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ERA-NET Cofund in Quantum Technologies

# Report on capacity building activities for less performing countries within QuantERA

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# List of Acronyms

| | |
|---|---|
| **CS** | Call Secretariat |
| **CSC** | Call Steering Committee |
| **EC** | European Commission |
| **ECR** | Early Career Researchers |
| **EP** | Evaluation Panel |
| **ERA** | European Research Area |
| **FSTP** | Financial Support to Third Parties |
| **GA** | Grant Agreement |
| **GE** | Gender equality |
| **QT** | Quantum Technologies |
| **PI** | Principal Investigator |
| **PC** | Project Coordinator |
| **RFO** | Research Funding Agency |
| **RIA** | Research and Innovation Actions |
| **R&I** | Research & Innovation |
| **RRI** | Responsible Research and Innovation |
| **SDG** | Sustainable Development Goals |
| **WG** | Working Group |
| **WP** | Work Package |
| **WWG** | Widening Working Group |

# Definitions

**'Call'** means a QuantERA joint call for proposals, which can be cofunded by the EU or not.

**'Consortium'** means all QuantERA Parties working collaboratively towards the realisation of the Programme under the Consortium Agreement signed by them.

**'ERA'** (European Research Area) means an unified research space across the European Union and associated countries, aimed at enabling free circulation of researchers, scientific knowledge, and technology.

**'EU-13' Countries** refers to the group of Member States that joined the European Union in or after 2004: Bulgaria, Croatia, Cyprus, Czechia, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia[1].

**'Evaluation Panels'** means the group of independent, scientific experts evaluating the proposals submitted within the Call.

**'Project'** is a project funded under the QuantERA Call.

**'Programme'** is a QuantERA initiative as a whole, including its Calls, coordination, and strategic framework

**'Research Funding Organisation'** means a national or regional agency responsible for providing a national or regional share of funding for the transnational Projects[2].

**'Widening Countries'** EU Member States and Associated Countries with lower research and innovation performance, identified by the EC for targeted support to strengthen their participation and capacity within the European Research Area[3].

[1] See: https://european-union.europa.eu/principles-countries-history/eu-countries_en.
[2] QuantERA RFOs mentioned in this document are referred to by acronyms; full names are available at: https://quantera.eu/consortium/.
[3] See: European Commission, *HORIZON 2020 WORK PROGRAMME 2014 – 2015 15. Spreading Excellence and Widening Participation*, 2013.


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# Introduction

Quantum technologies are increasingly recognised as strategic assets for Europe, shaping the future of secure communication, advanced computing, sensing, navigation, and other fields. Their potential is dual in nature: while enabling breakthroughs in healthcare, energy, and industry, they also carry implications for security and defence. For this reason, the European Commission has identified quantum technologies as a cornerstone of Europe's technological sovereignty and resilience, calling for a strong, inclusive, and excellence-driven European quantum ecosystem.

As stated in the **Quantum Europe Strategy**:

> *Europe's efforts remain fragmented across Member States, national and regional funding agencies. […] While several Member States have developed their own national strategies and roadmaps, insufficient coordination has led to duplication of efforts, inefficient use of resources, and growing competition for talent. This risks undermining the EU's ability to build critical mass and scale, slowing down the commercialisation pipeline, ultimately limiting the development of a globally competitive European industrial capacity and a unified European quantum market.*[4]

Ensuring that all EU Member States and Associated Countries are equally engaged in this field is not only a matter of fairness, but of **strategic necessity**. Sustainable leadership in quantum cannot be achieved if large parts of Europe remain underrepresented in frontier research. Building capacity across the European Research Area is therefore essential to unlock the full potential of quantum technologies, reinforce Europe's competitiveness, and ensure that no country is left behind.

This report has been prepared as part of **Work Package 6 – Additional activities**, specifically under **Task 6.3 – Spreading research excellence across the European Research Area (ERA),** which is led by NCN (Poland), and provides a consolidated overview of capacity building activities for less performing countries within **QuantERA II (2021-2026)**. While the deliverable formally belongs to the second edition of the Programme, the analysis also draws on data and evidence from finalised **QuantERA I (2016-2022)** and the early stage of **QuantERA III (2025-2030),** to illustrate the evolution of widening-related mechanisms across all Programme phases. This approach reflects QuantERA's long-term commitment to inclusiveness and capacity building in line with the ERA's vision of an integrated, open and collaborative research landscape. QuantERA, since the Programme very beginning in 2016, seeks to strengthen the participation of less represented and less research-intensive countries — the so-called *Widening Countries* — in the field of quantum technologies. By promoting peer learning, procedural alignment and coordinated actions among funding organisations, the Programme contributes to fostering a more inclusive and fair research culture across the ERA. This is consistent with QuantERA's belief that only research environments grounded in dignity, fairness and social justice can generate the innovation and creativity needed to address long-term scientific challenges.

[4] European Commission, *Quantum Europe Strategy: Quantum Europe in a Changing World*, 2025, p. 2.



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## From Coordination to Capacity Building

Strengthening research capacity across Europe has been a central ambition of the ERA since its launch in 2000[5]. Yet substantial disparities have continued to exist between more and less research-intensive countries, limiting the ERA's ability to fully unlock Europe's research potential. These imbalances have therefore been addressed through a range of targeted measures aimed at enabling all Member States and Associated Countries to participate more equally in knowledge creation and innovation.

In **Horizon 2020**, this ambition was pursued through dedicated ***Spreading Excellence and Widening Participation*** instruments — notably ***Teaming***, ***Twinning***, and ***ERA Chairs***[6]. These schemes were designed to create and strengthen centres of excellence, enhance institutional cooperation, and attract outstanding researchers to less research-intensive countries. These mechanisms laid the foundation for more systemic approaches to capacity building and widening participation. Horizon 2020 also introduced the **ERA-NET Cofund scheme**, which laid the groundwork for the networking instruments[7], providing also the framework for QuantERA I and QuantERA II.

In **Horizon Europe**, this ambition is carried forward through two complementary frameworks. The first is the **Widening Participation and Strengthening the European Research Area (WIDERA**) component, which promotes inclusiveness, policy learning, and systemic reforms in national research systems[8]. The second is the introduction of **Co-funded European Partnerships**[9], which provide long-term and strategic mechanisms for national funding agencies to collaborate, pool resources, and support transnational research in priority fields. The **ERA-NET Cofund** scheme was discontinued and replaced broadly by new Partnerships instrument. In selected cases, other mechanisms have been used to ensure the continuation of previous networks. QuantERA III is an example of a **Research and Innovation Action (RIA)** with **Financial Support to Third Parties (FSTP),** the so-called *cascading grants*[10].

Across its successive editions, QuantERA has mirrored the broader evolution of EU research instruments while maintaining widening as one of its core principles.

## What Defines a "Less Performing Country"?

In the context of the EU Framework Programmes for Research and Innovation, *less performing countries,* or *less research-intensive countries* are defined not by the year of EU accession, but by their **systematic underperformance in the EU Framework Programmes.**

The European Commission monitors performance using indicators such as:

- the share of total EU funding received,
- success rates in competitive calls, and
- national levels of investment in research and innovation compared to the EU average.[11]

[5] See: European Commission, *Towards a European Research Area (ERA),* 2000.
[6] See: European Commision, *HORIZON 2020 WORK PROGRAMME 2014 – 2015 15. Spreading Excellence and Widening Participation*, 2013.
[7] See: https://www.era-learn.eu/support-for-partnerships/cofunded-p2p/era-net-cofund.
[8] European Commission, *Widening Participation and Strengthening the European Research Area (WIDERA)*, 2024.
[9] For more information see: https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/european-partnerships-horizon-europe_en.
[10] See: G. Naujokaitytė, *Explained: Horizon Europe's cascade funding*, Science Business, 29 Jul 2025.
[11] European Commission, *Widening Participation and Strengthening the European Research Area (WIDERA)*, 2024, p.5.


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The classification of Widening Countries has evolved between **Horizon 2020** and **Horizon Europe.**

Under **Horizon 2020**, the group included EU Members: all EU-13 countries (**Bulgaria, Croatia, Cyprus, Czechia, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia**) alongside **Portugal** and **Luxembourg**[12], as well as **Associated Countries:** Albania, Armenia, Bosnia and Herzegovina, Faroe Islands, Georgia, Moldova, Montenegro, North Macedonia, Serbia, Tunisia, Türkiye, Ukraine.

In **Horizon Europe** this classification was updated to reflect the results of Horizon 2020 performance indicators. **Luxembourg**, whose participation and success rates significantly improved, is no longer considered a Widening Country, while **Portugal and most EU-13 countries remain part of the group** and **Greece was included**. The group of Associated Countries has also been expanded to include Kosovo and Morocco; Faroe Islands were removed**.** In addition, Horizon Europe introduced a new category of **Outermost Regions**, reflecting territorial specificities relevant to widening measures (French Guiana, Guadeloupe, Martinique, Mayotte, Réunion Island, and Saint-Martin (France).[13]

This evolving classification underscores that widening is not a permanent label, but a **policy tool to highlight structural imbalances** and to guide the design of support measures[14].

## QuantERA II and the General Widening Dimension

As a **network of Research Funding Organisations** (RFOs), QuantERA Programme, since its launch in 2016, has provided a framework for long-term collaboration and strategic coordination in the field of quantum technologies. By **pooling national and EU resources**, the Programme enables countries to jointly support research in areas of common priority and to strengthen the coherence of the European quantum landscape.

Through Task 6.3, QuantERA II has introduced a range of mechanisms. At the **programme level**, QuantERA focuses on coordination among funding agencies — aligning policies, sharing best practices, and integrating RRI and widening measures into joint calls and evaluation processes. At the **level of funded projects**, QuantERA supports transnational research consortia, fostering collaboration between institutions from both highly advanced and less research-intensive countries and carries out project monitoring to generate evidence for ongoing learning and the iterative improvement of its mechanisms. This model allows teams to work on equal terms and exchange expertise and resources.

Notably, the Programme is coordinated by the **National Science Centre (NCN, Kraków, Poland)**, based in a Widening Country, which reflects QuantERA's commitment to capacity building also at the **management level**. Among all Widening Countries, only **Poland (NCN)** and **Portugal (FCT)** have coordinated European programmes of this scale under Horizon 2020[15], which further strengthens the international significance of QuantERA in advancing the widening agenda.

