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RRI in Higher Education

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Abstract: Responsible Research and Innovation (RRI) is a way to promote ethical and socially desirable research. The concept of RRI has recently become more important. Public research funders have embedded RRI principles in their policies and now it is time for higher education institutions to embrace this principles as well. With this in mind, the following editorial summarizes the work that has been done so far to integrate RRI principles into higher education. Since teaching RRI is one of the key activities to implement its principles in higher education, our focus will be also be on how to successfully deliver the teaching of responsible research. Finally, an overview of the major problems that the implementation of RRI in higher education encounters and possible suggestions will be discussed. These are important questions to be asked from the perspective of the ORBIT project, which aims to foster a culture of RRI in the UK ICT research community. Ensuring that RRI is adequately covered is a necessary condition of success for this culture shift.

Keywords: RRI, higher education institutions, teaching.

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Introduction

In recent years the concept of Responsible Research and Innovation (RRI) has gained wider importance, especially as increased attention has been given to the importance of RRI in dealing with societal and global challenges (Mejlgaard et al., 2018). Due to its relevance, RRI has been embedded in EU and UK research policies even though there is still some discussion with regards to its definition and dimensions (Burget et al., 2016). The most referred to definition is the one of von Schonberg (2011), who defines RRI as *“a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view on the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society)”*. This view of RRI has been shaping the current research and innovation landscape. In particular, in the UK the biggest funder of ICT research, EPSRC (Engineering and Physical Sciences Research Council) openly committed itself to develop and promote RRI, stating that *“As a public funder of research, we have a responsibility to ensure that our activities and the research we fund, are aligned with the principles of Responsible Innovation, creating value for society in an ethical and responsible way”* (EPSRC, 2018). To implement RRI into research, EPSRC recommends the APREA-4P framework approach, which focuses on anticipating the effects of a research or an innovation, reflecting on these effects, engaging with the public and acting accordingly. This framework has been developed by Owen et al., (2013) and further implemented by Jirotko et al., (2017). The European Union incorporated as well RRI in its research policy, making it part of its European Framework Programmes (e.g. Horizon 2020). The EU vision of RRI focuses instead on six aspects: public engagement, gender equality, science education, ethics, open access and governance (European Union 2012).

Even though the RRI frameworks adopted by research funders in the UK and the EU seem different, they both focus on finding a way to structurally change the way research institutions carry research. Thus, teaching activities at higher education institutions become a key way to deliver the knowledge of RRI and to foster a community of researchers ready to embed RRI in their practice. As higher education institutions are forming future and current scientists, it becomes crucial that they undertake dedicated teaching activities to influence students and researchers to act responsibly in their research activities (Mejlgaard et al., 2018).

With this in mind, this editorial presents a short summary of the work that has been done to implement the teaching of RRI in higher education institutions.

Integrating RRI in higher education institutions

As previously highlighted, higher education institutions have a key role in promoting RRI. Because of this research funders such as UKRI and the EU decided to fund research projects that focus on integrating RRI in educational institutions. One of these projects is RRI Tools, an EU-funded project whose aim was to develop a set of tools to implement, train and spread the concept of RRI (www.rri-tools.eu). As part of their discourse on how to incorporate RRI into research practice, the RRI Tools team highlights the importance of the role of higher education institutions. The project provides, on its website, a set of suggestions and resources to help embedding RRI in higher education institutions.

According to RRI Tools, in order to integrate RRI into universities, institutions need to act at four levels (RRI Toolbox, 2016). The first and perhaps more obvious level is the institutional level itself. To integrate RRI, higher education institutions should refer to a normative RRI framework (such as those, previously cited, adopted by EPSRC and the EU). This also focuses on activities to engage with the public and promote an open public dialogue. An ethical code of conduct should be set in place for research and development activities and policies to promote openness and transparency across the scientific progress are essential. A formal training in RRI should also be delivered to the students. Another level at which RRI should be implemented is the university community. The staff at the university at all levels (PIs, researchers, lecturers, lab technicians, communication officers) should be familiar with the concept of RRI. This can be achieved through formal training but also by fostering a dialogue and participatory methods across the institution. Research teams are added to the acting levels as they should be always up to date with new RRI requirements and implement them in calls for funding. It is thus important to highlight the benefits of incorporating RRI to obtain funding. Finally, the teaching body (such as professors or lecturers) should incorporate RRI principles in their syllabi and introduce RRI policy agendas in their curricula.

