ENLIGHT'EM

European Training Network in Low-Energy Visible Light IoT Systems

Innovative Training Networks (ITN)
H2020-MSCA-ITN-2018

Deliverable D5.1

Initial Dissemination and Outreach Plan

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Contributors

All project beneficiaries

Abstract

Definition of dissemination and outreach plan, containing guidelines for project partners on identifying and exploiting dissemination opportunities. Report of initial dissemination activities. Analysis of exploitation and intellectual property landscape and identification of potential contributions.

Executive summary

The present Inıtıal Dissemination and Outreach Plan – prepared within the Dissemination and Outreach Work Package (WP5) – will ensure that dissemination needs from various WPs and the project in general are considered and coordinated.

The document includes all the information needed to facilitate the dissemination, communication and outreach efforts of the ENLIGHT'EM project partners. Subtasks such as the review and mapping of stakeholders at European, national and local levels, timing of communication and dissemination activities, media channels, and division of tasks between partners are detailed.

During the project lifespan, the present Dissemination and Outreach Plan will be regularly reviewed and updated to include new activities, formalize new opportunities that will naturally arise during the running time of the network, and ensure that dissemination, communication and outreach objectives are met and amended if necessary.

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List of Abbreviations

ENLIGHT'EM	European Training Network in Low-energy Visible Light IoT Systems Project
MSCA	Marie Skłodowska-Curie Action
ITN	Innovative Training Networks
ETN	European Training Networks
ESR	Early Stage Researcher
SB	Supervisory Board
IPR	Intellectual Property Rights
IP	Intellectual Property
IoT	Internet of Things
VLC	Visible Light Communication
LiFi	Light Fidelity

1 Introduction

Light Emitting Diodes (LEDs) are driving a revolution in lighting systems due to their superior energy efficiency, and are now entering the Internet of Things (IoT) market with embedded sensory functionalities. By bringing connectivity to every LED bulb, Visible Light Communication (VLC), also referred in recent technological versions as LiFi, offers the opportunity to write the next chapter of the LED revolution with the language of ubiquitous networks. With LiFi networking still in its infancy, ENLIGHT'EM will take the unique opportunity to design IoT systems that leverage the low baseline energy consumption of LEDs to jointly deliver lighting and networked communication. ENLIGHT'EM will explore the emerging field of low-energy VLC systems for the IoT to design and demonstrate sustainable networking solutions.

ENLIGHT'EM will train a new generation of innovators and provide them with the know-how to contribute to the development of the IoT in the world of 5G and beyond. Fifteen early stage researchers (ESRs) will evolve into leading-edge experts in a diverse array of sub-fields leading to the integration of low-energy LiFi into the IoT. The ESRs will acquire and hone cutting-edge skills contributing to IoT areas such as connected energy, light, living and cities through a multidisciplinary network of experts from universities, research institutes, SMEs, and large companies.

The trained professionals of this European Training Network (ETN) will be central to achieving a competitive advantage in Europe in terms of LiFi-enabled IoT integrated in the 5G ecosystem, with energy-efficient and sustainable solutions by design, and the application of LiFi technologies to networked embedded devices. ENLIGHT'EM represents a stepping stone to consolidate pan-European collaborations among leading groups in the field of visible light and radio communication technologies, embedded networking, solid state lighting, and smart applications, while training Early Stage Researchers (ESRs) with the skills to design IoT systems that leverage the low baseline energy consumption of LEDs to jointly deliver lighting and low-energy networked communication

Disseminating the results of such research and explaining its impact on the design of IoT systems that leverage the low baseline energy consumption of LEDs is an important objective of the ENLIGHT'EM project. ENLIGHT'EM's ESRs (as well as other members of the project) will receive extensive training in communication, dissemination and outreach skills in order to act as ambassadors for the ENLIGHT'EM programme: they will disseminate its scientific aims, objectives and results to a range of stakeholders including the academia at large, industry for government agencies and, crucially, the general public.

