Project Presentation

Seminario nacional online MSCA DN 2025: aspectos prácticos

- John Vardakas, Melani Gurdiel, Christos Verikoukis

This project has received funding from the European Union's HORIZON-MSCA-2022-DN-01 programme under grant agreement 101120332

What is EMPOWER-6G?

EMPOWER-6G proposes a break-through converged optical-wireless architecture that makes reality an efficient 6G Cell-Free (CF)-based access network for enabling the requested 1 Tb/s peak data rate and deployments with over 10^7 devices/km^2 and for supporting new advanced user-services (e.g. holographic telepresence, advanced AR/VR, massive digital twinning, flying networks, etc.)

- A **Doctoral Networks (DN)** Marie Curie Project
- EMPOWER-6G is an integrated and multi-disciplinary training-through-research network of 15 Doctoral Candidates (DCs) and Senior Supervisors fully committed to re-architecting current networking principles aiming at making 6G a reality

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Project Details

- Call: HORIZON-MSCA-2022-DN-01-01
- Type of Action: MSCA-DN
- Grant Agreement number: 101120332
- Acronym: EMPOWER-6G
- Budget: approx. € 3.821.918,40
- Starting date: 01/10/2023
- Duration: 48 months

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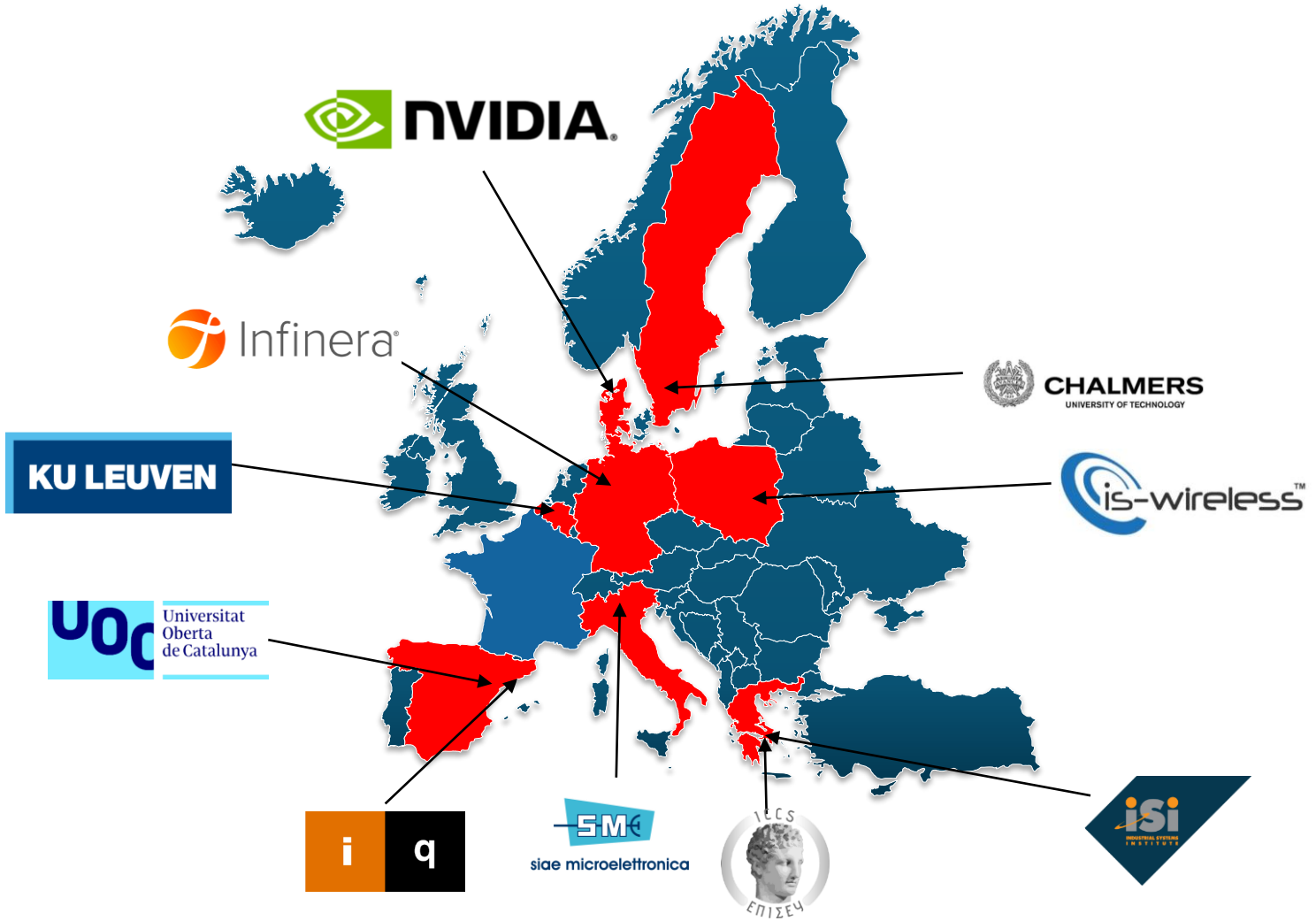
EMPOWER-6G Consortium