At the launch of the QuantERA Programme, the first edition in 2016 brought together **26 countries**, including **10 Widening Countries** (Bulgaria, Czechia, Hungary, Latvia, Poland, Portugal, Romania, Slovakia, Slovenia, Türkiye) as defined under Horizon 2020, and **11 RFOs.** Croatia has joined QuantERA I Consortium at the later stage. In QuantERA II (2021–2026),

[12] European Commission, *Innovation Union Competitiveness Report 2013*, 2014.
[13] See: https://rea.ec.europa.eu/horizon-europe-widening-who-should-apply_en.
[14] For more information see: ERA-LEARN, *Inclusiveness in European R&I Partnership Programmes,* 2022; ERA-LEARN, *Challenges of Widening Countries in European Partnerships – Survey Report*, 2023.
[15] See: https://www.era-learn.eu/network-information/networks.


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this representation **significantly increased,** encompassing all EU-13 countries except Cyprus.

QuantERA II Consortium incorporates 41 Research Funding Organisations (RFOs) from 31 countries, **including 17 RFOs from 15 Widening Countries:**

- **Bulgaria:** Bulgarian National Science Fund (BNSF)
- **Croatia:** Croatian Science Foundation (HRZZ)
- **Czech Republic:** Ministry of Education, Youth and Sports (MEYS); Technology Agency of the Czech Republic (TA CR)
- **Estonia:** Estonian Research Council (ETAG)
- **Hungary:** National Research, Development and Innovation Office (NKFIH)
- **Latvia:** Latvian Council of Science (LZP)
- **Lithuania:** Research Council of Lithuania (LMT)
- **Luxembourg:** Luxembourg National Research Fund (FNR)
- **Malta:** Ministry for Education, Sport, Youth, Research and Innovation (MEYR)
- **Poland:** National Science Centre (NCN), National Centre for Research and Development (NCBR)
- **Portugal**: Foundation for Science and Technology (FCT)
- **Romania:** Executive Agency for Higher Education, Research, Development and Innovation Funding (UEFISCDI)
- **Slovakia:** Slovak Academy of Sciences (SAS)
- **Slovenia:** Ministry of Higher Education, Science and Innovation (MVZI)
- **Türkiye**: Scientific and Technological Research Council of Türkiye (TÜBİTAK)

The map below illustrates the composition of the QuantERA II Consortium, highlighting the distinction between widening and non-widening Countries:

Figure 1: Participating countries in the QuantERA II Programme



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The subsequent edition of the Programme maintained a similar consortium composition, preserving a strong representation of Widening Countries. Considering the updated list of Widening Countries under Horizon Europe and the slightly restructured consortium, **QuantERA III** brings together **16 RFOs** from **14 Widening Countries** (**Croatia, Bulgaria, Czechia, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia, Slovenia, Türkiye**).

**Over the course of its duration, QuantERA has organised a total of five joint transnational calls for proposals:** two under QuantERA I (in 2017 and 2019), two under QuantERA II (2021 and 2023), and the first call under QuantERA III (2025), which is ongoing at the time of writing this report. The participation of RFOs from Widening Countries across these Calls is summarised in the table below:

| Programme | Call Year | Widening Countries in QuantERA Consortium | Widening Countries Participating in the Call | Widening Countries with Funded Projects |
|---|---|---|---|---|
| **QuantERA I** | 2017 | 10 | **10** | **8** |
| **QuantERA I** | 2019 | 11 | **11** | **7** |
| **QuantERA II** | 2021 | 15 | **15** | **12** |
| **QuantERA II** | 2023 | 15 | **14** | **10** |
| **QuantERA III** | 2025 | 14 | **13** | pending |

Figure 2: RFOs from Widening Countries participating in QuantERA Consortium

The consistent participation of Widening Countries in QuantERA's Calls shows that their presence within the Programme translates into concrete research activity. **A substantial majority of Widening Countries that take part in the application process also secure funded projects, which indicates not only nominal involvement but active engagement in scientific collaboration.** This evidence reflects a meaningful flow of resources into less research-intensive partners.

A review of the core figures shows that, across the 2017–2023 Calls, a total of €117 million was awarded, of which €20 million was allocated to Widening Countries (17% of all funding received):

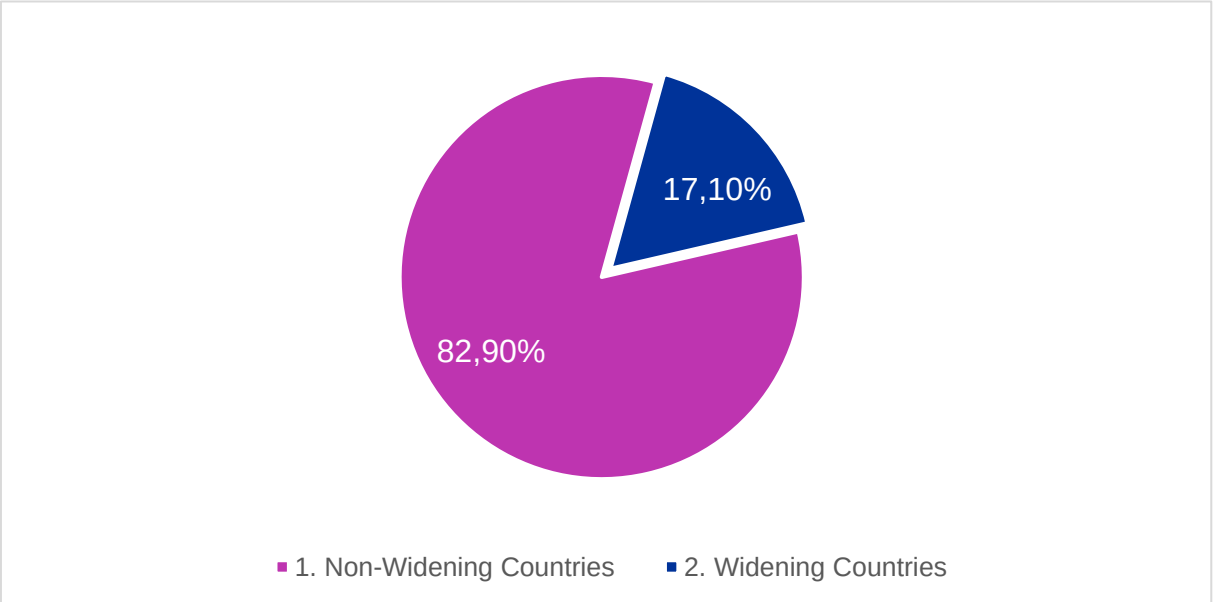


Figure 3: Percentage of fundings received by Widening and non-Widening Countries in QuantERA Calls 2017-2023



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The data show that Widening Countries requested €88 million and received €20 million, corresponding to a **success rate of approximately 23%.** This is slightly higher than non-Widening Countries success rate (21%), indicating that widening applicants have not only been funded at a comparable level, but in fact performed marginally better. However, for comparison, this rate remains lower than that of leading countries such as the UK (28.5%), Germany (27.8%) or France (27.2%). This data is also shown in the Figure below:

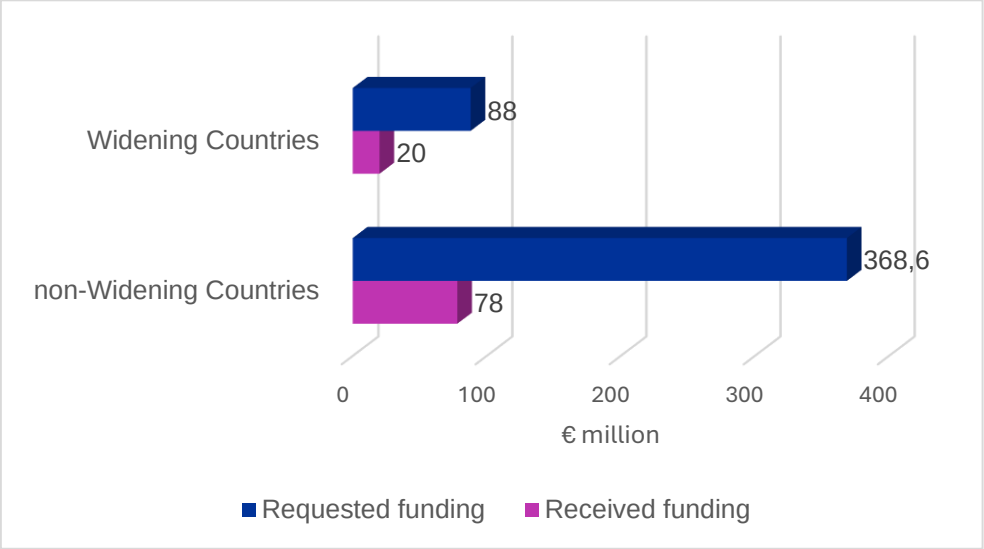


Figure 4: Requested vs. received funding in QuantERA Calls 2017–2023, comparing all participating countries with Widening Countries

Over nearly a decade of implementation, QuantERA has established itself as one of Europe's most inclusive and strategically coherent research funding programmes in QT, **effectively translating the principles of capacity building into sustained participation, collaboration.**

# Capacity as a Systemic Approach: Programme Level Activities

## Roles and Contributions of Widening Countries in Programme Implementation

As mentioned before, the **QuantERA Programme is structurally widening-oriented**, with its Coordination Office based in Poland. This positioning naturally supports the Programme's mission to encourage stronger involvement of less research-performing countries and to enhance their institutional capacities. Within this framework, **a key function is carried out by Romania**: UEFISCDI has, from the very beginning of the Programme, played a **central role in the monitoring and evaluation process**, ensuring the development and maintenance of online tools for project reporting and providing data and analyses that support evidence-based management.

