

D6.2 Guidelines in Responsible Research and Innovation in QT



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1. Executive summary

The purpose of this deliverable is to provide a guideline to current and future QuantERA projects participants in order to favour the implementation of Responsible Research and Innovation in QuantERA funded projects.

The document describes the activities undertaken in Task 6.3, their role in WP6 and their connection to other tasks of the QuantERA Programme.

2. Planned activities for WP6

The leader of WP6 is FCT (Portugal) with support from all QuantERA members.

The main objectives of WP6 are to:

- ❖ Assess and support the continuation of QuantERA beyond the first co-funded call;
- ❖ Investigate further possibilities of broadening the collaboration between, the academic community in QT and industry;
- ❖ Raise awareness on potential RRI issues with regards to QT;
- ❖ Build cooperation with countries outside Europe;
- ❖ Strive to continuously monitor the development of public policies in QT.

The tasks under this WP are:

- ❖ Task 6.1 Exploring the possibilities of additional joint funding activities and futures developments in QT;
- ❖ Task 6.2 Building Industry leadership and developing industry connections to QT research;
- ❖ Task 6.3 Responsible Research and Innovation in QT;
- ❖ Task 6.4 Enhancing cooperation with other countries;
- ❖ Task 6.5 Mapping the development of public policies in QT in Europe and worldwide.



3. Task 6.3 overview

The overarching objectives of this task are to raise awareness on potential RRI issues with regards to QT scientific community and the public at large and to develop a framework on RRI implications for this field.

This task involves several activities:

- ❖ Inventory and analysis of transnational and national RRI policies relevant for QT;
- ❖ Organisation of an expert workshop aimed at leveling the understanding of RRI of all QuantERA consortium members (see report from this workshop in Annex A);
- ❖ Organisation of a workshop for all QuantERA funded projects participants aimed at introducing the RRI concepts and get a feedback for the best implementation of RRI in the funded projects (see report from this workshop in Annex B);
- ❖ Redaction of an RRI guideline for the QuantERA research community.



4. Guidelines for Responsible Research and Innovation (RRI) in QuantERA funded projects

The QuantERA consortium has developed a guideline for Responsible Research and Innovation (RRI) in proposals to QuantERA.

What is RRI?

Responsible research and innovation is an approach that anticipates and assesses potential implications and societal expectations with regard to research and innovation, with the aim to foster the design of inclusive and sustainable research and innovation.

Responsible Research and Innovation (RRI) implies that societal actors (researchers, citizens, policy makers, business, third sector organisations, etc.) work together during the whole research and innovation process in order to better align both the process and its outcomes with the values, needs and expectations of society.

In the EU Programme for Research and Innovation 2014-2020, Horizon2020, **RRI is a cross-cutting issue**, actions are also promoted via ‘Science with and for Society’. The [H2020 definition](#) of RRI is composed of 5 dimensions:

- ❖ [public engagement](#),
- ❖ [open access](#),
- ❖ [gender](#),
- ❖ [ethics](#),
- ❖ [science education](#)

[RRI-Tools](#) provides more information about RRI and examples of integration of its dimension in research.



QuantERA and RRI

Provided below is a non-exhaustive list of possible actions that can be put in place to make RRI an integral part of your research. You may choose those that are relevant to your project.

- ❖ Involve all partners and participants in ongoing considerations of RRI throughout the project life;
- ❖ Draft and regularly update your data management plan to ensure the sustainability of your research (consider the use of open access data storage platforms);
- ❖ Disseminate results/outcomes of your research on open access platforms (ex. [arXiv](#), [Github](#), etc.);
- ❖ Disseminate your research results/outcomes towards the general public (scientific outreach);
- ❖ Reflect on your research with regards to ethical issues (in particular with regards to privacy and data protection issues, IP protection, etc.);
- ❖ Encourage the implication of early career researchers in your research projects;
- ❖ Provide equal opportunities for researchers of all genders;
- ❖ Involve relevant stakeholders to your project at the earliest possible stage and consider the involvement of RRI experts in your project implementation.

Please be aware that what is presented in this guideline is neither the only RRI approach, nor an exhaustive list of measures that can be put in place for making RRI an integral part of research projects. This guideline is meant to be an evolving document to which all QuantERA stakeholders may contribute. Please contact Florence.quist@frs-fnrs.be if you wish to provide complementary information.



