

Graphene Flagship

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Graphene Flagship Director

FLAG-ERA Info session webinar – 19 Jan. 2021

graphene-flagship.eu



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Flagship structure

Ramp-up phase,
74-142 partners, 2013-2016

Core Project 1
156 partners,
'16-18

Core Project 2
155 partners,
'18-20

Core Projects 3-
≈ 165 partners,
'20-23

2D-EPL
11 partners, '20-24

National
projects

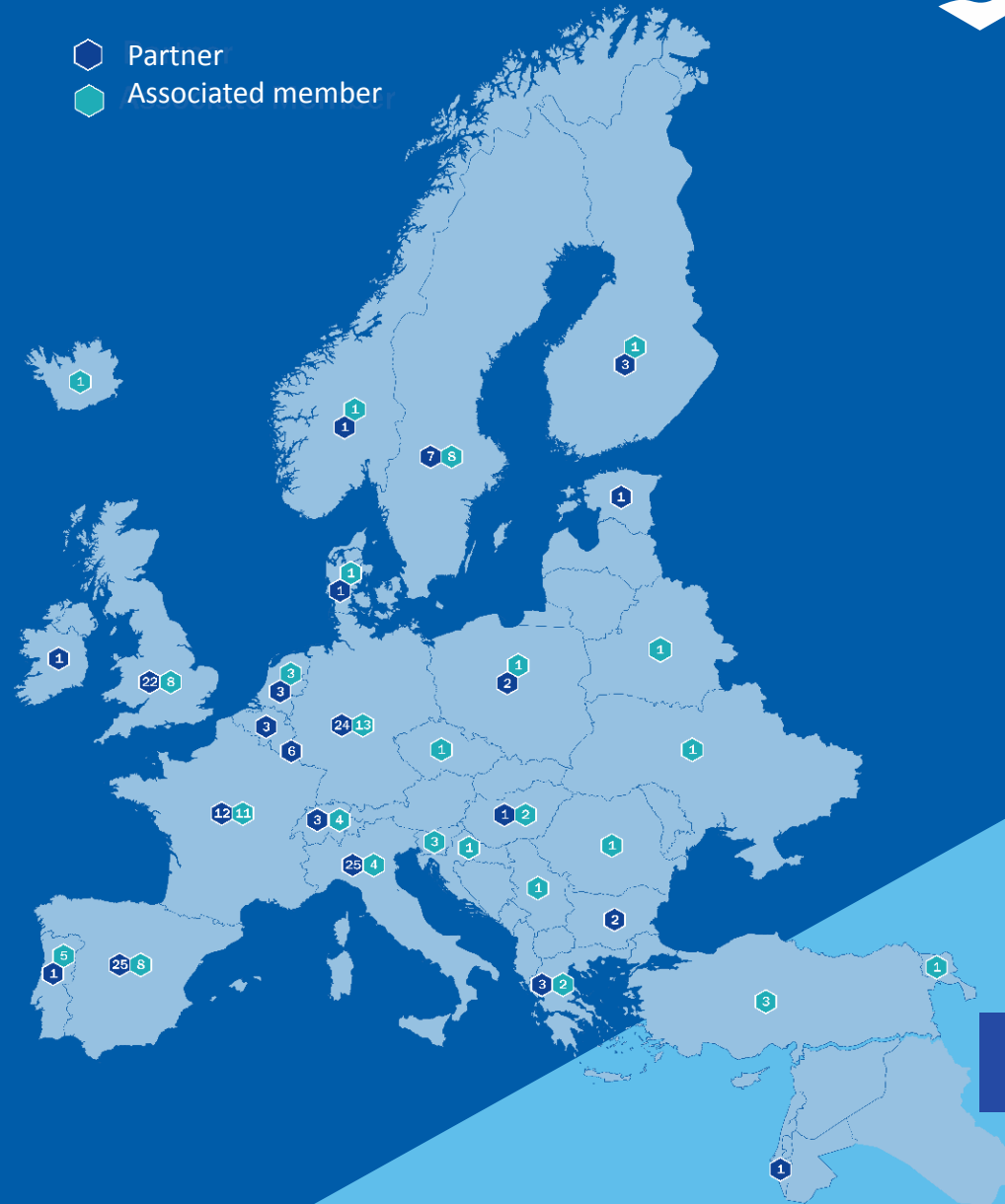
FLAG-ERA

Regional
projects

Other EU
projects

Horizon Europe 2023-?
Details still unknown

Partner
Associated member

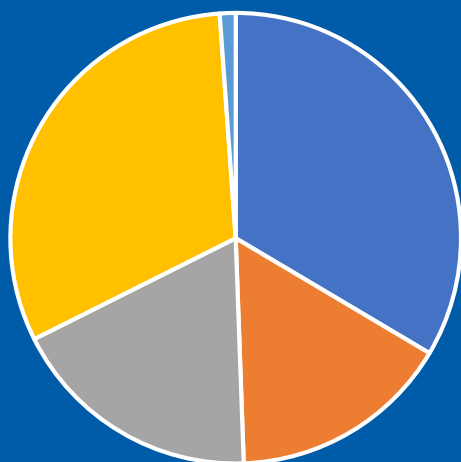


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Flagship consortium



Type of organisation

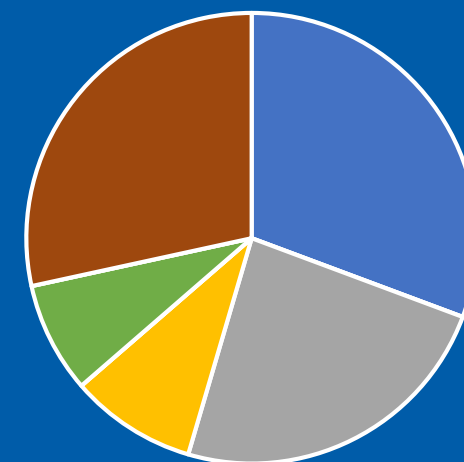


■ Enterprise ■ SME ■ Research organisation ■ Education establishment ■ Non for profit

The Framework Partnership is evenly split between commercial partners and academic/research organizations

Entry year

■ 2013
■ 2014
■ 2015
■ 2016
■ 2017
■ 2018
■ 2019
■ 2020



The consortium has demonstrated great ability for renewal: 28% of our partners joined last year, and only 31% have been involved since the start



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Flagship today – EC funded parts



Core 3

**High TRL
30%**

**Applied
Research
45%**

**Research
14%**

