

# NUCLEUS IMPLEMENTATION ROADMAP

*Deliverable 3.6*



**NUCLEUS**

## DELIVERABLE DESCRIPTION

Putting Responsible Research and Innovation into practice will lead to more insights in the further implementation of RRI in general. This 'Implementation Roadmap' summarises findings on RRI from the first phase of the NUCLEUS project as well as from other sources. Thereupon, it describes and proposes steps to be taken for both 10 so-called Embedded Nuclei as well as 20 Mobile Nuclei in the second phase of the project.

## DELIVERABLE

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## PROJECT

NUCLEUS is a four-year, Horizon 2020 project bringing Responsible Research and Innovation (RRI) to life in universities and research institutions. The project is coordinated by Rhine-Waal University of Applied Sciences. For more information, please visit the NUCLEUS website, follow our social media, or contact the project management team at [info@nucleus-project.eu](mailto:info@nucleus-project.eu).

## NUCLEUS ONLINE



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## EXECUTIVE SUMMARY

The NUCLEUS project focuses on **identifying key factors for successfully embedding RRI in academic practices**. This Implementation Roadmap introduces steps and actions to install **10 embedded Nuclei** and **20 mobile NUCLEI** as **innovative and reflective RRI test-beds**.

The **first phase** of NUCLEUS was completed in October 2017 and provides the following **considerations**, which are vital for a successful implementation in phase two:

### WORK TOWARDS A SHARED UNDERSTANDING OF RRI

- RRI is a multi-faceted concept that can be practiced in many ways. Before the implementation of the RRI approach in academic institutions, all partners involved should share a common goal, understanding the implications and impact of pursuing RRI.

### RRI REQUIRES DEVELOPMENTS AT THE POLICY AND GOVERNMENTAL LEVEL

- Dedicated staff embedded in the structure and governance of the universities should be installed to foster sustainable and productive relationships at policy levels. At the same time, academics' plea for freedom to also pursue other promising research lines should be accepted. For innovative research openness towards different approaches is key.

### INSTITUTIONAL OPENNESS CAN SUPPORT RRI

- Taking local contexts into account and sharing experiences from other projects in the NUCLEUS communities will foster practices of RRI. Therefore, building relationships within the universities and with other "cells" (economy, public policy, civil society, public engagement platforms and media) is crucial, while monitoring and analysing progress when practicing RRI will bring more understanding of influencing factors.

### SUPPORT INDIVIDUAL RESEARCHERS IN VARIOUS WAYS

- At a local level, funding and rewarding RRI efforts will support its implementation, just as acknowledging researchers' societal tasks. Training and coaching will improve researchers' engagement literacy, while RRI champions and role models can contribute to awareness and enthusiasm. Embedding trainings in educational structures in PhD schools, summer schools or tailored coaching for researchers will make RRI more sustainable.

Based upon the research and community building in the first phase, together with a review of literature on RRI and other RRI projects, the following recommendations for the second phase are proposed:

- **Work towards a shared understanding of RRI**
- **Analyse before you act**
- **Involve the governance level of your institution**
- **Support and assist scientists**
- **Create trust before you raise expectations**
- **Address obstacles before starting the process**
- **Include backgrounds, goals and interests of the stakeholders**
- **Motivate before you demand action**
- **Do not impose RRI on every research approach in your institution**
- **Be aware of socio-cultural differences**

These recommendations translate into a **General Action Plan** to be followed by all Embedded and Mobile Nuclei for a common NUCLEUS approach. This General Action Plan comprises five steps

#### **STEPS FOR THE EMBEDDED AND MOBILE NUCLEI**

Step 1: Identify the context - mapping the RRI landscape

Step 2: Tailor goals and plan to local context

Step 3: Build on strengths and improve on challenges

- Embedded Nuclei - select cases
- Mobile Nuclei - select an activity

Step 4: Continuous actions

- Reflect and respond
- Build relationships
- Monitor and evaluate

Step 5: Analyse progress

A key finding from Phase 1 was the need to adapt RRI to local circumstances. Therefore this Roadmap also sets out a **Framework for Action** for Embedded Nuclei which gives details of possible actions in working towards the successful implementation of RRI. Details of possible actions for the Mobile Nuclei can be found in the Mobile Nuclei Working Group Report developed in Leuven in May 2017.

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## 1 INTRODUCTION TO THE IMPLEMENTATION ROADMAP

Over four years in Europe, Georgia, China and South Africa, the NUCLEUS project will design and implement new ways to embed Responsible Research and Innovation (RRI) into the governance and culture of universities and scientific institutions. The project aims to align research with society's needs by identifying what institutional barriers prevent these organisations from engaging with their stakeholders, and then, find ways to overcome these obstacles. NUCLEUS will implement new policies and programming in 30 international test sites – 10 Embedded Nuclei and 20 Mobile Nuclei - to understand and extract the DNA of RRI

The first phase of the project noted existing cases of successful RRI practices and identified obstacles and barriers to the future implementation of RRI in universities and scientific institutions. For this initial phase the consortium conducted:

- six Field Trips (deliverables D4.2-D4.7, D4.10),
- an Interdisciplinary Study comprising a European Survey and a Cultural Adaptation Study with cases from China and South Africa (deliverables D3.3-D3.5),
- Working Group meetings in Bochum, Belgrade, Leuven and Tbilisi (deliverables D4.7, D4.8),
- three Annual conferences in Cleves, Lyon and Hannover (deliverables D6.1-D6.3).

