

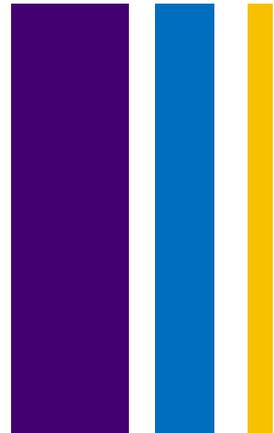


QuantERA Information Session

University of Birmingham, 13 February 2017

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- ■ ■ Introducing the QuantERA Initiative:
 - ■ ■ What is it & who is involved?
 - ■ ■ What are the objectives?
 - ■ ■ How does it fit into the wider landscape?

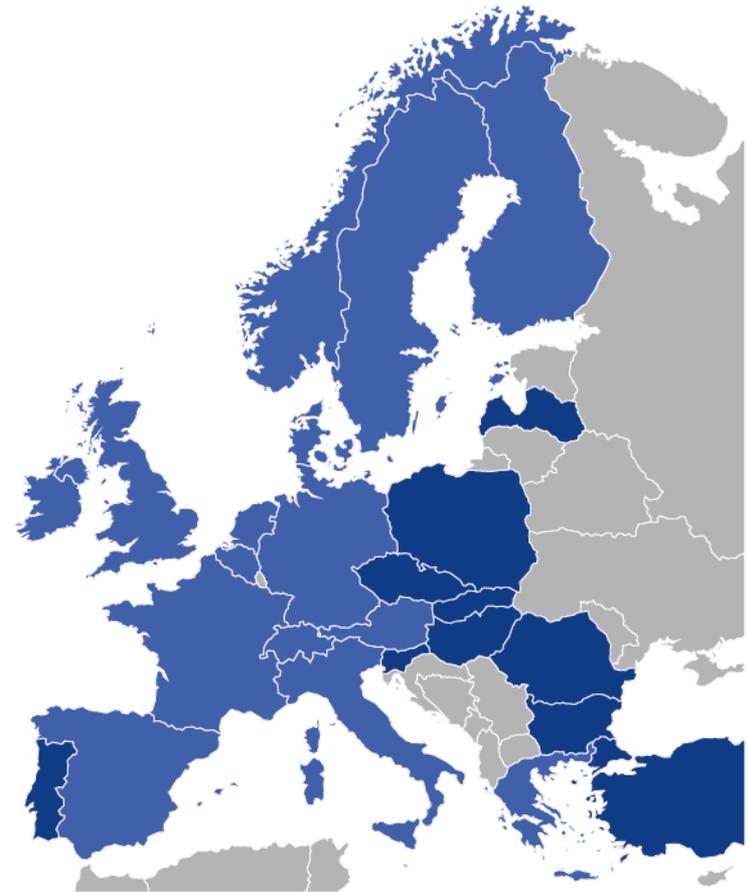
- ■ ■ The QuantERA 2017 Call:
 - ■ ■ Scope of the call
 - ■ ■ Timeline
 - ■ ■ Evaluation & selection process
 - ■ ■ How to apply
 - ■ ■ Key issues to consider

- ■ ■ Q&A



Summary of QuantERA initiative

- The QuantERA consortium consists of 32 national/regional funding agencies from 26 European countries (coordinated by NCN, PL; 'widening countries' shown in dark blue)
- Has its origins in the CHIST-ERA initiative (2010 call on Quantum Information Foundations and Technologies – QIFT)
- It is primarily focussed on running a transnational call for research projects in QT (€34M).
- It will also explore the development of future funding initiatives, connections to industry, responsible research & innovation and mapping the landscape.
- EC 'top up' & coordination funding (2017-2021), but majority of research funding from participating agencies.



