



PHOTONICS PUBLIC PRIVATE PARTNERSHIP

Photonics PPP

Photonics21 Coordination and Support Action topics (CSA)

for the Horizon2020 PPP Work Programme 2018-2020



PHOTONICS PUBLIC PRIVATE PARTNERSHIP

Content

Fostering careers in Photonics.....	3
Photonics21 Secretariat.....	4
Developing new Photonics Innovation Hubs and reinforcing existing ones	5
Linking the Innovation Hubs	6

Annex - Full Proposals

WG 7 – Fostering careers in Photonics	8
Cross Cutting Task Force – Photonics21 Secretariat.....	13
Cross Cutting Task Force – Developing new Photonics Innovation Hubs and reinforcing existing ones.....	15
Cross Cutting Task Force – Linking existing Innovation Hubs	15



Photonics21 Coordination and Support Actions – Summaries

Work Group proposed action 2018-2020, extract

Work Group: 7

Title: **Fostering careers in Photonics**

1. **What should be achieved by the funded projects under this proposed action?**

The overall challenge is both securing the necessary knowledgeable and skilled workforce in photonics in all layers, from industry and R&D to education, from unexperienced young people to different levels of experienced professionals, and extending the use of photonics and related technologies to new application fields. The key goal is thus twofold:

- To increase the number of new STEM graduates/ Ph.D. students/ young postdocs moving towards careers in photonics. It is imperative to reach out to the students currently studying STEM degrees, performing PhD theses in these fields, or at the postdoctoral level, unveiling to them the opportunities that photonics offers professionally.
- To have a professional community with the appropriate photonics training that makes it competitive and ready for a rapidly evolving industry. The action will provide Life-long Learning tools and methodologies in photonics to professionals along the entire photonics chain: from primary, secondary and professional schools, to universities, research centres and industry, as well as encourage innovation and entrepreneurship in photonics, and exploitation of photonics technologies by non-photonics professionals, with the implication of local photonics clusters.

2. **What are the relevance and expected impact of this proposed action?**

There is a growing need for a more qualified workforce in the domain of photonics at the European level and for a wider exploitation of photonics skills in non-photonics areas. Thus the proposed action, which addresses both problems, is of great relevance.

The expected impact is twofold: quantitative and qualitative.

Quantitative: more people moving towards photonics careers and more professionals exploiting photonics and related technologies in their activities.

Qualitative: better prepared and competitive workforce.

Photonics can address most societal challenges providing sustainable solutions. Being trained in photonics, especially in a project-based approach, will encourage and stimulate on the one hand innovations to target different societal challenges like energy, safety, food-production, etc., and on the other hand entrepreneurship, to start-up business in the domain of photonics or to integrate photonics-based solutions to extend the potentials of non-photonics products. In addition, it is expected that this CSA will improve the photonics innovation and entrepreneurship culture among university students and young professionals in the framework of photonics and beyond photonics-market.

**Work Group proposed action 2018-2020, extract**

Work Group: Cross Cutting Task Force

Title: Photonics21 Secretariat**3. What should be achieved by the funded projects under this proposed action?**

The Photonics21 secretariat CSA will provide the critical strategic and organizational support to the now more than 3100 Photonics21 members, Work Groups and Boards. It will ensure trusted, open, transparent and bottom-up decision making structures which is the very basis for the strong commitment and broad participation of the Photonics community towards the Photonics21 goals.

The CSA will

- Provide organizational and strategic support to Photonics21 Boards, Task Forces, Work Groups, and members to prepare a joint Photonics strategy for Europe.
- Steer implementation of the European Photonics PPP Roadmap
- Coordinate and advise running Horizon2020 Photonics PPP Research and Innovation and CSA projects to effectively deliver on PPP goals (jointly with EC).
- Closely monitor Key Performance Indicators of the Photonics PPP and implement corrective actions, if necessary.
- Coordinate all Photonics21 /PPP activities with the European Commission
- Position Photonics as Key Enabling Technology in the post Horizon 2020 Framework Programme (Advocacy)
- Coordinate closer alignment of European, national and regional funding in Photonics (Digital Innovation Hubs)
- Improve financing conditions for Photonics industry, e.g. loans for growth financing, Venture Capital beyond H2020 by teaming up with European Investment Bank and EIF.
- Broadly communicate to the end user industry, general public and politics about impact of Photonics and Photonics PPP projects (success stories).