In the second phase of the project RRI-related aspects will be implemented in mutual learning processes and monitored at ten academic institutions in “RRI-testbeds” or Embedded Nuclei as well as via activities in 20 Mobile Nuclei.

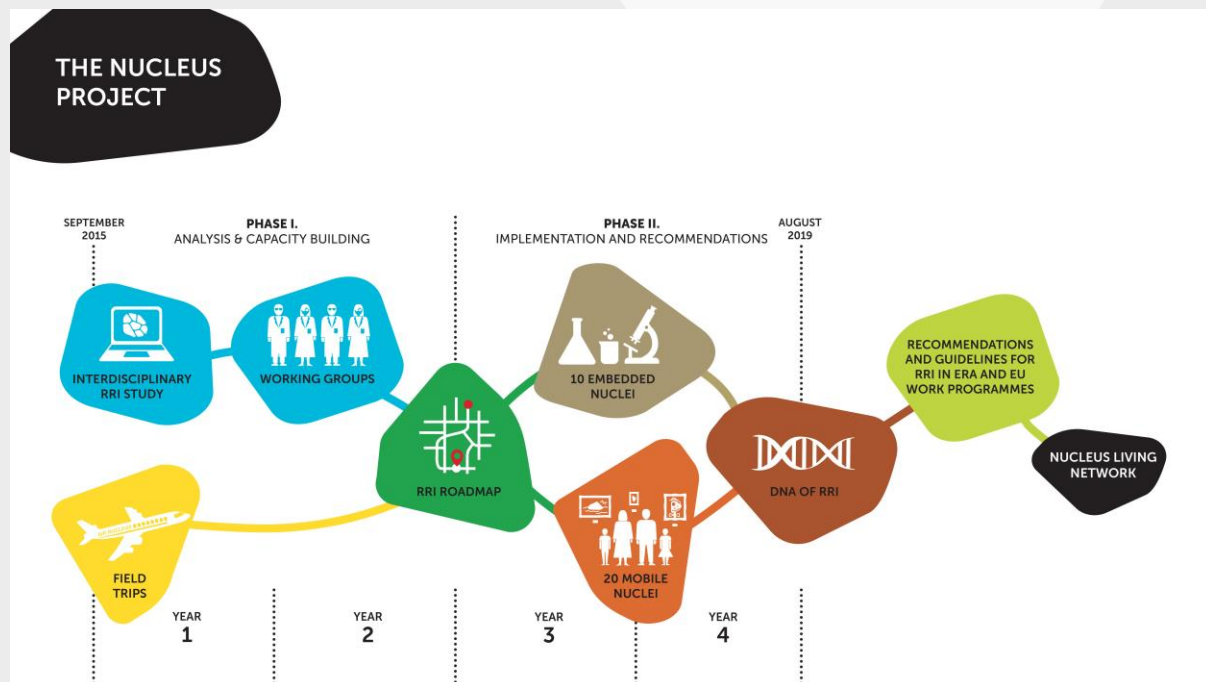
Each Embedded Nucleus will work towards the following goals:

- Build institutionalised bridges between the research community, stakeholders and the general public;
- Catalyse ongoing debates about the role of science in open societies;
- Develop, nurture and support new forms of transdisciplinary research including RRI principles in the scientific community;
- Stimulate co-responsibility of all actors involved in the process of research and innovation; and,
- Question and redefine prevailing notions of ‘recipients’ and ‘agents’.

At the same time the 20 Mobile Nuclei will establish units to test the innovative RRI approaches in different settings and environments.

From the experience of these 30 Nuclei, essential qualities needed for RRI (the “DNA of RRI”) will be identified and final recommendations will be offered in a set of “RRI Guidelines” for the improvement of RRI-practices more broadly.

This Implementation Roadmap draws on findings from the NUCLEUS project thus far, but also includes findings from other EU-funded RRI-projects, from publications about the implementation of RRI, and from multiple consultations with partners and other relevant parties.



In contrast to most other EU H2020 projects on RRI, NUCLEUS will try to implement RRI into the governance and culture of universities. It will do this not only through individual researchers but also via policy measures and recommendations at institutional, regional, governmental and EU-wide levels. The rich variety of experiences from all the Nuclei (with all their institutional and cultural differences) will provide input for the RRI Guidelines summarized at the end of the project. Moreover, the groundwork established by the NUCLEUS project and the insights it gains should lead to sustainable activity beyond the life of the project with the development of a NUCLEUS Living Network.