www.quantera.eu

Summary of QuantERA initiative

Agencies
~25.5M EUR

EC
~11.5M EUR



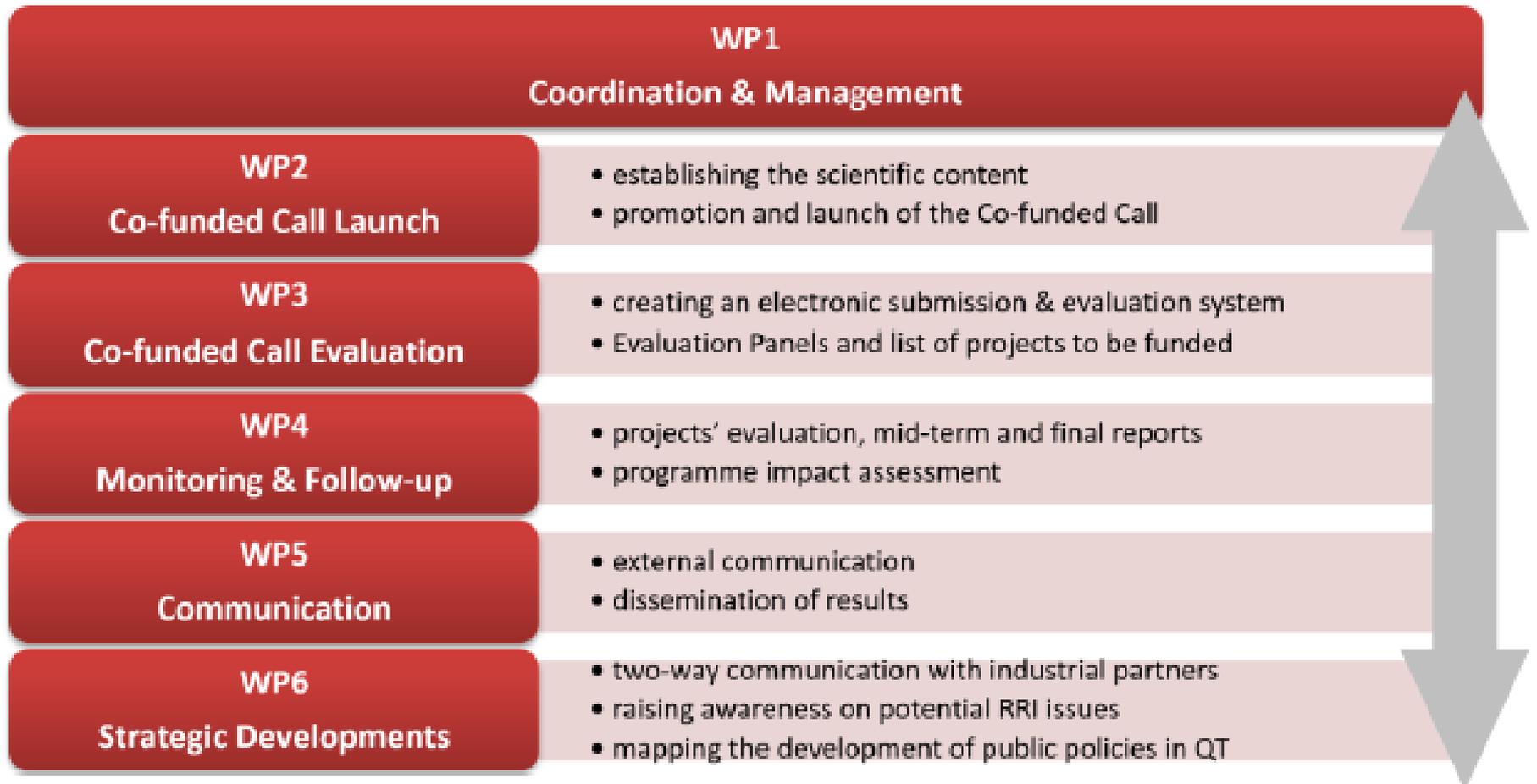
QuantERA Steering Committee ↔ **SAB**

Coordination Office
(NCN, Poland)

Call Steering Committee

Management Team
(WP & Task Leaders)





Who is involved?