4. What are the relevance and expected impact of this proposed action?

Streamlining companies' and research organization roadmaps towards common goals is a key issue for ensuring an effective research and innovation ecosystem in Europe. This does not only avoid uncoordinated and often redundant (public) research and innovation funding, but also supports the photonics community in pooling forces to further strengthen the Photonics sector in Europe. By preparing and implementing a joint European strategy for Photonics the full potential of this technology can be exploited with significant impact on growth and employment, not only for the Photonics industry itself, but leveraging end user industry. According to a European Commission study 10% of the European economy is impacted by Photonics. The major challenge for Europe and the European industry is to manage the growing competition from Asia which heavily invests in Photonics and the digitization of industry which will never be accomplished without broadly applying Photonics like 3D Manufacturing, optical networks, sensors etc. The Photonics21 Secretariat CSA provides the critical support to the Photonics community to act with one voice on strategy development and implementation and to be recognized as a critical Key Enabling Technology for Europe.



PHOTONICS PUBLIC PRIVATE PARTNERSHIP

Work Group proposed action 2018-2020, extract

Work Group: Cross Cutting Task Force

Title: Developing new Photonics Innovation Hubs and reinforcing existing ones

1. What should be achieved by the funded projects under this proposed action?

The coordination and support action will undertake activities to stimulate regions to create new Photonics Innovation Hubs or to reinforce existing ones in the regions.

In regions where innovation hubs do not exist but where there is significant competence which has the potential to develop into an innovation hub, the creation of new hubs can be stimulated. This can be done by providing mentoring and coaching services to these potential innovation hubs by the more mature and proven innovation hubs in other regions of Europe.

Other activities could vary from informational campaigns, networking, exchange of best practises to providing incentives for regions to invest, for example co-funding between regions and H2020.

There is significant regional funding which is available to support technology development and the infrastructure which Innovation Hubs depend on, fitting the region's smart specialization strategy to create a competitive regional economy. An expected outcome is this action facilitates more investment from the regions in photonics and in particular investment in cooperation across the regions on photonics.

2. What are the relevance and expected impact of this proposed action?

The expected impact is

1/ to strengthen the innovation capability and competitiveness of the photonics industry by providing access to capabilities and expertise which they do not have in-house and
2/ to strengthen the broader industry by accelerating the deployment of photonics in other sectors, making European industry more competitive and increasing the demand for photonics components and systems.

It is relevant and suitable to do it at European level because regional and local initiatives will benefit from exposure to other regions in Europe who have similar innovation hub initiatives. Networking and exchange of best practices at EU level will be an essential element.



Work Group: Cross Cutting Task Force

Title: Linking the Innovation Hubs

1. What should be achieved by the funded projects under this proposed action?

This CSA will build links between Photonics Innovation Hubs and Innovation Hubs in other technology domains such as microelectronics, advanced manufacturing, robotics etc as well as Innovation Hubs in application domains such as smart farming, smart health.

Activities linking the innovation hubs should include training of "innovation scouts" who will have a broad knowledge of capabilities provided by innovations hubs in Europe and who are actively engaged in reaching out to potential end-user companies.

[Note that the need for these actions is not limited to the Photonics PPP and will have more impact if actions can be jointly funded by other PPPs. Where possible, joint activities with other PPPs should be supported.]

2. What are the relevance and expected impact of this proposed action?

In many cases, industry is not looking for a technology component alone, but for a more complete solution that requires multi-disciplinary knowledge. When innovation hubs of different disciplines are linked, access to such knowledge will be easier.

The aim is also to extend the range and accessibility of Photonics Innovation Hubs through innovation hubs on other disciplines, i.e. by actively linking Innovation Hubs in different domains a company approaching any Innovation Hub in any region can be given access to photonics technology and expertise.

The resulting expected impact is thus

- 1/ to strengthen the innovation capability and competitiveness of the photonics industry by providing access to capabilities and expertise which they do not have in-house and
- 2/ to strengthen the broader industry by accelerating the deployment of photonics in other sectors, making European industry more competitive and increasing the demand for photonics components and systems.