Annex A: Report on workshop on RRI (for QuantERA consortium members)

Introduction

This is a brief report to outline the processes involved in determining the role of responsible research and innovation in the second QuantERA call. Initially, the process described in this report is the creation of a survey which helped determine the baseline understanding of responsible research and innovation (RRI) of each partner organisation in the QuantERA consortia. The creation of a survey and the resulting answers helped shape a workshop to begin to answer a series of questions. The workshop took place in the Atlantique Tower, Paris, France on 26 October 2017. The overall objectives of the Workshop was to:

1. Introduce RRI to each partner organization.
2. Examine how RRI is approached in each country with the aim of drawing together a list of common language and a framework for use by the partner agencies for the partner agencies in the QuantERA consortia.
3. Use the workshop findings to establish an RRI framework which can be implemented in the next QuantERA call.

Background

One of the aims of work package 6 is to begin to understand how RRI can be included in the next QuantERA call establish a base and importantly define a baseline understanding and a common language.

The survey helped to establish that each partner organization had a different understanding or experience of RRI. This of course meant that each organization demands different levels of RRI activity from their researchers. In a consortia where different organisations are funding projects it is important to align understanding and activities. This is also important as the European Commission and each partner organization could have a different interpretation of RRI.

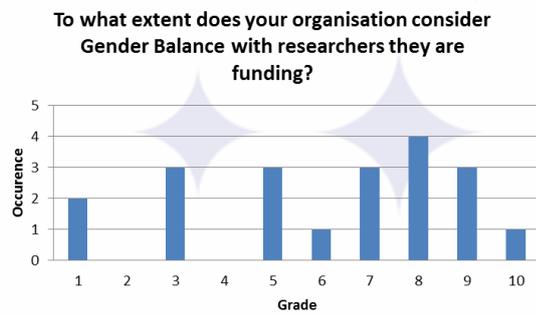
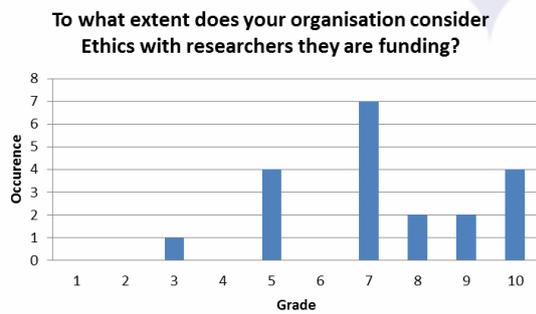
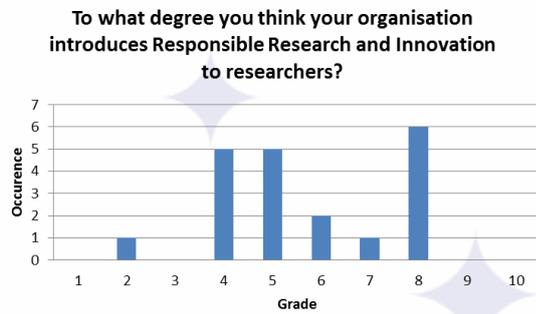
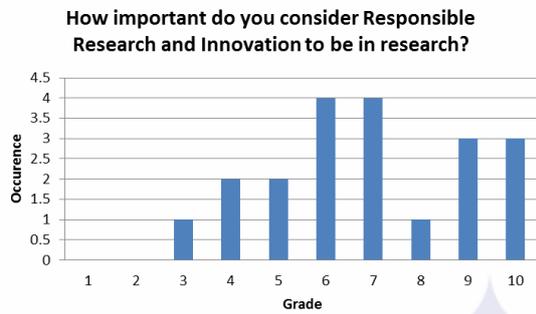
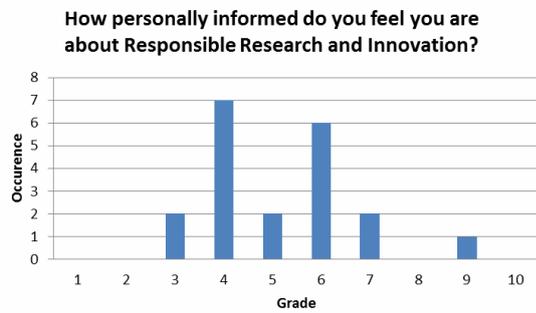
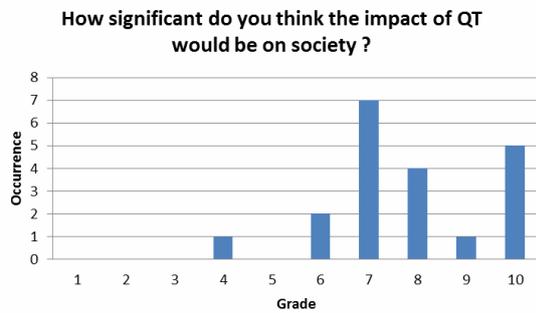
To give clarity to the RRI terminology the workshop asked a number of experts to come and help facilitate the workshop.



