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CARLA, the career launch hub to promote careers in photonics

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Abstract
Europe faces a situation in which the photonics industry is growing and needs more well-prepared professionals to support its growth and innovation potential. Addressing this pressing need requires engaging all photonics stakeholders to increase the visibility of the outstanding professional opportunities of photonics and provide the future workforce with tools to increase their employability.

CARLA, a new European funded project, aims to create a novel, rigorous and tested instrument to address this need at the source. It will develop a model for European photonics career camp—a reproducible 2-day intense, multi-format event—that 1) obtains coordinated input from all stakeholders, 2) encourages STEM university students, PhD students and young postdocs to pursue a career in photonics and 3) can be replicated by other organisations. CARLA will create a robust, competitive and sustainable career camp that will be tested on 11 occasions during the 2020–21 period, solidifying a ready-to-replicate camp model. It will incorporate the dimensions of industry, academia, innovation, entrepreneurship, and employability, putting special attention on empowering diversity, both within the camps and in the future photonics workforce.

Sustainability of the model will be ensured through the creation of a virtual careers in photonics hub that will support the photonics community at large during and beyond CARLA, and develop a comprehensive handbook to facilitate camp replication. With the promotion of diversity serving as one of the cornerstones in the design and implementation of CARLA, the project will furthermore translate lessons learned in the camps into an “Empowering Diversity in Photonics” guide applicable to future camps and the photonics community in general.

1. Introduction
The European Commission considers photonics a Key Enabling Technology (KET) for Europe’s future prosperity. It improves the well-being of our world by exploiting the unique properties of light, which can be found at the core of daily products and technologies such as smartphones, laptops, the Internet, medical instruments, telecommunications, and lighting technology, with up to 30% of the entire economy already depending on photonic technologies [1]. It is calculated that more than 301,000 people are employed by the European photonics industry, a number expected to grow up to 313,000 by the end of 2020 [2]. Photonics innovation can help society tackle some of the most relevant challenges of our time, helping us to produce greener energy, live healthier lives, automate our transports and homes, boost industrial productions, improve our digital infrastructure and its security. The pervasiveness of photonics applications poses a challenge as the sector faces a shortage of skilled workforce, damaging the growth prospects of companies and the continent’s economy [3].

This workforce is composed of graduates and postgraduates from different STEM careers, as is clearly seen in markets such as the US where people enter the field of photonics via multiple educational routes—physics, engineering, materials science, even medicine, reaching the doctoral educational level [4]. It is thus the universities and research and technology centres, through their graduate, master, post-graduate and academic programs, that are the main source of qualified workforce.
The reasonable conclusion is that the shortage in the competent work force has to be compensated through two approaches. Firstly, it is important to encourage more young students to pursue STEM studies or professional training. Secondly, we need to ensure that more university students and young researchers (PhD students and young postdocs) pursue careers in photonics. These factors will boost the availability of a highly skilled photonics workforce at all levels of technology development and of the production chain and hierarchy.

Studies show [5] that the majority of students of some STEM disciplines eventually pursue careers beyond academia, and point out that under- and post-graduate institutions nevertheless disproportionately focus on preparing university students and young researchers for jobs in academia, downplaying the professional opportunities beyond academia. However, graduate and scientific training communities and funding agencies are starting to accept multiple career pathways as successful outcomes. It is therefore important to ensure that academic and research institutions understand these career trajectories and add training paradigms to provide students with the appropriate resources required for success in the industrial sectors.

CARLA (The European Photonics CAReer LAunch Path), is a project that tackles all these interconnected challenges through the development of photonics career camps of excellence that are designed with the involvement of all photonics stakeholders from the start of the project and will be open source to facilitate replication beyond the project (see figure 1). These camps will be tested 11 times throughout the project in 10 different countries over 2020 and 2021, starting with a pilot CARLA camp in Barcelona in November 2020.

This initiative by ECOP (European Centres for Outreach in Photonics), coordinated by ICFO- The Institute of Photonic Sciences, aims at increasing the awareness among university students and young researchers of the professional opportunities that photonics poses as well as providing these communities with tools for better employability. Eleven leading organisations representing different segments of the photonics community - ICFO, Photonics Austria, Forschungsverbund Berlin e.V./Max Born Institute, Politecnico di Milano, Institute d’Optique, International Laser Centre, Vrije Universiteit Brussel, Delft University of Technology, Photonics Sweden, Southern European Cluster in Photonics (SECPhO) and Optics and Swiss Photonics- are joining forces in this project, bringing to the table a varied and broad experience with activities directed at university students and young researchers. This will ensure the access to the networks of stakeholders and will establish a sustainability mechanism that will allow the replication of the CARLA camps beyond this project.
2. Rethinking careers camps

The main objective of CARLA is to create a sustainable career camp that serves as a model of excellence for the European photonics community and that encourages STEM university students and young researchers (Ph.D. students and young postdocs) to pursue a career in photonics.

CARLA is working hand in hand with different stakeholders to create an attractive, meaningful and impactful instrument that can be easily replicated and adopted by the photonics community to increase the number of STEM university students and young researchers that follow the photonics career path. This is being done with an emphasis on diversity, especially on the gender dimension.