Country	Organisation	Indicative Budget (M€) (>1M in bold)	Country	Organisation	Indicative Budget (M€) (>1M in bold)
Austria	FFG	0.5	The Netherlands	NWO	1.0
Austria	FWF	0.5	Norway	RCN	0.5
Belgium	FNRS	0.2	Poland	NCBR	0.5
Belgium	FWO	1.5	Poland	NCN	1.0
Bulgaria	BNSF	0.3	Portugal	FCT	0.25
Czech Republic	MEYS	0.2	Romania	UEFISCDI	0.6
Denmark	IFD	1.0	Slovakia	SAS	0.24
Finland	AKA	0.7	Slovenia	MIZS	0.3
France	ANR	2.5	Spain	MINECO-AEI	0.5
Germany	BMBF / VDI-TZ	4.0	Sweden	VR	1.0
Greece	GSRT	0.4	Switzerland	SNSF	1.0
Hungary	NKFIH	0.3	Turkey	TUBITAK	0.4
Ireland	SFI	0.5	United Kingdom	EPSRC	2.4 (£2M)
Israel	MATIMOP	0.5			
Italy	CNR	1.5			
Italy	MIUR	0.4			
Latvia	VIAA	0.4			'Widening Country'



- The QuantERA Strategic Advisory Board (SAB) provides advice on matters such as:
 - the thematic scope of the QuantERA Co-funded Call and potential future funding actions;
 - the scientific aspects of QuantERA activities such as outreach or cooperation with non-European countries; and
 - new developments and issues related to research in QT that may have a strategic impact on Programme activities.

- Membership:
 - Alain Aspect (Institut d'Optique)
 - Tommaso Calarco (Universität Ulm)
 - Bruno Desruelle (Muquans)
 - Francesca Ferlino (Universität Innsbruck)
 - Ataç İmamoğlu (ETH Zürich)
 - Peter L. Knight (Imperial College London) - Chair
 - Hans Mooij (TU Delft)
 - Kelly Richdale (idQuantique)
 - Anna Sanpera (Universitat Autònoma de Barcelona)
 - Andrew Shields (Toshiba Research Labs Europe)
 - Jiri Vala (Maynooth University)
 - Marek Żukowski (Uniwersytet Gdański)



■ The ambition of QuantERA is:

- to reinforce European scientific excellence in quantum research, addressing major scientific challenges that are still to be solved in the above mentioned directions
- to identify novel aspects of quantum science that can be used as resources for technological developments
- to prepare a competitive European landscape for innovation and developments in QT.

■ This will be done by:

- supporting collaborative research projects that will put together competences from numerous participating countries in various fields of quantum science
- supporting high risk projects potentially leading to new QT
- reinforcing interdisciplinary interactions in collaborative projects
- organising contacts between the running projects in order to share acquired knowledge and developments on a broad basis
- facilitating connections between academia and industry in order to move ideas from labs to applications.