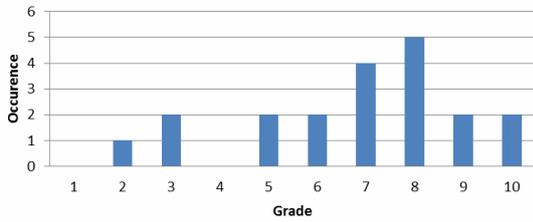
Survey creation and results

A survey was sent to members of the consortia prior to the workshop in order to determine views and gather information on responsible research and information. This information is showed below.

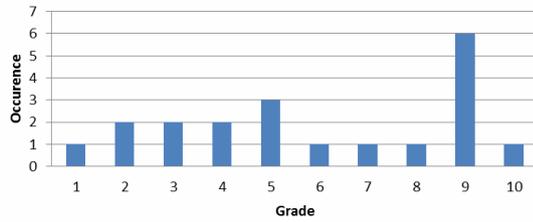
The results from the survey regarding views in RRI are shown below there were 20 respondents to the survey.



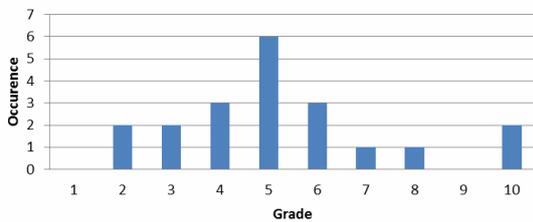
To what extent does your organisation consider Open Science/Access with researchers they are funding?



To what extent does your organisation consider Science Education with researchers they are funding?

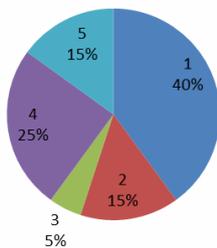


To what extent does your organisation consider Public Engagement with researchers they are funding?

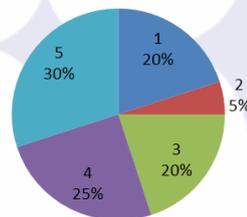


The importance of the 5 dimensions of RRI to the QuantERA consortia was considered by the members and the results are shown below. The pie charts indicate the importance of each criteria Ethics, Public Education, Gender, Open Science and Science Education. Each pie chart indicates the dimensions importance with a score of 1 being the highest importance and 5 being the lowest importance.

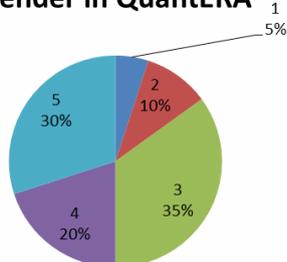
Ethics in QuantERA



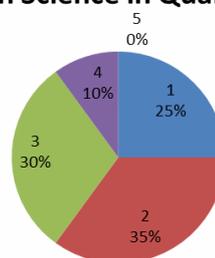
Public Education in QuantERA



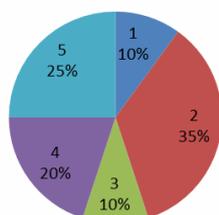
Gender in QuantERA



Open Science in QuantERA



Science Education in QuantERA



The survey results were presented in the workshop which will be discussed below.



Responsible Research and Innovation Workshop

Wendy Carr and Florence Quist were responsible for introducing the workshop and facilitating the process on behalf of the QuantERA Consortium. The workshop was attended by members of the consortia. In addition RRI experts were asked to attend the workshop in order to explain the concepts of RRI and facilitate the discussions between consortium members. These experts were:

- ❖ Dr. Philippe Galiay (EC)
- ❖ Pr. Bernd Stahl (De Montfort University, UK)
- ❖ Dr. Philip Inglesant (University of Oxford, UK)

The meeting agenda is given below.

