



PULSE – Plasma reconfigurable metaSurface technologies

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1. Purpose and scope of the deliverable

This document outlines the overall project dissemination, communication and exploitation strategy and associated actions, which have been foreseen in order to achieve a high level of visibility of the project outcomes, to transfer knowledge and results, and to translate the results into innovations.

This deliverable is divided into four main chapters: introduction, dissemination and communication strategy, exploitation strategy, conclusions.

The introduction chapter briefly summarizes the main objective of the PULSE project and the main reasons to foreseen dissemination, communication and exploitation activities.

The dissemination and communication strategy chapter defines the plan for the dissemination and communication activities, including objectives and the target to reach, with dedicated subchapters describing the dissemination and communication tools that will be used during the entire project duration and even beyond.

The exploitation strategy chapter provides an initial idea about how the exploitation of the project will be conducted and the next plans to be implemented.

This deliverable ends with brief conclusions that highlights the main strategy behind the dissemination, communication and exploitation plan, summarizing also the related results obtained in the first six months of the project.

2. Introduction

PULSE is a European Project funded under the call *EIC Pathfinder Open 2022*, pursuing the ambitious goal of defining a **new technological horizon for implementing reconfigurable electromagnetic devices** by unifying the research domains of **METASURFACES** with **PLASMA** physics.

The main objective of the project is to exploit **plasmas-based metasurfaces** as a **radically new technological platform**, which allows to conceive and realize **cutting-edge devices exhibiting novel functionalities**. In particular, the proposed research program aims at revolutionizing the tuning strategies currently employed for artificial metasurfaces as well as introducing brand-new unprecedented functionalities for the next generation of wireless systems. The radically new strategy we investigate in this research project will allow:

- to extend the applicative scenarios of reconfigurable metasurfaces to the millimeter-wave frequency range, where effective and fast tuning approaches are currently not available;
- to define a completely new approach for designing meta-atoms whose properties change both in time and space;
- to provide the scientific and technological fundamentals of an unprecedented family of metadevices composed by shape-varying meta-atoms;
- to improve the power efficiency and the reconfigurable capability of discharge technology with the aim to make plasma MTS a plausible candidate for everyday equipment.

The definition of these unprecedented technological lines, ensuring reliability at high frequencies and fast tunability rates, is of paramount importance to address the requirements of the future information society, especially in the area of **security** and **critical safety** applications. Therefore, we expect this technology to have a **huge social and economic impact**, as it will affect many application fields, such as telecommunication and navigation (compact antennas and EM shields, multi-/narrow-/broad-band, reconfigurable, electronically steerable, jamming resistant), Information and Communication Technologies (antennas embedded in internal/external surface of buildings, cars, aircrafts, mobile phones or wearable tissues open new horizons allowing high data rate interlink communication between users), aerospace, aviation and ground transportation, consumer electronics and health, driven by a major innovation in the physical layer of the future RF, microwave, and mm-wave systems.

PULSE aims at **maximizing its impact** through the proper combination of several **dissemination, communication and exploitation activities** distributed throughout the 3-year duration of the project and **for at least three additional years after its end**. These activities will focus on three target groups: (1) the scientific community, (2) the general public, and (3) the industries. These target groups will be addressed by different communication channels and tools, as detailed in the next chapters. In order to maximize the scientific and technological exposure of the project findings at a global level and ensure continuous and widespread dissemination, all the partners of the Consortium will be actively involved.

3. Dissemination and Communication Strategy

The *dissemination and communication activities* are foreseen to support the project in raising awareness about the issue and challenges addressed by PULSE, also involving external stakeholders, different scientific communities, and the general audience.

In particular, the **dissemination activities** of PULSE are aimed at spreading the progresses and the results of the project to different scientific communities (e.g., metamaterials, electrical & communication engineering, plasma physics and technology, material-science, antennas and microwaves, etc.). Given the strong interdisciplinary challenges of PULSE, these activities are also important to obtain **technical feedback** and keep updated the project state of the art.

In this framework, special attention will be devoted to the education of **young researchers and students** and several related activities (e.g. doctoral schools, training and workshops at scientific events, etc.) will be carried out. In addition, we will target to submit **scientific papers** on journals supporting green and, preferably, gold open access, as to maximize access and reuse of results. These papers will be made available before publication through open preprint databases.

PULSE also includes several kinds of **communication activities**, to ensure the highest visibility of the project scope and results. The communication activities are mainly aimed at informing a multitude of audience about the scopes, the project, and its main results. The language and the tools used in these initiatives will be specifically chosen for targeting also a *non-expert audience*.

The dissemination and communication activities are guided by the reference scientific association for metamaterials in Europe (Metamorphose-VI AISBL), which has been established in 2007 and, since then, annually organizes the most scientifically relevant Congress for the Metamaterials Community as well as several highly-attended schools for PhD students and post-doc researchers.

