

To conclude, COSMOTE sees a strong interest in the developments of AerOS in three ways:

- As a technology supplier, to assume the role of edge-cloud provider and offer enterprise, beyond connectivity, services, supporting the vertical industries' digital transformation and capitalising the 5G network investments. COSMOTE intends to build upon its strong telecom and ICT competence to exploit the AerOS metaOS results offering federated, scalable, extensible, secure, distributed intelligent edge to support multiple use cases and enterprise domains.
- As a technology consumer, to exploit technology towards its own transformation, at the business level and for the network sustainability. The Cloud IOT continuum offered by AerOS can become a core platform to manage the telecom systems, services and assets.
- To achieve its corporate sustainability targets. In this perspective, pilot #5 for smart, energy efficient buildings is an attractive solution to be deployed in own telecom premises.

5.1.3.1.5. SIPBB

One of the core parts of the SIPBB are test – and demonstration platforms for several applications. The largest platform is the Lighthouse project industry 4.0. The Lighthouse project industry 4.0 is a production line for Quadro – and hexacopter which focuses on automation and human-machine interaction in the context of industry 4.0. Within this line many IoT data points are available, which can be used for further computation. With aerOS the different data entries can be collected and exchanged with further data from the own production line as well as with other parties as suppliers, customers and other test and demo labs. From these opportunities the following exploitation purposes arise:

- Exchanging and computing IoT-data of demonstrators, sensors, Edge-Devices etc. within the production line for further insights and enhanced understanding
- Exchanging and computing IoT-data with suppliers of drone parts (e.g., PCB's) for quality improvement and CO2-calculation of the drone
- Exchanging and computing IoT-data with other test – and demo labs for exchanging information and common improving of the production line
- Dashboarding of collected, exchanged, and computed IoT-data along the production line.

5.1.3.1.6. NASERTIC

One of the most relevant lines of action in NASERTIC consists of the implementation of public Telco services deployed on top of our own ICT infrastructure. NASERTIC boosts all Telco projects commissioned by the Government of Navarra and is the reference partner for the Public Corporations in our Community for everything related with the deployment, assistance and maintenance of ad-hoc Telco services.

This line of activity has allowed our Community to carry phone coverage, Digital TV and high speed Internet connectivity (among other services) to 99.5% of our territory, which is possible thanks to our own telecommunication centers and the management of the Government of Navarra's redundant data processing centers, which host all the ICT services demanded by society. Simply put, NASERTIC offers the infrastructure on top of which other entities deploy their own ICT services which contribute and add value to the Navarra's society as a whole.

Keeping always in mind NASERTIC's vocation of public service, aerOS can be yet another technology to offer to Navarra's ICT scene. By hosting dedicated aerOS infrastructure, we would enable the Government of Navarra

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13 https://www.cosmote.gr/cs/otegroup/en/integrated_report.html
14 https://www.cosmote.gr/cs/otegroup/en/sistima_diaxeirisis_energeias.html

and public entities (including ourselves) to develop new services that fully exploit aerOS' core concept: the continuum. The seamless and transparent integration of clouds, edges and IoT sensors and actuators can be leveraged in the development of services aligned with the Government of Navarra's S4+ strategy: electric and connected mobility, healthy and sustainable food, green energy industry, personalised medicine, sustainable tourism and audiovisual industry.

In conclusion, we expect aerOS to strengthen the digitalization capabilities of our territory and to boost smart specialization strategies and inclusive growth (S4+), by incorporating the meta-operative system in our infrastructure and encouraging all actors in Navarra to leverage aerOS to create value added services for our society.

5.1.3.2. SMEs

5.1.3.2.1. 8BELLS

EIGHT BELLS Ltd is an independent high technology company providing innovative solutions, based in Nicosia, Cyprus and Athens, Greece. We specialize in selected parts of Information and Communication Technologies (in the fields of Defense, Security, Space, Telecommunications, Cybersecurity, eHealth and Environmental Protection, with disruptive IT solutions. Our technical capabilities include Systems Networks Engineering, Cloud Computing, Privacy, Security Data Protection and Software development.

8BELLS operates a privately-owned cloud based on comprehensive deployments of OpenStack and Kubernetes to manage bare-metal resources into virtual machines and containers, respectively. Our Everything-as-a-service (EaaS) philosophy is to be able to provide a high quality as-a-service approach to software and hardware resources. The entire architecture embeds scalability, high performance and security across all resources and tenants. In this sense and based on a perfect mixture of service orchestration and a best-of-breed DevOps approach, the platform is able to handle a multitude of workloads across Neural Networks, Blockchain, Big Data and other areas of distributed and cloud computing.

8BELLS plans to include aerOS results related services to the existing corporate portfolio making impact in core-aerOS, as well as in supporting features (TSF), extending its experience in data governance (e.g. DFF - Data Format Fusion), Softwarized Networks 5G & NetApps, APIs development & containerisation and predicting Self Maintenance mechanisms.

In order to maximise the impact 8Bells will focus on setting up good practices and guidelines for transfer of knowledge. 8Bells has a proven track record in smart networking, benchmarking and evaluation and business strategy. More specifically, 8Bells will exploit technologies such as NFV (e.g., VNFs/CNFs), programmable networks and VPN will be adapted to distributed IoT edge-cloud continuums, with intelligent reconfiguration capabilities (supported by policy based and/or AI methods), ensuring dynamic, low-latency intra- and inter-domain communications.

5.1.3.2.2. IQB

InQbit Innovations (IQB) is small medium enterprise (SME) that focuses on the designing, developing, providing to the market novel ICT solutions specializing on Identity and Access Management services. It has been founded by an international team that ensures a right balance of entrepreneurship, research and engineering that joined their forces targeting to produce innovation that will serve and satisfy societal and market needs. IQB participates also in several other Horizon Europe projects, such as H2020-ICT-41-2020-EVOLVED-5G, HORIZON-DATA-01-04-FAME, HORIZON-DATA-01-03-OASEES, H2020-ICT-40-2020-PHYSICS, and HORIZON-DATA-01-01-TRUSTEE,.

In aerOS, IQB as a partner focuses on the cybersecurity aspects of the edge-cloud continuum, the development of trust management over IoT deployments, as well as the privacy and security monitoring and validation of software and application developments following the DevPrivSecOps methodology of aerOS. More specifically, IQB is developing a context aware Trust Management broker to satisfy the requirements for trusted communication between IoT devices and users, utilizing mutli-attribute optimisation techniques to efficiently calculate the trust score of a device. What is more, IQB is developing authentication, authorization and access management mechanisms deploying verifiable credentials and distributed identifiers to ensure that data owners have sovereignty over their shared data and the identifiable information. The proposed self-sovereign identity

management is envisioned to be backwards compatible with legacy federated identity management schemes based on OpenID Connect and OAuth2.0 protocols, to satisfy the requirements for less intensive calculations and lower energy consumption. As such IQB's initial exploitation plans are centred around the following pillars:

- Encourage IQB research activities related to IoT trust management and multi-attribute optimisation models for efficient and accurate trust score calculations for devices and network entities across the edge cloud continuum.
- Develop the know-how in order to move forward in the area of privacy and security by design, materialising the DevPrivSecOps methodology with software and application level security testing as part of a cybersecurity toolbox.
- Encourage the development of SSI schemes for the edge-cloud continuum for research or commercial purposes/solutions.
- Create new partnerships in the EU research domain with the purpose of initiating new opportunities with the project's stakeholders.

5.1.3.2.3. FOGUS

FOGUS INNOVATIONS & SERVICES P.C. is a thriving SME in Greece that aims at integrating state-of-the-art technological advancements and cutting-edge research achievements, towards an immersive communication and computing experience. Founded by a group of industrial and academic experts covering a wide range of disciplines in the area of Information and Communication Technologies (ICT), FOGUS exhibits strong research record and vast experience in managing and implementing ICT Research & Innovation actions. It provides a comprehensive set of services, including: software development, simulation and experimentation set up, data analysis and tooling, and modeling and performance evaluation. FOGUS emphasizes on the optimization of core procedures and processes of network functions by integrating machine learning, big data analytics and cloud-empowered optimization. Holding experience that ranges from the design of mobile communication protocols to the development of custom-made software, FOGUS undertakes: i) end-to-end set-up of network simulation and emulation environments for IoT and User-centric services, ii) development of network functions end protocols for access and transport network domains, and iii) analysis of big data with expertise on mapping network and service performance parameters to user-experience metrics.