Thus, NUCLEUS aims to empower universities in better responding to societal challenges, to better take up their responsibility for the future. This Roadmap proposes steps for implementing this process in practice.

## 1.1 BUILDING A NUCLEUS COMMUNITY

RRI cannot be integrated into the governance and culture of academic institutions without support from institutions and researchers. Therefore, building relationships at various levels within institutions and with researchers will be an important factor for both the Embedded Nuclei and the Mobile Nuclei.

The idea of “Communities of Practice” offers a framework for doing so in a professional way. Whereas other EU projects on RRI have tended to emphasize the building of communities of practice at the European level, in the NUCLEUS project such communities of practice will be able to stimulate and catalyse activity at an institutional or local level (e.g. through meetings with representatives from the various stakeholder groups). Building such a NUCLEUS community with a team of people willing to contribute to RRI practices in co-creation processes will be a major aim of the Embedded Nuclei.

“Communities of practice are formed by people who engage in a process of collective learning in a shared domain of human endeavour. Communities of practice refer to ‘groups of people informally bound together by shared expertise and passion for a joint enterprise’. This definition challenges the boundaries between experts and non-experts, encourages work across organizational and disciplinary boundaries and runs counter to the structures and hierarchies often created and generated by HEIs.”

(Unesco report, 2015, p.8)

In a community of practice, the members learn from each other through action and knowledge exchange (Unesco report, 2015). The framework can be applied in many situations such as where, in the case of NUCLEUS, academics work together towards a common aim (Tight, 2015). Communities of practice are based on the ‘shared practice’, where members constantly interact with each other and with the world, and thus engage in mutual learning processes (Smith, 2003/2009; Wenger, 2000). In these processes the learning outcomes are the shared practices – e.g. tools, trainings, vocabulary – which the community of practice builds up. Ng and Pemberton (2013) found that individuals in higher education value membership of communities of practice for their common interests, knowledge diffusion, social interaction and the call for engagement.

The shared enterprise for the NUCLEUS communities will be identifying what are the key factors for the successful embedding of RRI in academic practices. One of the outcomes of the RRI Tools project was to build a community of practice for collaboration among all actors and public involvement (Key lessons from RRI Tools, 2017). The RRI Tools project built a community with over 900 members sharing knowledge and experiences.



NUCLEUS will build Communities of Practice at each institution. The members of these communities will be able to stimulate and catalyse activities at the institutional level; share those experiences; and help to develop recommendations for future implementation of RRI.

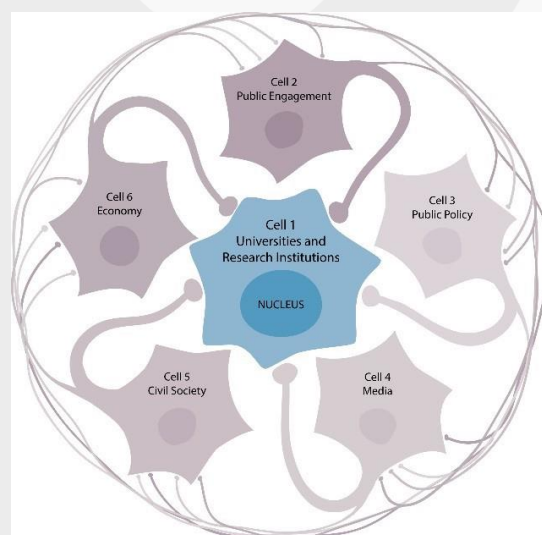
## 1.2 THE NUCLEUS APPROACH

At the heart of the NUCLEUS project is the idea that RRI functions in the same way as cells in an organism. The university “cell” is embedded within a responsive cluster of others cells: Public Policy, Civil Society, Media, Public Engagement and Economy. In this way the project aims to make the complex RRI approach accessible to stakeholders inside and outside academia, to policy makers and to society at large.

The biological analogy of the cell helps to highlight the interrelatedness of groups of stakeholders and that, working together, they can realise more than the sum of the parts. The six cells are distinguished as follows:

1. **Universities and scientific institutions.**

This cell includes higher education institutes as well as research institutions. While recognising that RRI can be of interest to government-run, non-profit, or commercial research institutions, NUCLEUS mainly focuses on universities. This is the central cell.



2. **Public policy.** This cell refers to different policy levels: European, national, regional, and local (e.g. regional governments and local municipalities) as well as at the institutional level. Not all these levels, however, are necessarily relevant in relation to all other cells.
3. **Civil society.** The civil society cell refers to non-governmental organisations and initiatives active in the field of research and innovation, such as science and technology advocacy groups or citizen sciences initiatives.
4. **Media.** This cell refers to media and journalists covering science, technology, research and innovation. This cell also includes organisations of science journalists.
5. **Public engagement platforms.** This cell refers to institutions and initiatives that organise public engagement, such as science centres, science festivals or science cafés.
6. **Economy.** This cell primarily refers to science and technology companies but also includes other organisations and institutions such as technology transfer agencies

and chambers of commerce which are involved in economic growth driven by technological innovation.