Time	Programme
13.30	Why have Responsible Research and Innovation in QuantERA?
13.45	Part 1: Towards a Common Understanding of Responsible Research and Innovation The Five Dimensions of Responsible Research and Innovation
14.00	Responsible Research and Innovation and Quantum Technology
<i>14.30</i>	<i>Break</i>
14.40	Part 2: Break-out discussion sessions
15.20	Conclusions from group discussions
<i>15.50</i>	<i>Break</i>
16.10	Part 3: Framework for QuantERA Brainstorming session
<i>17.00</i>	<i>Break</i>
17.10	General Conclusions and Next Steps
17.30	End of Meeting



In the first session (part 1) the workshop agenda was discussed along with the aims of the workshop. The survey results were presented and discussed, each expert gave a presentation to help facilitate the workshop and help workshop participants understand RRI concepts.

In the second session (part 2), groups discussed each of the 5 dimensions of Responsible Research and Innovation according to the European Commission definition (Ethics, Public Education, Gender, Open Science and Science Education). The main points of discussion are summarised below.

<p><u>Public Engagement – Summarising points</u></p> <ul style="list-style-type: none"> ❖ Two way dialogue ❖ Public money ❖ Avoid a backlash, e.g. GMO ❖ Who are the public? Industry? NGO? Variety of what the public knows, e.g. bitcoin ❖ A bit more than outreach ❖ What do they need to know – how much? ❖ Scientists as heroes ❖ Professors of science engagement ❖ Weird Q Theory – teach algebra and not tell kids its algebra and we do the same? ❖ Citizen Science. Crowd Funding 	<p><u>Science Education – Summarising points</u></p> <ul style="list-style-type: none"> ❖ Science literacy – aware and above all be able to participate in discussion ❖ No calls dedicated to RRI – QuantERA ❖ More people involved in Science education in Quantum Tech ❖ Some parts of the call could be dedicated to RRI and science literacy? We could incorporate a range of science literacy ❖ Limited and needs by agencies later in the future ❖ Exchange good practice in agencies ❖ Criteria we should include in the call? What should these be? ❖ STEM ambassadors in other countries? ❖ These coordinators should be funded in the FLAGSHIP?
<p><u>Open Science– Summarising points</u></p> <ul style="list-style-type: none"> ❖ Definition of open science determined <ul style="list-style-type: none"> ○ Open access ○ Open data ❖ Open access now possibility – peer review journals ❖ QuantERA projects – enforce parallel submission in open format? ❖ Peer review (impact factor) ❖ Data – what is the point? Without context (too big a task for QuantERA) 	<p><u>Ethics – Summarising points</u></p> <ul style="list-style-type: none"> ❖ Well established ethics – European Charter ❖ Looked at in different ways ❖ Conditional funding, ministry approval, funding panel looks at it ❖ Committees to address it plus ethical issues privacy, fraud ❖ Criminal action Improve transparency



<ul style="list-style-type: none"> ❖ “Data management plan” – how do we evaluate this? ❖ Big task – that will not bring value ❖ Phillippe comment – impact factors price issues ❖ <u>This will be included in FP9!</u> 	<ul style="list-style-type: none"> ❖ Have ethics as part of proposal – code of conduct – depends on project as to how it is considered
<p><u>Gender-Summarising points</u></p> <ul style="list-style-type: none"> ❖ A big issue! What can we do about it? ❖ Must be dealt with much earlier – cultural change, communication ❖ Lists of people in projects – 60% student undergraduates -> less -> less research professionals ❖ Monitor numbers of researchers and their roles? ❖ (Bear in mind Commission level rules) – Monitor how it is evolving – favour consortia that favour women over men ❖ Excellence – priorities for everything – is this a problem – cannot solve all issues ❖ Boot camps for girls? 	

The final session (part 3) discussed the Framework for QuantERA in a Brainstorming session

Outcomes

The breakout sessions were incredibly useful. As a consortium, a lot of topics were discussed surrounding RRI.

Overall the workshop indicated the following points:

- ❖ The whole QuantERA consortium considers RRI important with the following aims – to ensure that all of the funding agencies, researchers/scientists understand each other and understand their responsibilities to each other and society in terms of the five dimensions.
- ❖ The five dimensions of the European Commission are considered important to include in the RRI Framework for the QuantERA consortia for the second call.
- ❖ The design and implementation of a Framework will take time and time should be taken to decide exactly what should be included in the framework and how this is done.