PHOTONICS PUBLIC PRIVATE PARTNERSHIP

Annex – Full Proposals



WG 7 – Fostering careers in Photonics

Summary:

A very crucial parameter in sustaining and further growth of the photonics economy in Europe, is the quantity and the quality of the European workforce trained in Photonics technologies. The overall challenge is securing –both in quantity and quality- the necessary knowledgeable and skilled workforce in photonics, in all layers: from industry and R&D to education, from unexperienced young people to different levels of experienced professionals. Building on experience of previous photonics CSA programmes, now CSAs are needed to give support to attracting new or young postgraduates and professionals to photonics as well as provide sustainable Life-long Learning programs and tools to ensure that the workforce remains competitive, especially in view of the industry 4.0.

Specific KPIs:

- Percentile of new university students going into STEM careers
- Percentile of new graduates/ young researchers moving/ seeking to move into photonics-related job positions
- Number of professionals using/ enrolled in Photonics Life-long Learning programs
- Number of photonics-centred educational programmes integrated in schools

We propose to have this CSA be split into two phases: a first phase that develops and puts into place programs to attract more professionals/ future professionals into photonics as well as Life Long Learning for existing professionals, and a second phase that builds upon the tools and methodologies developed in the previous phase allowing a more hands on experience around photonics.

1. Area to be addressed

A very crucial parameter in sustaining and further growth of the photonics economy in Europe, is the quantity and the quality of the European workforce trained in Photonics technologies. According to the EC¹, **about 10% of the European workforce is related to the photonics industry**. This workforce is growing, and it is expected to grow to over 500,000 employees by 2020. The photonics labor market has to be fulfilled through incorporation of **STEM graduates and young researchers**, as well as through **professionals with different level of expertise**. Furthermore, professionals need to constantly gain access to knowhow and tools in order to maintain Europe's industrial and educational competitiveness. A key point is also to **promote access to photonics expertise for non-photonics professionals** such as for example craftsmen, and including artists. This requires specific events and courses

¹ http://cordis.europa.eu/fp7/ict/photonics/studies_en.html



PHOTONICS PUBLIC PRIVATE PARTNERSHIP

(including hands-on activities) to be organised to create awareness on the potentials of photonics in many application fields.

The graduates feeding the photonics workforce are what is called “STEM graduates”, namely students that have studied Science, Technology, Engineering or Mathematics degrees. There is currently a deficit of STEM students that continue their careers in photonics, being this a pressing matter.

Furthermore, there is also an opportunity to attract workforce with different degrees of experience into photonics as well as provide Life-long Learning tools to ensure that professionals are up to date, especially regarding digital education, which is one of the basis for a successful photonics industry 4.0, as well as provide the educational community with tools to allow them to roll out educational programs that more and more demand inclusion of more STEM and Century21 skills.

2. What is the challenge?

The overall challenge is both securing the necessary knowledgeable and skilled workforce in photonics in all layers, from industry and R&D to education, from unexperienced young people to different levels of experienced professionals, and **extending the use of photonics and related technologies to new application fields**. The challenge is thus twofold:

1. **To increase the number of new STEM graduates/ Ph.D. students/ young postdocs moving towards careers in photonics**. It is imperative to reach out to the students currently studying STEM degrees, performing PhD theses in these fields, or at the postdoctoral level, unveiling to them the opportunities that photonics offers professionally.
2. To have a professional community with the appropriate photonics training that makes it competitive and ready for a rapidly evolving industry. This involves **providing Life-long Learning tools and methodologies in photonics to professionals along the entire photonics chain**: from primary, secondary and professional schools, to universities, research centres and industry, as well as encourage **innovation and entrepreneurship** in photonics, and **exploitation of photonics technologies by non-photonics professionals**, with the implication of local photonics clusters.