1.1 Background and Scope

1.1.1 Background

Within ENLIGHT'EM, Work Package 5 (WP5) is dedicated to Dissemination and Outreach. WP5 is central to ENLIGHT'EM and serves to promote and coordinate dissemination and outreach activities within ENLIGHT'EM and to encourage the exploitation of results generated during the course of the project.

This will be achieved by:

- Training 15 Early Stage Researchers (ESR) on a wide range of research topics centered on LiFi, endowing them with top-notch knowledge of networked communications, sensing, hardware, and algorithms; this will form the basis for technical depth and awareness when disseminating the project;
- Offering a multidisciplinary research program to train the ESRs in a wide array of crucial aspects to develop entrepreneurship skills that will encourage the exploitation of innovative solutions investigated during the PhD studies;
- Each industrial member of the consortium has a prominent role in the training programme, leading the organization of at least one network-wide event, with topics dedicated to the skills needed to apply the acquired knowledge and research results in the business world;
- Providing the ESRs with personalized guidance from top-notch specialists from academia and industry, bringing together a diverse set of research groups, LiFi specialists at various networking layers, algorithm designers, researchers in IoT and wireless communications, and LiFi pioneers in academia and industry;
- Transforming the ESRs into versatile academics or industry professionals for the Beyond-5G landscape;
- Educating ESRs in a culture of Open Science and forming them to take effective actions against technological solutions with a uselessly high energy footprint in each step of their careers;
- Securing a prominent role to Europe in the emerging area of low-energy visible light networking for IoT in the Beyond-5G landscape, paying special attention to creating a gender-balanced group of ESRs.

1.1.2 Scope

The scope of this document is to identify dissemination and outreach material that will be generated within ENLIGHT'EM, and to critically assess the potential of such material. In this context material refers to, but is not limited to, publications and data generated, knowledge gained and training programmes established.

This document also identifies the resources available within ENLIGHT'EM and their appropriateness for dissemination and outreach activities, promoting research and

training within the field of low-energy LiFi for IoT, and promoting the exploitation of the material generated within ENLIGHT'EM for economic and social benefit.

Finally, this document identifies the main target groups for ENLIGHT'EMs dissemination and outreach as well as suitable means to effectively reach these target groups, structures the methodology applied in dissemination and outreach, and serves as documentation of ENLIGHT'EMs dissemination and outreach activities.

Accordingly, this document is subject to regular revisions throughout the duration of ENLIGHT'EM in response to the recognition of additional paths of dissemination and the obsolescence of others, as well as the practicability of implementation with regards to resources, copyright issues, IP issues or other relevant factors.

1.2 Responsibilities and Points of Contact

The following table lists the main network wide bodies responsible for the dissemination and outreach activities tasks of ENLIGHT'EM and the responsible project participants constituting the respective bodies.

Table 1. Contact persons details.

Contact Person	Role	Institution
Ilenia Tinnirello, ilenia.tinnirello@unipa.it	T5.1 – Academic Dissemination Lead	UNIPA
Daniele Puccinelli, daniele.puccinelli@supsi.ch	T5.2 – Communication and Outreach	SUPSI
Mostafa Afgani, mostafa.afgani@purelifi.com	T5.3 – Exploitation and Impact Plan	PURELIFI

2 Dissemination Analysis

Within ENLIGHT'EM we expect to produce dissemination materials that have the potential to position Europe at the forefront of low-energy LiFi for the IoT. With a strong preference for quality over quantity, these dissemination materials will be varied in its nature and may have impact over different time frames, within and beyond the duration of the project, and be suitable for different target groups. Consequently, the dissemination methods must be based on a dynamic analysis of needs and opportunities, recognizing both the nature of the material and the targeted audience.

Academic dissemination has two main goals for our project: i) sharing the project results with the research and industrial community working on VLC and incentivizing a general interest towards the adoption of low-energy LiFi for emerging IoT applications; ii) giving opportunities to ESRs to interact with a wider community of researchers, by also learning how to present results in both written texts and oral presentations.

