gradiant

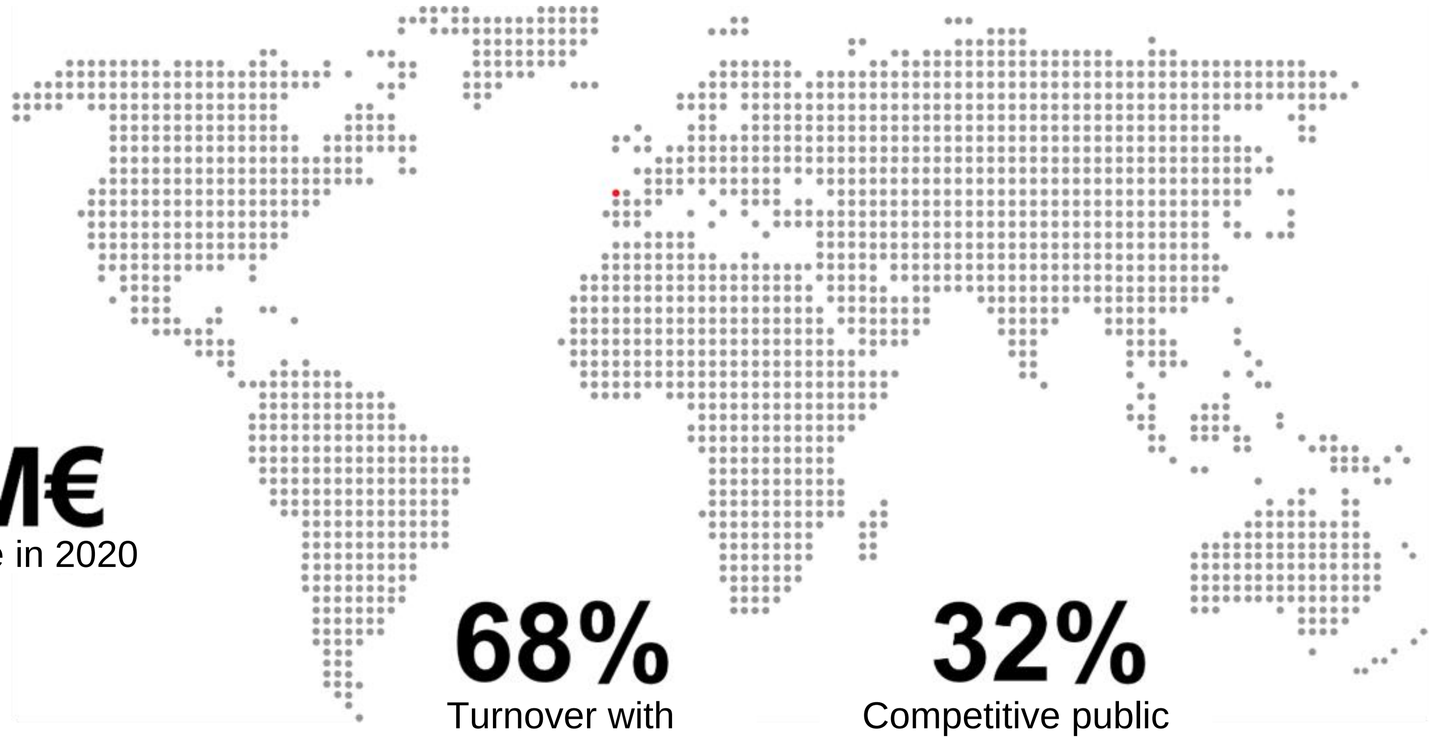
Pitch for propsal HORIZON-JU-SNS-2025-STREAM-B-03-02

SNS Brokerage Event
23 May 2024

Gradiant, 3rd ICT technology centre in Spain

Innovation provider, with more than 10 years of experience in technology incubation