FOGUS is currently operating an end-to-end deployment of LoRa/LoRaWAN IoT infrastructure with a cloud-enabled and modular application and network managers. This supports two key research and service lines of the company, namely network and service performance evaluation and campus/experimentation infrastructure development.

By participating to aerOS project, FOGUS is expected to gain expertise in concepts like IoT edge-cloud continuum. In parallel, FOGUS testbeds and simulation infrastructure will be extended in the context of aerOS, towards being compatible with 5G and IoT standards. The fact that FOGUS monitors the activities in 5G-PPP and EFFRA associations will assist on that as well.

In general, the involvement of the company in aerOS project is expected to strengthen company's position against the competition in the fields of experimentation and benchmarking. Also, since FOGUS invests on training and consulting services, the know-how acquired by the aerOS project will be exploited by the training and consulting sector in FOGUS to devise new courses and training material.

5.1.3.2.4. ICT-FI

ICT-FI aims to strengthen its scientific and technical expertise in cutting-edge research topics, and that is for the benefits of its clients, particularly in the area of edge computing and its management.

This will be implemented through:

- incorporating the project results to the knowledge base of the company's staff,
- using the outcomes of aerOS to reinforce current R&D initiatives and to strengthen the solution portfolio of the company,

- exploiting the aerOS results as a catalyst for generating further research projects in relevant scientific and technological areas.

The interaction with industrial partners will keep ICT-FI competitive for future research and innovation activities. The exploitation of the project's outcomes will enable ICT-FI to develop new business models and enhance its reputation and competitiveness in the fields of next-generation mobile systems. ICT-FI is also interested in strengthening its ties within the consortium and the relevant technological sectors, fostering future collaborations with top-level academic and industrial partners.

5.1.3.2.5. INFOLYSIS

INFOLYSIS 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 will exploit aerOS results by increasing INFOLYSIS's presence and penetration in the respective areas of 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, so as to guarantee a fast adoption of the project outputs and easier commercialization of its chatbot based services.

INFOLYSIS participation to the aerOS project, in particular through the INFOLYSIS provision of smart networking, connectivity and communication services (and potentially the use of chatbot as an informative end-user tool) within the framework of Use Case No 5, and in conjunction with the participation and outcomes of relevant IoT and 5G related projects (AerOS and EVOLVED-5G) will further:

- Foster INFOLYSIS IoT R&D activities coupled with smart networking and chatbot technologies
- Enrich the know-how and the research expertise of the company in IoT/continuum technologies under several different environments with focus on smart buildings
- Demonstrate gains of the **aerOS** architecture in an edge deployment for energy efficient, sustainable, flexible and health-safe smart buildings.
- Create new chatbot based products and services targeting new markets and sectors
- Exploit aerOS results within scientific communities, IoT and chatbot apps markets
- Enhancing its participation in the evolving SMEs ecosystem, IoT and chatbot apps markets.
- Participate in new SME accelerator communities and incubator programs through which INF will further disseminate aerOS developments, results and experimentation opportunities
- Use expertise gained in the research activities of ongoing IoT and 5G related projects in which INFOLYSIS participates for further enriching and promoting aerOS project's activities and achievements.
- Acting as a liaison among different research projects' common activities and promoting the engagement of SMEs in mutually beneficial activities
- Communicating aerOS activities to associations and working groups in which INF is member (e.g. NetworldEurope, SME WG, Comms WG, NGIoT communication task force, EU-IoT) diffusing in this way project results among several SMEs and startups that may act as external third-party experimenters/stakeholders.

5.1.3.2.6. PRO

PRODEVELOP has over 25 years experience offering solutions to the port sector. A wide range of products and solutions have been used by different Port Authorities and associated areas like Terminals. aerOS will give the opportunity to Prodevelop to optimize our current software offering solutions to port terminals. The potential users of our aerOS results will be container terminals which are part of the Maritime Industry. We expect that our results will be validated through the Port Continuum pilot which will demonstrate the benefits of the aerOS by executing a group of use cases that have as main objective to show how the technologies developed could transform completely the way that complex industrial processes, infrastructure and equipment is managed in a demanding industry such as the shipping one.

In particular, and thanks to the integration of edge computing capabilities and distributed framework, the project will enable advanced analytics to the industrial companies for:

- Alleviating the bandwidth required for data transmissions to central cloud servers.
- Reducing the extreme lack of scalability (and its associated computing needs) in the cloud node of the platform.
- Supporting ultra-low latency requirements for critical events, including predictive maintenance, and video analytics on the edge.
- Guaranteeing that the data collected from port terminal assets are not susceptible of being attacked thanks to the DevPrivSecOps methodology to be implemented in the project.

Consequently, aerOS results will be incorporated to the Big Data and IoT services and products in Prodevelop's portfolio, with special attention to POSIDONIA Terminal 4.0, our IoT and Big Data solution for Smart Ports, which will be further enhanced with new frugal AI services in the field of predictive maintenance and computer vision.

Finally, as agreed in aerOS GA, PRO's outcomes will be available in official project tools and repositories established for the project management. Therefore, those granted Open Calls that require some openly accessible components of our suite will be at the disposal of the participants as agreed by the GA as well.

5.1.3.2.7. DST

DST is an Italian system integrator and digital company active in research, development and innovation projects. DST provides a wide range of digital services to EU players, it is a Digital Consulting company and its main business is to support its customers in the development and maintenance of IT solutions, adopting a Cross-Pollination Methodology. With over 200 employees and collaborators, DST participates in several national and international R&I projects. The Research and Innovation division, in particular, is fully dedicated to the conception and development of innovative solutions such as, for example, new e-commerce services, semantic technologies, Artificial Intelligence (AI) technologies, and Big Data analysis.

In this respect, the development of the next generation of higher-level (meta) operating systems for the smart Internet of Things embedded in a compute continuum from IoT-to-edge-to-cloud contributes to the advancement of DST know-how in the field. aerOS has the potential to affirm itself as a European platform of key value for the development of the computing industry at the European level. In this way it could represent a relevant technological solution to fill a gap in the computing sector. Furthermore, the project may support DST's R&D activities by fostering its expertise and project DST into the technologies of the future.

The solution might also improve DST's capacities to process data from distributed sources by leveraging the edge computing's high bandwidth and low-latency. In this way, the solution will serve as an enabler for the creation of further digital solutions. Furthermore, the flexible architecture of aerOS will further enhance the possibility of employ it in several context and guaranteeing trust, security and privacy.

All of this will also translate in an enhanced capability of DST of providing further services to its clients needing to manage a vast amount of heterogeneous and unstructured data.

Finally, the knowledge gained via the aerOS project and the project outputs may act as a catalyst for the development of further projects. Participation in these initiatives might also benefit aerOS because it would make the project more widely known to other key players.

5.1.3.2.8. S21Sec

After the acquisition of S21Sec and ExcelliumSA by Thales Cyber solutions, under the holding company Maxive Cybersecurity, the group has become a global leader in advanced technologies and cybersecurity.

S21Sec Cyber Solutions by Thales, which is the new name for the corporate brand, will leverage Thales' leading Cyber Solutions business to enrich its offer and reinforce the capabilities of its Global Security Operations Center (SOC) in Madrid through Thales networks, to ensure greater efficiency in incident detection and response processes and better support international customers. With more than €1bn in sales generated in 2021 through an extensive cyber portfolio, Thales is involved at every step of the cyber value chain, offering solutions ranging from risk assessment to protection of critical infrastructure, supported by comprehensive threat detection and response capabilities. The portfolio provided for IT/OT & Cloud cybersecurity services can be grouped as follows:

- Advisory services (Compliance & Regulatory, Cyber security Ratings)
- Cybersecurity Infrastructure (Network, data, application, cloud security)
- Managed detection and response (SOCaaS, Threat Intelligence detection and response, Threat Hunting)
- Test, adapt and prevent (Red teaming, Vulnerability Management, Application testing/code review)

S21SEC intends to use the results of the aerOS research to improve the process of continuous integration and continuous deployment of managed cybersecurity services using the DevPrivSecOps methodology, supporting the company's strategy for S21SEC's SOC services provided globally.