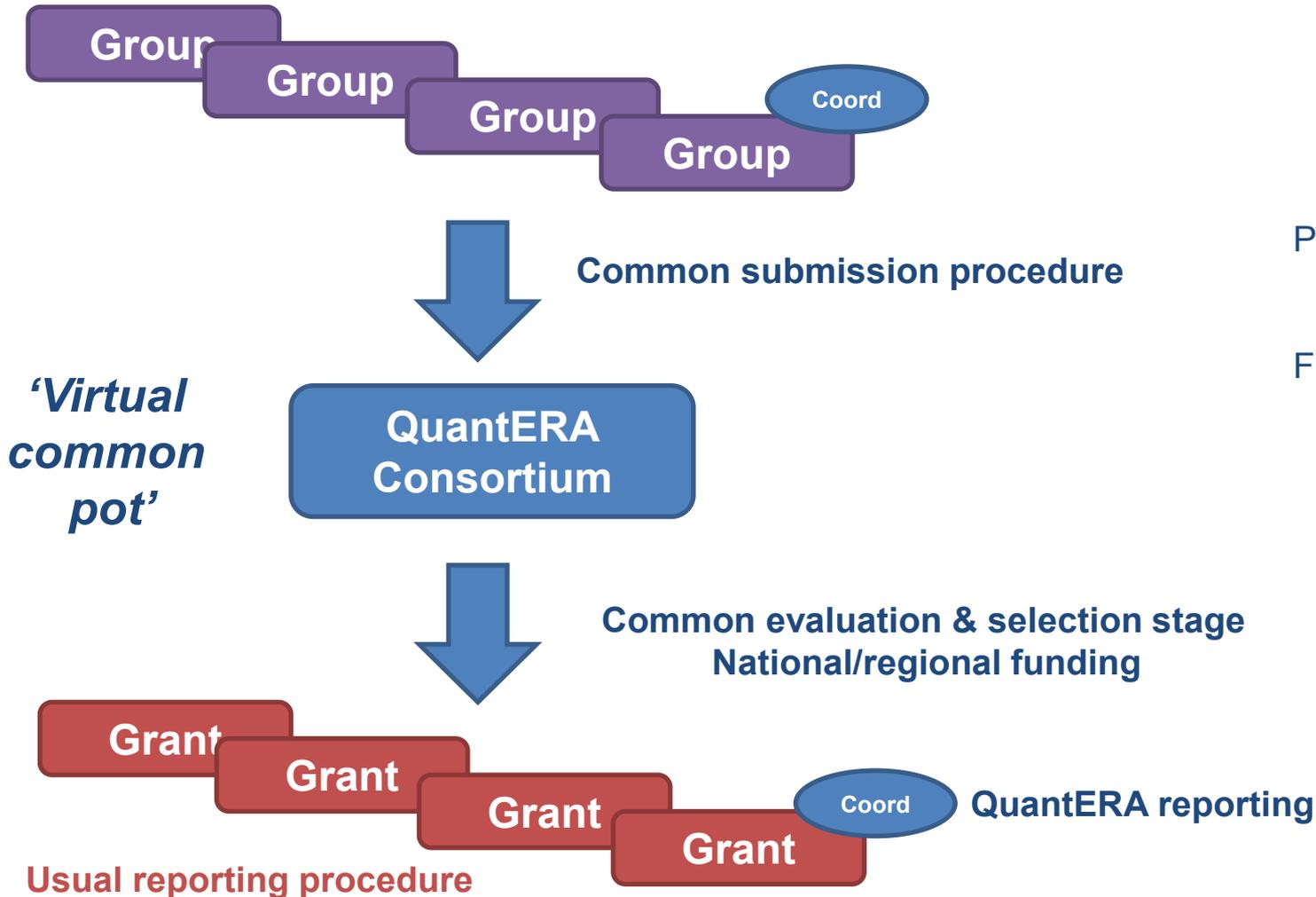


Wider European QT Landscape

- QT is an area of European research strength:
 - ~€500M EU funding
 - Large national initiatives, e.g. UKNQTP, QuTech...
 - CHSIT-ERA QIFT call (2010), Quropa (2013), 'Quantum Manifesto', QuantERA (2016).
 - Industrial interest (large corporates, SMEs...)
 - EC strategy to digitise European industry / 'European Cloud Initiative'.
- Significant investment worldwide (e.g. US, China, Canada...)
- Plans for €1bn 'Quantum Flagship' announced in May 2016 (joint funded by EC & member states).
 - "No more science as usual" (Thierry van der Pyl).
 - 'High Level Steering Committee' currently developing recommendations.
 - Aim to start 'ramp up' in 2018 (majority of funding in 'FP9', overlap with QuantERA (2018-2021)).



QuantERA 2017 Call Overview



Key dates

15 March 17
Pre-proposal deadline

30 June 2017
Full proposal deadline

September 2017
Rebuttal stage

October 2017
Notification

January 2018
Projects start



Proposals should:

- be of a 'FET-like' nature: see 'FET Gatekeepers' p7 at http://ec.europa.eu/research/participants/data/ref/h2020/wp/2016_2017/main/h2020-wp1617-fe_en.pdf
- Contribute to the development of European research.
- Aim to be transformative.
- Explore advanced multidisciplinary science and/or cutting edge engineering.
- Focus on the development of **quantum technologies** (see 'Expected Impacts').