3. What needs to be reached in the CSA in concrete terms?

In the last years, several CSA actions have been launched to address the visibility of photonics among the general public, young students and entrepreneurs. This has led to successful projects, some of which are still active, that turned out to impact millions of



PHOTONICS PUBLIC PRIVATE PARTNERSHIP

people across Europe, helping to make photonics a household word as well as promoting STEM studies among younger students. Building on experience of previous photonics CSA programmes, **now CSAs are needed to give support to attracting new or young postgraduates and professionals to photonics as well as provide sustainable Life-long Learning programs and tools to ensure that the workforce remains competitive, especially in view of the industry 4.0 and that the impact of photonics is extended to new application fields.**

This should be done through:

- **Actions/activities that engage** university students, young researchers and young professionals **to undergo photonics careers and boost their multidisciplinary and cross-KET innovation and entrepreneurship skills.** These actions/activities should provide students, young researchers and young professionals with the knowhow and a view on the opportunities that photonics poses at the professional as well as technology or industry levels. This can be done building on past successful activities by consolidating, updating and further spreading the material developed in previous projects (educational and photonics innovator kits). For hands-on activities also the Photonics-enhanced Maker Labs network should be involved. Indeed, the new action will not only exploit the material developed in previous projects (Educational kit of Photonics Explorer, Innovator kit of Light2015), but it will also take advantage from the introduction of photonics instruments and skills in existing Maker Labs that is being built by the running PhabLab 4.0 project.
- **Photonics Life-long Learning Programs** directed to professionals in different levels and of various fields, including educators (starting from primary school teachers to university professors), scientists, technicians, craftsmen, artists and entrepreneurs. This programmes should be integrated at the European level and implemented through a network of centres, making them sustainable and accessible to all levels in the educational and professional systems and for training centres. Programs should be especially conceived to help the European professional community be 4.0 competitive.

4. Expected impact on European economy, employment, societal challenges?

The impact is twofold: quantitative and qualitative. Quantitative: more people moving towards photonics careers and more professionals exploiting photonics and related technologies in their activities. Qualitative: better prepared and competitive workforce. Photonics can address most societal challenges providing sustainable solutions. Being trained in photonics, especially in a project-based approach, will encourage and stimulate on the one hand innovations to target different societal challenges like energy, safety, food-production, etc., and on the other hand entrepreneurship, to start-up business in the domain of photonics or to integrate photonics-based solutions to extend the potentials of non-photonics products. In addition, it is expected that this CSA will improve the photonics



PHOTONICS PUBLIC PRIVATE PARTNERSHIP

innovation and entrepreneurship culture among university students and young professionals in the framework of photonics and beyond photonics-market.

Specific KPIs:

- Percentile of **new university students going into STEM careers**
→ data at the beginning and at the end of the project, based on students in schools participating in the project
- Percentile of **new graduates/ young researchers moving/ seeking to move into photonics-related job positions**
- → data based on questionnaires shared out at the beginning and at the end of the project among students at participating universities
- Number of **professionals using/ enrolled in Photonics Life-long Learning programs**
→ data based on number of participants in such programs
- Number of **photonics-centred educational programmes integrated in schools**
- → data based on number of schools that establish such programs

5. EU added value: why should it be funded at EU level rather than national or local level?

There is a need for a more qualified workforce in the domain of photonics at the European level and for a wider exploitation of photonics skills in non-photonics areas. So it makes sense to combine forces and provide tools and methodologies on an integrated European way, reaching to all professional levels and making them available across Europe. The photonics players have already a successful track record in collaborations towards similar goals. The previous photonics outreach CSAs already proved the increased effect and impact when such activities take place at European scale.

6. Requested funding? When 2018/2019/2020?

The lack of a qualified workforce in photonics is a current and pressing challenge, making it an urgent matter. Funding should allow the creation and development of events/activities as well as the implementation of programs that allow to put into practice the learnings acquired. Thus, we propose to have this CSA be split into two phases:

Phase 1: Actions/activities that engage all-level students through educators (from primary school to university) to increase the impact of promoting photonics and boost multidisciplinary and cross-KET innovation and entrepreneurship skills, as well as creation of Photonics Life-long Learning Programs directed to professionals across levels, including educators, scientists, technicians, craftsmen, artists and entrepreneurs.