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EMPOWER-6G Technical Overview

Develop and evaluate a break-through converged optical-wireless architecture that makes reality an efficient 6G CF-based access network

THAT leverages

- distributed processing CF concept
- wireless mmWave solutions
- O-RAN concept
- innovations at the optical transport domain
- fully elastic Edge Computing concept
- ML-based methods for network management

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EMPOWER-6G Objectives Overview

- **Objective 1:** to design, evaluate, and optimize the radio edge network with improving the physical layer security, by developing**:**
  i. a scalable CF architecture that offers best-in-class Spectral Efficiency (SE)
  ii. a flexible wireless point-to-multipoint mmWave fronthaul solution based on novel hybrid beamforming and beam multicasting schemes
  iii. a virtualized CF RAN that is aligned with the O-RAN alliance, by considering joint radio and computing resource optimization at the radio edge network.
- **Objective 2:** to design, evaluate, and optimize the regional edge network, by developing:
  i. an optical regional edge network with FTTH support
  ii. regional network configurations based on optimum functional splitting options
  iii. control-plane protocols at the regional edge for CF networking support that are aligned with the O-RAN.
- **Objective 3:** to provide a network management framework by developing solutions for:
  i. the orchestration and management of multiple DUs through the design of an efficient resource scheduler
  ii. SDN-enabled intelligent traffic management methods and ML-based slice reconfiguration mechanisms
  iii. a self-driven virtual elastic infrastructure, based on a novel ETSI-compliant MEC platform and a blockchain-enabled multi-tenant orchestration system.

