



# ESPACIO EN HORIZON2020 WORKPROGRAMME 2018-2020 (BORRADOR) ANUALIDAD 2020

Jornada I+D en Tecnología Espacial  
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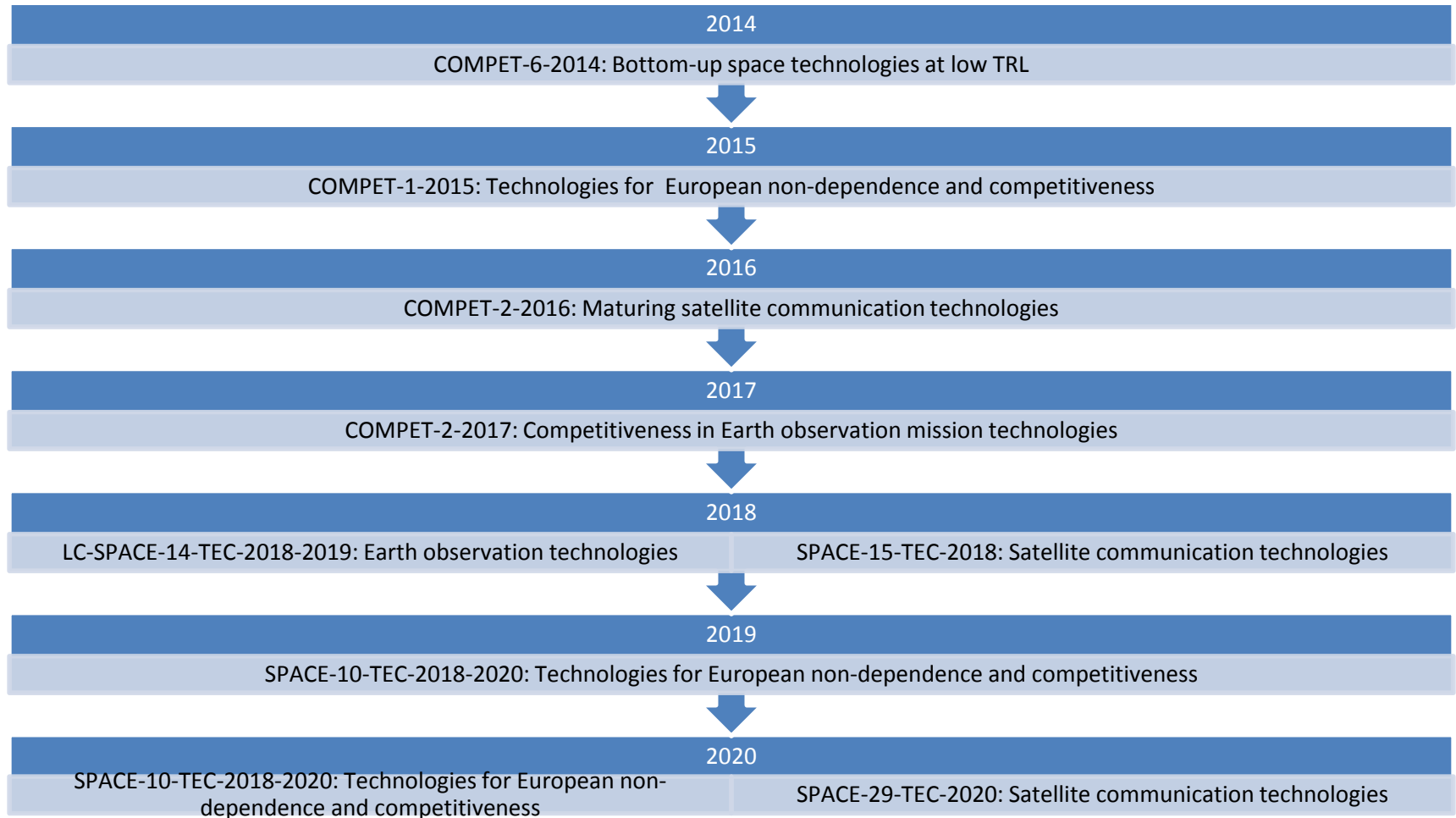
26 de Abril 2019