- ❖ The QuantERA consortium should look at what is done in other consortia such as the graphene flagship to see how RRI is approached by them.
- ❖ The consortium should consider asking QuantERA funded researchers their opinion on plans for a Framework for the next call and how the recipients of funding for the initial call could begin to implement RRI.
- ❖ More work needs to be done to help establish a common language and understanding of RRI amongst the researchers and the funding agencies so present a coherent and communicate the same information to society in each country.
- ❖ There should be a relationship between the Flagship and QuantERA (both the consortium and project participants) should be considered. and what they may be considering to introduce in terms of RRI Frameworks and call requirements

Next steps

The Next Steps of the process related to RRI are to:

- ❖ Compare ideas of RRI rules and EU Policy and disseminate the results of this comparison
- ❖ Discuss RRI in the Israel consortia meeting
- ❖ Discuss the initial idea for the framework with researchers in Bucharest and gain researcher feedback.
- ❖ Feedback to the European Commission and stay in touch with them.
- ❖ All members of the consortia should enter RRI tools community
- ❖ It is critical to consider integrating RRI practices in relation to governance and how this is carried out needs to be discussed carefully.



Annex B: Report on second workshop on RRI (for funded QuantERA projects)

QuantERA consortium view on RRI :

Based on survey results from all funding agencies, 3 priorities seem most easily addressable by QuantERA:

- ✦ Ethics
- ✦ Open Science
- ✦ Gender equality

The other two dimensions (Science Education and Public Engagement) are also important but the applications of it go over the possibilities that the QuantERA network can offer.

Researchers views on RRI:

All the PIs present in the workshop were asked to discuss the 3 dimensions identified above and provide 3 main inputs (break out discussions in 6 groups of ca. 6 person + 1 chair/secretary from the QuantERA consortium):

- ❖ Provide a definition for the dimension (objective: making sure that a common language and a common understanding of what the dimension implies is adopted)
- ❖ Provide solutions to the implementation of the discussed dimension in research in general and in a QuantERA research project
- ❖ Give input on what the QuantERA network could do to help in proper implementation of the 3 discussed dimensions

In general, researchers were understandably very reticent with the idea that the network would impose obligations on the implementation of the dimensions. Nonetheless, some interesting input could be drawn from the different discussions.

- ✦ Ethics

Definition: ethical research, data and IP protection, cheating/fabricating data

Implementation: there were discussions on the use of research results (making sure that research is not being used for unethical reasons = very difficult to control). A lot of the work can be done though leading by example = science education. There were also discussions



about research protection: some research groups systematically patent their results to avoid stealing of IP.

Proposed QuantERA input: information and sensitization to ethics

✦ Open Science

Definition : Open science entails **making available results and methods of your research including publications and data** which belong to published work, and activities and methods to as broad as public as possible and actively informing and engaging research community and general public about your activities so that **research can be reproduced**.

Implementation: **Data storage (open access)**, dissemination using a specific **website**, making published work in traditional journals available on **open access platforms** (e.g. arXiv, Github). There was even the mention of “punishment” to non-complying researchers.

Proposed QuantERA input: hiring an **advising or consulting company to serve the needs for all funded projects** by publicization. Publish a **guideline about open science**. **Organize and train people** on open science from each funded project.

✦ Gender equality

Definition: providing equal treatment and opportunities to all genders. In the case of Quantum Research, there is a clear absence of female researchers.

Implementation: a lot of the discussions focused on science education → presenting quantum research to young researchers or even high school students by female researchers to give female role models.

Proposed QuantERA input: There were suggestions on imposing quotas, of trying to ward off gender bias (in proposal evaluation step for example) and making sure that the evaluation panel is as gender balanced as possible. A big discussion also focused on participation to conferences and other workshop events → offer child care services during meetings.



As mentioned above, there was a strong demand from the researchers that QuantERA imposes the least amount of obligations to current projects and future research projects. QuantERA could therefore primarily work as an information platform to all current and future research projects.

Proposed QuantERA actions and guidelines (to be discussed and approved by the consortium):

- ✦ **Providing information on RRI to funded research projects (direct communication or website)**
- ✦ **Since there is a lot of discussion about science education: encourage the implication of young researchers in the field (already quite a young field though).**
- ✦ **Providing information on open access platforms for data storage and publication**
- ✦ **Add information on the 5 dimensions to the call text → what about evaluation?**
- ✦ **Monitor current projects on RRI implementation → already ongoing**