Understanding how these cells function both on their own and together is an essential aspect of NUCLEUS. To finish the analogy, the cultural and organisational approaches to RRI will lead to an understanding of the 'RRI DNA' which will help to provide practical guidelines for higher education institutions and funding programmes. The understanding of and approaches to RRI will, so to speak, become part of the hereditary material of each cell. As in an organic body, universities and research institutions are influenced by developments in the other cells and are the locus from which catalysing actions can influence all other cells.

By supporting a productive “metabolism” between universities and the surrounding cells, NUCLEUS stimulates creative, desirable, energy-driven reactions that foster Responsible Research and Innovation processes which respond to a variety of diverse expectations, needs, values and socio-cultural environments.

### **1.3 OUTLINE OF THE ROADMAP**

The remainder of this Implementation Roadmap is as follows: **Chapter 2** presents the work of NUCLEUS in Phase 1 of the project. This includes the key findings from the European Interview Study, the South Africa and China Cultural Adaptation Study and from the six Field Trips. Following an analysis of these findings the chapter concludes with recommendations for the implementation phase of NUCLEUS. **Chapter 3** sets out a General Action Plan to be followed by all Nuclei for a common NUCLEUS approach. However, a key finding from Phase 1 was the need to adapt RRI to local circumstances. Therefore this chapter also sets out a Framework for Action for Embedded Nuclei which gives details of possible actions for each Nucleus in working towards the successful implementation of RRI while Mobile Nuclei can find details in the Mobile Nuclei Working Group Leuven Report. **Chapter 4** sets out a Conclusion and Outlook.

**It must be noted that the recommendations and action plans set out in this Roadmap are the ones needed at this half-way stage of the project. They mark the transition from Phase 1 to Phase 2. These recommendations are meant to help the implementation of 10 Embedded and 20 Mobile Nuclei over the next two years. Based on the experiences of these “RRI test-beds” they will be further developed and refined, leading to final recommendations at the end of the project in 2019.**

## 2 PHASE 1 NUCLEUS STUDIES

The first phase of the project focused on **research and community-building activities**. The **research activities** consisted of an Interdisciplinary Study comprising a European Interview Study and a Cultural Adaptation Study with cases China and South Africa. The capacity building phase also comprised six Field Trips to different “cells”.

The European Study explored RRI obstacles and barriers, and developed recommendations on ways to overcome them, by interviewing leading researchers and research executives. More details can be found in the deliverables D3.1, D3.2, D3.4, and D3.5. The Cultural Adaptation Study focused on the conceptualisation of RRI and studied barriers and successes on the governmental, institutional, and individual level in China and South Africa (D3.3).

The six Field Trips looked at best practices as well as barriers for implementing RRI in each of the cells, both within as well as outside of Europe.

1. Universities and Research institutions: The field trip to Edinburgh explored how we can ensure that the responsible practice of research and innovation is embedded in the cultures of universities and research institutions. The trip particularly focused on the rules, regulations and organisation of universities and research institutions that supported this practice (D4.2).
2. Public policy: The field trip to Nottingham examined the barriers and best practice for embedding RRI into the relationships between local administrations, higher education institutions, and local and regional policymaking (D4.6).
3. Civil society: The field trip to Pretoria explored how the South African Agency for Science and Technological Advancement (SAASTA) tries to embed RRI in different socio-political contexts (D4.4). The particular circumstances of South Africa helped to highlight issues of location, segregation and indigenous knowledges.
4. Media: Unlike other field trips the Media field trip was not confined to one location. Instead, a virtual field trip conducted interviews across fourteen European countries. The interviews explored the role of the media within the RRI process, with a particular focus on science journalism and the question of whether the “two worlds” of RRI and the media can be aligned (D4.5).
5. Public engagement: The field trip to Beijing enabled consortium members to understand and reflect on the interactions between RRI and public engagement especially with reference to the socio-cultural differences between China and Europe (D4.3).
6. Economy: The field trip to Dublin examined the interactions between the University and local industry partners including social entrepreneurs, industry

representative bodies, and national policy makers. The trip identified several best practice approaches to embedding RRI (D4.7).

In addition to these research activities, Annual conferences, meant as **community building activities**, shared insights with participants from within and outside the consortium. The first conference, held in Cleves (Germany) in 2015, was themed [\*Facing the Challenge, Setting the Scene\*](#) (D6.1) The second conference, [\*Universities as 'Learning Systems'\*](#) was organised in Lyon (France) in October 2016 (D6.3). The community building will continue in the second phase of the NUCLEUS project. The 2017 conference took place in Hannover (Germany) on October 5 and 6 (D6.2 to be delivered). The theme of the conference was [\*Facing the Challenge: Obstacles and opportunities of RRI in scientific institutions\*](#). In 2018, the NUCLEUS conference will be organised on Malta. The final conference will present final findings and recommendations and is organised in Brussels in 2019.