**Admin & services
11%**

Core 3: 150M€ from 1 Apr 2020 – 30 Sep 2023 (3.5 years)

Water filters (Medica SpA)
Car dashboard (FIAT)
Circuit breaker (ABB)
Optical transmitter/receiver (Nokia)
Tandem solar cells (U Rome)
Aircraft cabin filter system (Lufthansa Technik)
Infrared imager (Emberion)
Automotive vision system (Qurv)
Batteries for Automotive (Varta)
Aircraft ice protection system (Airbus)
Regulatory, risk assessment, toxicology, environment (EMPA)

Health & Environment / Biomedical Technologies / Sensors
Electronic Devices / Photonics and Optoelectronics / Flexible Electronics /
Wafer-scale Integration
Energy Generation / Energy Storage / Environmental Foams & Coatings /
Composites / Production

Enabling Science / Spintronics / Enabling Materials

Innovation / Dissemination / Management / Industrialisation

**2D-EPL: 20 M€
1 Oct 2020 – 30 Sep 2024 (4 years)**

Wafer-Scale Growth
Wafer-Scale Transfer
Wafer-Scale Integration
Modules for the Industry
2D Pilot Line
Management



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Graphene Flagship Partnering mechanism

Ana-Maria Ciubotaru
European Alignment

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Contact us: graphene-eu@esf.org



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Partnering Projects (PPs) and Associates Members (AMs) – Partnering mechanism



What is a Partnering Project (PP)?