- Up to 30 months long



PHOTONICS PUBLIC PRIVATE PARTNERSHIP

- Budget: €3M (*it includes events and activities, which depends on the number of partners, and creation and production also in electronic format as much as possible of tools and methodologies for easy access, replication and sustainability*)
- WP2018

Phase 2: Programs that roll out the tools and methodologies developed in the previous phase allowing a more “do it yourself” and “hands on experience” around photonics, following the “I hear and I forget. I see and I remember. I do and I understand.” quote by Confucius. Photonics-enhanced Makers Labs should be involved in this phase.

- Up to 24 months long
- Budget: €3M (*to roll out a European-wide project-based program directed to all professional levels*)
- WP2020



PHOTONICS PUBLIC PRIVATE PARTNERSHIP

Cross Cutting Task Force – Photonics21 Secretariat

1. What shall be reached in concrete terms?

Photonics21 has been evolved as the most successful European Technology Platforms (ETP) in terms of membership and has been selected as one of the few ETPs to establish a Public Private Partnership with the European Commission in H2020. The positive economic prospects of Photonics, namely to create growth and jobs and the strong commitment of the Photonics community towards Europe made it happen.

The Photonics21 secretariat CSA priority proposed builds on the former CSA projects. It aims at providing the critical organizational support to the now more than 3100 members and the Boards of Photonics21 which act as volunteers alike. It will ensure open, transparent and bottom-up decision making structures which is the very basis for ensuring the strong commitment and broad participation of the Photonics community seen so far.

The further cooperation between Photonics companies and research organisations with end user industries, the critical role of Photonics for digitizing European industry and the closer alignment of European, national and regional funding (Digital Innovation Hubs), will be a major task for the Photonics community in Europe to further build up jobs and growth. As a Key Enabling Technology Photonics is providing the competitive edge to core European industries in areas like Automotive & Aviation Industry, Manufacturing, Health & Medical Technology, and ICT. As Photonics21 relies purely on voluntary work of committed Photonics experts from industry and research alike it will remain of outmost importance to provide a professional, transparent and efficient organizational backbone to these experts.

What shall be reached?

- Coordinate and provide organizational support for **all Photonics21 activities**, including
 - Assistance to Photonics21 Boards, Work Groups and members: ensuring open and transparent decision making structures and procedures, e.g. decision memos, timelines, democratic processes
 - Provide critical support for preparing and implementing a joint European Photonics Roadmap
 - Steer Horizon2020 Photonics PPP Research and Innovation projects to deliver on the Key Performance Indicators of the PPP.
 - Steer Horizon2020 Photonics PPP Coordination and Support projects towards the Photonics21/PPP goals.
 - Monitor Key Performance Indicators of the Photonics21 / PPP roadmap implementation and suggest corrective actions, if necessary.
 - Coordinate Photonics21 activities with the European Commission
 - Provide one single entry communication platform for the European Photonics community.
- Advocacy: Position Photonics as Key Enabling Technology in the post Horizon 2020 framework programme (FP9)
- Facilitate a closer collaboration between Photonics companies and research organization with end user industries



PHOTONICS PUBLIC PRIVATE PARTNERSHIP

- Coordinate of Photonics21/PPP roadmap implementation with national and regional photonic stakeholder organizations and public authorities
- Foster strategic collaboration with financial institutions to improve financing conditions for Photonics industry, e.g. loans for growth financing, Venture Capital
- Strengthen communication about impact of Photonics impact to end user industry and general public.

2. Expected Impact on European economy, employment, societal challenges;

Streamlining companies' and research organization roadmaps towards common goals is a key issue for ensuring an effective research and innovation ecosystem in Europe. This does not only avoid uncoordinated and often redundant (public) research and innovation funding, but also supports the photonics community in pooling forces to further strengthen the Photonics sector in Europe.

By preparing and implementing a joint European strategy for Photonics the full potential of this technology can be exploited with significant impact on growth and employment, not only for the Photonics industry itself, but leveraging end user industry. According to a European Commission study 10% of the European economy is impacted by Photonics. The major challenge for Europe and the European industry is to manage the digitization of industry which will never be accomplished without broadly applying Photonics like 3D Manufacturing, optical networks, sensors etc. Photonics is providing solutions for a variety of Societal Challenges like Health, Food security or Secure Societies demonstrated by current Photonics PPP projects.