Four Working Group meetings were also organised to facilitate ongoing interaction and mutual learning between the research activities and the community building activities. The Working Group meetings enabled the consortium partners to learn about and reflect on the ongoing research. Working Group meetings also provided opportunities to reflect on guiding approaches in the implementation phase.

The second phase of the project will build on this work of the first two years and enable the project to test and refine RRI practices in NUCLEUS 'test-beds' or "Nuclei". Ten Embedded Nuclei are located within the organisational structure of universities and research institutions across Europe, China and South Africa. They will be staffed by NUCLEUS consortium members for almost two years during which period, they will catalyse systemic and cultural implementation of RRI in their institutions and build NUCLEUS communities. In addition, twenty Mobile Nuclei will be organised around events or activities to test the innovative RRI approaches in different settings and environments.

## **2.1 EUROPEAN INTERVIEW STUDY**

Through the analysis of interviews with Leading Researchers and Research Executives insights were gained into their views on RRI and barriers to its implementation. The most important findings are the following:

Most of the scientists interviewed welcomed RRI in the double sense of interacting with society (both stakeholders and lay people) and of selecting research topics according to social importance. Many scientists explained they were eager to serve society and

appreciated social input for identifying pressing problems that they could set out to solve. Of course, it is not obvious whether this positive attitude actually translates into relevant action, but judging from the opinions given in the interviews, the atmosphere among scientists toward RRI is friendly and welcoming. There is a basis to be built upon. Suitable measures have been outlined in Deliverable D3.4 which develops recommendations to further elaborating and advancing the sense for RRI in the scientific community.

Input from industry, and stakeholders in general, was largely welcomed as a source of funding and ideas about useful pathways of research. However, Leading Researchers were worried about the influence of social forces on topic selection and the risk of bias. Concerns were articulated, in particular, regarding the impact of pharmaceutical companies on medical research. In contrast, Research Executives were merely afraid of a possibly negative reception of industry-funded research among the wider public. Such research might appear to be biased. However, the primary cause of concern was this appearance among the general audience and its impact on the reputation of science. A remedy suggested for keeping the one-sided stakeholder influence, imagined and real, at bay was involving a multiplicity of stakeholders.

A recurrent theme of the interaction between science and the public was the goal to augment the interest of the general audience in scientific results. Science was frequently believed to have a low reputation among the public, and RRI was seen as an opportunity to enhance the image of science among lay people. Thus, in this interaction it was the direction from science to the public that was underscored, but the reverse influence on science was welcomed too.

The study found three kinds of reservations about RRI. They represent obstacles to the implementation of relevant practices and need to be dealt with appropriately if RRI considerations are to be introduced broadly.

The first kind of reservation has to do with **fundamental research**. The usefulness of RRI is viewed by participants to be strongly dependent on the field at hand. In application-oriented sciences, input from outside of science is accepted, while the preference for fundamental research is for it to proceed freely and without intervention. Scientists believe that the distance between fundamental research and public needs and preferences is too great to allow for a meaningful input of lay people or stakeholders. In their view, fundamental research is, as a rule, not socially relevant and should not be judged by standards of social relevance.

The second sort of reluctance had to do with the felt **loss of autonomy**. Some scientists expressed their concern that non-scientists are not familiar enough with the issues in

question to make a useful input possible. They rather feared that an uninformed public could distort fruitful avenues of research. In line with earlier recommendations in D3.4, this concern should be taken care of by maintaining a wide variety of research endeavours and to see to it that fundamental research as well as competing lines of practice-oriented research be pursued. A sustained pluralism of pathways of research could be an effective antidote against the fear of being overpowered, as scientists, by an ignorant lay audience. This is tantamount to saying that researchers would welcome a research system that bestows a limited influence on the public, but preserves a leeway of discretion for the researchers as well.

The third worry had to do with the **expenditure required for RRI**. Scientists emphasised that RRI demands a lot of effort which needs to be supported or offset by suitable resources. The effort invested into RRI endeavours is feared to be taken away from addressing other challenges. In particular, researchers were afraid that institutionalising RRI would mean imposing an additional bureaucratic superstructure on them. A frequent demand concerned the effective and practicable design of the engagement process. As a result, RRI activities are demanded to remain a voluntary effort and to be recognised in terms of funding or career opportunities. These findings confirm the recommendations for implementing RRI given in Deliverable D3.4 and emphasize once more the need for practical guidelines.

## **2.2 RRI IN CHINA AND SOUTH AFRICA: CULTURAL ADAPTATION**

This study presents findings from two case studies on responsible research and innovation in China and South Africa respectively (D3.3). The study focused on the following questions: How are RRI and relevant other concepts implemented in international contexts? What are barriers and successes to the future implementation? What can be recommended for the future implementation of RRI in the Nuclei?