2.1 Research dissemination

ESRs will be encouraged since the very beginning of their research activities to publish their work, even as poster and demo papers, in selected conferences on communications/networking (such as IEEE INFOCOM, IEEE Globecom, ACM Mobicom, ACM CoNext, ACM Sensys), smaller-scale but highly targeted workshops and venues (such as the IEEE World Forum on Internet of Things WF-IoT, WONS) and well-known large venues to disseminate the results at European level such as EuCNC. We will also organize targeted workshops on a yearly basis (see the Annex for more details), co-located with ACM Mobicom and EWSN, the first one considered the top conference in mobile communication systems, and the second a highly reputable conference in IoT and embedded systems. ACM Mobicom has been preferred over ACM SenSys (listed in the initial proposal) in order to better differentiate the type of communities targeted by ENLIGHT'EM.

For consolidated results, we plan to target high impact-factor journals and magazines, such as IEEE Transaction on Wireless Communications and IEEE/ACM Transaction on Networking for system-level performance, or IEEE Photonics Technology Letters and Photonics Journal for physical layer advances.

Final results will be collected in a gold access book summarizing the main achievements of the ENLIGHT'EM project. For previous projects, IMDEA has been in contact with the Palgrave Macmillan publisher, which by default published open access books with a CC-BY 4.0 licence. The same publisher will be considered as a starting point, with the final decision to be made by the Supervisory Board at a later stage in the project. As an initial outline, the book will present the overarching topics

tackled in ENLIGHT'EM, its vision, the state of the art preceding the project, and the progress over the state of the art. Each ESR will have a dedicated Chapter to present the results of their thesis. The book will be concluded by a section that comments on the progress over the state of the art and draws a roadmap for future developments.

The main measurable outcomes of research dissemination are listed below, for each organization leading the publication work.

- IMDEA will target one ACM/IEEE transaction paper per year per ESR and one ACM/IEEE conference papers per year per ESR.
- IMDEA will also lead and encourage contributions to white papers/magazines for a larger audience dissemination.
- OZU will target one IEEE transaction paper per year in areas relevant to the work of the ESR.
- TUD will target one selective ACM/IEEE conference paper per year per ESR on system aspects of passive communication and sensing as well as energy consumption reduction in smart buildings.
- SUPSI will target one IEEE top conference paper per year in energy-aware communication strategies at the data link layer.
- UEDIN target one IEEE transaction paper per year per ESR and one IEEE conference paper per year per ESR on analytical foundations of LEDs as energy-efficient communication and mobility management for IoT systems.
- UNIPA will target the same outcome and target level per ESR as IMDEA, publishing on integrated VLC/radio networking.
- PLF will target one IEEE transaction paper per year per ESR in reduced energy consumption for high-speed communication and on energy efficiency of illumination and communication in dense deployments, respectively.
- FORD will target at least one IEEE conference papers per year per ESR, also in collaborations with other ESRs seconded there.
- TREL will target the same outcome and target level as FORD.
- LBEE will target one IEEE transaction paper per year in topics relevant to the ESR.
- All ESRs will publish at least one conference paper for the research work conducted during secondments, with joint publications involving at least two project members.

2.2 Education Dissemination

Apart from the technical and scientific contributions to the research community, ENLIGHT'EM will also provide innovative contents and methodologies for advanced academic courses, as well as educational platforms to build prototype and experimentally validate visible light communication systems. These contributions will be exploited by the academic partners to strengthen their Master's and PhD programs and to disseminate the project results to the widest possible student audience (which represents an important target for dissemination).

At this stage of the project, we envision three main actions to disseminate projects results for educational purposes.