S21SEC will deliver a DevPrivSecOps methodology that will ensure security by design in the software deployment process of the different software enablers for the aerOS IoT edge-cloud continuum platform and will particularly focus on the cybersecurity enablers to be applied in such architectures.

S21SEC will apply DevPrivSecOps methodology in Research and Development department enhancing the S21SEC internal corporate process helping to create environments for recurrent testing in R&D projects. Additionally, the experience and knowledge in DevPrivSecOps principles and practices will help to build a corporate offering of consulting services oriented to the assistance and implementation of DevPrivSecOps processes and methodology to be incorporated in the company's service portfolio.

S21Sec's role in aerOS will focus on the corporate strategy for the deployment of cybersecurity services, aligning the business strategy with the objectives of the aerOS project. S21SEC is responsible for the management of threats, detection and handling of breaches, the building of incident response and recovery capabilities in organizations, prevention techniques, education of the employees with the best cybersecurity practices, and alignment of business goals with the cybersecurity principles.

S21SEC will enhance with the results of aerOS their offer for managed security services in IoT edge-cloud continuum deploying these services both in the edge and also in the cloud of aerOS platform. For S21SEC it is crucial that new managed service offerings are designed to enhance, optimize and transform value creation along the entire value chain, both on the provider and user side.

The implementation of security in decentralized edge-loud IoT environments will enable the identification and development of new technology needs, allowing the services provided by the enterprise to be upgraded to meet the needs of next-generation networks. With aerOS, S21SEC will achieve a new position to their offering for managed security services.

5.1.3.2.9. MADE

MADE is one of the 8 italian Competence Centers, selected by the Italian Ministry of Economic Development, acknowledged as Digital Innovation Hub by European Union. MADE provides a set of knowledge, methods, technical and managerial skills on digital technologies to support companies in their digital transformation

towards Industry 4.0. On the other hand, thanks to the large demo-center of over 2000 m^2, it provides an I4.0 – based pilot production facility for pioneering test, demonstration and development project realization.

MADE mission is to lead companies digital and sustainable transformation, leading a complete industry migration towards digital transformation by: i) informing and showing Industry 4.0 technologies, ii) explaining them by specific training activities, and then iii) transferring and implementing technological solutions through projects (Test Before Invest). MADE is therefore proposed as a technical interlocutor to which companies can turn not only to manage activities of innovation, technology transfer, applied research and assistance during the implementation of 4.0 technologies, but also to receive a suitable support to reconsider their organizational and business models. Finally MADE is a public-private consortium composed of more than 51 partners clustered in: 4 Universities, 2 research facilities, 43 Manufacturing Companies including software technology providers and one public entity.

Namely MADE testing facilities is composed by 25 technology use cases and 6 manufacturing technology scenarios simulating the integration of digital technologies in a complete manufacturing production process cycle. The second area is reserved for digital twins, lean production and logistics 4.0 is a small compact plant, where the production of mechanical valves for the oil & gas industry is simulated, in a production chain. The area exploits, in a real production line, the advantages deriving from the use of digital tools such as Industrial IoT, Cloud, Data Analytics, Collaborative Robotics, Virtual Commissioning, Product and Process Digital Twin. The area includes robotics and mechatronics components, a transport line, AGVs for intralogistics, a machine tool and a station where individual components are assembled manually. The entire process is replicated in this area, where mechatronic processes and logistics can also be remodelled using the plant's virtual commissioning solutions. Materials are moved within the plant using logistics 4.0 and the product's progress can be traced in real time. A fleet of AGVs from different manufacturers is used to demonstrate various integrated single operator setups. An innovative indoor navigation system combined with a positioning system based on BLE beacons can be used to replan trajectories and identify the component used in the demonstration.
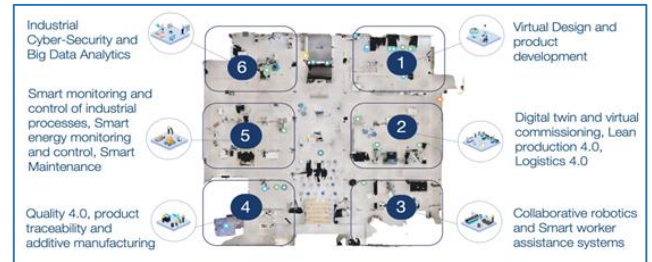
Figure 58 Area 2 digital simulation
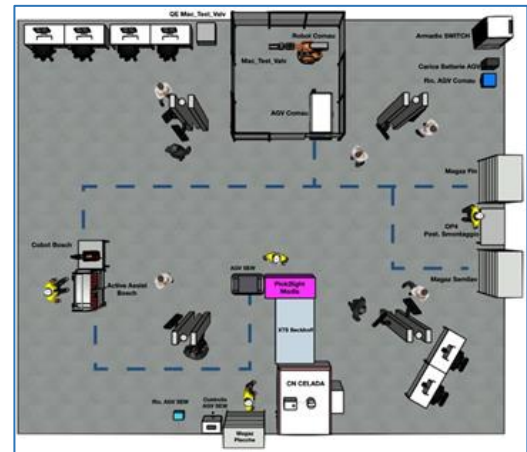
Figure 59 MADE Six use case scenarios

AerOS platform will improve the current status of the technological area introducing: (i) a more distributed (towards the edge-layers) computing power architecture that will enable real-time computing and permit to avoid transmission of huge amount of data to the cloud; (ii) introducing a Decentralized intelligence by Frugal AI/ML system that will contribute to increase network and orchestration efficiency; (iii) enable data interoperability and standardization for data coming from different third-party components and (iv) introducing ease of use and implementation of these applications by ad-hoc APIs that enable flexibility, scalability and versatility of the whole solution.

aerOS demonstration will allow MADE testing facilities to:

- Enable new technology scenarios and use case linked to IoT edge-cloud technology scenarios and data management;

- Demonstrate easy configuration of advanced networking and computing orchestration in the edge-cloud continuum

- Demonstrate network and energy consumption efficiency concepts that industry 4.0 new technologies introduce

- Update learning environment and infrastructure to nurture future teaching factory initiatives;

- Generate new knowledge to be transferred to MADE partners and ecosystem;

- Connect with European, national and international partner of Edge to Cloud innovation ecosystem. In addition MADE will exploit aerOS knowledge within EDIH service portfolio and connect with the EDIH Manufacturing Network and AI Testing Facilities

Expected exploitable routes leverages MADE mission pillars that are:

- Awareness Raising, showing aerOS solution in webinars, guided tours and demonstration event organized with end users;

- Education, defining new teaching factory courses;

- Test Before Invest, enhancing the renewed scenarios in future R&D project at regional, national, European level; generate new advisory services related to Edge to Cloud Continuum; develop new pilot services exploiting gained AEROS dataset

Table 20 Key Exploitable Results

KEY EXPLOITABLE RESULTS	EXPLOITATION ROUTE
New Lean I4.0/I4.0 technology scenarios	Consultancy, guided tours, Demonstration event
Update learning environment and infrastructure toward aerOS system	Teaching factory, Training courses
New knowledge	Further research (e.g. regional, national, EU projects)
Connection with new European and international partner	Synergies with EDIH service portfolio

5.1.3.3. Digital Technology Providers

5.1.3.3.1. TTC

With the trend towards intelligent and automated farming or, in general, with the trend of (semi) autonomous mobile machinery operation, safe and secure computing HW/SW platforms for connected and cooperative mobile machinery (e.g. for farming, construction and forestry) are a necessary precondition. There is a significant interest for such systems claimed from agricultural OEMs such as John Deere being a partner in the project, or others (potential) customers of TTControl. TTcontrol aims at developing a safe and secure high-performance platform, including e.g. a main control module for safe operation, gateway module, or a local HMI with corresponding external infrastructure. This will close essential gaps in the high potential area of smart farming, construction machinery domain, with huge market potential. Moreover, replicating the same platform in several vehicles will allow for autonomous operation of an electric vehicle driver-less fleet, which has in turn, potential to reduce the CO_2 footprint. In addition to that, precision farming technologies offer a pathway to reduce resources, increasing yields and quality of produced goods on one side, and by means of the digitalized approaches integrated control of machines involved in production or construction process can be realized. All this will be supported by the proposed by TTControl solution for more autonomy in a field or at a construction side.