The *dissemination and communication activities* involved in the PULSE project are summarized in

Table 1, where also a tentative time schedule of the different activities is reported. More details about the different **dissemination and communication channels and tools** are reported in the following sections.

Table 1: Tentative schedule of the dissemination (D) and communication (C) activities.

Dissemination and communication													
#	Activity	Quarter											
		1	2	3	4	5	6	7	8	9	10	11	12
D1	Conference abstracts												
D2	Journal articles												
D3	Special sessions, tutorials, workshops												
D4	Doctoral school												
C1	Promotional materials												
C2	Website & Social media												
C3	Press news												
C4	Divulcation events												

Please note: The schedule of the dissemination and communication activities could be subject to modifications throughout the project lifetime in order to better adapt to the developments of the project itself and to the opportunities that arise from outside the project.

3.1. Dissemination channels and tools

Several **dissemination channels and tools** will be exploited throughout the duration of the project for the **promotion and dissemination of knowledge** on the scientific and technical achievements of PULSE activities. The dissemination materials will be realized according to the different communication needs, to the various event/channels typologies and to follow the project evolution and results. So far, the following mechanisms have been identified as useful for dissemination purposes.

3.1.1. Conferences and workshops

In order to raise awareness of PULSE's project objectives and achieved results, the Consortium plans to attend a wide range of external scientific conferences and workshops across Europe and beyond.

In particular, the Consortium plans to submit contributions to the main scientific conferences of the involved scientific communities (e.g., electromagnetics, communications, metamaterials, plasma physics, and material science). In addition, submissions of proposals to organize special sessions, tutorials and workshops at scientific conferences are expected.

This approach allows disseminating the main results of the project to the interested scientific communities and enabling them to use the results in their own work, as well as getting feedback from the peers about the obtained results and the expected next steps.

Each consortium partner is involved in the dissemination activities and will define his own objectives in terms of participation and publication in targeted conferences of international/national/regional interest. However, the Consortium as a whole will regularly submit and present papers about the PULSE project's objectives and results.

In addition to participating, in various forms, in external events, the Consortium have also agreed to organize two scientific workshops in the first year of the project for brainstorming and defining the scientific guidelines of the research. In particular, a first internal scientific workshop, restricted to the project participants, was hosted by FORTH in a hybrid format on September 10, 2023. In this

workshop, all the partners have presented the general guidelines they are following (or they have planned to follow) to carry out the research activities throughout the entire project.

Moreover, during the first two progress meetings (on June 26 and September 10), the Consortium has started to define some of the organizational aspects for an external workshop. In particular, it was agreed to:

- Organize the workshop in an online format (to facilitate the participation of leading scientists from all over the world) on January 2024;
- Invite representative of both universities and companies to get feedback about industry needs and expectations;
- Tentative title of the workshop “Plasma Electromagnetics: expectations, current trends and challenges”.

The final stage will be to organize the final conference of the PULSE project (tentatively scheduled on M36 at RM3 premises), with the ultimate objective of increasing awareness and support for building the future PULSE’s results adoption, by creating expectations and finding industries and organizations interested in exploiting these results.

3.1.2. Scientific papers

The Consortium members will promote the PULSE project through the submissions of scientific papers to peer-reviewed journals supporting open access publication. The journals will be selected based on the scopes, the impact factor and reputation. The submitted papers will be made available before publication through open preprint databases (i.e., arXiv, TechRxiv).

3.1.3. Doctoral schools

The Consortium will encourage students and junior researchers to pursue research on the topics of the project by organizing at least one doctoral school, hosted by one of the partners, where the team researchers and younger leaders will be the key lecturers.

3.2. Communication channels and tools

Several **communication channels and tools** have been and will be exploited throughout the duration of the project for **informing the general public and students** about the project scopes and the main achievements, as well as for **informing potential stakeholders and venture capital** of the business opportunities deriving from the industrial exploitation of the project results. So far, the following mechanisms have been identified as useful for communication purposes.

3.2.1. Logo and visual identity

As reported in Deliverable D4.1 - Website and project logo, an eye-catching and simple logo for the project have been created. Aiming to be used in different media (e.g. social account, website, meeting slides, etc.), a light and a dark version have been designed, which are both reported below. The logo will be added, when possible, to any official document related to PULSE, to any dissemination and communication material, and to the websites of the Project partners.



Figure 1: Light (left) and dark (right) version of the project logo.

3.2.2. Website

The PULSE website has been released on April 28th, 2023. It can be accessed through the URL <https://www.pulse-pathfinder.eu/> and it is intended as a primary tool to obtain information about the PULSE project. Indeed, it is an important element in its Communication strategy, acting as a first contact communication tool and main information resource. The website will be regularly updated throughout the project lifetime in response to any news on the project and partner activities.