The findings are based on a multi-method approach using qualitative research methods, which included literature and interview studies. In China 30 interviews were conducted with researchers and leading management. In South Africa 13 interviews were held with researchers and science centre managers. Analysis was performed at the conceptual, governmental, institutional and individual level, based on the following themes: equality; science education and open access; stakeholder and public engagement; and ethics and broader impacts.

Findings show are that RRI can be identified in many concepts, policies and practices, despite not being a commonly used term in either China or South Africa. In China, there is a strong emphasis on science communication and popularisation and social

responsibility of researchers. In South Africa, equality, science education, outreach and stakeholder engagement in the form of including indigenous knowledge and people is important. Both countries are actively developing policies to further these; have installed agencies for science education, communication and popularisation; and are focusing on (even more) developing globally competitive universities.

### **2.3 FIELD TRIPS**

Between December 2015 and June 2017, six NUCLEUS Field Trips assessed the current barriers and opportunities relating to RRI in the context of the six NUCLEUS Cells in six different locations (D4.2-D4.7, D4.10). These trips involved over 100 face-to-face interviews and many fruitful open discussions.

The purpose of the Field Trips was to explore Responsible Research and Innovation (RRI) in practice, in geographically and culturally diverse environments and brought together many NUCLEUS partners with many representatives from universities and societal actors. Wide reaching discussions that covered recommendations and barriers were raised during each Field Trip by interviewees and the results summarised by the report writer and the Field Trip participants. Although all the Field Trips were themed under the NUCLEUS cells (for example 'Public Engagement'), discussions on each trip overlapped with other cells. In addition, several Field Trips discussed similar opportunities, such as employing an individual to broker relationships between research and societal actors. In order to bring all the information gathered together to form the implementation recommendations all the opportunities and barriers identified in the Field Trip reports was collated in D4.10.

### **2.4 CONSIDERATIONS**

Recommendations from each of these parts of phase 1 produced a number of considerations that needed to be taken into account for the action plan. Further details of these recommendations can be found in Appendix C.

#### **CONSIDERATIONS FROM THE SURVEY (SEE ALSO D3.4)**

##### **General:**

- Analyse the social impact of research and innovation.
- Academics are keen to conduct socially relevant research but with freedom to pursue other promising research lines.
- Organise room for public to identify research demands through inclusive Public Engagement with wide range of stakeholders.

- Incentivise engagement programme for academics through funding, career progression.
- Develop trainings for researchers in Public Engagement.
- Appoint RRI Champions.

### **CONSIDERATIONS FROM THE CULTURAL ADAPTATION STUDY (SEE ALSO D3.3)**

#### **For Governments:**

- Strive to open & innovative research with minimum regulation.
- Increase scientific literacy and trust in science via good research ethics & openness.
- Share knowledge and best practice.

#### **For research institutions:**

- Create socially responsible & community orientated research.
- Increase trust in science.
- Create platforms for sharing knowledge and best practice.
- Incentivise RRI, identify RRI Champions.
- Stimulate widening and equal access.

#### **For researchers:**

- Train researchers in PE, science education, science popularisation/communication.
- Educate and share knowledge with public to increase scientific literacy and trust.
- More extensive training in research ethics.

### **CONSIDERATIONS FROM THE FIELD TRIPS (SEE ALSO D4.10)**

#### **Relationship management:**

- Appoint dedicated staff to broker relationships between Universities and Stakeholders.

#### **Physical spaces:**

- There is a need for a space in which researchers and stakeholders can interact.

#### **Incentives:**

- RRI must be incentivised for researchers and societal actors (funding, rewards).

#### **Language of RRI:**

- RRI is an unfamiliar term. Current gaps between the understanding of what RRI is in theory and practice

#### **Training researchers:**



- To engage with different societal actors, using an RRI approach

#### **Local knowledge and partnerships:**

- The Roadmap must take into consideration the contextually situated data collected in different geographical locations.

#### **Self-Assessment:**

- Assessing current RRI practices is necessary to start.

## **2.5 ANALYSIS**

Several themes emerged from the studies, the field trips and meetings. These inform the recommendations upon which the action plan is built

### **UNDERSTANDING OF RRI IN THE STUDIES**

RRI can be seen as a **multi-faceted concept**, and some aspects of the concept fit more naturally with some researchers, institutions, or even countries than others. The Field Trips as well as the Cultural Adaptation report stress the importance of **tailoring** RRI and RRI goals, projects and activities to the local context.

RRI is a relatively **novel** concept. Results from the European Interview Study point to the need for careful consideration of researchers and their interests, their research fields, their knowledge of and views on RRI, and practical constraints (such as time available) if one wants to implement RRI in an (academic) institution. Not all research fields are equally suitable for citizen science, for instance. Individual researchers might be unfamiliar with, sceptical of, or even averse to RRI or aspects of it. An openness to such concerns, fears and criticism is advised when trying to establish a dialogue. Educating researchers on RRI and training them in possible ways of doing RRI might help in building knowledge about RRI. Moreover, according to interviewees in the European study (D3.4), not all research should be focused solely on societal challenges: many fundamental research lines lead to concrete technologies after years or decades of research. It is therefore important to have a plurality of research lines that includes fundamental as well as societal driven research.