Within the **QuantERA I**, other widening partners were also entrusted with specific operational tasks. **Portugal (FCT)** coordinated activities under **Work Package (WP) 6 – Strategic Developments (Additional Activities)**. **Bulgaria (BNSF)** contributed to **WP4 – Monitoring**


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**and Impact Assessment**, which provided an analytical overview of the Programme's first Call outcomes. In QuantERA III, efforts to engage RFOs from Widening Countries in Work Plan tasks are continued: **Slovenia** (**MVZI)** role will be **crucial in the Programme impact assessment (Task 4.4), outlining QuantERA sustainability strategy (Task 4.5),** and contributing to communication efforts **(WP5)**, helping to secure the long-term success and visibility of QuantERA III. **Latvia (LZP) will support UEFISCDI (Romania) in monitoring activities (WP4**) ensuring that the progress and outcomes of the funded projects are tracked effectively. **Czechia (TA CR) will contribute to drafting the QuantERA III Roadmap for International Collaboration (Task 6.2).**

In addition to their operational roles within the Programme, several Widening Countries have also advanced **national quantum strategies and initiatives –** often still emerging but demonstrating political commitment and system-level engagement. Romania, Hungary and Latvia have introduced dedicated QT funding programmes or policy roadmaps, while some other Widening Countries are developing national strategies or embedding quantum research priorities within broader innovation agendas.[16]

QuantERA Programme also attaches importance to **regularly organising events in Widening Countries**, thereby strengthening their visibility and role within the network. Over the years, several key meetings in the framework of QuantERA I and QuantERA II have been hosted across Europe, including:

- the **Kick-off Meeting** of the Programme (**Kraków, 2015**);
- the **Proposers' Day** (**Malta, 2017**);
- **QuantERA Steering Committee Meetings (QSC)** in **Bucharest (2018)**, **Ljubljana (2018)** and **Dubrovnik (2022)**;
- The **QuantERA Strategic Conference and QSC** held in **Kraków (2022)** included a dedicated panel on *Inclusiveness and Spreading Excellence*, moderated by the NCN representative and involving project coordinators from Sweden, Poland and Israel.
- **QSC** held in **Gdańsk (2025)** on the occasion of the *Quantum Horizons Conference*.

**QuantERA III** will organise programme-level meetings, among others, in **Poland** and **Slovenia**.


Figure 5: Inclusiveness and Spreading Excellence Panel during QuantERA Strategic Conference, Krakow 2022

It is also important to note that **NCN** – for which QuantERA is one of its flagship international programmes – actively implements its own institutional policy supporting capacity building and widening participation. Beyond its operational role as the QuantERA Coordinator, NCN contributes to broader European-level policy development in this area. The agency participates in shaping guidelines on **inclusiveness and widening in partnership programmes** through the **ERA-LEARN,** a European Commission–supported platform that develops evidence, guidance and training for R&I Partnerships. A relevant

[16] See: QuantERA, *Quantum Technologies. Public Policies in Europe*, 2023, p. 16.


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illustration of this commitment is NCN's contribution to the **ERA-LEARN report on *Inclusiveness in European R&I Partnership Programmes,*** where QuantERA is highlighted as an example of good practice[17].

## Inclusive Mechanisms in the QuantERA Joint Calls for Proposals

The table below provides a comparative **overview of the key procedural mechanisms** applied across all QuantERA Calls between 2017 and 2025. It summarises the evolution of evaluation, selection, and inclusiveness principles as reflected in the official call documents. The comparison, presented in the Figure 6, focuses on five core dimensions shaping the Programme's systemic approach to capacity building:

- **articulation of projects expected impacts**
- **design of research consortium**
- **distribution of funding among consortium partners**
- **composition of evaluation panels**
- **tie-break mechanisms.**

The comparison includes not only dedicated widening mechanisms but also the Programme's broader prioritisation of widening in a systemic context. Taken together, these elements demonstrate how QuantERA has progressively evolved towards a mature, cooperative and inclusive model — one that increasingly integrates widening, gender balance, and responsible research principles into all stages of the joint call process.

| Dimension / Mechanism | Call 2017 (QuantERA) | Call 2019 (QuantERA) | Call 2021 (QuantERA II) | Call 2023 (QuantERA II) | Call 2025 (QuantERA III) |
|---|---|---|---|---|---|
| **Expected Impact of the Call and Research Targeted in the Call** | As an aspect of targeted research: QuantERA aims at spreading research excellence throughout the whole European Research Area. **Therefore, proposal consortia are encouraged to include partners from the widening countries** participating in the call. | Among others: **-Spread excellence throughout Europe by involving partners from the Widening Countries** - Build leading innovation capacity across Europe by involvement of key actors that can make a difference in the future, for example excellent young researchers, ambitious high-tech SMEs or first-time participant | Among others: - Create a diverse and inclusive quantum community; - **Spread excellence throughout Europe by involving partners from the Widening Countries**; - Build leading innovation capacity across Europe by involvement of key actors that can make a difference in the future, for example excellent young researchers, ambitious hightech SMEs or first-time participants. | Among others: - Foster Responsible Research and Innovation approaches in quantum research; **- Spread excellence throughout Europe by involving partners from the Widening Countries**; - Build leading innovation capacity across Europe by involvement of key actors that can make a difference in the future, for example excellent early career researchers, ambitious high-tech SMEs or first-time participants. | Among others: - **Spread excellence throughout Europe by involving partners from the Widening Countries** - Build leading innovation capacity across Europe by involvement of key actors that can make a difference in the future, for example excellent young researchers, ambitious high-tech SMEs or first-time participants. |

[17] See for example: ERA-LEARN, *Inclusiveness in European R&I Partnership Programmes*, 2020.



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| Dimension / Mechanism | Call 2017 (QuantERA) | Call 2019 (QuantERA) | Call 2021 (QuantERA II) | Call 2023 (QuantERA II) | Call 2025 (QuantERA III) |
|---|---|---|---|---|---|
| **Research Consortium Structure** | **3–3 rule**: min. 3 partners from 3 countries | | | | |
| **Distribution of funding among Consortium partners** | **At most 60%** of total funding to partners from one country; **At most 40%** of total funding to single partner | | | | |
| **Formation of Evaluation Panel** | The CSC can consider adjustments to the EP so as to ensure:<br><br>- Appropriate thematic coverage of the proposals;<br>- **Balanced geographical representation of the countries in the call;**<br>- Significant representation of countries outside the call (in Europe and overseas);<br>- Gender balance. | The CS can propose to the CSC adjustments to the EP so as to ensure:<br><br>- Appropriate thematic coverage of the proposals;<br>**- Geographical balance of Call-participating countries in the Evaluation Panel**<br>- Significant representation of countries outside the call (in Europe and overseas);<br>- Involvement of excellent young researchers;<br>- Gender balance. | The CS can propose to the CSC adjustments to the EP so as to ensure:<br><br>- Appropriate thematic coverage of the proposals;<br>- **Balanced geographical representation of the countries in the call;**<br>- Significant representation of countries outside the call (in Europe and overseas);<br>-Involvement of excellent young researchers;<br>- Gender balance. | While suggesting experts, the CSC members are encouraged to ensure:<br><br>- Appropriate thematic coverage of the proposals;<br>**- Balanced geographical representation of the countries in the call;**<br>- Gender balance;<br>- Involvement of excellent early stage career experts. | While suggesting experts, the CSC members should ensure:<br><br>- Appropriate thematic coverage of the proposals,<br>-Gender balance : Women should form 50% of the panel member suggestions,<br>**- Geographical balance of Call-participating countries in the Evaluation Panel**<br>**-** Involvement of researchers at various stages of their research careers,<br>- Propose experts knowledgeable about innovation/technology transfer |
| **Tie-breakers (additional criteria regarding ex aequo proposals)** | - The output of the call<br>**- The projects involving partners from the Widening Countries should be prioritised**;<br>- If possible, each funding organisation funds at least one project. | - The output of the call,<br>- If possible, each funding organisation, funds at least one project;<br>- **The projects involving partners from the widening countries should be prioritised.** | - The output of the Call<br>- The success rates of both topics being comparable;<br>- If possible, each funding organisation, funds at least one project;<br>- **The projects involving partners from the Widening Countries should be prioritised.**<br>**-** The gender balance among the personnel named in the application will be used as a factor for prioritisation. | -The output of the Call<br>-The success rates of both topics should be comparable;<br>- If possible, each funding organisation should fund at least one proposal;<br>**- The projects involving partners from the Widening Countries should be prioritised;**<br>- The gender balance among the personnel named in the will be used as a factor for prioritisation. | -The success rates (i.e. the overall number of funded projects relative to the overall number of proposals) of both topics should be as close as possible to each other.<br>-If possible, each RFO should fund at least one project.<br>**- Projects involving partners from the Widening Countries and territories should be prioritised.**<br>-The distribution of genders among the PIs and co-PIs considering all funded proposals should be as balanced as possible. |

Figure 6: Comparison of capacity building mechanism across all QuantERA Calls documents



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The analysis of call documentation across the entire QuantERA timeline shows a gradual and deliberate transformation of the Programme's operational philosophy. In the earliest phase (Call 2017) concepts such as *spreading excellence* or *capacity building* were just mentioned as an aspect of targeted research; they also appeared implicitly only in the selection stage, where **proposals from Widening Countries were given preference in tie-break situations**. This shows that inclusiveness was initially treated mostly as a corrective measure, not as an embedded design feature.

By 2019 a conceptual shift became evident. The *Expected Impact of the research targeted in the Call* began explicitly referencing "**spreading excellence throughout Europe by involving partners from the Widening Countries**" and "**building innovation capacity across Europe.**" This language marks a clear turning point — **widening was no longer an administrative adjustment but a stated programme objective.** The operational side also matured: the **formation of Evaluation Panels introduced formal procedures to ensure balanced geographical representation** and gender considerations.

Within QuantERA II Call 2021 this strategic evolution was further advanced, and the Call 2023 then consolidated widening-related measures. By 2025, within QuantERA III, these elements were further aligned and applied consistently across the Programme, reflecting a gradual and still ongoing **progression from basic procedural fairness toward a broader and more inclusive operationalisation of excellence** within QuantERA. Taken together, these developments illustrate a gradual and still ongoing progression from procedural fairness toward a broader and more inclusive operationalisation of excellence.

Beyond the procedures directly embedded in the joint calls, QuantERA has also developed **supporting instruments** designed to foster collaboration and diversity within research consortia**. The Partner Search Tool** is an online matchmaking platform that facilitates the identification of potential partners and the formation of new research consortia. It enables applicants to browse submissions from other teams and directly contact organisations whose profiles match their scientific, technological or geographical needs. By providing a structured and transparent space for partner identification**, the tool helps reduce entry barriers for newcomers and supports the creation of balanced, diverse and competitive consortia**. Initially conceived as a practical response to the growing demand for transparent and inclusive partner-matching processes, the tool has evolved into an important capacity-building instrument. It enables researchers and institutions — particularly from less research performing countries — to position themselves within the European quantum research landscape.