Face-to-face lessons. All academic partners will incorporate some aspects of ENLIGHT'EM's results into Master-level courses, such as courses on the Internet of Things, Smartphone Sensing, Advanced Digital Communications and Wireless Networks, as detailed in the specific per-partner dissemination plan. Specific modules will be also proposed within summer schools for PhD students, such as the summer school on the Internet of things organized by SUPSI, or within the PhD courses planned yearly by academic partners. Examples of these modules are lectures on modelling of visible light channels and interference, energy-efficient architectures for LiFi networks, algorithms for VLC-based positioning, multi-target optimizations for dense IoT networks, etc. We remark that, to date, there exists no offer of summer schools focused purely on VLC topics.

Another initiative for the organization of face-to-face lessons will involve the proposal of tutorials, that we plan to co-locate with prime venues related to wireless communications, such as well as EWSN and Mobicom. The tutorials will be given by the academic and industrial supervisors of the ESRs, with direct involvement of the ESRs, and will present cutting-edge results on theoretical limits and potential applications of VLC technology.

Online courses. In order to reach the broadest possible audience even at a global level, we also plan to organize online courses. In some cases, we will exploit the material already established for our tutorials in order to prepare webinars that will be available on ENLIGHT'EM's web site. The ultimate target will be the development of a massive open line course (MOOC) to be offered within the edX platform. Our partner TUD has a consolidated expertise in developing this kind of courses as part of the edX consortium.

The course will be structured to cover different aspects related to smart lights, from physical/MAC layers to system-level integration aspects, and will also include a final test and some proposals of home projects. We will also consider indicators to assess the success of the course. Current practices for the evaluation of MOOCs are dominated by analytics on different types of users (registrants, downloaders and participants). This data yields insight on the numbers of users and their behaviour, complemented by feedback about the efforts/expectations of the students with heterogeneous background on different aspects of the course. We will also consider the efforts on the realization of the course and the expectations of the teachers.

Hackathons. In order to incentivise the utilization of the prototyping platform developed within ENLIGHT'EM, we plan to rely on interactive and team-based educational sessions, based on hackathons. The project partners are already using

in-house developed platforms (namely, OpenVLC and Shine) to train MSc and PhD students on prototyping activities and experimental validation of solutions for VLC. The platforms will be extended during the project's lifetime, and new hardware and software releases will be offered and documented. Due to their informal and amusing nature, hackatons are excellent opportunities to attract a diverse spectrum of students, especially those with a strong interest in the deployment and engineering of systems.

We plan to involve the ESRs in the hackathon organization, for example by engaging them as team leaders, in order to incentivize peer-learning (which is typical of these events, despite their competitive nature). Moreover, the events feature mentors from both the university and industry, who provide hands-on support, troubleshooting and advice. We will monitor the hackathon results, by analysing the projects that will continue as long-term research activities, proposing post-event surveys, and tracking student academic records and source-code commit log data from the event. This experience will be used to improve the quality of the hackathon in subsequent years.

Each project member will commit to concrete and measurable educational outcomes, as listed below.

- IMDEA will organize one hackathon per year, presenting the OpenVLC platform and its evolution to the hacking community, with the objective to promote OpenVLC and improve its functionalities.
- OZU will contribute to graduate courses on wireless communications organized locally by expanding on communication system aspects of simultaneous data and power transfer. Such course will be organized once per academic year.
- TUD will be teaching Internet of Things and Smartphone Sensing courses with VLC modules (open to PhD students from our consortium). Each course will be taught once per academic year.
- SUPSI will embed recent VLC developments in its Bachelor- and Master level courses, and in its summer school on the Internet of Things. Each year, at least one SUPSI course will include VLC in its syllabus.
- UEDIN will aim to embed material from the projects of ESRs 1.1 and 2.1 into their graduate courses on Digital Communications and Advanced Digital Communications.
- UNIPA will focus on embedding local area network aspects of VLC communications for 5G networks into their curriculum of Advanced Class on Telecommunications. Each year one of such class will be organized.

All project members (including the ones form industry) will be involved in the creation of a MOOC on VLC.

