Dear Photonics21 Secretariat

We herewith submit the nomination of the following Photonics21 Board of Stakeholder candidate SOFRADIR SAS / Patrick Abraham.

- Letter of Nomination -
Photonics21 Board of Stakeholders
Election 2018

1. Full legal name of the affiliation nominated as BoS Member (candidate's organisation):

SOFRADIR

2. Full contact details of the affiliation (street, postal code, country) nominated as BoS Member and invoice address (in case the candidate is elected, the affiliation needs to pay an annual service fee according the Photonics21 Terms of Reference §5 (10)):

SOFRADIR- Development and production center
Actipole - 364 Route de Valence
CS - 10021 - 38113 Veurey-Voroize - FRANCE

3. Name of the suggested BoS Representative (the personal candidate)

Patrick Abraham

4. Information about the BoS candidate and the BoS representative

a) Description of the activities and information about the expected contribution and value added the nominated BoS member (candidates organization) will bring to the BoS[2]

The group SOFRADIR is a leading global provider of best-in-class Infrared (IR) detectors and equipment for a broad range of industries. SOFRADIR group products are used for defense, space, and commercial applications.
The Group consists of parent company SOFRADIR SAS and its two subsidiaries, ULIS SAS, and SOFRADIR EC Inc, employing approximately 1,000 people, 730 of which are with SOFRADIR SAS and 200 with ULIS SAS. Together, SOFRADIR group's companies provide a complete range of cooled and uncooled IR detectors as well as night vision modules.
The uncooled detectors based on micro bolometer technology are manufactured by ULIS SAS. The micro bolometer technology used by ULIS SAS was transferred from CEA-Leti, a leading European microelectronics and nanotechnologies RTO, in 2002. All other IR detectors, mainly cooled, are manufactured by SOFRADIR SAS using MCT (Mercury Cadmium Telluride), InGaAs, InSb and Quantum well Infrared Photodetector (QWIP) technologies. MCT is the technology SOFRADIR SAS was founded to develop in 1986 as a spin-off of CEA-Leti. The III-V technologies (InGaAs, InSb and QWIP) were acquired in 2013 from III-V Lab and SAGEM.
With this portfolio of technologies, SOFRADIR group is able to supply detectors working in the 0.9 µm to15 µm detection range.

SOFRADIR group reported revenue of € 230 million in 2017. The defense and commercial application markets each account for around 40-45% of SOFRADIR group's revenue; with space applications making up the remaining 10-15%. Over the last 10 years SOFRADIR group CAGR has been around 10%.

[2] The candidate is aware and accepts that according to the Photonics21 Terms of Reference a service agreement and a service fee invoice is to be signed / paid with the Photonics21 association.

SOFRADIR SAS and ULIS SAS are merchant suppliers dedicated to providing best-in-class technologies to their customers. The company's strategy is built on strong R&D investments (10% and 20% of SOFRADIR SAS and ULIS SAS revenues respectively) and ties with numerous European research partners:

- *CEA-LETI, ONERA, III-V Lab, Minalogic, and Universities (Grenoble, Montpellier, Poitiers, Strasbourg, Toulouse, Versailles…) in France.*
- *Twente University in the Netherlands*
- *IFAE laboratory at Barcelona University in Spain*
- *Strategic industrial partners in France, Austria, Ireland, Italy, Germany, Slovenia…*

This strategy led to some major innovations:

- *In 2005 SOFRADIR SAS was the first company to launch production of 15-micron-pitch IR detectors*
- *In 2007, ULIS introduced the first XGA format uncooled infrared sensor with a 17-micron pixel pitch*
- *In 2009 SOFRADIR SAS was the first company to provide HOT components (High Operating Temperature: 30 K higher than competing products)*
- *In 2012 SOFRADIR SAS demonstrated the feasibility of a 10-micron pitch*
- *In 2013, ULIS introduced the first 80x80 Infrared sensor format*
- *In 2016, the patented ULIS Pixel Level Packaging was made available at industrial level*

SOFRADIR SAS is the global (excluding the US) leader on the space market designing and manufacturing IR modules for applications such as earth observation, meteorology, scientific and environmental analysis and military surveillance. SOFRADIR SAS has close relationships with the major private-sector stakeholders (Airbus Defense and Space, ThalesAlenia Space…) and government or international organizations (CNES, ESA…) in the space industry. SOFRADIR SAS is the leading global (excluding the US) supplier of flight models in terms of the number of satellites with IR channels launched and the number of ongoing programs.

SOFRADIR group's products on the industrial and commercial markets mainly come from ULIS SAS. Numerous applications on these markets benefit from SOFRADIR group's products: security and surveillance, thermography, machine vision, scientific and R&D applications, thermography, outdoor and leisure, firefighting, smart building and automotive applications. New applications in the field of astronomy, gas detection for industrial site monitoring, health, people counting and detection, night-time wildlife surveillance, and drone based observations like precision farming are also gaining traction and SOFRADIR SAS and ULIS SAS are involved in developing imaging solutions for these applications.

The group SOFRADIR will contribute to setting photonics and innovation objectives and R&D&I roadmaps by bringing its knowledge of the IR imaging ecosystem to Photonics21 BoS. SOFRADIR group will provide inputs on:

- *The needs of imaging system developers/integrators and their market applications*
- *The improvements required to lower the cost of photonics solutions for Extended Infra-Red (EIR) imaging*

- *The potential of IR sensors for new applications that respond to the societal challenges facing Europe*
- *The convergence opportunities between dual-use technologies and IoT*
- *IR market needs and trends for space, commercial, and scientific applications*

b) Description of the activities and information about expected contribution and value added the BoS Representative (candidate / person) will bring to the BoS.

Patrick Abraham has been in charge of Public-Private Partnership (PPP) development at SOFRADIR since 2014. He joined SOFRADIR SAS in 2007 as head of the Front End R&D Department.
Mr. Abraham graduated from Lyon University in 1987 with a PhD in Materials Science with a research focus on III-V semiconductor processes.
Mr. Abraham spent the first eight years of his career as an Associate Scientist at the National Center for Scientific Research (CNRS) in France working on Metal Organic Vapor Phase Epitaxy (MOVPE) precursors and semiconductor surface passivation.
He then joined John Bowers and Steve DenBaars groups at the University of California Santa Barbara (UCSB) where he worked for four years on MOVPE process development for the growth of world record-breaking avalanche photodiodes, vertical cavity surface emitting lasers (VCSEL), electro-absorption modulators and optical switches.
He then joined Agility Communications in Santa Barbara (CA-USA) when the company was founded. He started the company's MOVPE activity to develop and produce wavelength tunable lasers. At Agility Communications (acquired by JDSU, in 2005, now separated in Lumentum and VIAVI) he moved up from Senior MOVPE to Front End Manufacturing Manager.
Mr. Abraham has authored and co-authored more than 60 papers. He holds a Certificate in Innovation Management from Grenoble Graduate School of Business and has been a Senior IEEE member since 1999.

As representative of SOFRADIR, Mr. Abraham will bring the following added value to Photonics21 BoS:

- *Experience in diverse photonics applications from fiber-optics communication to infrared imaging*
- *PPP development*
- *Experience in promoting and managing innovation*
- *A balanced vision of academic and industrial needs*
- *Strong relationship with the photonics R&D community in Europe*
- *Experience with H2020 and ECSEL collaborative projects*

Participating in Photonics21 BoS will allow Patrick Abraham to share his experience and help the European photonics community to better serve the European society.