- A PP is a research or innovation project whose objectives are relevant to the Graphene Flagship's research roadmap

What is an Associated Member (AM)?

- i) Members of a Partnering Project that are not already members of the Core Project
- ii) An organisation that is not part of a specific PP (Individual AM)

PPs and AMs have to demonstrate that:

- Already have their own (public or private) funding in order to perform research and innovation activities
- Significantly contribute to the Flagship's strategic research roadmap and overall mission



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<https://graphene-flagship.eu/collaboration/our-partners/partnering-with-the-graphene-flagship/>

Associated Members (AMs)

- Individual AMs
 - Reinforce participation and interest from the private sector
 - Cca. 40% individual AMs currently
 - By Executive Board or Work Package Leader nomination
- AMs through Partnering Projects
 - Engage with other (nationally) funded projects
 - Bring in resources and know-how
 - Coordinated and targeted projects in line with GF objectives
 - Participants in Partnering Projects become AMs

⇒ **All AMs have the same benefits**



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PP/AM Association Process

What

1. Identification of potential PPs/AMs

2. AM nomination - *only for candidate AMs which are not part of a PP*

3. Application to become PP / AM

4. Recommendation to accept a PP/AM

5. Approval of the PP/AM

6. Signature of the Association document (MoU)

Who

1. CP members, European Commission, national and regional funding agencies, S&T community

2. CP Executive Board Member or Work Package Leader

3. Candidate PP Leader or Coordinator / AM Principal Investigator

4. Core Project WP Leader/Deputy and Division Leader

5. Core Project Management Panel

6. Representatives of the Core Project and Partnering Project



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AMs Benefits

AMs enjoy all benefits of the CP partners except for those that involve exchange or exploitation of confidential or proprietary information or results (e.g., intellectual property) or EC funding

These include:

- New opportunities for collaboration
- Increased research results visibility and impact
- Increased industry visibility
- Networking
- Access to information
- Financial support to participate in collaborations with CP partners
- Exchange platform



Associated Members and Partnering Projects are key components of the Graphene Flagship. They add dynamism and flexibility to the project, and create mutually beneficial synergies and contacts between different parts of the venture.

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Graphene Flagship Director



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Core Project & AMs/PPs: Partnering Division (Division 5)

- PPs and AMs are represented in the governance of Core Project through Partnering Division (Division 5), and in particular through the division leader and deputy
- Leader of Partnering Division is a member of the CP Management Panel – operative implementation body