The aerOS project greatly supports the mentioned development activities and is an important step for TTControl to approach relevant markets during the project duration and beyond, leveraging project results for commercial exploitation in the future. As done with other developments of TTTech Group, in a longer term the results shall be applied to other industrial sectors as well. Utilizing the results and transferring them to other additional areas will allow TTControl to grow and establish extended product line(s). TTC will add the expected project outcome, as from other R&D projects to the company product portfolio using the same business model when the technology has been productized.

To conclude, as a key off-highway product supplier, TTControl can meet safe and secure computing platform requirements for autonomous operation. With this, TTC plans, in general, to increase its turnover and support

as well as generate highly qualified, long-term positions in Vienna, Austria. In the long term, TTC will potentially offer a new product line addressing (partially) automated driving and operation for mobile machinery to stay competitive in the next 5 to 10 years. Furthermore, including the TTC's technology the Tier1 suppliers and OEMs will be able to offer performant and cost-efficient products on the leading edge of technology and improve their competitiveness.

5.1.3.3.2. ERICSSON

Over the past 6 years Ericsson has become more involved in the IoT space. In 2017, Ericsson was engaged in multiple IoT platforms focused towards connected vehicles and digital transformation. Smart Factories using Industry 4.0 concepts posed connectivity and coordination challenges in an effort to maximise productivity, flexibility and safety. Advances in IoT and 5G technologies provided the speed and connectivity for new use cases and ways of working in this space (Figure 60).
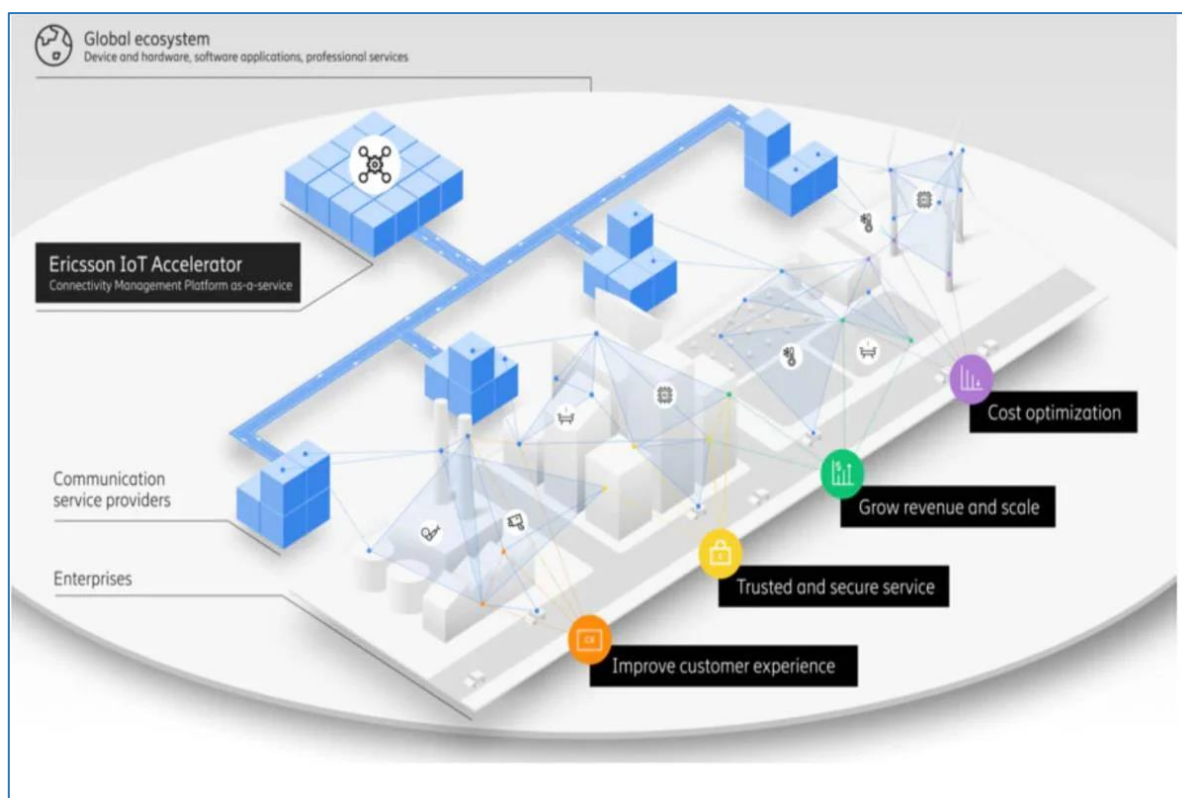
Figure 60 Ericsson Exploitation plan

In 2018 Ericsson released the IoT Accelerator Marketplace to help address the need for collaboration within the digital ecosystem community and benefit developers and service providers. A catalog of IoT applications was made available to service providers allowing for a shorter time to market for new offerings to their enterprise customers. Application Developers could utilise global cellular connectivity APIs and engage with the IoT ecosystem as a shopfront. Monetization and settlement capabilities allowed for billing across the ecosystem.

In 2019 Ericsson continued its work in the IoT domain, new use cases around sustainable development were highlighted for connected vehicles leading to investigations into reducing transportation emissions. New areas such as smart water management and global cellular connectivity for IoT devices highlighted new challenges for the network and the digital ecosystem.

Over the past 3 years Ericsson has continued to be involved in the IoT domain, partnering with industry leaders to continue development in connected vehicles and cellular IoT. Ericsson has continued to investigate new areas such as smart irrigation, supply chain visibility, smart agriculture, urban public transport and mobility, smart grid, offshore industries, and EV charging (Figure 61).
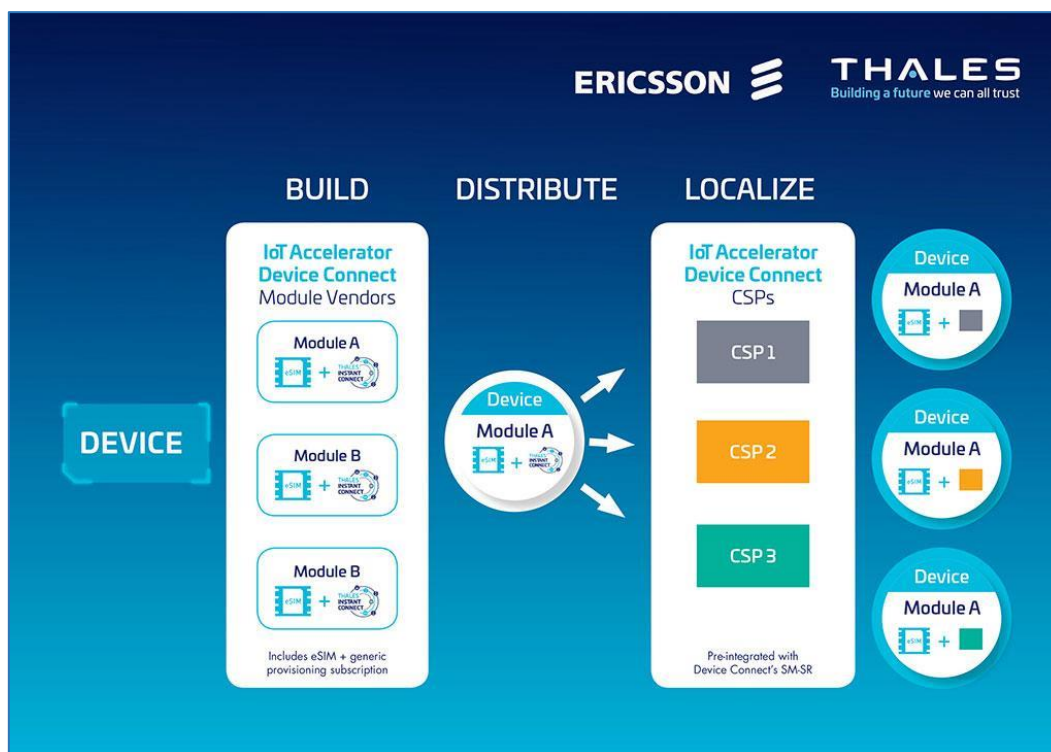
Figure 61 Ericsson IoT Accelerator device

Most recently Ericsson Internet of Things, in partnership with Thales, has launched the IoT Accelerator Device Connect with first-ever connection-ready generic eSIMs for enterprises. At the core of IoT Accelerator Device Connect is an innovative generic profile on every enterprise eSIM, allowing IoT devices and modules to be shipped connection-ready without the need to pre-select mobile network providers. With IoT Accelerator Device Connect, manufacturers can ship a single global stock-keeping unit (SKU), giving enterprises full control to easily and programmatically select the Service Providers that best suit their deployment needs. Via Ericsson IoT's digital marketplace, enterprises can choose the most suitable partners for each device's use case, selecting from Ericsson's extensive ecosystem of global Service Provider members.

aerOS will provide Ericsson with an opportunity to foster the growth of its Innovation department focused on IoT edge-cloud continuum. The knowledge and experiences gained from our involvement will be disseminated internally to our engineers, research teams, managers and product leaders providing insights into the IoT perspective and ways of thinking in regard to networking and communication with Edge and Cloud.