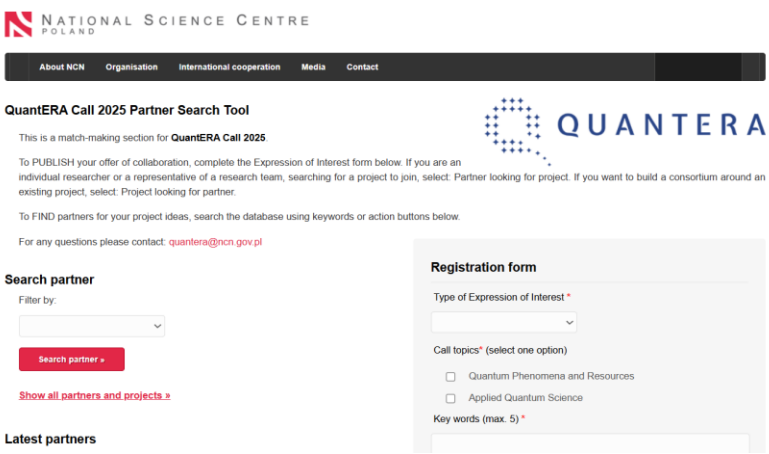


Figure 7: QuantERA Partner Search Tool interface

# Advancing Excellence through Collaboration: Presence and Synergies

A core element of QuantERA's contribution to capacity building lies in strengthening collaboration mechanisms, while also improving the visibility of Widening Countries and promoting an inclusive attitude across the European quantum ecosystem. Beyond its joint Calls, the Programme actively engages with strategic initiatives and working groups that coordinate efforts across Europe and link research funders, scientific communities, and policy-level structures.

## Widening Working Group

The Widening Working Group (WWG) is a dedicated expert body established under the **Quantum Community Network (QCN)** of the **Quantum Flagship** to address the strategic challenge of low participation of widening EU Member States in European quantum initiatives. Its mandate is to monitor participation trends, promote "widening balance" across consortia, boards, and events, and develop practical measures to increase the visibility and involvement of institutions from Widening Countries — while ensuring that excellence remains the primary criterion. The group brings together representatives from research organisations, national funding agencies, and industry partners from across Europe. QuantERA contributes to this effort by **sharing its programme-level experience, data, and good practices in capacity building**, offering a complementary perspective from the viewpoint of transnational research funding. In 2024, QuantERA projects were used by WWG to evaluate the Key Inclusiveness Indicators on Widening Countries and gender balance.

## Advocating for Inclusiveness

Visibility efforts also include QuantERA's advocating for widening participation and spreading excellence during various events organised in Europe and beyond. Representatives of the Programme regularly engage in conference panels, workshops, and strategic discussions focused on widening participation, where QuantERA showcases its experience, presents data from the Calls, and contributes to shaping the European debate on inclusiveness in QT and broader policy discourse. Representatives of QuantERA participated in several key events, including:

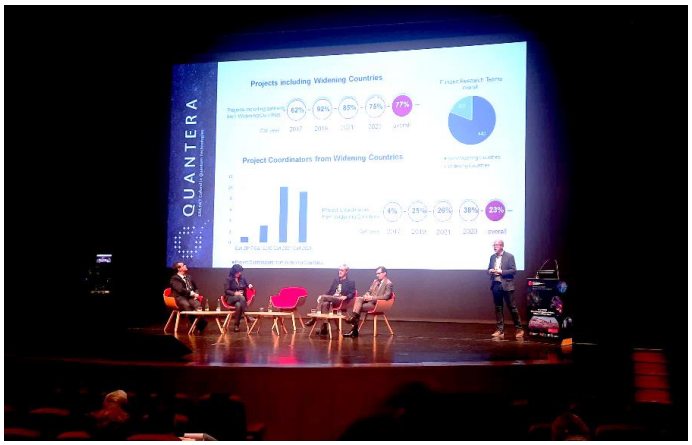


Figure 8: EQTC, Lisbon 2024, "Widening Participation in Quantum Technologies" Panel

- **Widening Participation in Quantum Technologies & Balkan Integration**, Belgrade, Serbia, **29–30 August 2022**
- **Science Business Widening Conference**, Prague, Czechia, **26 September 2023** – participation in the panel *"The added value of the Widening Programme"*


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- **European Quantum Technologies Conference (EQTC)**, Lisbon, Portugal, **18–20 November 2024 -** participation in the panel *"Widening Participation in Quantum Technologies"*

- **The Role of Southeast Europe: How to Maintain, Build and Interconnect Research and Innovation Infrastructures in Europe**, Skopje, North Macedonia, **1 October 2024**

- **European Quantum Technologies Conference (EQTC)**, Copenhagen, Denmark, **10 November 2025** - QuantERA Roundtable: *"Pan-European Quantum Collaboration: How to Connect the Dots?"***;** participation in the panel *"Empowering Talent – Inclusion Strategies for the Quantum Workforce"*


Figure 9: EQTC, Copenhagen 2025, QuantERA Roundtable: "Pan-European Quantum Collaboration: How to Connect the Dots?"

In the area of visibility, it is also important to highlight **QuantERA's presence in online dissemination channels**, which extend the Programme's reach beyond conferences and panel discussions. This includes participation in **dedicated webinars** — for example, the ERA-LEARN webinar on Widening in Partnerships (28 April 2021) — as well as coverage in **international online publications**, such as the article *On a quantum quest: Europe's journey towards technological innovation*, published in Science Business in 2024", which highlights QuantERA's role in building a pan-European quantum research ecosystem and underscores the need to strengthen capacities across all regions, including Widening Countries[18].

Moreover, information about QuantERA Programme and its actions are regularly disseminated through **scientific communication platforms**, enabling researchers from different regions to access Programme updates and opportunities. In addition to the Programme's own website, QuantERA resources are available on the Quantum Flagship website and on the European Commission's CORDIS platform, further enhancing visibility across the European research community.

# Capacity in Action: Evidence from QuantERA Funded Projects

## Statistics on Funded Projects

Across all its joint transnational Calls, QuantERA demonstrates that programme-level widening measures translate directly into tangible outcomes at the project level. Since 2017, teams from Widening Countries have consistently secured a strong presence among funded consortia, both as coordinators and partners. Participation from these countries spans the range of funded thematic areas, showing that when supportive mechanisms are embedded in Call procedure design, evaluation, and panel composition, they effectively broaden access to inclusive research.

[18] A. Korzekwa-Józefowicz, *On a quantum quest: Europe's journey towards technological innovation*, Science Business, 15 April 2024.


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As illustrated in the Figure below, **the share of QuantERA research consortia that include widening teams has remained consistently high across all Calls — ranging from 62% to 92% and averaging 77%** — demonstrating that their participation is strong regardless of whether a given call included EU top-up co-funding or was financed solely by national and regional agencies.

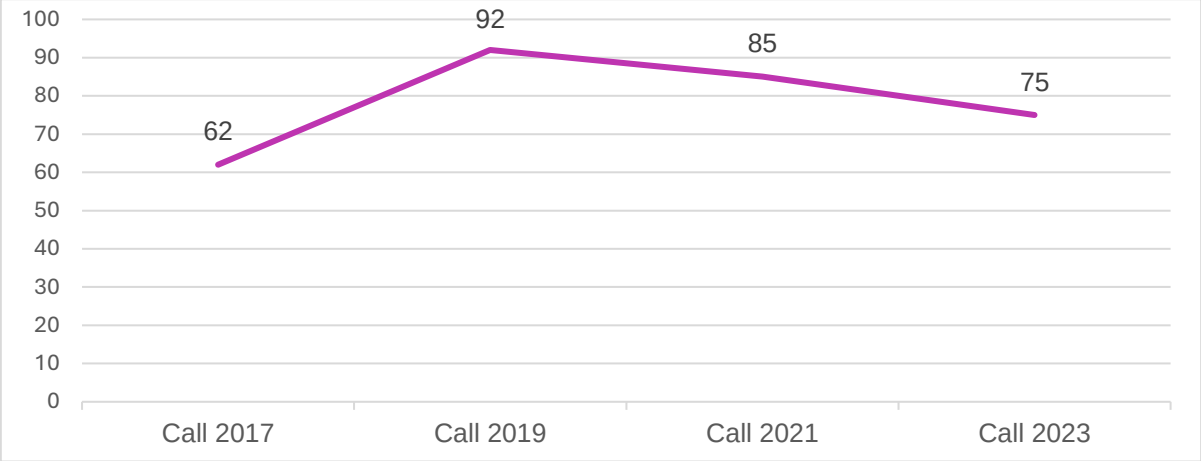


Figure 10: Percentage of QuantERA research consortia that include teams from Widening Countries

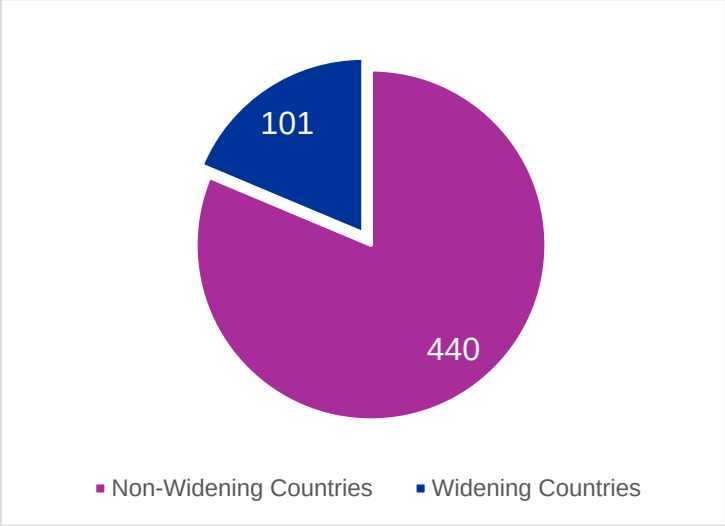


Figure 11: Distribution of research teams in QuantERA projects: Widening vs. non-Widening Countries

Across all research teams participating in QuantERA-funded projects, **101 came from Widening Countries** and **440 from non-Widening Countries**. This means that **just under one fifth** of the entire project consortia (approximately **19%**) consists of partners from Widening Countries.