Partnering Division since Core1

182 Associated Members

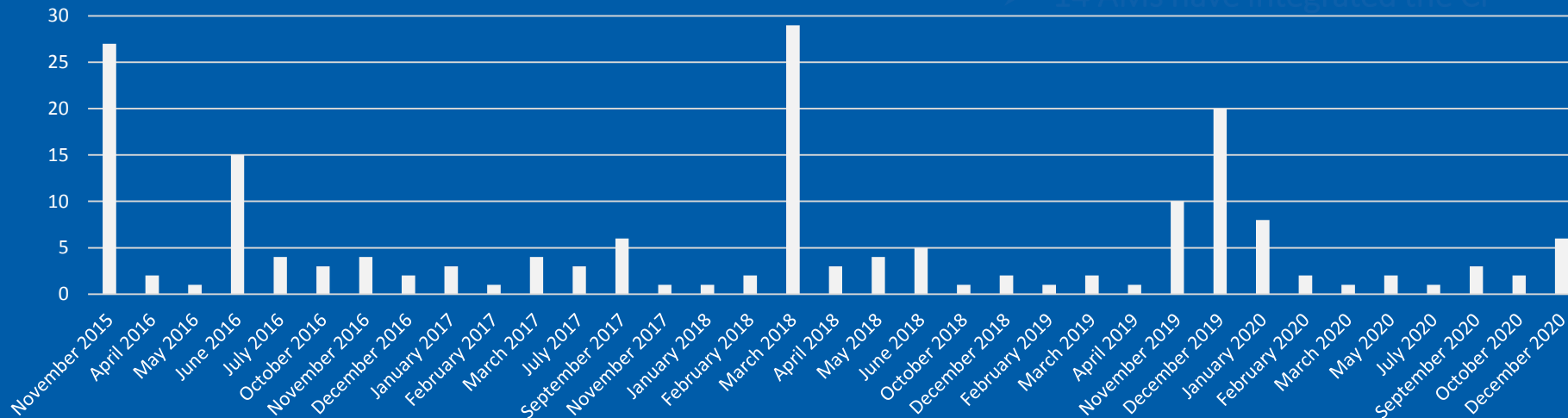
58 Partnering Projects

33 EU and associated countries

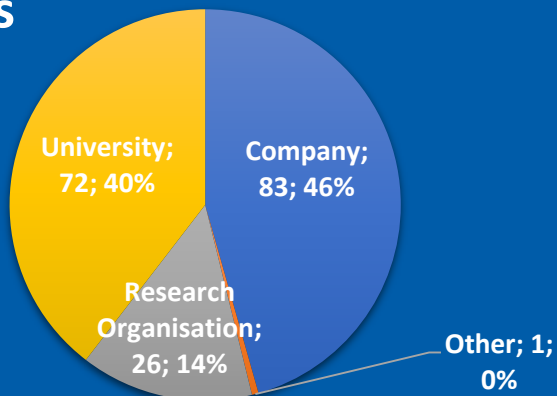
62 Individual Associated Members

AMs association

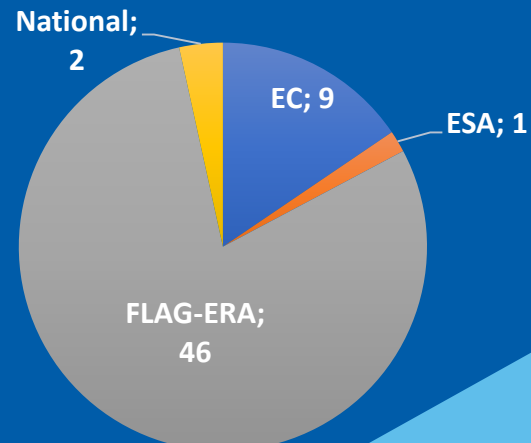
➤ 14 AMs have integrated the CP



AMs

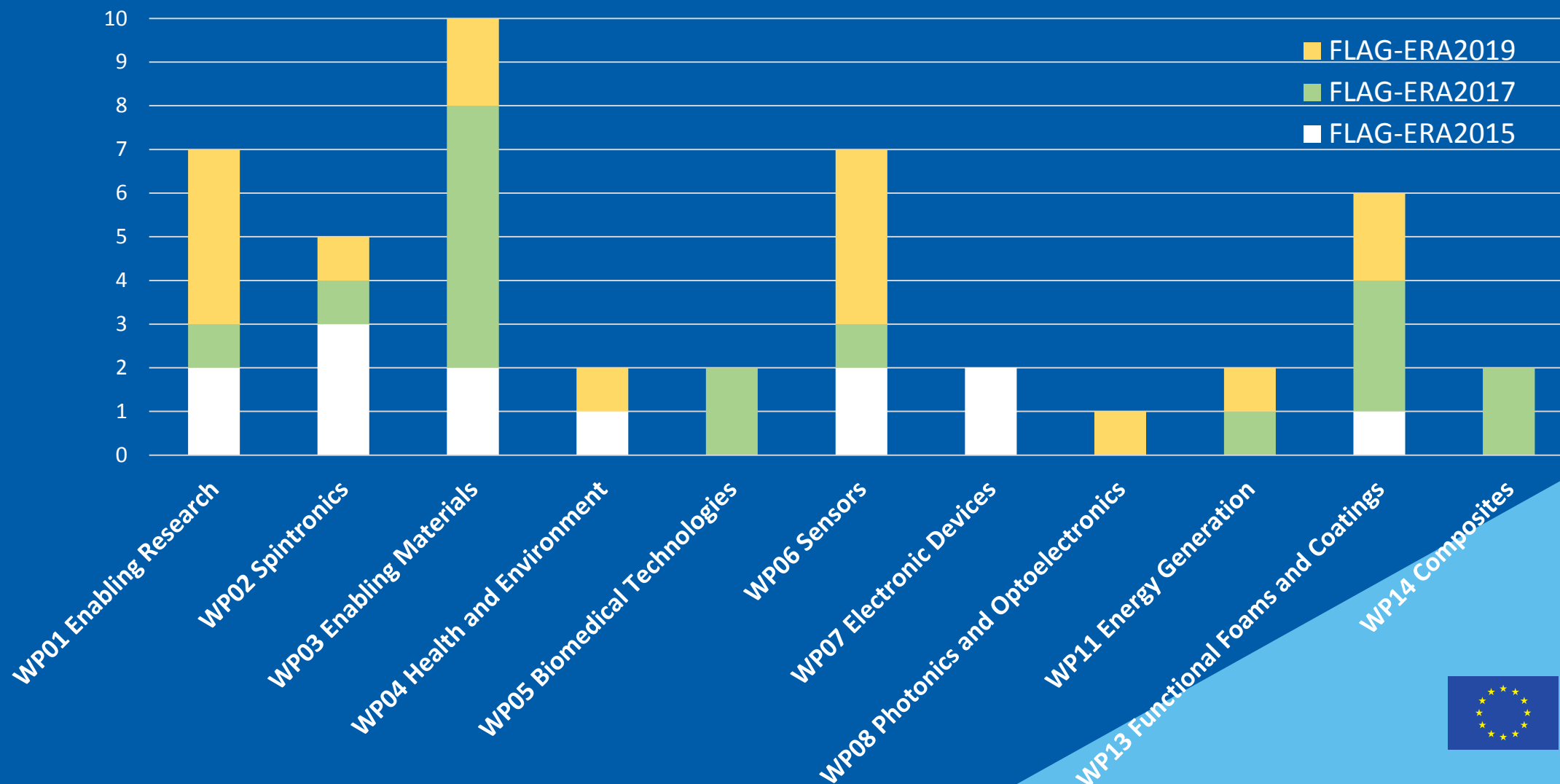


PPs



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FLAG-ERA JTC projects – 46 PPs



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AMs/PPs integration

Mobile World Congress

Transparent and flexible force-
touch human machine interface



Atomic Mechanics

Graphene earphones



Versarien

Batteries and aerospace
composite panels



Talga

Graphene inks



Graphene Tech

- 10 different AMs exhibited at MWC since 2017

General Assembly meetings

- Over 40 AMs attended the General Assembly meetings



Fringe sessions



- 3 AMs in 2018 and 5 AMs in 2019 presented their highlights

Partnering Division meetings

- Over 100 participants attended the three Partnering Division meetings



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Partnering Projects

2016

Partnering Division

2017

The Graphene Flagship has partnered with a wide international levels that align with the aims of the Flagship collaborations between the Core project and the Part benefits and foster a strong graphene community in highlights from several such projects.

G-IMMUNOMICS: The G-IMMUNOMICS project aims to use and provide guidance for developing safe new medical test diagnosis of low-layer graphene can play a key role in specific immunosensitive biomarkers with no activity towards other common beyond the membrane.

PolyGraph: The aim of the PolyGraph project is to develop precise chemical routes to make cost-effective components for the energy the evaluation of the chemical effect that leads to new materials and the proposal of an innovative spray coating method to overcome the

GRABATOR: As part of the GRABATOR project, which focuses of chemical vapor deposition-grown graphene, the synthesis and long-term storage investigation [1]. From an high doses of 300 µg per centimeter of graphene, effects observed.