5.1.3.3.3. SIEMENS

Siemens, being the largest industrial manufacturing conglomerate in Europe, is involved in the development and application of innovative technologies for many areas, mainly industry, infrastructure, transport, and healthcare. Siemens creates solutions that add real value to the diverse customers and verticals that those areas represent. Often, those solutions involve services provided by distributed digital infrastructure elements, such as edge computers, controllers, sensors, actuators, or cloud-based applications. For that reason, novel solutions for the cloud-edge continuum as the ones developed by the aerOS project constitute a well of exploitation potential for Siemens´ activities.

Siemens has positioned itself as a leading Industrial Internet of Things (IIoT) vendor with its Siemens Industrial Edge Platform. The Siemens Industrial Edge Platform provides a ready-to-use edge computing platform for the industry. It enables companies using this platform to optimize their workflows, save resources and improve quality by gathering, structuring, and using a wide range of data from machines, IT systems, the cloud, and other resources. By evaluating quality parameters in real time, companies can respond to deviations immediately. In the context of the aerOS project, Siemens focuses on integrating its Industrial Edge Platform as one of the execution environments of aerOS.

Additionally, aerOS highlights the combination of various branch-independent use cases. Open standards like MQTT, supported by the Siemens Industrial Edge ecosystem, help to lower the boundaries towards other non-industrial use-cases. Due to the setting of an industrial platform, it is also possible for other providers to integrate their solutions effortlessly for industrial customers.

Another interesting offer in Siemens´ portfolio is Mindsphere, a cloud infrastructure perfectly adapted to the needs of industrial environments, for example in terms of cybersecurity. By the combination of the Mendix, Mindsphere, and the Industrial Edge Platform, Siemens offers the whole state-of-the-art IT-infrastructure from edge to cloud and easy and flexible no-code/low-code user interface design. Using this infrastructure in the context of the aerOS project, Siemens evaluates approaches to overcome the classical three-layered approaches of cloud, edge, and IoT, to transition to a seamless cloud-edge continuum. That will make it easier than ever to design, implement and orchestrate complex use-case fulfilling all requirements of industrial domains, such as cybersecurity and reliability by default. In short, Siemens aims to tackle the challenge of industrial machine learning operations to enable the standardization of machine learning offerings ultimately utilizing the strengths of cloud, edge and IIoT environments joint seamlessly.

As showcased by its product portfolio, Siemens recognizes Industry 4.0, the smart factory, and the IIoT as the future of industrial manufacturing. However, the right communication frameworks should be used to achieve such goals of flexible production plants and intralogistics. It is in that regard where the 5G broadband cellular networks and deterministic communication standards, such as TSN or DetNet, open important new prospects for the company and its customers.

The performance of the infrastructure elements (devices or software applications) is key for an efficient deployment of 5G networks, especially in industrial and other mission-critical applications. For that reason, Siemens develops ultra-reliable communication elements such as the SCALANCE Industrial 5G routers. However, these solutions require higher layer communication technologies and services that leverage the potential of 5G deployments, gap that can be filled in many verticals by the aerOS meta operating system.

One of the goals of aerOS is TSN compliance. That aligns with Siemens´ Time Sensitive Networking solutions, that aim to open new perspectives for highly agile and available communication for established industrial communication protocols, such as PROFINET or OPC UA.

Lastly, in the context of the aerOS project, Siemens also explores solutions for service and resource orchestration with the focus on resource and energy consumption optimization. This topic is especially relevant in the edge and far edge environment which is provided by the pilots of aerOS project. Originally, optimization problems were solved by Mixed Integer Linear Programming which is resource and time consuming. With the aerOS project, Siemens evaluates more efficient methods e.g., Deep Reinforcement Learning as orchestration approach.

5.1.3.4. End-Users – Stakeholders

5.1.3.4.1. ECTL

Eurogate Container Terminal Limassol Ltd (ECTL) is the island of Cyprus main container port terminal, handling more than 90% of the volume of containers of the country.

The core operations of the terminal are already digitized in a central system (Terminal Operating System – TOS), that aggregates data in real time from many different sources including vessel agent input, data from the competent port authorities and machinery operators or port workers, using field devices.

Additionally, Eurogate is a group of port Terminals with twelve terminals in the wider European region (so far), thus technologies developed in one Terminal, are eventually transferred to the entire network of Eurogate Terminals.

aerOS will demonstrate the next level of digitization to the Terminal operations by automating the collection of data and data analysis though the use of IoT devices and machine learning technologies. Specifically,

Connectedness of on-the-field port machinery

Even though port machinery are usually equipped with digital PLCs (programmable logic controllers), the data produced by the machinery is isolated on the machinery itself and only accessible on-site. aerOS will demonstrate suitable, secure and reliable methodologies to aggregate this data into a single accessible point on the cloud, allowing Eurogate to deploy the technologies developed to the entire terminal operations and integrate them into the day to day production-level operations.

Deployment of ML/AI models and smart solutions

Container Terminals are already deploying propriety solutions utilizing optical character recognition and object detection in order to identify containers, cargo damages or container seals. aerOS will assist in providing a framework to deploy ML/AI models by utilizing a non-propriety an open infrastructure, allowing the faster deployment of ML/AI models or smart solutions.

The deployment of the above stated solutions within the Eurogate terminal and possibly, at the other eleven Eurogate terminals, can:

- Increase safety performance by automating high-hazard tasks (such as checking of the container seal) and removing the human factor from a high risk area.

- Increase the productivity of the port operations by reducing the time needed to

- Reduce down-time and increase maintenance efficiency by providing remote-diagnostics of port machinery and allow the deployment of ML predictive maintenance models.

- Promote or implement a unified approach and technology stack for the collection of IoT data, throughout the Eurogate group, thus reducing development costs and increasing security of the IT infrastructure.

- Provide immediate information to cargo-owners, shipping lines or other interested parties of the condition of their cargo (via connection of the TOS and the aerOS stack).

5.1.3.4.2.   JD

The flexible architecture of aerOS is a crystallization point for developing and delivery of a complete range of communication and AI solutions for end users (e.g. construction companies or farmers), as well as regional partners such as dealers, farming contractors or machinery rings. Furthermore, aerOS' flexible architecture provides an initial point for interconnecting directly addressed core process systems such as primary food production or road construction with preceding and succeeding process systems along with the full value chain. aerOS also will be backbone for integrated closed loop control of mobile machinery in different application sectors (farming, road construction, forestry).

Due to the strong anchoring of John Deere in EU area, in conjunction with other industrial and research partners, a corresponding benefit for the EU economy and research landscape can be expected. Possible product and service innovations are to be derived from the project results, or corresponding participations in joint ventures are to be created, to be able to identify in particular cross-manufacturer or cross-supplier cloud connections of sensor technology, machine systems and third-party applications with high market and customer benefit potential. The results are thus a first step towards bringing products and services to market maturity in several subsequent steps. Solutions to support autonomous smart applications of mobile machines under implementation of robust sensor technology and communication networks are a promising approach here. Principally, all results and software and hardware components to be developed can be applied in multiple areas. For John Deere farming, construction (Wirtgen Group) and forestry (JD Forestry) appear promising.

With respect to agriculture, the following market potential emerges:

In many EU countries, the number of farms will decrease by about half in 20 years. This means that the number and, above all, the acreage of large farms is growing permanently. In addition to farms, contractors, service providers, machinery rings and others operate on agricultural land. National and international competition and legal framework conditions will challenge farmers to produce effectively and in an environmental-friendly manner.