**During QuantERA II the role of Widening Countries expanded markedly: their involvement progressed from participation towards coordination. In Call 2017, coordinators from Widening Countries represented only 4% (1 out of 26) of all PCs, whereas by Call 2023 this share had risen to 38% (9 out of 24). This demonstrates that Widening Countries are not only consistently engaged but increasingly take on leadership roles within the Programme's research consortia.** This trend is illustrated by Figure 12 and 13 below:


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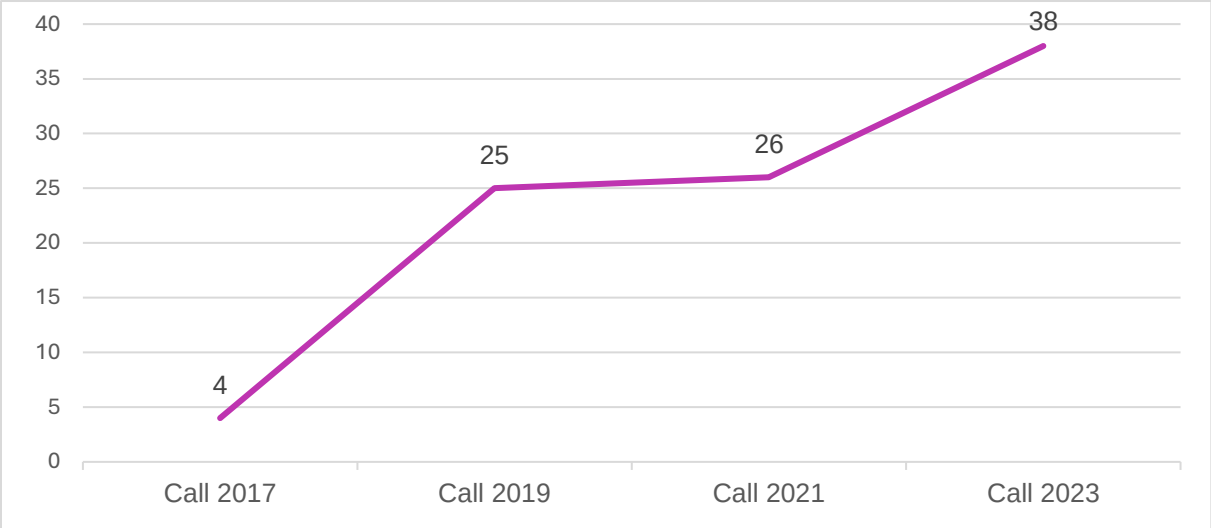


Figure 12: Percentage of Project Coordinators from Widening Countries across QuantERA Calls (2017–2023)

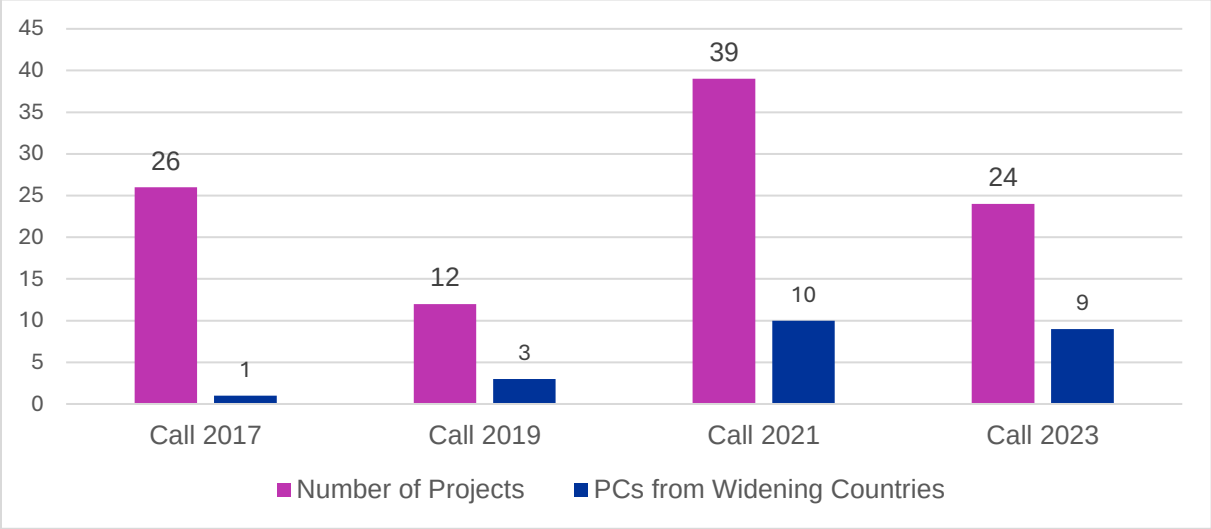


Figure 13: Number of Funded Projects and Project Coordinators from Widening Countries across QuantERA Calls (2017-2023)

A detailed picture of the engagement and capacity of Widening Countries within the QuantERA Programme can be provided through the comparison between the number of research teams applying for funding and those ultimately participating in funded projects (see Figures 14 and 15 below).

While participation levels vary across national research systems, some countries demonstrate a consistently strong presence throughout the application and funding stages. Others participate on a smaller scale but show proportional success when submitting proposals. **It is also important to note that success rates are partly shaped by the national budgets allocated to the Call, which determine how many projects each funding organisation manages to support**.


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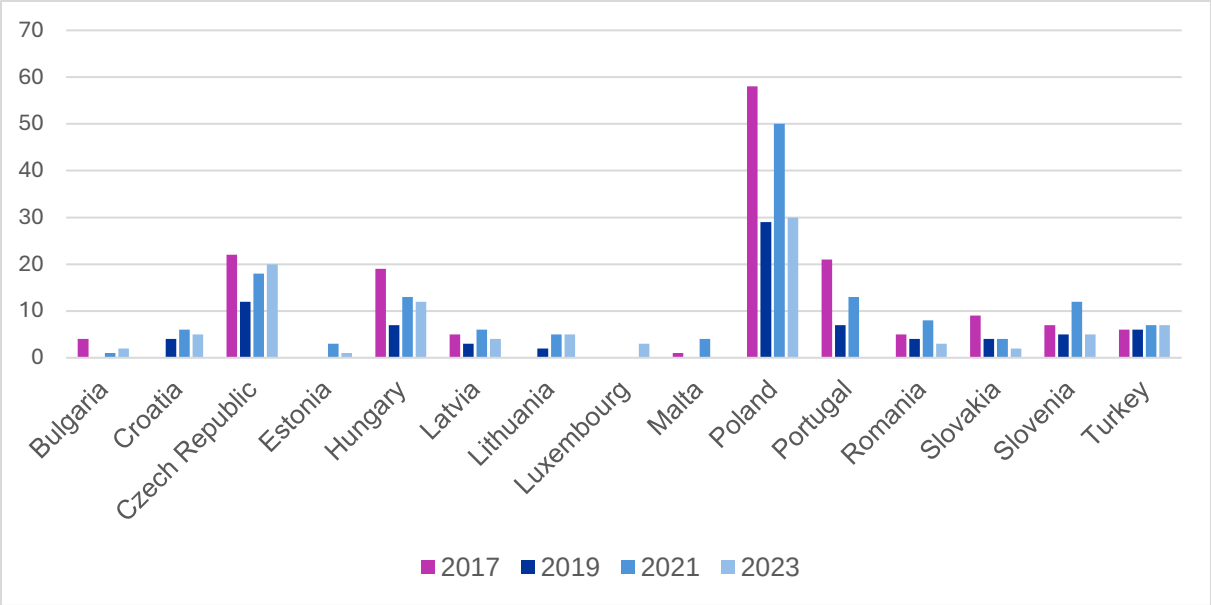


Figure 14: Number of research teams from Widening Countries applying in QuantERA Calls (2017-2023)

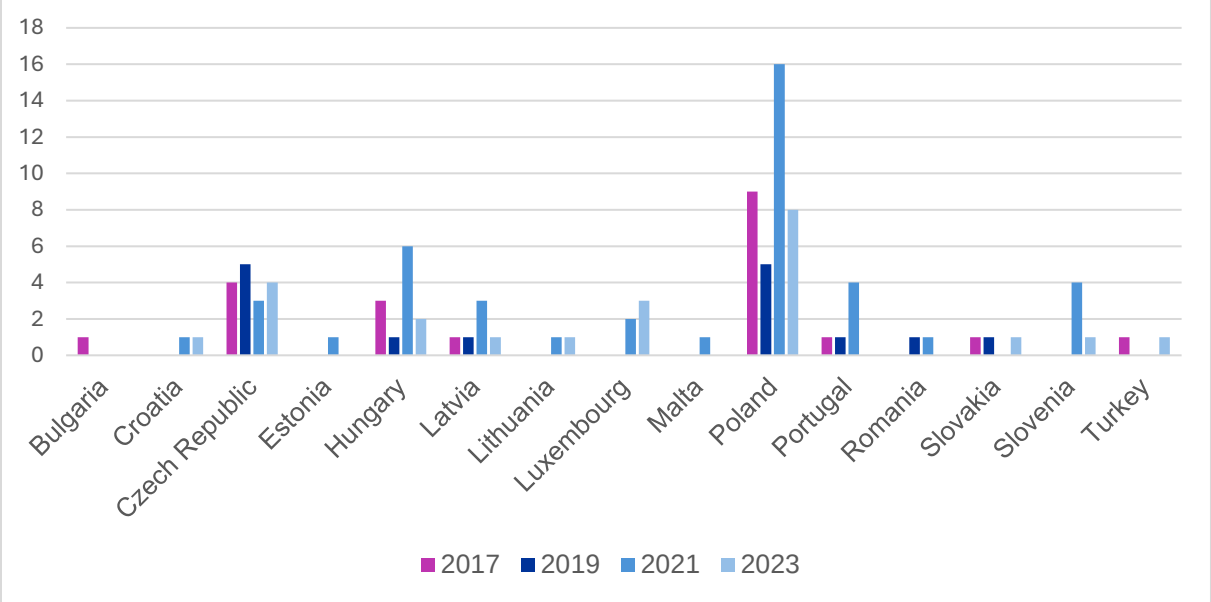


Figure15: Number of research teams from Widening Countries funded under QuantERA Calls (2017–2023)

Overall, the data reveal a diverse landscape in which many Widening Countries are able to translate applications into funded involvement, reflecting increasing competitiveness and the positive impact of QuantERA's widening-oriented measures. Based on the data presented in Figures 14 and 15, several participation patterns can be observed:

**• Strong and consistent participation in some Widening Countries**

Poland, Czechia and Hungary show the highest and most stable levels of engagement across all Calls, both in applications and funded teams. Their conversion rates remain comparatively robust, indicating well-established research communities with significant experience in competitive transnational funding schemes.