Tassone et al., (2017) also recommended that higher education institutions focus on being relevant, responsive and reflexive when fostering ethics and RRI and this can be done through openly supporting an RRI policy, embed RRI activities in the curricula and foster more responsible forms of teaching how to do responsible research.

It is clear from these perspectives that the teaching of RRI plays a key role in the implementation of RRI principles in higher education institutions, as this should be implemented at every level within the institution. Thus, one focus should be on how to efficiently deliver RRI teaching and how to develop a standard for it.

Teaching RRI

Teaching activities that openly address RRI principles are being developed across schools and universities. These focus on teaching at several levels. For instance, the EU funded project ‘irresistible’ focused on the designing of educational activities to raise awareness

and engagement with RRI at high school level (irresistible, 2014). The majority of the projects focus however on the development of a standard for higher education institutions, are those that are directly forming new scientists and developers.

The first question to be addressed is what it means to teach RRI at the level of higher education. Teaching RRI can, in fact, mean many things, as highlighted from Mejilgaard et al (2016a). It can mean, at the most basic level, to acknowledge the fact that Responsible Research and Innovation has been developed and the knowledge of its basic principles. On a deeper level though, teaching RRI can also mean to introduce students with the critical studies and theories that form the basis of Responsible Innovation. This type of teaching involves a deeper understanding of the concept of RRI and its role in addressing societal issues. Finally, teaching RRI can also aspire to influence the way in which the scientific community and the society interact and how to adopt more responsible research practices.

Once the idea of what teaching RRI involves has been defined, it needs to be clarified how to efficiently deliver this teaching to students in higher education. To answer this question an exhaustive literature review based on current and historical approaches to teaching RRI at higher education has been carried out by the HEIRRI project. This EU-funded project put together training materials and teaching activities about RRI. Based on their work, some core elements of RRI can be identified as key for a successful teaching of the concepts of responsible research (Mejlgaard et al., 2016b). The development of student's critical skills should be a core element of RRI teaching, as this forms the base of one's ability to question whether the research carried out is an example of good and responsible research or not. Another key aspect is the emphasis that has to be put on the interdisciplinarity of one's own academic research. RRI should in fact help students understand how the research that they are carrying out can be related to other scientific domains. This understanding will then bring to the important knowledge that problems in research and innovation are not specific to a particular research area but are interconnected. Thus, the concept of 'interdisciplinary' research should also help to foster collaborations between different fields of research, allowing a transfer of knowledge and combining insights of what constitutes a good research practice. Finally, a good way to effectively teaching RRI should also aim to facilitate an open and collaborative dialogue between the professors/teachers and the students in order to gain diverse prospective on issues.

To go a step further, the project EnRRICH, funded by the European Union, developed a tool to support the embedding of RRI in higher education curricula (Tassone & Eppink, 2016). This tool guides the teachers to choose the assessments, teaching and learning methods to give a RRI prospective to teaching modules. This has been a first step to try to put RRI teaching into practice. However, more work needs to be done to overcome some of the barriers of teaching RRI, as both the HEIRRI and the EnRRICH projects found.

Challenges

From the work done to embed RRI teaching in higher education institutions it emerged that both scholars and teachers appreciated the benefits that arise from focusing on this area. However this work was not exempt from encountering challenges and barriers (Mejlgaard et al., 2018). One of the first barriers encountered was the reluctance to implement RRI activities in courses as they were seen as demanding in terms of resources and not as relevant as other subjects taught in the courses. This can be a link to another problem encountered, which is that RRI teaching does not always fit well with other programmes. This makes RRI teaching very vulnerable to the loss of funding as its costs can be seen as hard to justify. This has been reported to be a common problem in some engineering and scientific higher institution. This is exacerbated by the fact that scepticism towards ethical activities is historically embedded in some fields (Sunderland et al., 2014).