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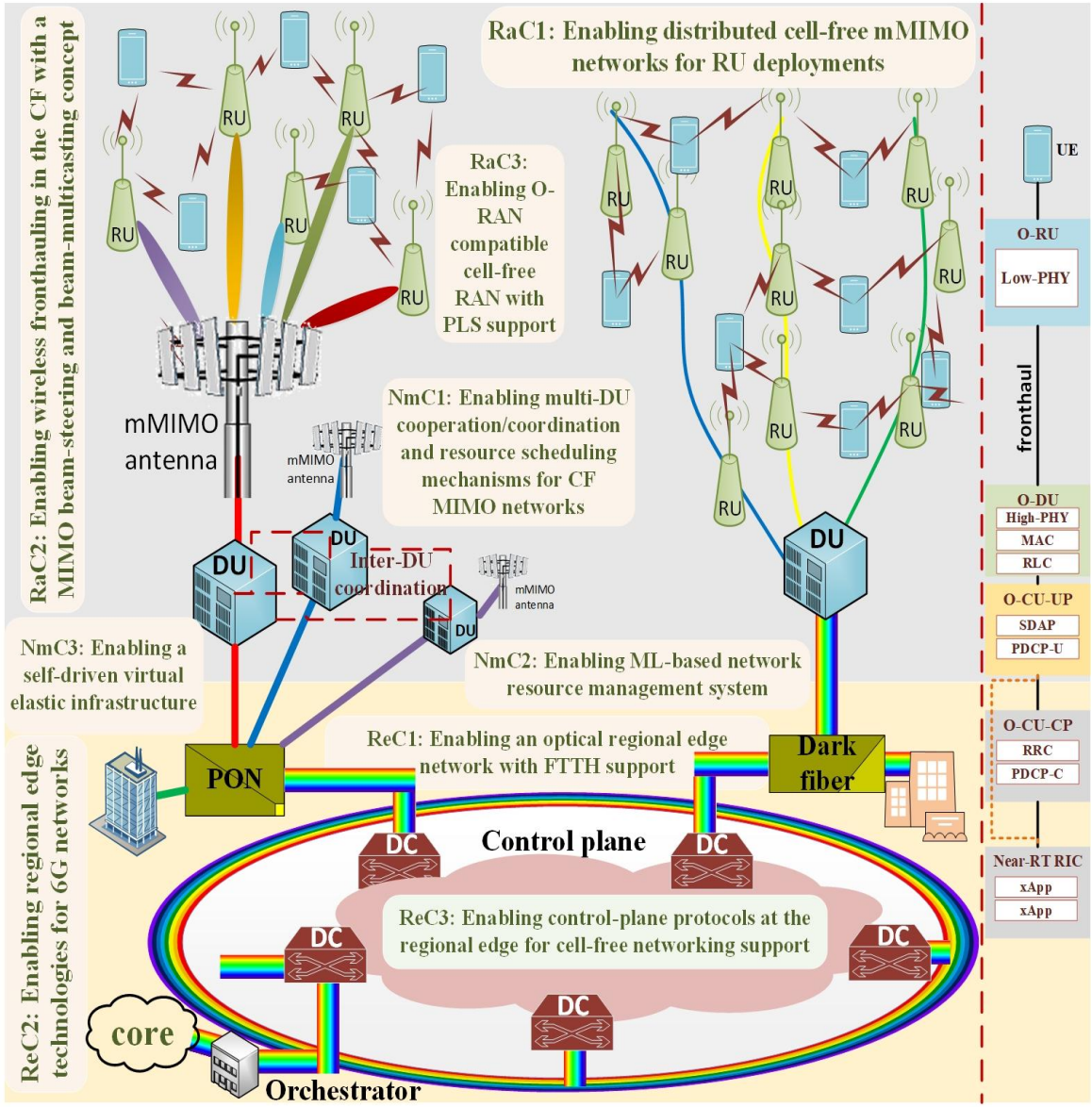
EMPOWER-6G Objectives Overview



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EMPOWER-6G Work Packages

WP	WP Title	Start	End
1	Management	M1	M48
2	Training	M1	M48
3	Dissemination, Communication, Standardization	M1	M48
4	Radio-edge infrastructures for 6G networks	M7	M42
5	Regional-edge infrastructures for 6G networks	M7	M42
6	6G network management and control	M7	M42