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• **Moderate but strengthening participation in Baltic countries and Romania**

Latvia, Lithuania, and Romania participate regularly but at a smaller scale. Importantly, their funded team numbers tend to grow in proportion to the number of applications, meaning that when these countries apply, they often succeed. This reflects increasing capacity and improving competitiveness within their research systems.

• **Limited participation in smaller or emerging research systems**

Countries such as Malta, Luxembourg, Estonia, and Turkey submit relatively few applications, which is reflected in their funded-team involvement. These patterns likely relate to the size and maturity of national research ecosystems, which influence both the number of proposals submitted and their likelihood of success.

| Country Pair | Number of Joint Projects |
|---|---|
| **Poland – Germany** | 34 |
| **Czechia – Germany** | 19 |
| **Poland – France** | 18 |
| **Hungary – Germany** | 14 |
| **Poland – Italy** | 13 |
| **Czechia – France** | 11 |
| **Poland – Spain** | 11 |
| **Hungary – France** | 10 |
| **Latvia – Germany** | 9 |
| **Slovenia – Germany** | 9 |
| **Poland – United Kingdom** | 8 |
| **Croatia – Germany** | 7 |
| **Romania – Germany** | 7 |
| **Poland – Switzerland** | 7 |
| **Czechia – Italy** | 7 |

Figure 16: 15 Most Frequent Country Pairs in QuantERA Projects: Widening-related collaborations (2017-23)

The analysis of collaboration patterns also reveals a strong structural trend within the QuantERA Programme across all Calls: **Germany appears as the most frequent cooperation partner for Widening Countries**, present in the majority of top-ranked country pairs, as shown in the Figure 16. This includes recurrent links such as **Poland–Germany, Czechia–Germany, Hungary–Germany, Latvia–Germany** and **Slovenia–Germany**. This pattern largely reflects Germany's position in European quantum research and the robustness of its institutional cooperation networks. **Poland also emerges as a highly connected Widening Country**, forming frequent partnerships with France, Italy, Spain, Switzerland, the United Kingdom, and Germany. **Czechia and Hungary likewise demonstrate strong and stable cooperation patterns** with several major research systems, confirming their advanced level of integration into the European quantum landscape.

| Country Pair | Number of Joint Projects |
|---|---|
| **Poland – Czechia** | 6 |
| **Poland – Hungary** | 5 |
| **Czechia – Slovakia** | 4 |
| **Hungary – Slovenia** | 4 |
| **Latvia – Lithuania** | 3 |
| **Poland – Latvia** | 3 |
| **Poland – Portugal** | 3 |
| **Hungary – Croatia** | 2 |
| **Poland – Estonia** | 2 |
| **Czechia – Hungary** | 2 |
| **Slovenia – Slovakia** | 2 |
| **Luxembourg – Slovenia** | 2 |
| **Latvia – Estonia** | 2 |

Figure17: Widening-widening cooperation pairs

While most high-frequency connections involve a Widening Country collaborating with a non-Widening partner, the dataset also contains several **widening–widening collaborations**. These occur less frequently but demonstrate an emerging pattern of regional capacity-building, for example: **Poland – Czechia; Hungary – Poland; Czechia – Slovakia**; **Latvia – Lithuania.** These links, although less numerous, highlight the beginnings of **intra-regional research cohesion**, which is an essential long-term objective of widening policies. Widening-widening cooperation pairs are shown in Figure 17.

However, Figure 18 below, which displays the 100 most frequent networks across all QuantERA Calls, indicates that collaborations among non-Widening Countries form a considerably more complex and intensive network:


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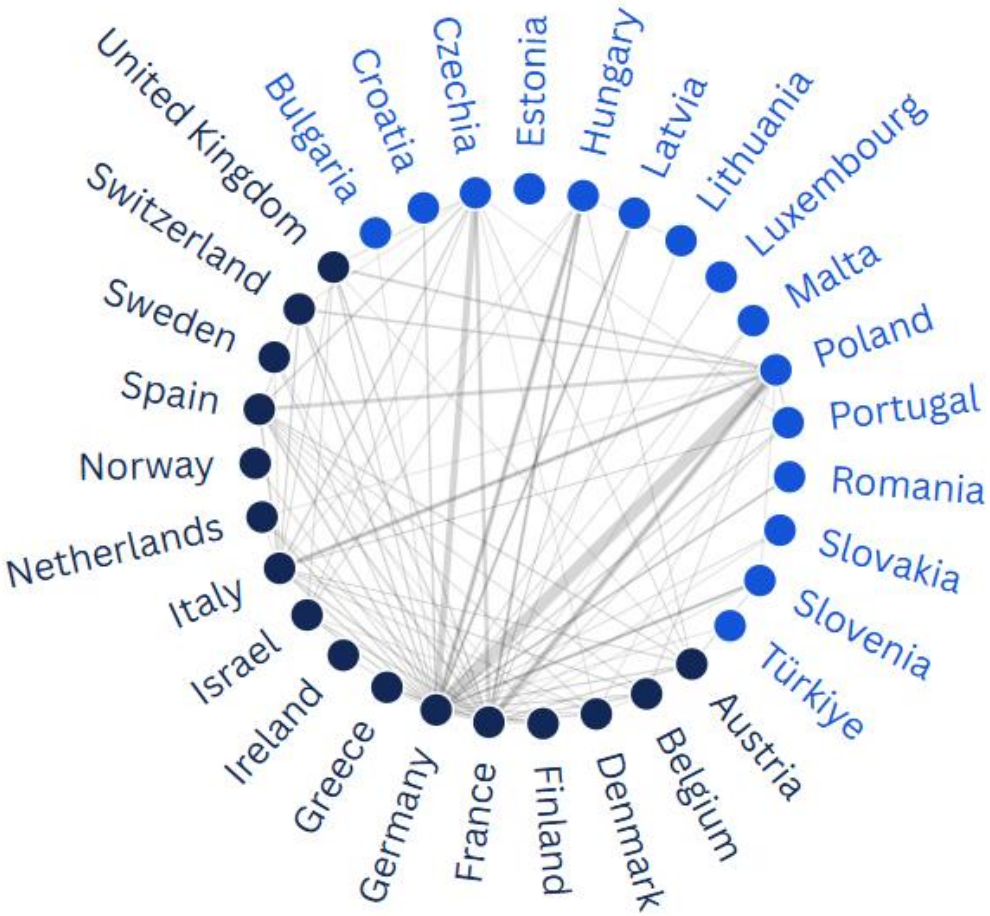


Figure18: The 100 most frequent collaboration links across QuantERA Calls (2017–2023).

## Insights from Projects' Monitoring

### Sources and Methodology

QuantERA applies a unified and systematic approach to monitoring the progress, outputs, and collaboration patterns of all funded projects. Data are collected through two mandatory reporting stages — the **Mid-term Report** and the **Final Report**, provided by the Project Coordinators.

Throughout the Programme's duration, the monitoring system evolved and was iteratively refined, drawing on lessons learned from previous Calls and responding to emerging analytical needs. These adjustments progressively enhanced the system's ability to capture more detailed and meaningful information on project implementation and outcomes.

Compared to QuantERA I, the monitoring system of QuantERA II is more comprehensive, with further enhancements planned for QuantERA III. The monitoring system of QuantERA II integrates three main categories of information:


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1. **Administrative and structural data:**
   Project duration, consortium composition, institutional profiles, team demographics, roles and workload allocation, as well as any changes or new collaborations within the consortium.

2. **Scientific and technical progress:**
   Work plan implementation, scientific achievements, deliverables and milestones, deviations, and interactions with broader European QT initiatives.

3. **Outputs, impact and RRI-related evidence:**
   Publications, prototypes, software, patents, communication and outreach activities, Open Science practices, gender equality measures, industrial cooperation, follow-up funding applications and broader spillover effects.

The structure of the reporting templates allows QuantERA to derive a set of indicators relevant to the assessment of capacity-building processes, including:

- team structures, mobility and involvement across career stages,
- collaboration dynamics and cross-border interactions,
- inclusiveness objectives.

**The data presented below, drawn from project reports, are based on Final Reports from the Calls 2017 and 2019 and the Mid-term Reports submitted by projects funded under Call 2021. Because of the reporting timeline, mid-term reports from Call 2023 and final reports from Call 2021 are still undergoing evaluation and are therefore not available for analysis at the time of writing this report.** Among the information relevant for assessing capacity building, the reports from Call 2017 do not include data on team composition or jobs created, which prevents these results from being incorporated into the full analysis.

## Mobility

Mobility represents a direct indicator of knowledge exchange, access to laboratories and the depth of collaboration within QuantERA projects. All available project reports (Final Reports from Calls 2017 and Call 2019 and Mid-term Reports from Call 2021) provide information on mobility activities, understood as collaborative and scientific exchange visits longer than two weeks**. It is important to note that all three Calls analysed here were implemented under pandemic-related mobility constraints, which likely reduced the overall scale of undertaken activities.** A consolidated overview of mobility patterns across the Calls 2017-2021 is presented in the Figure below:

| Call | Widening teams number | Non-widening teams number | Funded projects number | Mobility activities in total | Mobility activities FROM Widening Countries to non-Widening Countries | Mobility activities TO Widening Countries from non-Widening Countries | Mutual widening mobility activities |
|---|---|---|---|---|---|---|---|
| **Call 2017** | 21 | 134 | 26 | 49 | 12 | 3 | 0 |
| **Call 2019** | 15 | 50 | 12 | 27 | 17 | 3 | 2 |
| **Call 2021** | 43 | 159 | 39 | 50 (basing on the mid-term reports) | 9 | 12 | 1 |

Figure 19: Summary of mobility activities across QuantERA Calls 2017–2021


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This comparison of mobility patterns shows a **clear progression in the engagement of Widening Countries**. In 2017, mobility was limited and largely one-directional, with widening teams mostly travelling to non-widening partners. By 2019, exchanges became more diversified, including the first widening–widening connections and an increase in inbound visits to widening institutions. Mid-term data from 2021 confirm this trajectory, showing more balanced flows and growing recognition of widening institutions as relevant destinations for scientific exchange. Despite the pandemic constraints, the structural evolution of mobility patterns indicates strengthening collaboration capacity across widening teams**. The increasing share of mobility directed to widening institutions suggests improving research environments and deeper integration within the European quantum community.** However, the consolidated view of all mobility activities, presented in Figures 20-22, also reveals the continued strength and density of well-established collaboration networks among non-Widening partners:

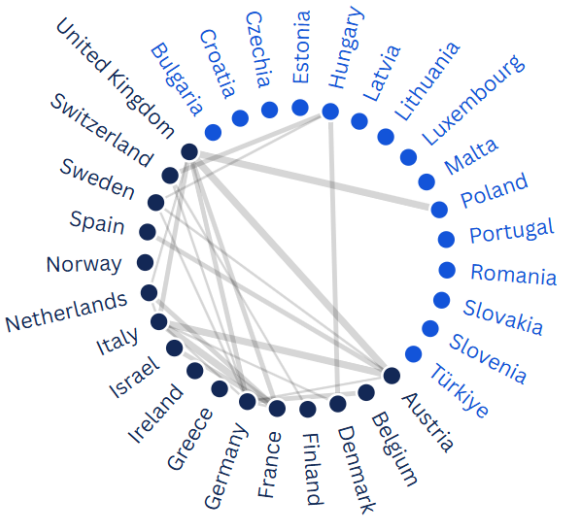


Figure20: Mobility activities undertaken within projects funded under the QuantERA Call 2017

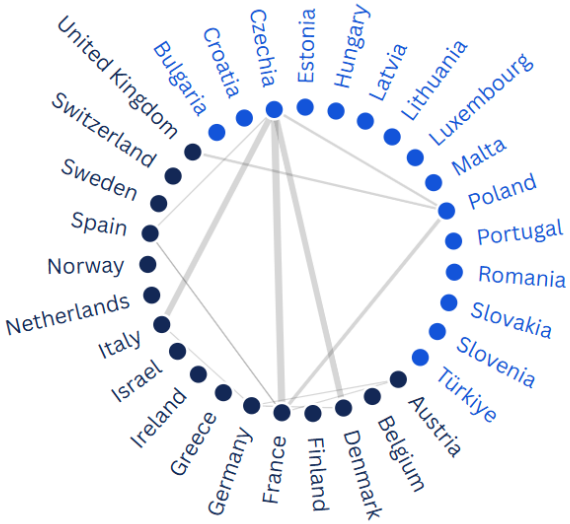


Figure 21: Mobility activities undertaken within projects funded under the QuantERA Call 2019



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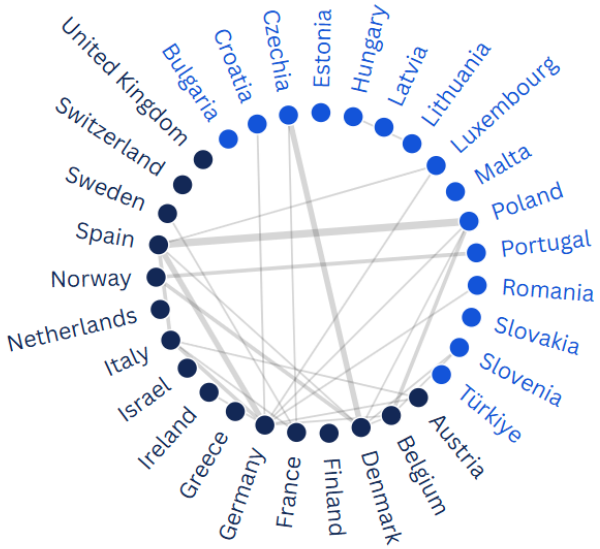


Figure 22: Mobility activities undertaken within projects funded under the QuantERA Call 2021 (basing on the Mid-term Reports)

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## Career Stage Structure

Career progression and the involvement of early career researchers (ECRs; master students, PhD candidates, PhD graduates, and postdoctoral researchers) represent an important dimension of capacity building within the QuantERA Programme.

In the projects funded under **Call 2019**, a total of 274 researchers were involved, including 86 from widening teams. **Among them, 45 were reported as ECRs, representing** 52.3% **of all researchers from widening teams.** Among non-widening teams, 96 out of 188 researchers were recorded as ECRs, accounting for **51.1%**.

In the projects funded under **Call 2021**, a total of 234 researchers were involved, including 74 widening staff members. Widening teams reported 39 ECRs out of 74 total staff members, meaning that **52.7%** of all researchers engaged in widening teams were at an early stage of their career. For comparison, teams from non-Widening Countries reported 90 ECRs out of 158 researchers, corresponding to **57%**. This shows that while the proportion of ECRs is relatively close across widening and non-widening teams, the latter display a higher share, with a difference of slightly above four percentage points.

**Taken together, these figures indicate that widening teams participate in QuantERA projects with a workforce structure broadly comparable to that of more research-intensive systems. The presence of more than half early career researchers in both groups demonstrates that the Programme plays an important role in fostering training, skill development, and career progression.**


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## Gender Balance

Gender representation in projects funded under **Call 2017** shows that women in teams from Widening Countries accounted for 16.2% of all researchers, while in non-widening teams their share was slightly higher, at 17.8%.

In **Call 2019**, among researchers from widening teams, women represented 17.4% of personnel, compared with 23.9% in non-widening teams.

In **Call 2021**, women represented 14.0% of the personnel reported by teams from Widening Countries and 18.2% of the personnel reported by non-Widening teams.

Although **both groups reflect the broader gender imbalance characteristic of the quantum research field, the underrepresentation is more pronounced in widening teams**. This suggests that while gender equality challenges are systemic, they may be further amplified in regions where research systems are still developing.[19]

## Project Participants' Perspective: Impact Assessment Survey

To complement the quantitative monitoring of capacity building, in 2025 QuantERA asked a set of questions regarding participants' views on the Programme's effectiveness in this area to all Project Coordinators and Principal Investigators involved in projects funded under all Programme Calls. The questions were asked within the Impact Assessment Survey, which formed part of QuantERA's overall impact evaluation process carried out under Task 4.5. In total, **the survey collected 72 responses from 39 Project Coordinators and 33 Principal Investigators.** Respondents represented 42 universities, 28 public research institutions and 2 private entities.

The survey reveals a very strong perception of fairness and equal treatment within QuantERA consortia. As shown in the Figure 23 below, **82% of respondents (59 persons)** felt fully treated as *equal partners*, regardless of geographical origin or institutional profile. An additional **10% (7 persons)** indicated they were treated "mostly" as equals, and **7% (5 persons)** indicated they were treated as equals "only partially". Only **1% (1 person)** reported not being treated equally.

[19] For more information about addressing the issue of gender balance across QuantERA see: QuantERA, *Revised "QuantERA RRI guidelines for research community" with a focus on gender equality in research community,* 2025.



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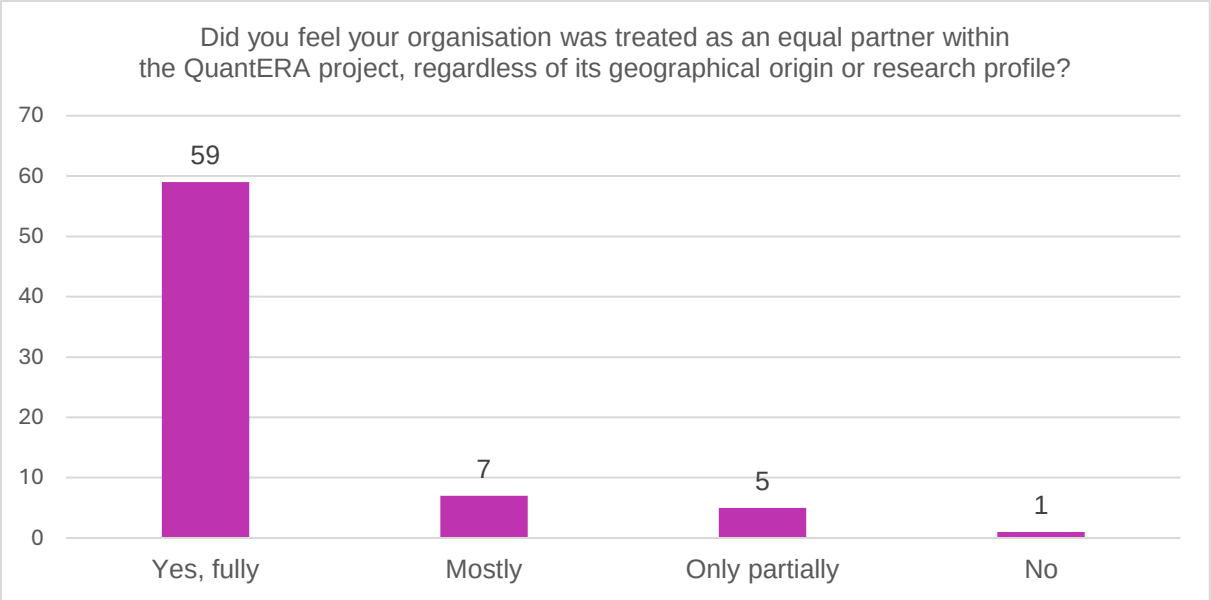


Figure 23: Perceptions of equality within funded projects' participants

The Programme's emphasis on knowledge exchange and mentoring dynamics is clearly reflected in the data shown in Figure 24. **Approximately 36% of respondents (26 persons) indicated mutual learning. A further 28% (20 persons) reported learning from more experienced partners, and 15% (11 persons) contributed by sharing their own expertise**. The charts also show that 14% of respondents (10 persons) reported no such exchange.