3. EU added value: Why should it be funded at EU level rather than national or local level?

By definition a European task as the CSA action addresses a joint European Photonics strategy development and implementation.

4. Requested funding? When 2018/2019/2020?

2-3 M (depending on level of involvement of National Technology Platforms or other partners), 2020



Cross Cutting Task Force – Developing new Photonics Innovation Hubs and reinforcing existing ones

Cross Cutting Task Force – Linking existing Innovation Hubs

This document contains a proposal for three actions that are all necessary to realise the vision of Digital Innovation Hubs in Europe:

1. **Access to photonics technologies for industry through Innovation hubs** (Innovation Action)
2. **Linking innovation hubs** (CSA)
3. **Fostering new and reinforcing existing photonics innovation hubs** (CSA)

Area to be addressed

Photonics Digital Innovation Hubs

1. What shall be reached in concrete terms?

- **Open access to Photonics Innovation Hubs:** Providing easy access to Photonics Innovation Hubs in order to reinforce the competitiveness of European industry. The aim is
 - 1/ to strengthen the photonics industry by providing access to capabilities and expertise which they do not have in-house and
 - 2/ to strengthen the boarder industry by accelerating the deployment of photonics in other sectors, making European industry more competitive and increasing the demand for photonics components and systems.

Access to Photonics Innovation Hubs must be provided in a way that

- Builds on technology platforms and capabilities that have previously been matured
- Is driven by the business needs of industry which are the users of the Innovation Hubs
- Facilitates the use by SMEs and non-photonics end-user industry all over Europe
- Provides other complementary support such as facilitating access to other sources of financing as well as business support (e.g. market intelligence, business plan development)

The Photonics Innovation Hubs should provide access on both a subsidized basis as well as a commercial basis depending on the scale and closeness of the activity to the market.

- **Linking the Innovation Hubs:** Building links between Photonics Innovation Hubs and Innovation Hubs in other technology domains such as microelectronics, advanced manufacturing, robotics etc as well as Innovation Hubs in application domains such as smart farming, smart health.



The aim is to extend the range and accessibility of Photonics Innovation Hubs so that any industry in any region in Europe can have easy access to photonics technology. By actively linking Innovation Hubs in different domains a company approaching any Innovation Hub in any region can be given access to photonics technology and expertise.

Activities linking the innovation hubs should include training of "innovation scouts" who will have a broad knowledge of capabilities provided by innovations hubs in Europe and who are actively engaged in reaching out to potential end-user companies.

[Note that the need for these actions is not limited to the Photonics PPP and will have more impact if actions can be jointly funded by other PPPs. Where possible joint activities with other PPPs should be supported]

- **Developing new Photonics Innovation Hubs and reinforcing existing ones.**

There is significant regional funding which is available to support technology development and the infrastructure which Innovation Hubs depend on.

One aim of this activity is to facilitate more investment from the regions in photonics and in particular investment in cooperation across the regions. Activities could vary from informational campaigns to providing incentives for regions to invest, for example co-funding between regions and H2020.

The second aim is to stimulate the creation of new Photonics Innovation Hubs in regions where they do not exist but where there is significant competence which has the potential to develop into an innovation hub. This can be done by providing mentoring and coaching services to these potential innovation hubs by the more mature and proven innovation hubs in other regions of Europe.

2. Expected Impact on European economy, employment, societal challenges;

- Reinforcing the innovation capability and competitiveness of the photonics sector.
- Significantly increasing the uptake of photonics by other industrial sectors, thereby increasing the demand for photonics and also reinforcing the competitiveness of European industry in general.

3. EU added value: Why should it be funded at EU level rather than national or local level?

Photonics Innovation Hubs across Europe need to be linked together must be made accessible by any company in any region in Europe. This can only be done at EU level.

4. Requested funding?

Linking the Innovation Hubs:

Type of action: CSA

1 m€ as a part of a joint action with other PPPs

Developing new Photonics Innovation Hubs and reinforcing existing ones.

Type of action: CSA

2.5 m€, including mentoring of up to 20 potential Photonics Innovation Hubs (100k€ each) and 500 k€ for regional outreach, informational campaigns