- Funded projects are expected to significantly advance the state-of-the-art of quantum sciences and technologies by achieving one or more of the following targets:
 - Develop a deeper fundamental and practical understanding of systems and protocols for manipulating and exploiting quantum information;
 - Enhance the robustness and scalability of quantum information technologies in the presence of environmental decoherence, hence facilitating their real-world deployment;
 - Develop reliable technologies for the different components of quantum architectures;
 - Identify new opportunities and applications fostered through quantum technologies, and the possible ways to transfer these technologies from laboratories to industries;
 - Enhance interdisciplinarity in crossing traditional boundaries.



- Proposals are expected to address one or more of the following six topics:

- Quantum communication**

- Methods/tools/strategies to deal with the issues of distance, reliability, efficiency, robustness and security in quantum communication; novel protocols for multipartite quantum communication; quantum memory and quantum repeater concepts.
- Novel photonic sources for quantum information and quantum communication, coherent transduction of quantum states between different physical systems; integrated quantum photonics; quantum communication embedded in optical telecommunications systems; other communication protocols with functionality enhanced by quantum effects.



Quantum simulation

- Platforms for quantum simulation; development of new measurement and control techniques and of strategies for the verification of quantum simulations.
- Application of quantum simulations to condensed matter, chemistry, thermodynamics, biology, high-energy physics, quantum field theories, quantum gravity, cosmology and other fields.

Quantum computation

- Development of devices to realise multiqubit algorithms; demonstration and optimisation of error correction codes; interfaces between quantum computers and communication systems.
- Development of novel quantum algorithms; demonstration of quantum speed-up; new architectures for quantum computation.



Quantum information sciences

- Novel sources of non-classical states and methods to engineer such states. Development of device-independent quantum information processing. Methods for the reconstruction and estimation of complex quantum states or channels and certification of their properties. Development of resource theory for quantum information. Study of topological systems for quantum information purposes. Understanding and control of open quantum systems; development of methods to confine dynamics in controllable decoherence-free subspaces. Study of thermodynamics processes at the quantum scale.



Quantum metrology sensing and imaging

- Use of quantum properties for time and frequency standards, light-based calibration and measurement, gravimetry, magnetometry, accelerometry, and other applications. Development of detection schemes that are optimised with respect to extracting relevant information from physical systems; novel solutions for quantum imaging and ranging. Implementation of micro- and nano- quantum sensors, for instance for quantum limited sensitivity in the measurement of magnetic fields at the nanoscale. Extension of the reach of quantum sensing and metrology to other fields of science including e.g. the prospects of offering new medical diagnostic tools.

Novel ideas and applications in quantum science and technologies

- Quantum phenomena, such as superposition and entanglement, as means to achieve new or radically enhanced functionalities.



- ■ ■ QuantERA consortia comprise '**partners**' (research groups) from multiple countries.
- ■ ■ The consortium must be represented by a '**coordinator**', who is responsible for the proposal submission, representing the consortium (including during the evaluation process) and reporting.
- ■ ■ The consortium must be 'international' and 'balanced':
 - ■ ■ With a minimum of 3 **partners** requesting funding from agencies involved in the call (*i.e. they must be eligible*).
 - ■ ■ These **partners** must be located in 3 different countries.
 - ■ ■ No more than 60% of the funding can be requested by **partners** in a single country.
 - ■ ■ No more than 40% of the funding can be requested by a single **partner**.
 - ■ ■ *Remember that some agencies are imposing financial restrictions.*