The website will also include some media materials such as images and short videos from the PULSE's meetings, workshops and conferences.

3.2.3. Social network tools

Social media have become an essential tool for communication, networking and content sharing purposes. Therefore, they will be crucial for implementing the communication and dissemination strategy of the PULSE project, by reaching relevant stakeholders, establish an online presence and increase PULSE project awareness in both scientific community and general public.

Since April 2023, PULSE is present in LinkedIn and Twitter (the most relevant social media channels in the scientific and business world) with the following accounts:

- Twitter - <https://twitter.com/PulsePathfinder>
- LinkedIn - <https://www.linkedin.com/company/pathfinder-pulse>

where several contents to increase PULSE project awareness in both scientific community and general public have been already published.

3.1.1. Press releases and editorials

A key objective of the project communication strategy is ensuring that all relevant audiences are aware of the PULSE scope and scientific results. An important part of the PULSE communication plan will be to create and use an eclectic range of official press releases for a selection of different targeted audiences. Press releases will be released in correspondence with relevant project milestones or for specific noteworthy events, in order to inform both external stakeholders and national media.

Eventually, articles written for magazines aimed at more general audiences will have a higher level overview of the project and will use more open and accessible language, whilst pieces for the more specialized magazines will have a much greater level of project details.

In addition, a number of selected magazines will be contacted to assure that project will have some editorials. Of course, the Consortium is not to be held responsible for what is written in the editorials.

3.2.4. Leaflets, banners, and branded material

Leaflets, promotional banners, and a number and different types of branded material (e.g. stickers with PULSE's logo, pen, pencils, notebooks, etc.) may be developed and produced in occasion of the different meetings and events which all Consortium or single partner will participate to.

3.2.5. Exhibition booths

PULSE project's scope and results will be shown in different conferences/exhibitions in a specific booth or at partner's booth.

4. Exploitation Strategy

The **exploitation activities** to be carried out during and after the research project to foster the translation of research results into innovation are summarized in Table 2. These measures are aimed at **creating awareness** of the advantages of this new technology in as many as possible relevant **industrial stakeholders** working in the following areas: telecommunications, civil security, electronic defense, aerospace, networking and consumer electronics. The success of these activities is also fostered by the presence of two technological SMEs in the Consortium with a strong research and industrial vocation, which will be responsible of defining effective exploitation plan and technology roadmap.

We also underline that among the SMEs customers, there are several **key European industry and institutional players**, such as AIRBUS, Thales group, the European Space Agency (ESA), etc., which will be invited to the **round tables and workshops** and may play an important role to maximize the exploitation of the project results. As shown in Table 2, all the measures are properly distributed throughout the entire project duration and for (at least) the next 3 years after, according to the expected progress.

Furthermore, to accelerate the exploitation measures the project is planning to make full stock of the **Horizon Result Booster initiative** already experienced by participating SME partners in the frame of other **H2020 projects**.

Table 2: Summary of the exploitation activities.

Exploitation activity	Scopes	Tentative Schedule (quarter)
Organization of round tables and meetings with relevant industrial stakeholders and professional actors to get feedback about the industry needs and expectations	Getting feedbacks from the industry about the expectations of a new technology for tunable telecommunication devices.	Q3-Q4
Organization of industrial workshops, demonstration days and a final conference to illustrate to relevant industrial stakeholders and professional actors the main results of the project and the performance expected by the proposed technology.	Creating knowledge in the main industrial stakeholders about the advantages of the proposed technology	Q9-Q12+
Submissions of patents	Protecting the intellectual property	Q11-Q12+

4.1. Exploitation channels and tools

Several **exploitation channels and tools** will be exploited throughout the duration of the project, which will be detailed in the next release of the document.

5. Conclusions

This deliverable presents the **Dissemination, Communication and Exploitation Plan** for the **PULSE** project. In particular, this plan identifies, organizes and establishes the channels, tools, and activities that have been and will be used in order to **promote PULSE objectives and results**.

On the current issue of this deliverable, we have also presented the current outcomes of the dissemination and communication activities until month 6, which are briefly summarized below:

1. Implementation of the project Logo to define the visual identity of PULSE;
2. Implementation of the PULSE website as a first contact communication tool and main information resource;
3. Creation of social media accounts (on both Twitter and LinkedIn) and publication of several contents to increase PULSE project awareness in both scientific community and general public;
4. Organization of an internal scientific workshop, restricted to the project participants, which was hosted by FORTH in a hybrid format on September 10, 2023.
5. Starting the organization for an external scientific workshop (tentatively scheduled on January 2023).

The implementation of this plan will be monitored and the strategy outlined will eventually be updated during the lifespan of the Project. Moreover, an update of this document is foreseen on February 2026, with the Deliverable D4.4 - Dissemination, Communication & Exploitation Plan Issue 2.0, where the final version of plan for dissemination and exploitation including communication activities will be reported.