3 Communication and outreach

The goal of communication and outreach is to bring the outcomes of ENLIGHT'EM to the attention of the general public. Our beneficiaries and partners have extensive expertise in making research results accessible to the general public, as demonstrated by their strong engagement in the last decade. Our approach is based on mapping research results to outcomes that are relevant to the everyday lives of general users. Based on the technological advancements in WP1, demonstration of smart lights for dense and integrated IoT in WP2, and application scenarios in WP3, we plan to connect with the general public by way of a three-pronged approach involving electronic media, the formal press, and public events.

3.1 Communication through open electronic media

The official ENLIGHT'EM web page is online as of June 2019 (M1). It provides a detailed overview of the project, a thorough description of the consortium, and all the necessary information for the recruitment process. The web page is structured to focus to promote the work of the ESRs, once they will join ENLIGHT'EM. Moreover, the web page features a calendar of all past and future ENLIGHT'EM events. The URL of the web page is https://enlightem.eu/

The Website currently contains HOME, TRAINING, PARTNERS, ESRs AND RECRUITMENT, DISSEMINATION, OUTREACH tabs and also shortcuts to the network's social media (Facebook, Twitter, Youtube – more details are provided later in the section). The TRAINING section contains details about Project Events such as topics, dates, locations. The PARTNERS section contains the list of the beneficiaries of the ENLIGHT'EM project with links to their web sites. The ESRs AND RECRUITMENT section includes space for the ESR Profiles, explains the recruitment process steps, and provides all related information. The DISSEMINATION section contains publications and deliverables of ENLIGHT'EM project. Finally, the OUTREACH section contains information about outreach events promoted by the ENLIGHT'EM project.

Other channels have been created and will be maintained to leverage the most popular social networks:

Facebook: https://www.facebook.com/EnlightemMSCA/
Youtube Channel: https://www.youtube.com/channel/UC8IT0DcBRiA7PvJPzxglk0A
Twitter: https://twitter.com/EnlightemMSCA

Our beneficiaries already have a substantial visibility, and some have already disseminated VLC results through videos, e.g.: LiFi products (PLF), and OpenVLC (IMDEA). We will continue and strengthen this trend during the course of the project. Facebook Live, Periscope and/or YouTube live will be used for live-stream demos

and special events (we commit to three live videos per year from M9 to M45).

The table below summarizes the social network activity from M1 to M3.

Table 2. Activity on ENLIGHT'EM social media up to the delivery date of this document.

Social Network Channel	Number of messages
Facebook	8 posts
Youtube	1 video
Twitter	15 Tweets – 5.163 Tweet impressions

ENLIGHT'EM will also use novel means of content propagation including Instagram and Snapchat to target younger audiences, and get them interested in STEM careers by showing what such common and widespread tools as LED light bulbs can do. Social accounts for these channels will be created and maintained at a later stage of the project, once all ESRs have joined the project (M9). By M48, the WP5 leader on Dissemination and Outreach (FORD) will coordinate the recording of one final video of 20 minutes for each ESR (total: 15 videos), where each fellow will present her or his research in lay language.

3.2 Communication through the formal press

A news item about the launch of the project has been distributed by IMDEA on June 2019 (M1). Details are available at https://www.networks.imdea.org/whats-new/news/2019/birth-new-discipline-low-energy-visible-light-iot-systems ("The birth of a new discipline: Low-energy Visible Light IoT Systems"). The news has resonated very well over the web. In the following table, we list the main online newspapers that have written an article about ENLIGHT'EM after the news posted by IMDEA.

Table 3. General press impact of the initial ENLIGHT'EM press release.