GRUBITANK: The GRUBITANK project aims to use gas compressed hydrogen storage tank, for use as a hydrogen supplier made of porous aerogel-graphene-based have been investigated, porous network of aerogel-graphene that could be used as the

Gr4NE: The Gr4NE project focuses on using graphene in helix to make high-frequency electronic devices. Recent results include insulating N_2O_5 onto graphene, demonstrating isolation, piezoelectric [1], and a review of the state-of-the-art in graphene-nitride electronic

PRERAMP: The PRERAMP project investigates the potential of phonons and electrons. Under this project, the modulation of two grown graphene sheets breaks down wrinkles formed during growth, which has implications for the electrical properties, as the work

CRITONE: The CRITONE project studies the properties of giant group II oxides and applications in heterogeneous devices. As a structure, interaction energy, and electronic properties of different graphene. Remarkably, a strong interface dipole is induced by the structure of the device.

GRIFONE: The GRIFONE project is developing new routes towards the fabrication of electronic devices composed of layers of graphene and semiconducting materials such as metal oxides. Using a combined approach of modelling, transmission electron microscopy and atomic force microscopy, investigating the growth dynamics of these electronic devices is key to develop controllable production methods compatible with industrial fabrication methods [1].

"A growing number of Associated Members and Partnering Projects are supporting the Graphene Flagship, enabling an excellent alignment of GRM research across Europe and helping to realise an unprecedented network of industrial and academic partners."

G-IMMUNOMICS: The G-IMMUNOMICS project investigates the potential health and environmental concerns of graphene-based materials. A large-scale analysis [1] of the effects of graphene-oxide (GO)-based nanomaterials on the immune response of 15 different cell types showed that amine functionalisation improves GO biocompatibility. Using single-cell mass cytometry, the high-throughput method simultaneously identified multiple immune response markers at single-cell level, helping to characterise the complicated interactions between GO and immune cells.

2Dflex: The aim of the 2Dflex project is to develop new techniques for high-volume manufacturing of electronic devices based on GRMs. A method to grow insulating thin films on top of transition metal dichalcogenides (TMDCs) was developed by first depositing small quantities of silicon dioxide [1]. This method will be an essential building block for TMDC-based chip devices. 2Dflex research also found that electrical properties of TMDCs on insulators are strongly affected by the production method [1], allowing tuning of the electrical properties of layered GRM devices.

2D-CHEM: For many uses, including biomedical and composite applications, it is useful to add chemical groups to change graphene's chemical properties. The 2D-CHEM project develops scalable synthesis methods to produce graphene-derivatives from fluorographene, a stable and easily synthesised precursor. Such graphene-derivatives include those functionalised with amine, carboxyl, hydroxyl and aromatic functional groups [1][2]. Significantly, hydroxyl-functionalised graphene shows room-temperature magnetic properties and could be interesting for spintronics applications.

NU-TEGRAM: The aim of the NU-TEGRAM project is to develop porous graphene-polymer composite membranes for nanofiltration applications. These membranes are expected to provide advantages in water purification and biomedical applications. NU-TEGRAM researchers have developed large-area porous graphene-polymer membranes that can be fabricated to scale [1]. Pores created in graphene as a polymer support, while selective etching of microchannels in the polymer support increases flow for high-efficiency filtration.

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AMs/PPs visibility



2018



Partnering Division

"The Partnering Division is a key element in the visibility of the Graphene Flagship, enabling an excellent alignment of GRM research across Europe and helping to realise an unprecedented network of industrial and academic partners."

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Partnering Division

2019

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The Partnering Division facilitates the building of a Europe-wide network of research facilities and experts with outstanding potential in research and innovation in the field of graphene and layered materials."