The approach to creating these camps requires the re-evaluation of the career camp concept. Experts, stakeholders and potential users, combined with the accumulated experience that the consortium has acquired through past initiatives, is coming together in order to produce a tool that is effective for everyone. CARLA camps will consist of a set of talks, workshops, training and networking sessions concentrated in a two-day program. The recommendations resulting from the stakeholder groups that are being set up with the industry, academia, entrepreneurs, university students, young researchers and diversity experts will help identify the appropriate approach for closing the skill gap and shaping the content of the camps. The format in which the content will be transferred to the attendants of the camps will be established in collaboration with human resources and training experts at business schools, experts in innovation and through the creation of tools, methodologies and training focused on innovation.

2.1. A top-down-bottom up approach

CARLA teams up with industry (large companies and SMEs), academia (university and research centres) and entrepreneurs and innovation experts, to understand what employers look for in the workforce and to gain the top-down perspective on what a photonics career camp of excellence should include, as well as to engage them in the sustainability of the camps. Simultaneously, it works with potential users of the camps (university students and young postdocs) to gain their bottom-up perspective, understand their view on career camps in general, identify what they would expect from such events, and what does and does not work for them.

CARLA is working in close collaboration with academia and industry organizations and entrepreneurs to ensure that, through the camps, attendees are given a thorough overview of the vast possibilities and multiple career pathways of photonics. Four CARLA consortium members are photonics clusters that include large numbers of SMEs and large companies in the field of photonics as well as research and technology centres. In addition, the universities and research centres that participate in the project also have networks in both industry and academia that will be instrumental in the dissemination and sustainability of the project.

CARLA is creating working groups representing the different stakeholders to gather their input on format and content for a camp of excellence focused on photonics. To do that in a productive, systematic way, all working sessions have a defined structure and common methodology with the aim to extract the input from each of the stakeholders groups in a way that it can be integrated into the design and implementation of the camps.

The work done in collaboration with the stakeholders as well as HR and training experts and the business schools, will allow CARLA to identify the battery of non-technical skills that are relevant to the different career pathways, so that attendants leave the CARLA camps with a roadmap to better employability.

3. A career in photonics hub beyond the camps

To maximize the impact and support the replication and sustainability of the CARLA camps, this initiative is also creating an online hub for careers in photonics through the existing LinkedIn platform (CARLA Hub) and Instagram (@the_carla_hub). These online platforms will be managed initially through the CARLA consortium and eventually by ECOP to provide a hub where students, researchers, industry, academia and entrepreneurs can network and disseminate information around careers in photonics.

This virtual space will build upon the community of alumni and industry and academia organizations that participate and are engaged in CARLA. It will expand towards additional students, researchers, and photonics-related organizations such as Photonics21, OSA, EPIC or SPIE, companies, SME’s and entrepreneurs, photonics clusters such as Photonics Israel or the Dutch Optics Centre, universities and research centres across Europe, and other types of organizations and initiatives such as Laserlab-Europe and EURAXESS.

All these organizations will be invited and encouraged to use this channel to reach out to the student and research communities. CARLA will drive the activity in this group by posting information and articles, including outcomes of the CARLA camps and other related photonics careers events of the members of the
community, information on reports and articles related to the photonics professional and technology market, etc.

4. Empowering diversity in photonics

An important dimension that will be taken into consideration during the design and implementation phases will be the encouragement of diversity in the photonics community. Thus, one of the objectives of CARLA will be to increase the involvement of women and other underrepresented communities in photonics careers.

Women represent a minority in the photonics sector, accounting for 21% of the workforce. Female participation drops to 10% as one follows the progression of the women in the sector over time. The percentage of women also decreases as we go up the seniority ladder of positions [6, 7]. CARLA aims at helping increase the percentage of women and other underrepresented communities moving into careers in photonics by working hand-in-hand with experts in gender and diversity, in science and technology. These experts will also help shape the content and format of the CARLA camps to ensure their appeal to underrepresented communities. Increasing their exposure to the photonics sector at large in the framework of career development should translate into higher numbers moving towards this sector professionally.

5. Conclusions

CARLA is a 2-year H2020 EU-funded project that will develop a model for pan-European photonics career camps of excellence to encourage university students and young researchers to pursue a career in photonics. It will integrate the fields of industry, academia, innovation and entrepreneurship, putting special emphasis on empowering diversity. During the project, 11 camps will be organised in 10 different countries, aiming to create a rigorous, tested and reproducible tool to support growth, leadership and innovation potential in photonics at the EU level.

All this will result in a proven tool available to the photonics community at large in the form of a CARLA camp handbook that will be published and disseminated through several channels like social media, websites and collaborating networks. Specific guidelines to empower diversity in photonics will also be created and made public to help institutions plan and implement their events in a way that encourages diversity, helping, for example, to close the gender gap in the photonics community.

Finally, a supporting online structure is being created to build a community around careers in photonics and leverage CARLA beyond the camps themselves through the website carlahub.eu and platforms such as LinkedIn (CARLA Hub) and Instagram (@the_carla_hub), thus providing a network structure for all stakeholders.

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