150
People



23
European Projects

5M€
Revenue in 2020

2
Red Cervera Projects

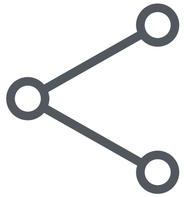
68%
Turnover with companies

32%
Competitive public funding

Our R&D lines

Security

- Information security
- Cloud Security
- Privacy protection systems
- Privacy by Design
- Biometric systems



Intelligence

- Data Analytics and Big Data
- Intelligent video analysis
- Advanced IT infrastructure management and deployment
- Learning Analytics and Adaptative Learning
- Bioinformatics

Connectivity

- Communication Subsystems (digital and analogue)
- IoT (Internet of Things)
- Integrated Systems and Onboard
- Networks
- Sensing: ISAC, THz

Basic info

Target stream: HORIZON-JU-SNS-2025-STREAM-B-03-02: Higher Speed Optical Access Networks and future end-to-end Packet Optical Network Architecture in 6G

Project Title: Innovation in 6G Architectures and UM-MIMO PA-less AI-driven for High FR1 and FR3

Expected Duration: 36 months

Budget: €8 million (Significant SNS funds contribution)

TRL: Start at TRL 2-3, target TRL 4/5 (some parts TRL 3)

Description: the Project focuses on reducing energy consumption in high data usage environments with sustainability as a priority. In this context, it aims to revolutionise open-RAN radio units with optical processing technology, enabling centralised network processing and AI-driven resource optimisation. It also targets increased security by incorporating encryption through Quantum Key Distribution (QKD).

Main objectives

- Develop and validate an optical RRH/RU to improve efficiency and capacity of 6G networks, focusing on FR1 and FR3 frequencies (below 25 GHz).
- Implement and validate optical beamforming to simplify RU processing.
- Design a programmable optical filter for adaptable technology use.
- Redesign fronthaul with WDM analogue optic transmission.
- Develop UM-MIMO radios optimising high-speed optical architecture without PAs in the fronthaul.
- Use AI for automation and resource efficiency through optical programmable switching.
- Develop systems for simultaneous communication and sensing for FR1 and FR3.
- Implement QKD for secure encryption protocols.

Expected Outcomes

- Increase of speed, signal quality and reliability of network elements.
- Reduction of energy consumption and system complexity.
- Development of Ultra-massive MIMO radios with minimal electrical PAs.
- Implementation of innovative technologies:
  - optical beamforming with WDM
  - IA resource optimization
  - ISAC
  - QKD encryption

Potential partners

Project Coordinator: Gradiant

Technical Coordinator: Vodafone

- **Vodafone** Operator and End-User: Ensure project developments meet market needs and validate technologies for real-world scenarios.

  Potential outcomes: usage specifications and impact evaluations.

- **Gradiant** PIC Design/System Design, Signal Processing, QKD: Develop and conceptualize circuit architectures, enhancing efficiency and capacity of optical communication systems. Optical beamforming algorithms. Integrate QKD.

  Potential outcomes: simulations and characterizations of various elements. QKD architectures.

- RU Suppliers: Develop and integrate advanced radio solutions to improve network efficiency and performance.

  Potential outcomes: new UM-MIMO radios and high-speed optical architectures.

Potential partners

- Assembly and Packaging: Responsible for integrating photonic components into functional modules and preparing them for testing and validation.

  Potential outcomes: 3D models and final integration results.

- Universities: Contribute knowledge in new optical processing techniques and advanced beamforming algorithms.

  Potential outcomes: algorithms for beamforming and channel models.

- Resource Optimisation using AI: Integrate advanced AI technologies to optimize resource management and improve operational efficiency.

  Potential outcomes: dynamic resource management and improvements in security and fault detection.

- SW Design and Implementation: Facilitate updates and adaptation to new technologies through software reconfiguration.

  Potential outcomes: new architectures leveraging photonics.

- Deeptech companies: Implement advanced security protocols essential for data protection

  Potential outcomes: secure encryption technologies.

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