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- 24 AMs and PP's highlights included in the GF Annual Reports
- Over 25 news items on AMs/PPs results published on GF website



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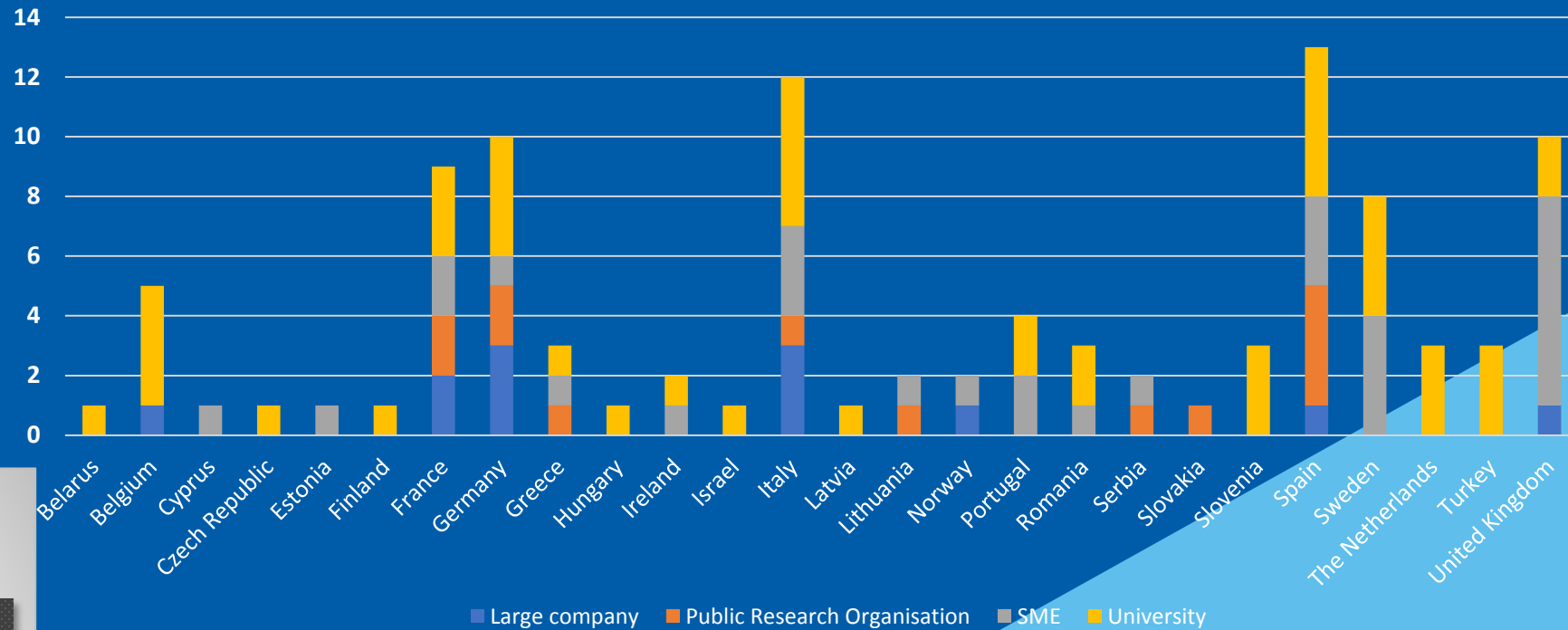
Partnering Division current status