The demand-oriented supply of smallest sub-areas up to single plants under consideration of several environmental factors will only be possible by means of IT-based solutions. Provided that the solutions developed in aerOS with their application for agriculture over several vegetation periods represent a significant improvement in efficiency, robustness and practicability compared to the previous established processes, a demand will be stimulated.

The assumed improvements offer the partners of the project a good starting point for a transfer of possible developments into marketable products. For example, John Deere has for some time been pursuing an approach of integrating different players, such as software companies, sensor manufacturers or even agricultural management system providers, in its OperationsCenter or software systems while maintaining its own data sovereignty. Already today, many sensor manufacturers can be integrated into the system via partnering models and defined interfaces in a variable and customer-specific manner. Successful results of the project that can be implemented in a timely manner can be integrated in this framework and brought to farmers via existing (not only John Deere internal) sales and dealer networks, leading to rapid implementation.

Beyond EU markets, countries such as Brazil or Canada with large areas and low population density and with farm sizes often well above 10,000 ha are particularly worth considering as potential areas of application. The market potential in commercial horticulture and in parts of forestry is similarly high as in field crops, since here too the sustainability and efficiency of cultivation depends on a large number of influencing factors in conjunction with the manual and technical use of resources that needs to be optimized.

From an economic point of view, the widespread use of the overall project results is expected to increase the competitiveness of farms and significantly improve the ecological balance of agriculture.

From JD's perspective, the following exploitation intentions underlie the project:

- Safety concepts for (partially) autonomous driving applications
- (Edge-)cloud integration of own, as well as third-party, systems
- Demonstrate software-as-a-service offerings and business models
- Machine integration and networked machine interaction

5.1.3.4.3. CF

CloudFerro, as a European cloud provider and an SME intends to capitalize on aerOS' positive effects in two aspects: obtained knowledge, expertise and experience during the project execution and developed flexible metaOS architecture for building cloud-edge systems.

Firstly, the vast majority of technology and services operated by CloudFerro is open source based. With disparity in contributions to major open-source projects between European and global industry (major open software projects usually originate from US), it is difficult to find and build competence locally. Work planned in the aerOS project – thanks to its innovative and ambitious nature outline in the proposal – will greatly enhance CloudFerro's team knowledge regarding designing and development of distributed systems. This progress does not rely solely on the scope of the project. There are significant positive spillovers. For an SME, positive results of working with industry leaders (such as John Deere, Siemens or Ericsson) cannot be overlooked. Without the framework of the project, establishing such relations would be extremely unlikely. Similarly, direct access to and close collaboration with established research institutions will enable transfer of knowledge.

However, overcoming market failures and expanding expertise is not the primary goal for the company. Considering the latest trends in the cloud industry, AerOS architecture can enable CloudFerro to build sophisticated cloud-edge and multi-site (over multiple traditional clouds) systems. Without the project, pursuing flexible, infrastructure-agnostic solutions would be too expensive.

CloudFerro currently operates several traditional public clouds in separate locations and couple of big Earth Observation data repositories. However, its capability to consciously manage computing and data storage across multiple sites is limited to establishing static replication or routing policies. And changing those manually. aerOS modules can be used by the company to automatically distribute workload between multiple traditional clouds in resource- and self-conscious way, or between traditional clouds and edge locations. Something that CloudFerro is actively pursuing.

Crucially, aerOS objectives are in-line with the goals of the biggest CloudFerro's R&D project: GEP (Green Edge Processing). It's a multi-year development program aiming to move computing resources to energy sources. It will distribute computing resources geographically, to locate it directly at renewable energy, with a direct connection to the source (wind or PV farm). The company's goal is to create a sustainable, non-emissive and cheap pool of resources for its Earth Observation data processing. Integrating aerOS with it brings a new source of workload and users. Because AerOS can distribute workload directly to a location, without intervention from GEP central mechanism, it offers more flexibility and independence to separate locations. Thus, it makes the resource utilization more efficient and cost-effective. Direct results of the project planned by CloudFerro are:

- Connecting two renewable energy locations with aerOS
- Connecting one traditional cloud with aerOS

Additionally, CloudFerro intends to present its work within the scope of the project:

- As at least 1 white paper
- At, at least 3 European conferences
During at least 4 online workshops or webinars.

5.1.3.4.4. ELECT

Electrum is an APC - Alternative Power Creator offering creative engineering solutions at every stage of the investment for the renewable energy sector. We carry out projects along the entire value chain and throughout the life cycle of the project and assets: Development – EPCM – Asset Management & ESCO – Reinvestment & Repowering.

The aerOS project's exploitable outcome for Electrum are two test field locations where the implementation of the IoT-Edge-Cloud operating system is to be deployed and tested across Micro Edge & Far Edge IoT sensors installed across PV and Wind power generating installations with initial data processing on-premises running on Industrial AI Edge Computers as well as Cloud High Performance Computing operations in the distributed container-based data centers provided by Consortium Partner - Cloud Ferro.

The result type of the outcome is a demonstrator (Outcome Category - Research Achievement), where the power management system designed by Electrum for the distributed on-premises data centers can be tested, validated and certified. The demonstrator will allow autonomous management of the power balance between grid connection and local renewable energy generation capacity across two power park locations being under Operating & Maintenance service by Electrum.

The aerOS objectives are in-line with the goals of a major internal R&D project at Electrum - the development of the Virtual Power Plant Solution. The VPP solution was designed to manage the distributed energy mix with the highest possible economical and energy efficiency. Based on microservices and supported by Machine Learning Operations, the VPP solution is a completed software + hardware package delivered as Infrastructure as a Service and / or Software as a Service, offering ultimate data security and new autonomous features highly increasing the efficiency of the renewable energy mix. The platform architecture features data integration across Micro Edge - Far Edge IoT devices, Edge AI Computing and distributed Cloud / HPC data centers, providing virtually unlimited scalability. The Customer Segment that will benefit from the project outcome is reaching all energy market participants, including:

- Independent Power Producers

- Distribution Network Operators

- Power Producers, Consumers and Prosumers

- Operating & Maintenance firms

- Banks, Insurers, Crypto-Fiat Exchange

- Energy Storage Systems operators

- Infrastructure equipment manufacturers

Additionally, Electrum will capitalise on the knowledge, expertise and experience gained via other achievements of the project outcome, such as legal and regulatory analysis of the data centers located on Distributed Energy Resource locations.

The direct result of the Electrum's involvement in the project is the design, engineering and installation of the hybrid power supply connections (DER-Grid/ESS switch) and fiberoptics internet infrastructure as well as the power management system customised for the data centers located on two various DER locations (PV and Wind, possibly integrated with ESS).

5.1.3.5. Academic and research partners

5.1.3.5.1. UPV

UPV as Project Coordinator aims at enlarging its portfolio of successful projects and expects to make an impact in four technical areas related with the project goals. The research group will be supported by previous research and innovation actions led or with its participation. First, and the most prominent, UPV is expected to position aerOS results among the main contributions in the definition of the IoT-edge-cloud computing continuum architecture and principles. Second, it is expected to integrate and customise (to some extent) the capabilities of smart networking and self-* capabilities in the edge computing field (taking advantage of virtualisation and software-definition, besides the utilisation of modern orchestration technologies such as KubeEdge and lightweight distributions of K8s). Third, UPV aims to gain huge experience in the federation of AI/ML services among heterogeneous nodes, in the cloud continuum, from the device till the cloud going through the edge and far edge nodes. Four, UPV expects to enlarge the test base of fruitful integration of distributed computing technologies in different verticals with special focus in transportation and logistics, energy and Industry 4.0.

From an exploitation perspective, it must be considered that UPV is a public and dynamic academic institution. Therefore, it can be realised that the "business" issues that can be solved (needs that can be met) by the execution of aerOS are (i) enhancing the knowledge of specific technological fields developed in the project, (ii) gaining expertise and know-how with regards to actual deployments of technologies, (iii) augmenting the volume of the research team and consolidating that number, (iv) exploring new research lines and (v) envisioning potential continuation of the research through market-oriented actions (like technology transfer, consulting actions, start-ups or spin-offs creation). Considering this context, aerOS will allow UPV research team to:

A. Improve research indicators of research team (Project Coordinator and researchers) due to scientific contributions to the community.

B. Enhance and excel the current knowledge on the established fields of edge computing, CI/CD, orchestration, IoT, interoperability, self-* capabilities of heterogeneous computing nodes, machine learning, data science, distributed real-time systems and global communications and networking.