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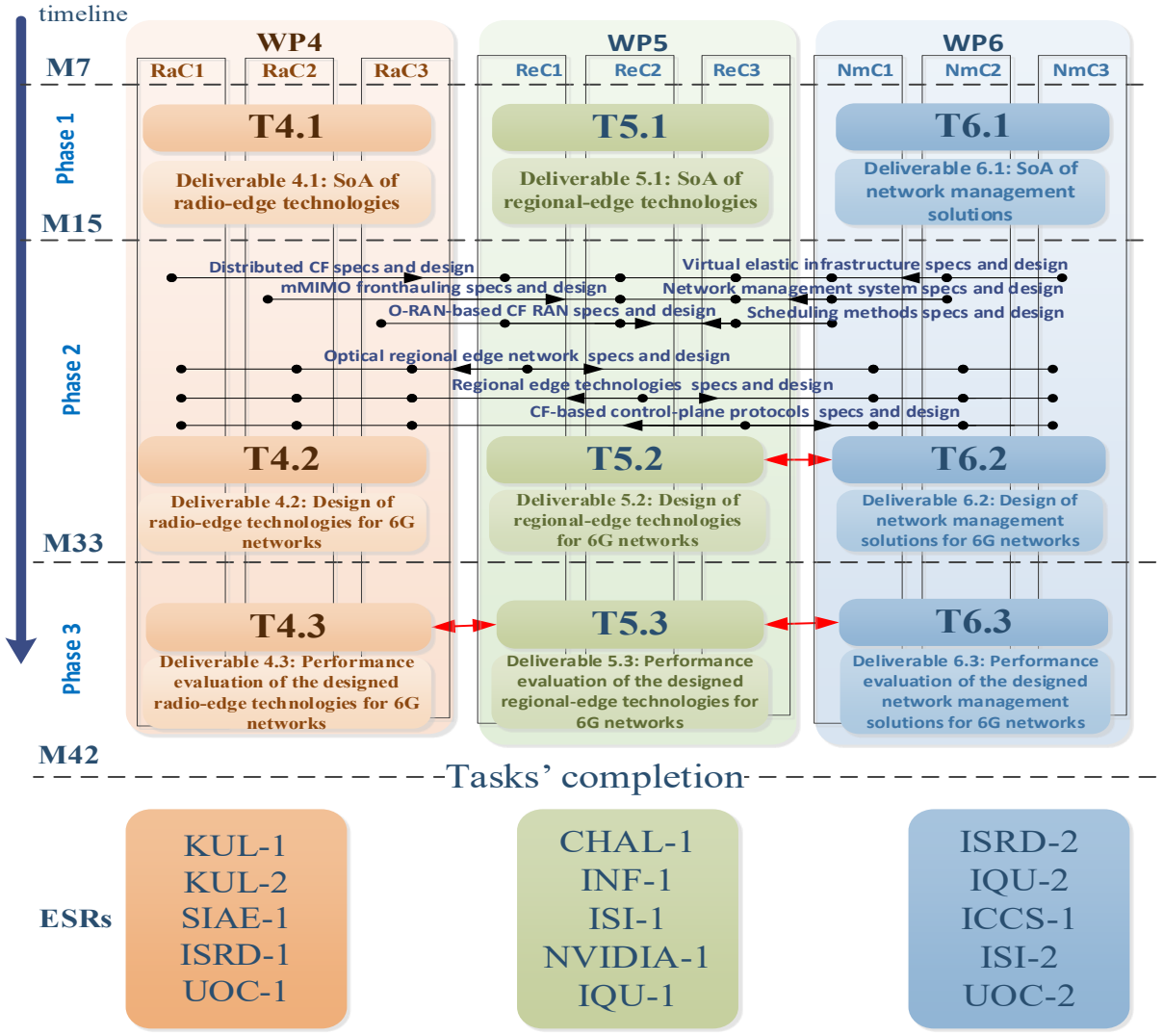
EMPOWER-6G Methodology



Phase 1 (M7-M14), all ESRs will review the state-of-the-art and acquire the knowledge on the required tools for their projects

Phase 2 (M15-M30) all ESRs will go beyond SoA by proposing and developing innovative solutions to meet their research project objectives

Phase 3 (M31-M42) each ESR will evaluate and optimize their designs by utilizing simulations and experimental platforms

Proof-of-concept study: ESR IQU-3 will integrate building blocks and algorithms provided by the ESRs into IQU's platform, specifically focusing on optimizing and demonstrating the performance of network management tasks.

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EMPOWER-6G Training

- ✓ **Training through research:** All ESRs will contribute to the implementation of the research WPs through the successful accomplishment of their innovative individual projects
- ✓ **Training through network-wide training activities:** schools, skill courses, workshops
- ✓ **Training through structured postgraduate courses:** offered by EMPOWER-6G's academic partners
- ✓ **Training through interaction with other DN projects** through joint activities