**ESHORIZONTE2020**

Portal español del Programa Marco de Investigación e Innovación de la Unión Europea

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# FINANCIACIÓN EN TECNOLOGÍAS ÓPTICAS Y FOTÓNICAS EN H2020 – ESPACIO (2014-2020)



# ¿QUÉ SE HA FINANCIADO EN H2020?

2014

## COMPET-6-2014: BOTTOM-UP SPACE TECHNOLOGIES AT LOW TRL (RIA)

- ✓ Proposals were sought with relevance for the fields of: "**high-resolution optical and radar observation related technologies (including hyperspectral systems)**", "radiation-hardened instrument components", "in-situ sensors/instruments of physical parameters", "technologies for flexible/new generation SatCom payloads" and "**advanced inter-satellite and/or downlink communications and tracking techniques (RF or Optical)**".



- ✓ **Funded project** in the field of high-resolution optical and radar observation related technologies (including hyperspectral systems):
  - ✓ **[PHySIS - Sparse Signal Processing Technologies for HyperSpectral Imaging Systems](#)**

Budget aprox. 1 M €

Coordinator: FOUNDATION FOR RESEARCH AND TECHNOLOGY HELLAS

Spanish Partner: None

# ¿QUÉ SE HA FINANCIADO EN H2020?

2015

COMPET-1-2015: Technologies for European non-dependence and competitiveness (RIA)

- ✓ Technologies to be funded:
  - ✓ U4 - Advanced materials and material technology for combustion chambers
  - ✓ **U6 - Fibre Optic Gyro (FOG) based Inertial Measurement Unit - IMU**
  - ✓ U7 - Power amplification: Travelling Wave Tube (TWT) materials
  - ✓ U13 - Passive components
  - ✓ U14 - Active discrete components



- ✓ **Funded project** in the field of Fibre Optic Gyro (FOG) based Inertial Measurement Unit - IMU

- ✓ **NONE**

# ¿QUÉ SE HA FINANCIADO EN H2020?

2016

## COMPET-2-2016: MATURING SATELLITE COMMUNICATION TECHNOLOGIES (RIA)

- ✓ The aim of this topic is to demonstrate, in a relevant environment, technologies, systems and sub-systems for satellite communications. Fields:
  - ✓ **Advanced communication technologies** for feeder or service links, **preparing satellite networking** in the Terabit-throughput **including optical communication** and RF communication at high frequencies (Q/V/W). Optical communication technologies will indicatively include laser communication terminals for ground and satellite segment. This could include transmitter and receiver technologies, **hybrid RF-photonic technologies**,...
  - ✓ **Photonics technology** (for high capacity reconfigurable payloads).
  - ✓ New generation of waveforms and related protocols, as well as **photonic building blocks** and technologies, devoted to seamless integration of SatCom Systems with terrestrial networks [...]



- ✓ **Funded projects** in this field:

- ✓ **OPTIMA - Towards Demonstration of Photonic Payload For Telecom Satellites**

Budget aprox. 2,8 M €

Coordinator: AIRBUS DEFENCE AND SPACE LTD

Spanish Partner: DAS PHOTONICS

- ✓ **QV-LIFT - Q/V band earth segment Link for Future high Throughput space systems**

Budget aprox. 3,4 M €

Coordinator: AGENZIA SPAZIALE ITALIANA

Spanish Partner: ERZIA TECHNOLOGIES SL

# ¿QUÉ SE HA FINANCIADO EN H2020?

2017

## COMPET-2-2017: COMPETITIVENESS IN EARTH OBSERVATION MISSION TECHNOLOGIES (RIA)

- ✓ The aim of this topic is to demonstrate, in a relevant environment, technologies, systems and sub-systems for Earth Observations. Fields:
  - ✓ **Optical technologies** for high precision sensing, including high stability structures, stable and lightweight mirrors, large focal planes, adaptive optics and wave front error (WFE) control techniques
  - ✓ High performance and **miniaturised optical** (ultra-violet, visible, infra-red), and SAR sensors. [...]
- ✓ **Funded projects** in this field:



- ✓ **SCARBO - Space CARBOn Observatory**

Budget aprox. 2,9 M €

Coordinator: AIRBUS DEFENCE AND SPACE SAS

Spanish Partner: NONE

- ✓ **HOLDON - HgCdte APD Optimization for Lidar Detection Of greeNhouse gases**

Budget aprox. 2,5 M €

Coordinator: COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES

Spanish Partner: ALTER

# ¿QUÉ SE HA FINANCIADO EN H2020?

2018

## LC-SPACE-14-TEC-2018-2019: EARTH OBSERVATION TECHNOLOGIES (RIA)

- ✓ The aim of this topic is to demonstrate, in a relevant environment, technologies, systems and sub-systems for Earth Observations from satellites as well as from high altitude platforms. Fields:
  - ✓ **Very high resolution optical EO for LEO and/or high resolution optical EO for GEO/HEO instrument technologies**, with focus on improving payload (e.g. radiometric and spectral parameters, spatial resolution, swath)...
  - ✓ **Competitive remote sensing instruments and space systems**: innovations supporting readiness advancements for next generation systems in the optical and radio frequency domains (active/passive),...
  - ✓ Disruptive technologies for **remote sensing**, as technology building blocks for innovative **LiDAR** (Light Detection And Ranging) **and radar instruments** (including cost-effective wide-swath altimetry and imaging systems), super-spectral and hyperspectral payloads,...
  - ✓ Advanced **SAR/Radar technologies**...



- ✓ **Funded projects** in this field:

- ✓ **RETINA- Miniaturised Photonics Enabled Next Generation SAR**

Budget aprox. 2,9 M €

Coordinator: DAS PHOTONICS

Spanish Partner: DAS PHOTONICS, UPV

- ✓ **LEMON - Lidar Emitter and Multispecies greenhouse gases Observation iNstrument**

Budget aprox. 3,3 M €

Coordinator: OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES

Spanish Partner: NONE



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# ¿QUÉ SE HA FINANCIADO EN H2020?

2018

## SPACE-15-TEC-2018: SATELLITE COMMUNICATION TECHNOLOGIES

- ✓ Proposals shall address one of the following sub-topics:
    - ✓ **[...]Optical communications, including photonics**, for very high throughput systems with more than 10 Gbps (**e.g. hybrid RF/optical payloads use of optical up- and down links**), on-board and ground aspects focusing on feeder links
    - ✓ [...]
- Proposals shall consider enabling technologies and solutions aiming at exploiting the potential synergies between the Satellite Communication domain and the Navigation and Earth Observation domain



- ✓ **Funded projects** in this field:

- ✓ **SODAH- Software Defined Space Optical Data Highway**

Budget aprox. 3,1 M €  
Coordinator: SODERN SA  
Spanish Partner: DAS PHOTONICS

- ✓ **ORIONAS - Lasercom-on-chip for next generation, high-speed satellite constellation interconnectivity**

Budget aprox. 2,9M €  
Coordinator: LEO SPACE PHOTONICS R&D MONOPROSOPIIKE  
Spanish Partner: NONE



# ¿QUÉ SE HA FINANCIADO EN H2020?

2019

## SPACE-10-TEC-2018-2020: TECHNOLOGIES FOR EUROPEAN NON-DEPENDENCE AND COMPETITIVENESS

- ✓ Proposals shall address one of the following sub-topics:
  - ✓ **JTF-2018/20-28 – Photonics components [U15]**
    - ✓ **Digital Photonics Payload.** Development and qualification of high data rate, high density optical links for future space missions to take advantage of the mass and AIT advantages that optical fibres and optical communications offer
      - ✓ 10Gbps(>20 Gbps as target goal) optical emitter/receiver
      - ✓ Space qualified optical cables and connector assemblies for multifibre cables (12 channels)
    - ✓ **Microwave photonic payload.** Photonics components needed for future photonic telecom payloads as well for RF Earth Observation photonic functions like: Frequency Generation, up/down Frequency Conversion, Local Oscillator Distribution, Optical Switching, programmable photonic processors, Optical Beam Forming/Steering, Photonic RF filtering