- Remember the 'virtual common pot' model: international consortia/national regional funding.
- The eligibility of **partners** is subject to the requirements of the funding agency that they are requesting funding from (EPSRC for UK applicants).
- Failure to ensure eligibility at the submission stage will jeopardise the viability of the entire consortium!**
- Note that some agencies require prospective applicants to make contact prior to submission.
- If in doubt, ask! (your Research Office, EPSRC)*
- Partners requesting funding from EPSRC must be represented by a Principle Investigator, according to the usual EPSRC eligibility requirements, and be affiliated to an organisation eligible to receive EPSRC funding.
- Eligible investigators can only request EPSRC funding on one proposal submitted to this call.**



- **Partners** requesting funding from EPSRC should cost their proposal in GBP and convert this to EUR for the purposes of the QuantERA proposal (using the exchange rate at the time of submission).
- *UK partners should cost proposals as if submitting a standard EPSRC proposal.*
- QuantERA proposal forms are available at the QuantERA website. The pre-proposal form (10 pages) must be submitted *via* the **QuantERA Electronic Submission System (ESS)**.
- UK **partners** must additionally register their intention to submit at: <http://www.smartsurvey.co.uk/s/QuantERA/> before the pre-proposal deadline
- If successful, UK **partners** will be asked to submit their costings *via* the JeS system.



- ■ ■ Two-stage evaluation procedure:
 - ■ ■ Pre-proposal (max 10 pages)
 - ■ ■ Full proposal

- ■ ■ Ineligible projects will not proceed to the evaluation stage.

- ■ ■ At both stages, proposals will be evaluated and ranked by an independent expert panel, assisted by external expert reviewers.

- ■ ■ Projects presented at the pre-proposal and full proposal stages must be consistent.
 - ■ ■ Projects invited to submit a full proposal may be informed of the possibility to include partners from countries with a risk of underspending, provided that this adds value to the project.
 - ■ ■ Any changes must be explained and justified.



- The evaluation of each proposal is summarised in a consensus report, which will be made available to applicants together with individual evaluation reports.
- Full proposal coordinators will be forwarded the comments of external expert reviews during September and will have the opportunity (optional) to comment within 10 calendar days. Comments will be available for consideration by the evaluation panel.



- The evaluation criteria are based on those used for the 'FET Open' scheme:

- **Excellence** (threshold: 4/5, weight: 60%)
 - Compliance with 'FET Gatekeepers'³
 - *i. Clarity and novelty of long-term vision, and ambition and concreteness of the targeted breakthroughs towards that vision*
 - *ii. Novelty, non-incrementality and plausibility of the proposed research for achieving the targeted breakthrough and its foundational character*
 - *iii. Appropriateness of the research methodology and its suitability to address high scientific and technological risks*
 - *iv. Range and added value from interdisciplinarity, including measures for exchange, cross-fertilisation and synergy*



■ ■ ■ **Impact** (threshold: 3/5, weight: 20%)

- ■ ■ *Extent to which the outputs of the project contribute at the European or international level to:*
 - ■ ■ *i. The expected impacts (see ‘Research Targeted in the Call’ page 4)*
 - ■ ■ *ii. The transformation of technology and/or society*
- ■ ■ *Quality of the proposed measures to:*
 - ■ ■ *iii. Exploit and disseminate the project results (incl. management of intellectual property rights), and to manage research data where relevant*
 - ■ ■ *iv. Communicate the project activities to different target audiences.*



- ■ ■ **Quality and efficiency of the implementation** (threshold: 3/5, weight: 20%)
 - ■ ■ *i. Quality and effectiveness of the work plan, including extent to which the resources assigned to work packages are in line with their objectives and deliverables*
 - ■ ■ *ii. Appropriateness of the management structures and procedures, including risk and innovation management*
 - ■ ■ *iii. Complementarity of the participants and extent to which the consortium as a whole brings together the necessary expertise*
 - ■ ■ *iv. Appropriateness of the allocation of tasks, ensuring that all participants have a valid role and adequate resources in the project to fulfil that role*



- ■ ■ The selection decision of the projects to be recommended for funding to the national/regional research funding organisations has to follow the ranking list.
- ■ ■ If at a given rank in the list not all *ex aequo* proposals can be selected, the following criteria will be applied:
 - ■ ■ The output of the call, i.e. the overall funding, should be maximised;
 - ■ ■ *Remember the EC 'top-up' funding.*
 - ■ ■ The projects involving partners from the widening countries should be prioritised;
 - ■ ■ If possible, each funding organisation funds at least one project.