C. Consolidate the knowledge gained during the last few years about Tactile Internet, Data sovereignty, computing fabric, Big Data, DLT and 5G technologies.

D. Reinforce the orientation of the group towards practical application of the orchestration of the continuum and other technologies (aerOS is pilot-oriented and human-centric by design), through technology transfer actions.

E. Keep a stable team of 4/5 researchers devoted to aerOS throughout the project duration.

F. Establish a new research line of the group: self-* capabilities of federated computing nodes as part of the continuum.

G. Tighten the gap with the market via exploring the creation of associated spin-offs out of the results of the participation in aerOS, including potential patenting and OSS initiatives contribution.

H. Leverage the participation in aerOS for granting industrial contracts (tech-transfer or consulting activities), or, at least, put the group in a better position for endorsing this line of work.

Apart from the operative exploitation exposed above, other relevant results that will help UPV to improve its presence and impact in the field would be the following:

- At least 2 PhD theses will be conducted under the scope of aerOS.

- Attendance to multiple scientific conferences.

- Presentation of multiple scientific papers in journals and conferences focused various technological domains.

- Lecture at the university about the project and its most relevant findings.

- Organisation of conferences and seminars within the University (including posters)

5.1.3.5.2. NCSRD

Participation in aerOS, as Technical Coordinator of the project, is seen by DEMOKRITOS as a direct step toward establishing a strong research and scientific position in the field of future network architectures and management systems. Based on the experience gained by aerOS trials, NCSR Demokritos will gain experience and expertise in novel cloud continuum infrastructures and related technologies, leading to the development of an automated federated framework for continuum orchestration on top of cloud infrastructures. Such tools that will be developed by NCSRD within AEROS are planned to be further exploited as services offered by NCSR Demokritos to external SMEs in the framework of the digital innovation hub Ahedd (https://ahedd.demokritos.gr/) that operates within NCSR Demokritos premises. Furthermore, DEMOKRITOS is home to the "Lefkipos" Technical Park, which houses many private companies and startups in the fields of IT and telecommunications, where the results of the Athens platform trials will be promoted, looking for possible synergies and joint ventures.

Moreover, NCSRD foresees further exploitation opportunities of the expertise gained in 5G and cloud continuum by the signed partnership agreement with 5G Ventures Société Anonyme ("5G Ventures SA") that has been established pursuant to Article 93 of Law n. 4727/2020 (Government Gazette A' 184) and is a direct subsidiary of the Hellenic Corporation of Assets and Participations (HCAP SA). The purpose of the 5G Ventures SA is the establishment and management of Phaistos Investment Fund, based on the provisions of Article 7 of Law n. 2992/2002 (Government Gazette A' 54), according to prevailing market conditions, with guarantees for full transparency and accountability and complying with International Financial Reporting Standards (IFRS). The objective of the Phaistos Investment Fund is the public investment in businesses that are actively involved in 5G-related research and/or development of products and/or services in Greece, in sectors such as transport and logistics, manufacturing, public goods and utilities, health, tourism, information and media. As a result, NCSRD by exploiting the AEROS Platform through this collaboration will be able to support the development of services and products for the cloud continuum and 5G ecosystem.

Finally, NCSRD plans to exploit further the Cloud Continuum/5G expertise by innovation activities related to entrepreneurship and for this reason has proceeded to a collaboration agreement with the Municipality of Egaleo, and more specifically with the Entrepreneurship hub (https://hub.egaleo.gr/) for fostering further the development of innovative products and services related to 5G and Cloud Continuum by startups and young teams that are willing to get involved in the field.

5.1.3.5.3. SRIPAS

Participation of SRIPAS in the aerOS project will enlarge its portfolio of international projects and will allow to gain new and advance existing experience in the project's technical areas, e.g. semantic data processing and data homogenisation, autonomous systems, ML/AI and distributed AI (including ML/AI at the edge and federated learning). As a result, SRIPAS's standings and ranking in the academic area will be increased and a stronger scientific position in the area of Next Generation IoT will be established.

SRIPAS research group dedicated to Next Generation IoT technologies, as a result of this project, will advance it's research portfolio and toolset library. Specifically, its members will: (i) improve their knowledge of specific research and technological fields related to the project, (ii) improve research indicators for team members, as a result of new publications, (iii) possibly extend the research team, (iv) explore new research areas and potential of participation in new project initiatives (funded by the EC, or nationally) and/or market-oriented actions, (v) build collaboration with the industry.

Since SRIPAS is a research institution, it will be intensively involved in dissemination activities including:

- Masters and PhD theses pursued within the scope of aerOS,
- preparation of scientific publications and conference attendance,
- communication at the Institute and within its network of contacts, about the project and its most relevant findings,
- possible participation in tech-transfer and consulting activities based on gained knowledge.

Having aerOS in the project portfolio will enable SRIPAS to attract new PhD students, and young researchers, interested in up-to-date innovative research and working on topics with practical applicability in real life pilot use cases.

5.1.3.5.4. CUT

CUT is a relatively new but vibrant public university in Cyprus with several schools and state-of-the-art research laboratories. As a partner of aerOS, CUT will mainly contribute to the project by participating in the use case "Smart Edge Services for the Port Continuum". The team from CUT brings to aerOS previous experience with successful projects related to the maritime sector (e.g., STM, STEAM, MARI-Sense, etc.) and innovative research capacity. The CUT team is primarily responsible for the Logistics/ Port Pilot deployment and validation in the EUROGATE Container Terminal (EGCTL), Port of Limassol together with Prodevelop, Spain. The researchers from CUT aim to facilitate the digitalization of the container terminal, as well as develop machine learning models for predictive maintenance of quay cranes/straddle cariers and computer vision applications (e.g., detect container damage, distinguish sealed from non-sealed containers).

In terms of exploitation, CUT plans to further exploit the results of aerOS in the following ways:

- deepening of knowledge of current state-of-the-art technologies together with the developed tools and methods, and the highly theoretical and dense results from desk and field research conducted by the partners of the aerOS project,
- applying the developed methods in different use cases related to the maritime industry,
- establishing new collaborations with different stakeholders and partners, e.g., from the maritime industry, especially Port of Limassol, ECTL, and Prodevelop,
- updating courses taught on all levels and new PhD students,
- developing of new ideas for future research based on the outcomes of the aerOS project,
- disseminating the results in national/international workshops/conferences and journals,
- organizing seminars/webinars for academia and end users to enhance the impact of aerOS.

5.1.3.5.5. POLIMI

The participation in aerOS means a valuable achievement for POLIMI in terms of constitution of a web of knowledge. Despite the topics of software architectures for far-edge systems are already in the technical background of the university, the involvement of the department of Management, Economics and Industrial engineering is aimed at constituting a body of knowledge for the deployment aspects and the effective results of an implementation of these technologies. The innovative aspects of this research makes also the topics addressed as particularly valuable in terms of sharing of knowledge and following from a close point of view the manufacturing application will give POLIMI the opportunity to publish scientific papers about

manufacturing acceptance of these technologies as well as to increase the testbed pool to measure the most effective roadmaps for industrial digitalization.

Furthermore, the methodologies eventually developed to deploy aerOS solution in the manufacturing domain will be embodies by POLIMI and will be spread through its spinoff MIRAITEK in the context of Small and Medium Enterprises, which constitute the backbone of European manufacturing and usually are left behind in the digitalization journey.

Finally, the importance for aerOS in terms of academic perspective is not to be underestimated. In particular, it is highlighted the possibility to leverage on the expertise gained during the duration of the project to give students a new point of view on the modern challenges of manufacturing. The exploratory nature of the project in terms of acceptance of technology in manufacturing domain is already being included in a PhD research and the effort scheduled on POLIMI's side has already led POLIMI to open the first of a series of research positions.

5.2. IPR Management and Innovation Action plan

An important issue for exploitation will be the identification and management of project assets and IPR. To that end, a comprehensive inventory of individual IPR and assets will be maintained throughout the life of the project. IPR management will be implemented by collecting the Intellectual Property Claims from all partners and also, to monitor the IPR considered by partners, its typology (patent, copyright, utility model, etc.) and also, whether it is an individual or joint ownership. After the prioritization of project results, Key Exploitable Results will be extracted and further detailed by a more extensive explanation of topics related to market strategy, positioning and IPR management of the result.