- ✓ **Funded projects** in this field:

- ✓ **UNDER EVALUATION**

# CALENDARIO Y TOPICS PARA LA ANUALIDAD 2020

DATE	
1st November 2019	Space call opening
Q4 2019 (tbc)	Infoday in CDTI
5th March 2020	Space call deadline
MidJuly 2020 (tbc)	Evaluation results

TOPIC	TYPE OF ACTION	TOTAL BUDGET (M€)	SIZE OF PROJECTS (M€)
SPACE-10-TEC-2018-2020: Technologies for European non-dependence and competitiveness	RIA	14	1 - 3
SPACE-29-TEC-2020: Satellite communication technologies	RIA	9	2 - 3

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# SPACE-10-TEC-2018-2020: Technologies for European non-dependence and competitiveness



TO REDUCE THE DEPENDENCE ON CRITICAL TECHNOLOGIES AND CAPABILITIES FROM OUTSIDE EUROPE FOR FUTURE SPACE APPLICATIONS

## ✓ Actions to be implemented in 2020:

- ✓ JTF-2018/20-5 – Very high performance **microprocessors** [U20]
- ✓ JTF-2018/20-9 – Design and prototype of **ultra-reprogrammable SoCs** [N50]
- ✓ JTF-2018/20-14 – **Fiber optic or photonic** integrated technology **gyro-based inertial measurement unit (IMU)** [U6]
- ✓ JTF-2018/20-16 – Active discrete **power** components [U14]
- ✓ JTF-2018/20-17 – Power amplification: travelling wave tube materials [U7]
- ✓ JTF-2018/20-23 – **SW** tool: automatic generation of code [N64]
- ✓ JTF-2018/20-33 – Advanced materials and material technology for **combustion chambers** [U4]



## Analysis of relevant available roadmaps

**Analysis of how their selected critical space technologies can contribute** to different space/non-space applications

**Commercial assessment of the supply chain technology** in the space or non-space domains

**Business plan for commercialisation**

**Describe the technologies and/or technology processes** to be used and show that they are free of any legal export restrictions or limitations

**Set up a suitable technology development process** aiming at avoiding export restrictions of non-EU states.

**Budget: 1 -3 M €**

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<b>Description and needed Action</b>	<p>Ensure long term availability of a European cost effective high performance fiber optic or photonics integrated technology gyroscope based IMU (with accelerometers).</p> <p>This activity targets the full range of FOG (Fiber Optic Gyro) IMUs aiming at dependence and cost reduction by the introduction of COTS (Commercial Off-The-Shelf) components.</p>
<b>Estimated Initial TRL:</b>	4
<b>Target TRL</b>	<p>≥ 6</p> <p>The target TRL of 6 implies at least the adaptation of an IMU Engineering Model.</p>
<b>Applicable Mission Class(es)</b>	Navigation, Science Missions, Earth Observation, Human Spaceflight, Robotic Exploration, potential Telecommunications, Launcher, UAS, Defence applications
<b>Comments</b>	<p>Until recently, Inertial Measurement Units procured by ESA for Science and Exploration missions were sourced in the USA (Honeywell MIMU, Northrop Grumman SIRU).</p> <p>In 2012, the development of the ASTRIX1090, a 3-axis Fiber Optics Gyro was engaged with ADS-France (ARTES 5.2, 3.4 and ADS co-funding) originally for GEO Telecom S/C. This 3-axis configuration was paving the way to an IMU by adding accelerometers. At the time, no European accelerometer was available for Space. Therefore a first IMU configuration, the Astrix 1090A has been developed using US accelerometers (Honeywell QA3000). This configuration was qualified in 2016 and has been selected for Exomars 2020.</p> <p>In parallel, several activities have progressed developing European accelerometers, first targeting light-weight, MEMS accelerometers (with Colybris, Switzerland). More recently activities have started with Ireland (Innalabs) by the Science Technology Programme CTP, focussing on the radiation hardening of a terrestrial high performance accelerometer (matching QA3000 in terms of performance). The activity European IMU breadboard (MREP / TRP) between ADS-France and Colybris was then started, in order to develop a mass-attractive fully European Inertial Measurement Unit and completed in 2016.</p> <p>An evolution of the Astrix 1090A, the Inertial Measurement Unit selected for EXM2020 could be envisaged, implementing European High Performance accelerometers from Innalabs, while pursuing efforts in reducing mass or improving the overall IMU performance.</p> <p>No project selected as part of H202 COMPET-1-2015.</p>