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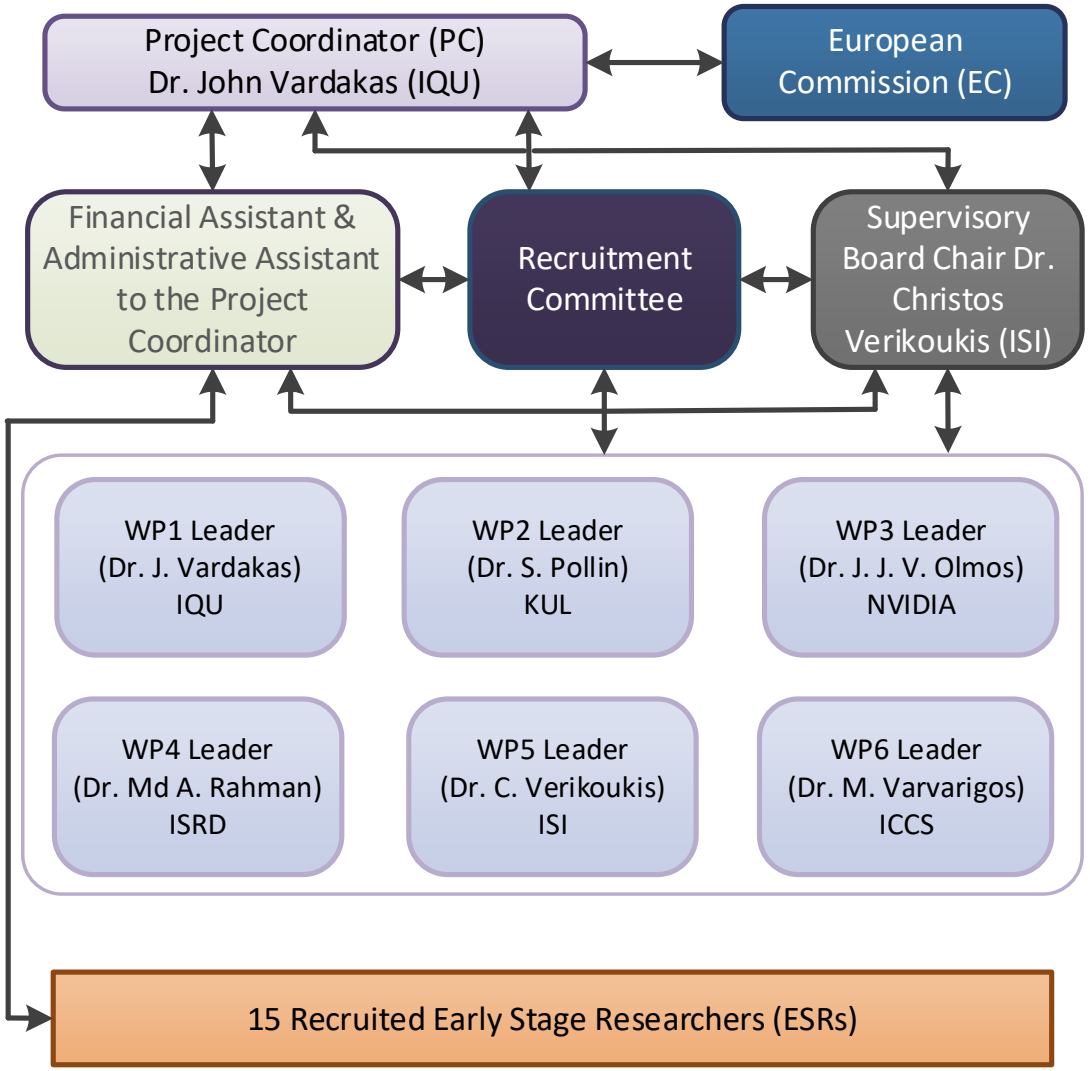
EMPOWER-6G Management



- **Supervisory Board (SB) to manage the project**
  - Progress monitoring of the project and the DCs' work
  - Approval of the DCs' PCDP and progress reports
  - Approval and coordination of the research/training/dissemination/communication/public engagement and secondment activities
  - Approval of the final versions of all deliverables
- **WP Leaders (WPL)**
  - Coordinate activities inside the WP
  - Report quarterly to the SB
  - Monitor timeplan and resources
  - Organize deliverables

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Contact Details

- John Vardakas
- Barcelona
- jvardakas@iquadrat.com

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