Online Newspaper	URL
EurekAlert!	https://eurekalert.org/pub_releases/2019-06/ini-tbo062819.php
PowerPulse	https://powerpulse.net/low-energy-visible-light-iot-systems-the-birth-of-a-new-discipline/
Telecompaper	https://www.telecompaper.com/news/imdea-networks-coordinating-new-visible-light-comms-iot-project--1298795
15MinuteNews	https://www.15minutenews.com/article/167249883/the-birth-of-a-new-discipline-low-energy-visible-light-iot-systems/
ScienMag	https://scienmag.com/the-birth-of-a-new-discipline-low-energy-visible-light-iot-systems/

IoTaustralia	https://www.iotaustralia.org.au/2019/07/03/iotnewsglobal/imdea-networks-institute-aims-to-use-light-from-led-lights-for-iot-comms/
RevistaByte	https://www.revistabyte.es/actualidad-byte/enlightem-bombilla-led/

Additionally, project coordinator Domenico Giustiniano has been interviewed in early August by the Chinese press agency to release a declaration about the project, which is planned to be added to a reportage on LiFi technology to be broadcast by the China Global Television Network (China's official TV).

During the project, we will exploit the press release channels of our beneficiary UEDIN, who has already been able to disseminate VLC work in the most prestigious media of the world (e.g., BBC, The Economist and The New York Times). We will also rely on other successful press releases such as the one from IMDEA as already done so far. We will also reach out to technological magazines such as TechCrunch and Wired.

3.3 Communication through public events

ESRs will learn the skills for communication to a wider audience early in the project (Event 2, M9) from beneficiary UEDIN. ESRs will be encouraged to engage in public speaking as often as possible, for instance by delivering TED talks throughout the project. ENLIGHT'EM results will also be showcased at key events such as the "EU Researchers' Night" and the "Science Week".

4 Exploitation of results and intellectual property

ENLIGHT'EM will define and maintain precise exploitation plans and track and influence standardization fora on topics related to the project. The following sub-sections present the current methodology of the consortium to maximize the output and the impact of the project in terms of exploitation.

4.1 Intellectual property and patents

The generation, ownership, and protection (e.g. with patent applications) of foreground knowledge, including those cases where multiple partners contribute to a result has been regulated in the Consortium Agreement (Deliverable D6.1, M2). Project members have strong expertise in Intellectual Property Right (IPR) protection and ESRs will actively participate in the generation and exploitation of IPRs from its conception. Throughout the project, our six ESRs hosted in industry will benefit from continuous discussions with IP departments. All the ESRs hosted in academia will benefit particularly through planned secondments in industry. All ESRs will benefit from two network-wide training events (4 and 5, at M22 and M26 - see Annex). These events will train the ESRs on the protection of IP/patent filing, commercial exploitation of results, and adoption of the customer's perspective. Particular emphasis will be given to IPR generation, standardization and commercial exploitation of results, early-stage development of commercial products based on customer information, and technology transfer processes from research into the business world. After the training events, the ESRs will have the chance to apply the different methodologies and practices learned in the training event to their work.

4.2 Standardization

Event 5 will be co-located with the annual IEEE standardization meeting in Europe in Madrid, Spain. This meeting will give ESRs a chance to present their work in front of one of the Task/Study Groups (802.11 Light Communications; IEEE 802.15.7) and to understand the steps of a standardization process as it is happening live. Preference will be given to ESR projects that are more oriented towards practical aspects that can be of interest for ongoing standardization activity, with the final objective of *disseminating the results in standardization fora and influence the standards during the event.* ESRs will be also encouraged to actively participate in future standardization events. This event will be led by our beneficiaries OZU and PLF, who are playing a key role in LiFi standardization.

4.3 Creation of start-ups

Following the example of PureLiFi, a highly successful partner of this ETN and a spinoff of UEDIN (also an ENLIGHT'EM partner), ENLIGHT'EM will provide *guidance for the establishment of start-up(s)* when/if necessary, connecting with start-up hubs hosted by each participating university. A concrete example is the case of Yes!Delft, from TU Delft, which was considered as one of the top ten European business incubators in 2015 by UBI Global). ENLIGHT'EM's partners will also be invited to 5TONIC, a prime IMDEA-based laboratory to promote technological advances, discussion, joint project development, and entrepreneurship for 5G technologies. These offices and hubs will help ESRs in creating business models based on ideas generated within ENLIGHT'EM, and establish strategies to search for investors.