# SPACE-29-TEC-2020: Satellite communication technologies



## THE PREPARATION OF FUTURE AND ADVANCED SATELLITE COMMUNICATIONS TECHNOLOGIES UP TO TRL 4-5

- a) **Secure and robust satellite communications including quantum technologies**, such as key generation and distribution, anti-jamming technologies and products, anti-spoofing techniques, etc.
- b) **Bandwidth efficient transmission techniques** to serve multiple users with high throughput satellites and to ensure effective use of limited spectrum resources.
- c) **High speed processing and flexible and reprogrammable telecommunication payloads**, able to adapt to changing service needs such as satellites integration in the 5G protocol and system.
- d) **Flexible broadband passive and active antenna techniques**, such as phased array antennas for very high throughput spaceborne or airborne satellite communication applications
- e) **Ground systems technologies for satellite communication services and applications**: evolution of ground control stations and teleports, also making use of artificial intelligence, improving the interoperability, etc



Proposals shall **consider enabling technologies and solutions** aiming at exploiting the potential synergies between the **Satellite Communication** domain and the **Navigation and Earth Observation domain** (such as **EO/SatCom hybrid mission satellites, smart satellites, high data rate solutions, high speed links, high performance processors, antennas/reflector/structures, ground segment**).

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Activities to include:

**Analysis of relevant available roadmaps**, including roadmaps developed in the context of actions for the development of **Key Enabling Technologies** supported by the Union;

**Commercial assessment** of the supply chain technology in the space or non-space domains

**Business plan**

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Budget: 2 – 3 M €

# EVENTOS DE INTERÉS EN EL SECTOR ESPACIAL

## [2019 LIVING PLANET SYMPOSIUM](#) 13 - 17 May 2019 Milan (Italy)

Open Innovation in the space sector, featuring a number of specialists of various fields of business and science, both in the public and private sectors, all sharing an in-depth knowledge of innovation. This symposium focuses on how **Earth Observation** contributes to science and society, and how disruptive technologies and actors are changing the traditional Earth Observation landscape, which is also creating new opportunities for public and private sector interactions.

## [SPACE FORUM](#) 21-22 May 2019 European Convention Center Luxembourg

It gathers European Space Clusters & Tech Valley representatives, Space business angels, satellites operators, satellite industry suppliers etc. It will be held during ICT Spring, a tech event dedicated to encourage emulation and networking between business decisions makers, innovation managers, startups, researchers and venture capitalists on a European scale. It will give the opportunity to discuss different key topics including: Services to benefit Defense & Security, NewSpace in China and Europe, Services to benefit Agriculture, Transport & IoT, Big Data& the business of data from space

## [SPACE ACADEMY / EBAN ANNUAL CONGRESS 2019](#) 3 – 4 June 2019 Helsinki (Finland)

This Expo will include in-depth interviews, forums and conferences, organized by the world's leading experts in the sector and will feature a large exhibition area.

## [NEW SPACE ECONOMY INTERNATIONAL EXPO](#) 10 -12 Dec 2019 Rome (Italy)

This Expo will include in-depth interviews, forums and conferences, organized by the world's leading experts in the sector and will feature a large exhibition area.

## **INFODAY VILNIUS (LITHUANIA)**

12-13 Jun 2019

## [SPACE WEEK 2019](#)

9 – 11 October 2019

Rome (Italy)

## **INFODAY H2020 – ESPACIO**

Oct - Nov 2019

Madrid (Spain)



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