On top of this, universities often try to focus on the commercialisation of the products of their research and on knowledge transfer with industry rather than on the role that society has in shaping research (Mejlgaard et al., 2018). This is reflected in the fact that public engagement has often been neglected in science (Stilgoe et al., 2014). Finally, RRI has often been seen as a ‘box ticking’ exercise in the research practice, making it loose part of its salience in research (Mejlgaard et al., 2018).

All together these challenges should not discourage from trying to embed RRI into teaching. On the contrary, they should serve as a starting point to work on fighting the scepticism and sometimes misinformation that is built around RRI.

Conclusions

Societal, environmental and global challenges are urging us to re-evaluate the way we do research and to push towards more ethical and socially desirable innovations. Responsible Research and Innovation (RRI) is a way to address these problems and research funders such as EPSRC in the UK and the European Union are incorporating its principles in their policies. To embed RRI in higher education institutions is a priority as those institutions are training the future researchers and developers. Several efforts have been undertaken to find the most efficient way to integrate RRI at the higher education level. The research carried in this field highlights mainly the actions that institutions should do to embed RRI at different levels. One of the most important activities consist in integrating RRI into the teaching curricula. In this extent, several research projects reviewed and tried to define the most efficient way to deliver RRI training to students with teaching. The highlight has been placed on the active roles of students in engaging with the RRI exercise. Students have, in fact, an active role in the learning and are prompted to reflect and critically think about their research and to foster a dialogue with senior researchers,

lecturers and create interdisciplinary connections. Despite these efforts to integrate Responsible Research and Innovations activities into higher education institutions, some challenges arise. These are mostly related to the fact that RRI is often perceived as a less relevant activity and fewer funds are allocated to its teaching. This problem highlights the necessity of changing the way RRI is perceived by scientists and stressing the role that the society should have in shaping innovation.

To help foster a positive research environment, higher education institutions should be the first ones to openly commit to RRI and to embed its teaching into their curricula. Even though there is work to be done before this can become a reality, it is positive to see how public research funders are openly promoting and committed to RRI. The fact that in recent years more projects that promote RRI have been funded is a clear sign that the awareness of the importance of RRI is perceived by public funders. Hopefully higher education institutions will be following their example and become protagonist in fostering a culture of Responsible Research and Innovation.

This Issue

In addition to highlighting an important aspect of RRI, in this case RRI in higher education, we use the ORBIT journal editorials to introduce the papers published in the particular issue. Following a number of large issues, this particular one is brief, containing only a single paper. However, from the perspective of an online journal this is not a significant problem.

In this case quality has taken precedence over quantity. We are delighted to include Guido Gorgoni's (2018) paper on voluntary measures, participation and fundamental rights in the governance of research and innovation. His paper raises a fundamental question at the heart of RRI, namely the degree to which it can be left up to the negotiation between actors. The question he pursues in the paper is whether the openness and responsiveness that are crucial to RRI can be relied upon to lead to acceptable outcomes. As RRI is characterised by its prospective ambition, i.e. the fact that it sets out to proactively identify problems rather than reactively remedy them, it is not rule-based but needs to rely on the stakeholders involved to identify and address issues. This implies the willingness of the stakeholders to assume commitments and realise these, a process that Gorgoni calls *responsibilisation*. The interesting point of *responsibilisation* is that it is not legally mandated but constitutes a voluntary agreement between the stakeholders. The problem of this construct is that it provides no substantive guidance on what should be agreed and can end up as an arbitrary agreement between the particular stakeholders at a particular time that is not necessarily aligned with the spirit and principles of RRI.

Fundamentally this points to the question whether and to what degree RRI can or should be regulated or legislated. Gorgoni's suggestion is to include references to human rights

into the voluntary agreements that constitute RRI. His point is that these references provide RRI as a science and technology governance structure the necessary normative content to ensure its acceptability. This rules out those voluntary agreements that are not acceptable.

This is an interesting idea that addresses some of the open questions of RRI. From the perspective of RRI in ICT, one can easily see that it would call for the integration of privacy rights into RRI. At the same time this idea raises a number of additional questions. Which human rights need to be included? Or should any RRI activity always refer to all human rights? How are they to be adjudicated and how can such a constitutional governance framework avoid becoming too rigid and legalistic, something RRI is arguably meant to avoid? These are important questions that RRI will continue to wrestle with and Gorgoni's paper ensures that these questions continue to be debated.

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