Annex

Table 4. Main Network-Wide Training Events, Conferences and Contribution of Beneficiaries and Partner Organizations.

Main Training Events & Conferences		ECTS	Lead Institution	Project Month
Event 0	**Kick-off project meeting**	0	**IMDEA/OZU** Held at **IMDEA**	June 2019 (**M1**)
Event 1	**Project meeting #1**: welcome to ESRs and introductory tutorials at conference	3.2	**TUD/PHR** Held at EWSN 2020	Feb. 2020 (**M9**)
Event 2	Training on research skills, and **project meeting #2**	2.4	**IMDEA/UEDIN** Held at **IMDEA**	May 2020 (**M12**)
Event 3	Training on entrepreneurship, Workshop at conference, and **project meeting #3**	2.4	**LBEE/VEL/SUPSI** Held at ACM Mobicom 2021	Oct. 2020 **(M17)**
Event 4	Training on VLC technology & Research commercialisation and **project meeting #4**	2.4	**UEDIN/PLF** Held at **UEDIN**	March 2021 (**M22)**
Event 5	Training on research exploitation, Presentation at IEEE standardization meeting, and **project meeting #5**	1.6	**TREL/PLF/OZU** Held at EU IEEE st. meet	July 2021 (**M26**)
Event 6	Training on industrial careers, Workshop at conference, and **project meeting #6**	2.4	**TRI/ZII/SUPSI** Held at ACM Mobicom 2021	Oct. 2021 (**M29**)
Event 7	Training on advanced research skills, tutorials at conference, and **project meeting #7**	3.2	**TUD/UEDIN** Held at EWSN 2022	Feb. 2022 (**M33**)
Event 8	Industry day and **project meeting #8**	1.6	**FORD/PHR/ZII/TREL/TRI** Held at **FORD**	June 2022 (**M38**)
Event 9	Final workshop at conference and **project meeting #9**	0	**UNIPA/IMDEA** Held at EWSN 2023	February 2023 (**M45**)
Event 10	Open day and **final project meeting**	0	**IMDEA/TUD** Held at **IMDEA**	May 2023 (**M48**)

Table 5. Details of each training event in Table 4.

Event: 0	**Title:** Kick-off project meeting	**Date:** M1	**Duration:** 2
The kick-off meeting of the project will allow all partners to discuss the recruitment strategy and policies, the administrative aspects, the WP coordination, the organization of the next training events, and any other important adjustments.			
Event: 1	**Title:** Welcome to ESRs and introductory tutorials at conference	**Date:** M9	**Duration:** 4
This event serves as a primer for the ESRs recruited by the network. The event is held at the International Conference on Embedded Wireless Systems and Networks (EWSN), a highly reputable venue worldwide in IoT. EWSN 2020 will be held in Lyon, France (http://ewsn2020.conf.citi-lab.fr/). Two tutorials will be offered at the conference on (i) technology and communications aspects of low-energy VLC led by TUD; and (ii) networking and service provision aspects in low-energy VLC led by PHR.			
Event: 2	**Title:** Training on research skills, and project meeting	**Date:** M12	**Duration:** 3
The ESRs will be kicked off in key skills for research that will be required throughout the course of their doctoral programs and careers. The event is timed to take place within the first 3 months of the ESR recruitment, will be organized by IMDEA. IMDEA will organize the following training modules: research organization (meaning of being a researcher, academic integrity, yearly qualification exams); personal management (self-managed growth through a targeted choice of course offering from various sources, effective use of time). UEDIN will lead for the following modules: transversal research skills (identifying problems of interest, literature search and sources, teamwork); impact (effective publishing practices, networking, scientific presentation practice, communication to wider audiences).			
Event: 3	**Title:** Training on entrepreneurship, Workshop at conference, and project	**Date:** M17	**Duration:** 3 days

