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VIEWPOINT

Securing the Future for European Photonics

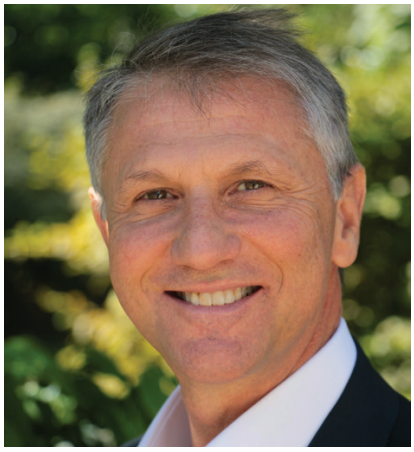
Photonics21 executive board members **Roberta Ramponi** and **Giorgio Anania** speak to the importance of academic and industrial collaboration.

Photonics has come a long way since being little more than a theory in the late 1960s, undergoing phenomenal and exciting changes in subsequent decades. Photonic technologies have become a part of everyday life, revolutionizing society with new and innovative applications that extend far beyond lighting products.

Today, the global market for photonic applications has grown to €450 billion, and has nearly doubled in the last 10 years. The photonics sector has become a highly competitive market, as nearly all global leading technological industries have integrated photonics into their products in some way. Leading economies throughout the world are investing heavily in photonics: from 2014 to 2020, public funding for photonics in South Asia (China, South Korea and Japan) will double to some €4.2 billion. In the United States, the decision several years ago by the Obama administration to invest in next-generation photonics manufacturing facilities is fostering unprecedented innovation in digital industries.

Europe, meanwhile, leads the world in photonics manufacturing in a variety of sectors, including production technology (50 percent of world output), measurement

Roberta Ramponi



Giorgio Anania

and automated vision (35 percent), optical components and systems (32 percent), medical technology and life sciences (28 percent), defense and security (26 percent) and lighting (24 percent). Europe is the second-largest producer of photonics products behind China, with the photonics sector directly employing around 300,000 people, and with growth in photonics running at 3.5 times overall GDP growth.

At the heart of this phenomenal development in Europe has been the Photonics21 platform—the voice of photonics, which was named a Key Enabling Technology by the European Commission (E.C.) and its stakeholders. And a recently published vision document by Photonics21 (http://bit.ly/photonics21-vision-paper) forecasts tremendous growth, with a million new jobs created in Europe alone as a direct result of leveraging this technology.

Photonics21 in Horizon 2020

Building on the strengths of the European photonics sector and reinforcing its competitiveness through a long-term commitment to a shared vision, Photonics21 was established at the beginning of 2005 as a technology platform. With the beginning of Horizon 2020, the eighth Framework Programme of the European Union, in 2013, the platform evolved into the Photonics Public-Private Partnership (PPP).

Within the Horizon 2020 framework, Photonics21 has seen strategic work programs developed by a technological *entente cordiale* comprising the E.C., the photonics industry and the R&D community—all collaborating in a growing Photonics PPP. Photonics21's work groups, each focusing on the development of specific research and innovation priorities, have not only become activity hubs within the organization, but have also allowed stakeholders the chance to set the next key agendas, giving a democratic voice to the people who matter.

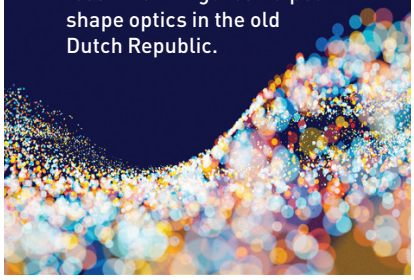
Describing the Photonics PPP role in Horizon 2020 would not be complete without mentioning the many projects funded through this program that are coming to fruition. Already we are seeing medical devices that will provide standoff detection of major diseases and others that will dramatically improve surgery times, as well as devices that

SPECIAL ISSUE:

European Photonics

This month, OPN throws the spotlight on the dynamic environment for photonics in Europe—a leader both in photonic science and in recognition of that science's power to drive regional progress and economic growth. Among the stories in this special issue:

- **Photonics21's road ahead**
  Two executive-board members for a key academic–industry partnership take stock of its achievements and future.
- **OSA in Europe**
  OPN talks with Yann Amouroux, OSA's new European rep.
- **Training a new generation**
  An update on PHABLABS 4.0, a Horizon 2020-funded project to build a better photonics workforce via hands-on workshops.
- **Toward greater equity**
  The GENERA program seeks to increase the presence of talented women in physics.
- **Europe's quantum push**
  From the E.U. "Quantum Flagship" to diverse member-state programs, support for quantum tech is booming.
- **Brexit dilemmas**
  Two years after the U.K.'s earth-shaking vote, the potential outcomes seem as uncertain as ever.
- **A look back**
  Both scientific luminaries and less-known figures helped shape optics in the old Dutch Republic.



use photonics to transform disaster rescue efforts and make clean energy.

Since its founding in 2005, and throughout the Horizon 2020 period, Photonics21 has raised awareness of photonics as a Key Enabling Technology for European industry. Today, we are proud to report that this body has more than 3,000 members from more than 1,700 organizations all over Europe—all sharing this collective vision.

Academia–industry cooperation

When Photonics21 was invited to form the Photonics PPP six years ago, one issue that was very important to us then, and that remains equally pertinent now, was the collaboration between science and industry that Photonics21 represents. Only through the unique opportunities that academia–industry cooperation allows can we truly find the most innovative ideas to tackle the pressing issues of our time.

Photonics is making a huge contribution to solving major societal challenges, such as instant diagnosis of major diseases, accident- and congestion-free road transport and quality food from farm to fork. Partnerships with industry are vital to our success. Through collaboration and a wealth of funding opportunities, academics have the resources and, more important, the freedom to develop their ideas to help the photonics sector in resolving some of these challenges, for the benefit of all our citizens.

Alongside the other five European Key Enabling Technologies (micro- and nanoelectronics, nanotechnology, industrial biotechnology, advanced materials and advanced manufacturing technologies), photonics is crucial to driving growth and employment in Europe. With this in mind, the Photonics PPP made a long-term pledge both to the E.C. and to photonics stakeholders to secure future European industrial leadership through economic growth, a highly skilled workforce and the capability to generate new jobs that attract young people.

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Photonics in Horizon Europe

Much has been achieved during the development phase of the PPP, and through Horizon 2020. But it is essential to keep this momentum going with strong investment from the E.C.'s ninth Framework Programme, Horizon Europe, which will succeed Horizon 2020 at the beginning of the next decade. It is paramount to build upon what has already been achieved in developing the Key Technologies, so that Europe can remain at the forefront of future leadership in arguably one of the fastest-growing global markets.

Look at the current developments in quantum optics and the spread of optical sensing and light-generating technologies in healthcare, mobility, industrial manufacturing, energy and many other sectors. These technologies will drive strong growth in photonics employment and revenues to 2030 and beyond. Being a key player in this future, and securing a front seat for photonics in Horizon Europe, will ensure Europe's place in the forefront of these developments.

Complacency is not an option, however. Making this future a reality will require a long-term public–private commitment that combines Europe's strengths in photonics with a highly innovative transnational ecosystem. That will include creating a truly European lab-to-fab infrastructure for accelerating innovation and competitiveness. Europe needs to expedite the uptake of technology and its translation into new products and services. Also, boosting opportunities for entrepreneurship—through vehicles such as the work Photonics21 is doing with the E.C.- funded project ACTPHAST 4.0 to support small and medium-sized enterprises, both in the photonics sector and among nonspecialists—is essential to the progression of photonics.

Above all, through the seven-year term of Horizon Europe and beyond, Europe needs to ensure that today's young people are engaged with industry. The education and training of tomorrow's specialists today guarantees our future. OPN

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