In this deliverable, Innovation actions and IPR Management (including background and foreground) and Know-how issues are addressed and planned to carry out during the project, making use of the following methodology (Figure 62):
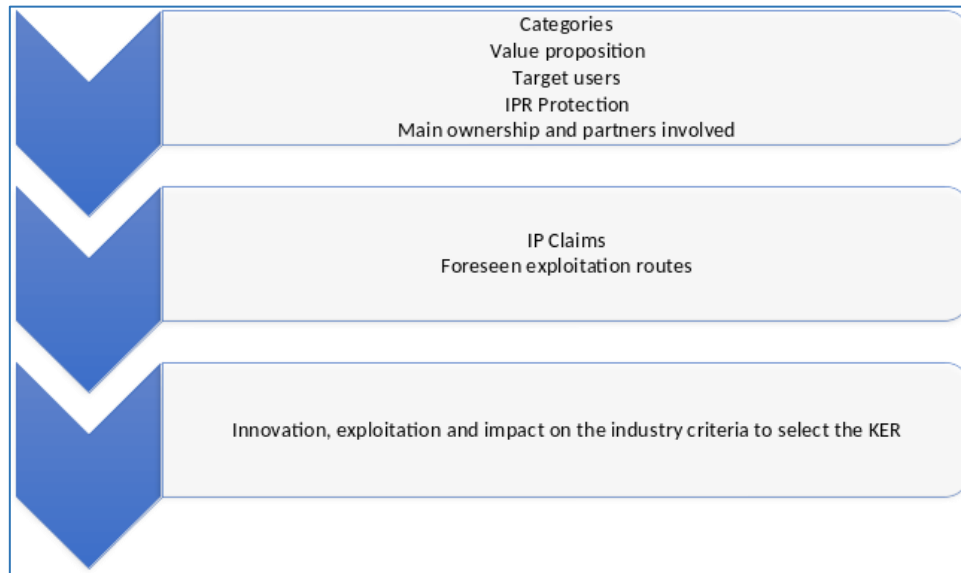
Figure 62 IPR Management (background and foreground)

To this end, the IPR Management of aerOS will be based on a BFMULO analysis. A BFMULO Analysis is applied to evaluate the involvement of each partner in related exploitable results. In order to do so, partners need to assign specific letters to each of the exploitable results according to their type of involvement.

The BFMULO analysis involves a 3 step-planning for the IPR Management:

- Define each of the letters applied to the IPR Management methodology (Table 22). The letters of BFMULO stand for:

Table 21 BFMULO letters meaning for IPR Management plan

B	BACKGROUND	IPR's on background information, information excluding foreground information, brought to the project from existing knowledge, owned or controlled by project partners in the same or related fields of the work carried out in the research project.
F	FOREGROUND	IPR's on foreground information, Information including all kind of exploitable results generated by the project partners or 3rd parties working for them in the implementation of the research project. To have an F in an exploitable result it is necessary that a partner has a task(s) in the project related to that very result
The intention of the partners to exploit the results by:		
M	MAKING IT AND SELLING IT	Making the products, manufacturing and selling or directly implementing it through own facilities and skills.
U	USING IT INTERNALLY TO MAKE SOMETHING ELSE FOR SALE	Using the result, implemented with own knowledge to develop new ranges of products or newer processing. Furthermore, the direct or indirect utilization of foreground in further research activities other than those covered by the project, or for developing, creating and marketing a product or process, or for creating and providing a service.
L	LICENSING THE RESULT TO 3rd PARTIES	Licensing the result, therefore earning from a negotiation towards third parties outside the Consortium.
O	PROVIDING OTHER SERVICES	Other, any other exploitation means (e.g.: consultancy, advisory, training, master programs, etc).

Table 22 BFMULO letters meaning for IPR Management plan

- In order to compile this information partners will be asked to fill a table containing the following information for each exploitable result (Table 23):

Table 23 An example forms for a specific exploitable result

Exploitable result: TBD		
(B) BACKGROUD		
(F) FOREGROUND		
(M) MAKING IT AND SELLING IT	Has the asset to be transformed or adapted before the sale? How?	
	Estimated time to market	
	What are the markets or segment	

	markets expected to reach?	
	Type: mass market; niche market; segmented; diversified; multi-sided platform;	
	What most important customer segment do you expect to reach?	
	What type of relationship do you expect to establish or maintain with your different customer segments?	
	Who are the Competitors?	
	Which are the distribution Channels?	
	Eventual protection of the result?	
(U) USING IT INTERNALLY TO MAKE SOMETHING ELSE FOR SALE	How are you going to use it internally?	
	(Describe the new result: characteristics, functions,)	
	Does it require any transformation or adaptation of the asset? how has the asset to be transformed?	
	What additional thing is needed to do for sale?	
	What are the key activities needed to do for that?	
	What are the markets or segment markets expected to reach?	
	Type: mass market; niche market; segmented; diversified; multi-sided platform;	
	What most important customer segment do you expect to reach?	
	What type of relationship do you expect to establish or maintain with your different customer segments?	
	Who are the Competitors?	
	Which are the distribution Channels?	

	Eventual protection of the result?	
(L) LICENSING THE RESULT, EARNING FROM A NEGOTIATION TOWARDS THIRD PARTIES OUTSIDE THE CONSORTIUM	Does the asset already complied with the standards of performance or functions (ISOs, International Norms,etc.)?:	
	If not, what additional activities are required to do so?	
	Has the asset to be modified or enhanced before the sub-license; does this imply a new version of the result?:	
	What are type of stakeholders/value chain actors we are going to grant the sub-license?:	
	Expected date of licensing:	
	Competitors?:	
	Eventual protection of the result?:	
(O) PROVIDING OTHER SERVICES SUCH AS CONSULTANCY, ADVISORY, TRAINING, MASTER PROGRAMS, ETC.	Describe the service you are going to provide:	
	What type of services?	
	Consultancy Advisory Services Training Services Master programmes offers Others (Specify which ones)	
	What are the markets or segment markets expected to reach?	
	Type: mass market; niche market; segmented; diversified; multi-sided platform;	
	What most important customer segment do you expect to reach?	
	Which are the distribution Channels?	
	Who are the Competitors?	
	Eventual protection of the result?	

- Once all the information is compiled, the BFMULO matrix will be built. Here is an example of how a completed BFMULO matrix would look like (Table 24):

Table 24 BFMULO Matrix example

RESULTS / PARTNERS	ER 1	ER 2	…	ER N
Partner 1	B F O	O	B F O	B F O
Partner 2	B F U	F U	F U	U
Partner 3	U	U	U	U
…	U	U	U	UL
...	B		B	B F O
...	U	O		O
…	O			B F O
...	U	O		O
...	B			B F O
…	B F O	O	B F O	
...	U	U	UL	U
...	B		B	B F O
…	UL	U	U	U
...	U	U	U	U
...	B		B	B F O
…	U	O	B F U	O
...	O		O	B F O

In addition, IP strategy includes: (i) the release of all developed software as open source, using MPL, LGPL, Apache 2.0 or similar software license (ii) public project results will be made available to the wide public, whereas commercial use might require agreements on related IP Results." & "aerOS will rely on open-source technologies that might imply un-tested functionalities. The contributions to open-source initiatives/open repositories are one of the project's KPIs as it is shown on the following table (Table 25):

Table 25 Open-source initiatives KPI

KPI	M12	M24	M36
# of contributions to opens source initiatives/open repositories	-	5	12

6. Conclusion / Future Work

This deliverable presented in detail the initial aerOS Communication, Dissemination, Standardisation and Exploitation plans, aerOS Target Groups, Communication and Dissemination activities' timeline and KPIs, targeted SDOs and contributions, exploitation plan, partners' individual exploitation plans, innovation methodology and initial performed aerOS impact activities were also presented and analysed in D6.1.

The actual goal of the provided plans is to support aerOS in achieving the highest impact of outcomes by targeting all intended audience and key stakeholders to the greatest extent possible. The provided plans and proposed actions refer to initiatives and activities that are planned throughout the project's lifetime and may be adjusted, updated, and enriched based on the project's evolution and the plethora of opportunities that may exist.

Any potential updates on the mentioned plans and proposed actions will be reported in the upcoming WP6 deliverables (D6.2 and D6.3). In these deliverables will be also reported all the performed activities for each reporting period of the project.