RRI – or related aspects – is often known in practice under **other names or labels**. RRI is not only a new phrase for many stakeholders, but also many activities or views which might be seen as RRI are not labelled as such. RRI-related elements are named differently via different notions. RRI elements can be ‘social responsibility’ as in China, or, focus on ‘community or societal oriented research’, as in South Africa (D3.3). In the European Interviews, for example, researchers and leaders of universities more than once gave a

different name (such as societal valorisation), to activities that could be considered as RRI (D3.4).

Consequently, the language used by those trying to practice RRI should be inviting and clear, even though the current RRI discourse sometimes falls short on this desired clarity. Developing and using clear, shared language, as well as striving for win-win situations was mentioned several times as important for shaping stakeholder relationships in the second phase of NUCLEUS: for those new to RRI, it is a complex concept and being able to clearly communicate about it will help in building relationships between stakeholders.

Inclusive engagement in research and innovation, research ethics and open communication about research findings can contribute to **trust in science** (D3.3). Dialogues between innovators developing new technologies and researchers working on the societal implications of new technologies are advised as a way to include values, represent relevant views, and safeguard procedural fairness. This can help in considering beneficial or unfavourable social aspects or consequences ahead of time (D3.4).

#### **MORE THAN PUBLIC ENGAGEMENT**

While public engagement is an important element of RRI, the results from these initial studies point to additional ways of practicing RRI. Besides public engagement and the inclusion of new voices, RRI includes (but is not limited to) promoting open access, stimulating equal access to higher education and research positions, anticipating impacts and consequences of research and innovation, and not the least, by responsiveness to societal development.

#### **BUILDING RELATIONSHIPS WITHIN LOCAL CONTEXTS**

The Field Trip “Recommendations for the Implementation Roadmap” (D4.10) highlights several themes that frequently came up during the visits: the **importance of relationship management** with all stakeholders, **incentives** for doing RRI, **training**, using **local knowledge** and individual **skills**, **assessing the institution** to understand where it is in terms of RRI in order to be able to start working on (further) implementing RRI.

In all Field Trips, several barriers were identified such as culture clashes on RRI or the absence of expertise in bringing different stakeholders together. These can be overcome by appointing an individual or a group with the task of relationship management. Having or creating a physical space for such meetings was also suggested. Such spaces can be used for meetings but also for science festivals or expositions.

RRI activities are often not part of assessment of academic performance and incentives could contribute to the implementation in academic practices. RRI could be part of review

criteria or management could facilitate researchers by allowing them to spend time on RRI.

Different kinds of training and education are also thought to be helpful in overcoming barriers. Educating both researchers and other stakeholders in the ideas of RRI will help reduce the unfamiliarity with the concept. Training researchers to deal with media and the public and to manage stakeholders will prepare them for the new tasks related to RRI. Educating the media in RRI will help journalists understand changes in research and innovation induced by implementing RRI.

A further theme that was stressed in the Field Trips (D4.10) as well as in the Working Group Meetings is the need to tailor the implementation of RRI to the local context. No university or research institution is the same. Staff responsible for the implementation process will be located in different departments, have different means of influencing their institution, while the institutions differ with respect to the state-of-the-art of RRI at the start of the implementation process. They will be staffed by individuals with different skills and experiences. These factors need to be taken into account by assessing the institution before setting goals and drafting the final RRI plans.

Furthermore, the Field Trips showcased how RRI in universities can be implemented and developed in relationship with the other stakeholder groups, the other cells. An example is DCU Alpha, the commercial innovation campus at Dublin City University that supports research collaborations between industry and academics. Another example is the Beltane Network which stimulates and supports the development of public engagement for four Edinburgh universities. In addition, win-win situations were underlined when matching researchers and policy makers with relevant topics to work on.

Local contexts need to be understood through an **initial analysis** of the state of the art of RRI. A selection of tailor-made goals can then be established with the preparation of activities to achieve them. Careful monitoring is needed to capture changes throughout the whole process in each institution.

## **2.6 CONCLUSION AND RECOMMENDATIONS FOR IMPLEMENTATION**

Implementing Responsible Research and Innovation in the governance and culture of scientific institutions will allow universities to better respond to societal challenges. The first two years of the NUCLEUS project confirmed a shared understanding within the consortium that this responsiveness will increase the economic, social and cultural impact of research findings across Europe and on a global scale. However, since RRI is a complex endeavour, in which a variety of academic and non-academic stakeholders

should work together during the whole research and innovation process, the implementation of this concept demands some key elements to be considered.

The NUCLEUS Study and Field Trips showed that, when implementing RRI in scientific institutions, it is important to understand that this approach requires more than a set of dialogue-oriented public engagement-activities. The concept asks for a new, almost disruptive understanding of innovation, public engagement, creativity and learning. If conducted sustainably, the concept is able to challenge given notions of academic excellence, which today, as expressed in the Rome Declaration on RRI, “is about more than ground-breaking discoveries – it includes openness, responsibility and the co-production of knowledge” (2014).