- ■ ■ **Remember the ‘virtual common pot’ model: international consortia/national regional funding.**

- ■ ■ When constructing your consortium, keep in mind:
 - ■ ■ Eligibility needs to be established before submission (and don't forget to register your intention to submit). *If you're not sure then ask!*
 - ■ ■ Many agencies have imposed strict financial limits on the amount of funding that can be requested (remember the 40%/60% rules).
 - ■ ■ The evaluation scheme (excellence, impact, quality and efficiency of implementation).
 - ■ ■ That ‘excellence’ carries the highest weighting.
 - ■ ■ Your eligibility and costs must meet EPSRC's usual requirements.
 - ■ ■ You can only request funding from EPSRC once.

- ■ ■ Justify the added value of your consortium in your proposal.

- ■ ■ It's not just a call.



Q: How should I cost my proposal?

A: UK 'partners' will be funded by EPSRC and must ensure that they comply with the usual eligibility and costing rules. If in doubt, please check with your research office. Ineligible costs risk jeopardising the viability of the entire consortium.

Q: I am based in a UK university. Can I apply for student costs?

A: No, EPSRC studentship funding is provided directly to universities for them to allocate. See: <https://www.epsrc.ac.uk/skills/students/>

Q: Can I be involved in more than one QuantERA proposal?

A: You can only request funding from EPSRC on a single proposal. If want to be involved in additional proposals then you will need to find funding from an alternative source. Please note that partners not requesting funding do not count towards the consortium eligibility requirements (see the QuantERA call document for further details).



- Q:** Some of my collaborators are involved in more than one QuantERA proposal. Why has EPSRC limited participation to a single proposal?
- A:** All of the agencies involved in QuantERA are committed to managing demand in order that it is equitable to applicants and reviewers. Considering the breadth of the scope of the call, EPSRC has decided to limit the number of applications rather than impose a strict financial 'cap'.
- Q:** What happens once an agency exhausts its budget for the call?
- A:** The QuantERA call follows a 'virtual common pot' model: each partner is funded by its respective national/regional funding agency. Funding decisions will be based on the rank ordered list produced by the expert evaluation panel. In order to mitigate the risk that an agency's funding is exhausted and 'blocks' the rank ordered list, the agencies have provided information on anticipated financial constraints in the QuantERA call document. If at a given rank in the list not all *ex aequo* proposals can be selected, the agencies have committed to maximising the number of projects that can be funded.



- ■ ■ **Q:** Can my consortium involve more than 6 partners?
- ■ ■ **A:** Yes, most consortia are expected to involve 3-6 partners. However, the consortium size should be selected and justified in terms of the research being proposed, as the balance of expertise will be considered in the evaluation process.

- ■ ■ **Q:** What documentation does EPSRC require from applicants?
- ■ ■ **A:** The Principle Investigator of the UK partner must register intention to submit before the pre-proposal deadline at:
<http://www.smartsurvey.co.uk/s/QuantERA/> Successful projects will be contacted to request costings *via* the JeS system.

- ■ ■ **Q:** Can industry participate in my proposal?
- ■ ■ **A:** Industrial organisations are not eligible to receive EPSRC funding, but can be involved in proposals as 'project partners'.



■ ■ ■ **Q:** Are there institutional limits on submission?

■ ■ ■ **A:** No.

■ ■ ■ **Q:** What role is EPSRC playing in QuantERA beyond providing research funding?

■ ■ ■ **A:** EPSRC is one of the original members of the QuantERA consortium, and is involved in the operation of the peer review procedure with our partner agencies ANR (France) and BMBF/VDI (Germany). EPSRC is also leading QuantERA activities on Responsible Research and Innovation (RRI).