103 Associated Members

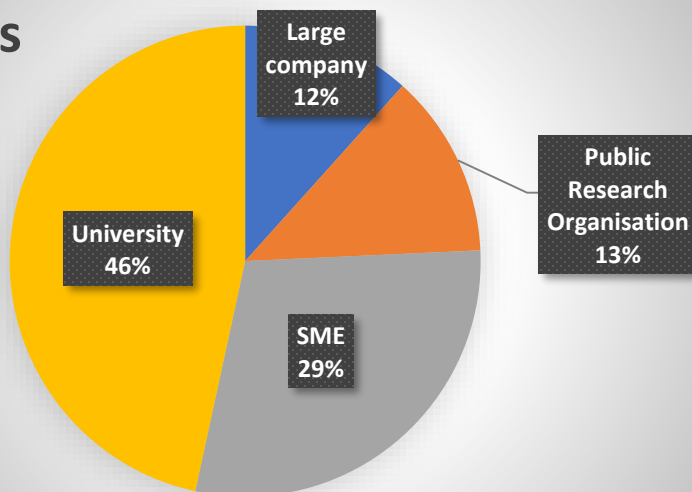
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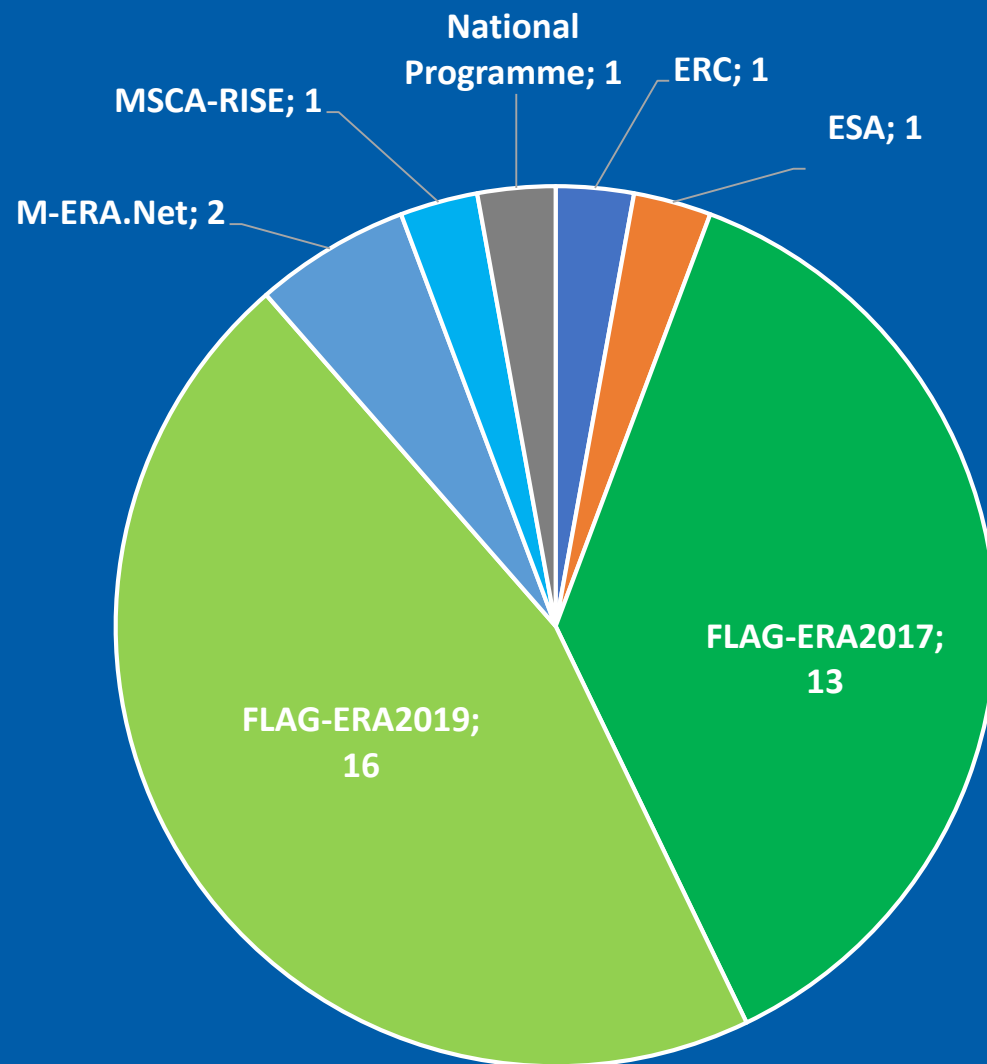


AMs



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Partnering Division current status PPs



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