Taken together, these findings suggest that while knowledge exchange is common across many collaborations, some teams appear to work more in parallel than interactively, resulting in more limited mentoring or mutual learning dynamics**.**

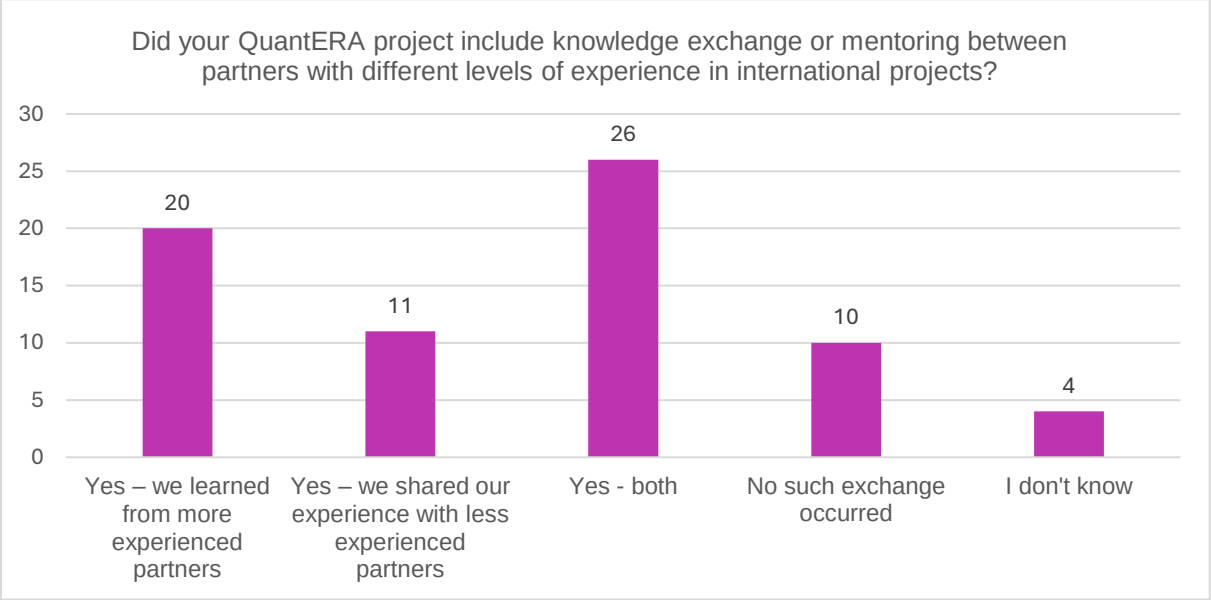


Figure 24: Knowledge exchange and mentoring between partners


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Although **39% of respondents (29 persons) reported *no significant challenges*** in benefiting from the QuantERA collaboration, the survey — as illustrated in Figure 25 — also points to persistent structural barriers.

Two issues stand out most clearly:

- **Limited funding or research infrastructure** – identified by **23 respondents**
- **Administrative or legal complexity** – identified by **22 respondents**

These patterns show that despite strong collaboration dynamics, disparities in institutional capacity remain. The findings underline the continued need for improving access to shared research infrastructures, reducing administrative burdens, and harmonising procedures among participating RFOs.

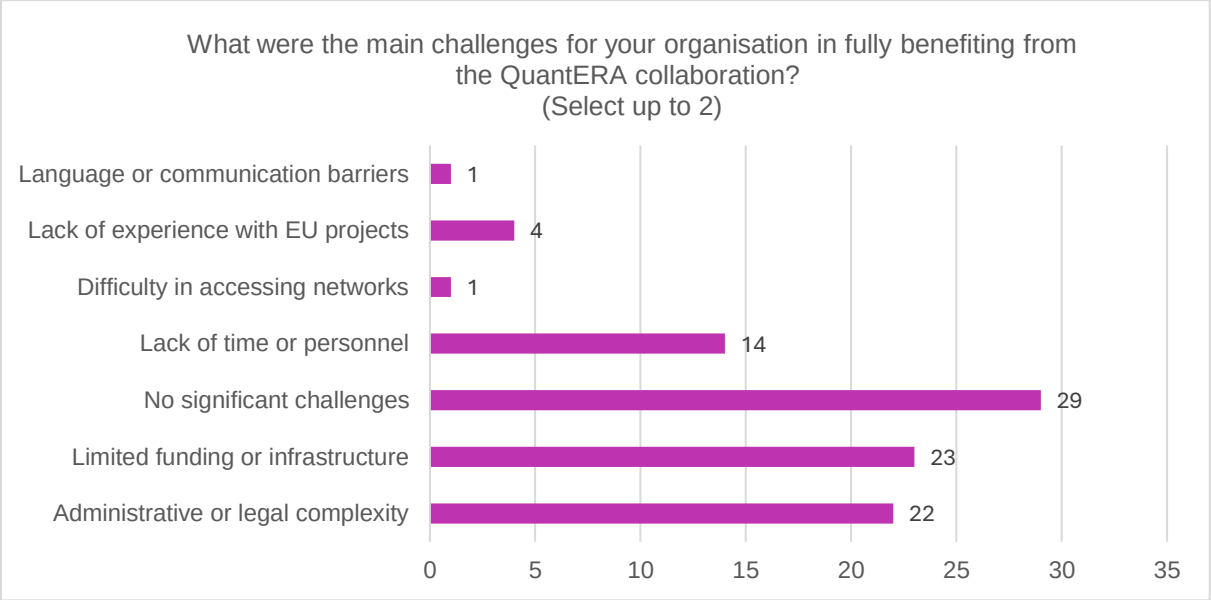


Figure 25: Main challenges faced by organisations in benefiting from QuantERA collaboration

These systemic challenges, if addressed, could help further enhance the depth and quality of cooperation, especially for widening-country institutions.

Perceptions of the Programme's wider impact on reducing disparities between more and less research-intensive countries are notably positive. As shown on the Figure 26 below, **36% of respondents (26 persons)** believe QuantERA contributes *significantly* to reducing disparities, and an additional **42% (30 persons)** believe it does so *to some extent*. Only one respondent felt the Programme had no impact. Taken together, **78% of participants recognise QuantERA as a meaningful driver of capacity building at the European level**.

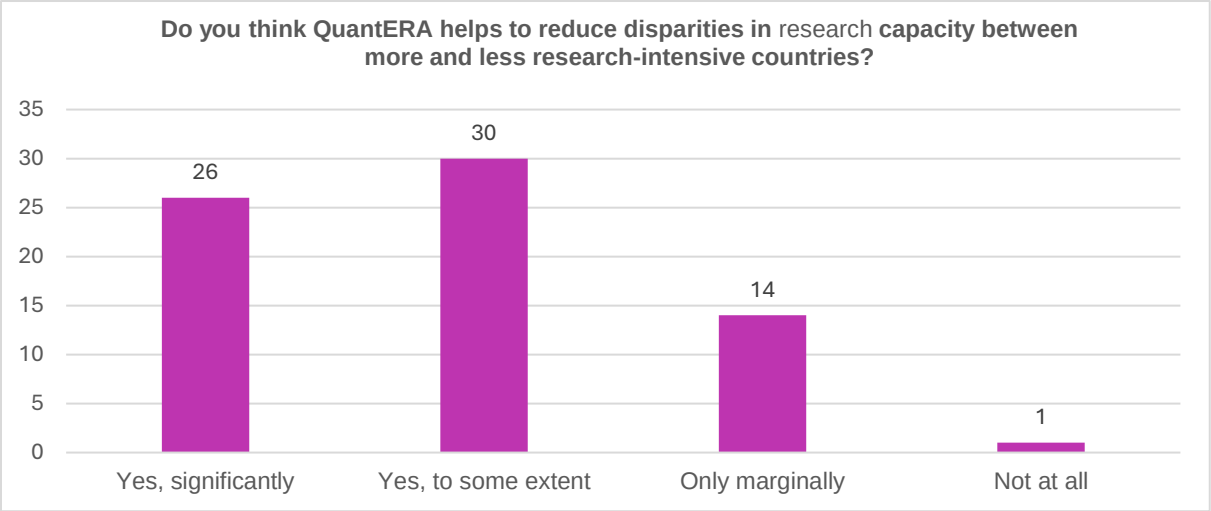


Figure 26: Perceived impact of QuantERA on reducing disparities in research capacity

The survey results confirm that QuantERA not only supports scientific excellence but also fosters an inclusive and collaborative quantum research environment. Participants widely acknowledge the Programme's contribution to levelling differences in research capacity, strengthening networks, and facilitating mutual learning. At the same time, challenges related to infrastructure and administrative complexity highlight areas where further alignment and support could enhance the Programme's long-term impact—particularly from the perspective of Widening Countries.

# Conclusion

The evidence collected in this report demonstrates that **QuantERA has developed a coherent and progressively maturing approach to capacity building**, **supporting the equal participation of Widening Countries and embedding inclusiveness at programme, procedural and project levels.** The analysis of successive Call designs, consortium structures, mobility flows and other monitoring data shows that widening has evolved from an auxiliary corrective mechanism into a stable and deliberate dimension of how QuantERA defines excellence, promotes collaboration and evaluates impact. Participation and coordination trends confirm that institutions from Widening Countries increasingly engage as equal partners and contribute substantively to the European quantum research landscape.

As Prof. Ticijana Ban (Institute of Physics, Zagreb, Croatia) notes:

> *Strengthening scientific excellence in the Widening Countries is crucial for fostering a Europe without borders and gaps. Spreading of excellence across the entire European Research Area should play a major role in evaluating the long-term impact of individual funding programmes.*[20]

QuantERA's approach to date aligns closely with this view. Programme-level measures have translated into concrete outcomes at the level of project coordination, leadership and scientific collaboration, contributing meaningfully to reducing disparities within the ERA and strengthening the participation of Widening Countries in European quantum research. These

[20] A. Korzekwa-Józefowicz, *On a quantum quest: Europe's journey towards technological innovation*, Science Business, 15 April 2024.


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widening-oriented mechanisms have generated measurable outcomes and helped foster cooperation, coordination and scientific excellence across diverse research environments.

At the same time, the data from project monitoring and the Impact Assessment Survey indicate that progress is accompanied by broader structural limitations such as unequal access to advanced research infrastructures, administrative challenges and persistent gender imbalance. While these constraints lie largely beyond the remit of QuantERA Programme, recognising their influence is important for understanding the conditions in which the Programme operates.

Looking ahead, the key areas in which QuantERA can continue to support capacity building in quantum technologies—particularly by fostering transnational collaboration and strengthening the research environments of less research-intensive countries—include:

- **Sustained attention to Call procedures and the evaluation process**, including clear documentation and well-balanced Evaluation Panels.

- **Strengthening the engagement of widening consortium partners** in the implementation of QuantERA programme-level activities.

- **Creating opportunities for networking and strengthening connections among research partners**, enabling knowledge transfer and supporting the scientific maturation of smaller research ecosystems.

- **Enhancing monitoring practices** capable of capturing long-term effects such as institutional learning, research mobility, infrastructure sharing and the durability of research networks.

- **Increasing the visibility of funded projects**, helping to disseminate outcomes and highlight emerging research groups.

- **Promoting career-stage and gender inclusiveness** through encouragement of balanced team composition.

**QuantERA's experience underscores the continued need for European-level funding instruments that enable pan-European collaboration across countries and research communities with varying capacities. Such mechanisms are essential not only for advancing basic and exploratory research—the foundation of future technological breakthroughs—but also for supporting knowledge upgrade, spreading excellence and ensuring that teams with more limited national resources can participate meaningfully in the evolving European quantum ecosystem and contribute to Europe's collective research potential.**


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