The young startups in our consortium, LBEE and VEL, will present a training session on entrepreneurship. The focus will be to provide ESRs with the necessary knowledge to create a start-up and understanding the market potential of their work. The topics to be covered are analysis of market competition, spotting of business opportunities and creation of a strong business plan. The event will be held alongside a workshop organized by SUPSI in parallel to ACM Mobicom, the premier ACM conference in Mobile Communication. The conference will be enhanced with a special workshop session dedicated to the topics of the ENLIGHT'EM network. As a result, the ESRs' work will enjoy exposure in front of a top-notch community of experts.			
Event: 4	**Title:** Training on VLC technology & Research commercialisation, and project meeting	**Date:** M22	**Duration:** 3 days
The purpose of this event is two-fold and leverages the close-by location of UEDIN and PLF for improved efficiency. The first half will be led by UEDIN, one of the world's leading centers in VLC research, and has the purpose to train the ESR with the latest advancements in VLC technology, as well as in measurement and experimental technology in general. The second half will be led by PLF, a successful spin off from UEDIN, and will focus on the early-stage development of commercial products based on customer information, and on the technology transfer process from the research into the business world.			
Event: 5	**Title:** Training on research exploitation, Presentation at IEEE standardization meeting	**Date:** M26	**Duration:** 2 days
The activity will focus on fostering the entrepreneurial spirit. Our beneficiary TREL will provide an open training session on research exploitation. This session will cover topics of key relevance for successful startups and large organizations such a s IPR generation, standardization and commercial exploitation of results. Alongside this event, we will take the opportunity offered by an IEEE standardization meeting, which usually occurs in Europe in the middle of the year. This meeting will give ESRs a chance to present their work in front of one of the Task/Study Groups (802.11 Light Communications; IEEE 802.15.7) and to understand the steps of a standardization process as it is happening live. This second activity will be led by our beneficiaries OZU and PLF, who are playing a leading role in VLC standardization.			
Event: 6	**Title:** Training on industrial careers, Workshop at conference, and project	**Date:** M29	**Duration:** 3 days
The first objective of this event is to train our ESRs in industrial careers. Two industry partners, TRI and ZII, will provide training on making a transition from academia to industry, technology roadmap (TRM) and innovation management, TRL process engineering, and building and leading teams. The second objective will involve organizing a second special workshop co-located with ACM Mobicom, giving ESRs a continuous opportunity to showcase their work and receive substantial feedback from an expert community.			
Event: 7	**Title:** Training on advanced research skills, tutorials at conference	**Date:** M33	**Duration:** 4
The event will be co-located with the EWSN conference. The purpose of this event is two-fold: tutorial sessions will be organized to showcase the results of the ESRs to a broad global audience (activity led by UEDIN); and ESRs will be trained on advanced transferable skills (activity led by TUD). The training will include modules on thesis completion (effective writing, preparing for the thesis defense); continuing education and career development (career planning, skill development and professional development planning, CV writing, applications and interview in the academic and non-academic domains); impact (advanced presentation skills, advanced communication skills, knowledge transfer).			
Event: 8	**Title:** Industry Day	**Date:** M38	**Duration:** 2
In this training event, all industrial beneficiaries and partners will form a panel to provide substantial insight and feedback on potential applications and use cases for the ESR's work and on optical technologies in general. The event will feature demonstrations and poster sessions to showcase the project technologies.			
Event: 9	**Title:** Final workshop at conference and project meeting	**Date:** M45	**Duration:** 3
A workshop on the topics of ENLIGHT'EM will be organized as a co-located event of the EWSN 2023 conference, presenting the main innovation of projects led by ESRs when approaching the completion of their programs. A project meeting will be held alongside the event.			
Event: 10	**Title:** Open day and final project meeting	**Date:** M48	**Duration:** 3
Invited talks from VLC experts, research talks and practical demonstration of ENLIGHT'EM will be blended together into the final open day of ENLIGHT'EM. The event will be organized at TUD premises. The event will be advertised in order to reach out to a wide spectrum of audience, with technology demonstrations for practitioners, industry and government representative, as well as more engaging technology displays for the general public. The final project meeting will be held alongside this event.			