Similar to the recommendations developed by other RRI projects, the results of the NUCLEUS capacity-building phase show that RRI processes require enriching the structures and formats within HEIs and offering adequate training and support to realise this culture change within the HEIs and in the public sphere.

One of the most important aspects that distinguishes the NUCLEUS project from other RRI initiatives funded by the EC during FP 7 and HORIZON 2020 is the project’s inclusive approach to RRI. Closely following the definition given by the EC in the new HORIZON 2020 funding scheme, the NUCLEUS consortium understands RRI as “a process in which all societal actors (researchers, citizens, policy makers and businesses) work together during the whole research and innovation process in order to align R&I outcomes to the values, needs and expectations of European society”.

Five “keys” give direction to the EC’s policy on RRI: Ethics, Gender Equality, Open Access, Public Engagement and Science Education. NUCLEUS recognises these as a valuable part of the RRI landscape and takes into account the findings and recommendations of RRI projects which, in a large majority, follow the “key” approach.

However, while recognising the keys as common landmarks in the RRI landscape a major aspect which distinguishes the NUCLEUS approach from other RRI projects is that it is less focused on the five keys and more oriented towards co-responsibility with and responsiveness to different stakeholders. Instead of focusing on the keys as the sole indicators of RRI, the NUCLEUS concept reflects the idea of interrelations among different institutions and frameworks.

In the upcoming implementation phase, the NUCLEUS project will develop and encourage new forms of collaborations. From November 2017, NUCLEUS will trial and test ways of implementing RRI in the governance and culture of 10 universities and scientific

institutions, called Embedded Nuclei. Spreading the concept even further via 20 “Mobile Nuclei”, the project aims to encourage innovation capacities both within academic bodies and between science and society.

The NUCLEUS studies work conducted in Phase 1 provided an excellent opportunity to reflect on the RRI approach with practitioners from policy making, civil society, economy, media, public engagement and universities. They also helped to establish a "NUCLEUS Living Network" with academic institutions and decision makers across Europe and beyond.

However, the first phase of the NUCLEUS project also showed a number of challenges and obstacles which need to be addressed and overcome before a successful implementation of the RRI process can start in academic institutions:

- Interviews for the project’s Interdisciplinary Study for example showed the diversity of expectations and different degrees of willingness to apply and perform RRI. Some of the reasons for this rejection were a lack of clarity in the concept itself, but also a lack of incentives such as funding, a lack of communication expertise or a fear of losing academic autonomy. Another concern was the fear of decreasing academic excellence by uncritically including less informed or biased stakeholders into (seemingly) objective research processes.
- The Field Trips documented concerns raised by RRI practitioners from different backgrounds: They saw a strong need of clear(er) definitions and concepts, asked for a more concise language and clarity of goals, and wished for a more precise communication of the expected impacts. The Field Trips also showed that there is often a lack of understanding and even appreciation between scientific institutions and stakeholders outside academia, making collaborations on an eye-to-eye-level challenging, if not impossible.

Based on the findings of the first two years, the NUCLEUS consortium developed the following recommendations to academic institutions who plan to implement RRI into their governance and culture:

#### **WORK TOWARDS A SHARED UNDERSTANDING OF RRI**

**RRI is a multi-faceted concept that can be practiced in many ways.** The RRI-approach is relatively complex and needs to be communicated just as much within as beyond academia - in a clear way, with convincing best-practice- examples.

#### **ANALYSE BEFORE YOU ACT**

**The implementation of RRI should be based on institutional self-assessments.** Before striving to implement RRI, institutions first need to analyse, map and reflect their

current RRI status. The NUCLEUS Field Trips' showed that self-assessment and an understanding of an institute's already existing efforts or achievements, whether labelled as "RRI" or not, is necessary. This "mapping of the RRI landscape" can also be used to measure the current level of support and/or understanding of RRI. It will also spread the awareness of RRI and its implementation.

#### **INVOLVE THE GOVERNANCE LEVEL OF YOUR INSTITUTION**

**A successful RRI approach requires change-management processes at the policy- and governmental level of each institution.** The NUCLEUS Field Trips showed that there is a varying level of understanding, appreciation and support for RRI across different areas. In addition, structures and relationships both within universities and between universities and societal actors differ across universities and countries. Without an active involvement of all policy levels, the multi-stakeholder-approach will not be integrated into a new understanding of academic excellence.

#### **SUPPORT AND ASSIST SCIENTISTS**

**Scientists who want to start RRI in multi-stakeholder engagement processes need support and assistance.** Trainings in communication and two-way dialogue processes are needed if collaborations between scientists, economy, citizens and media stakeholders shall be successful. An understanding of local or regional challenges and the specific frameworks of policy making or economy will increase the engagement capability of scientists.

#### **CREATE TRUST BEFORE YOU RAISE EXPECTATIONS**

**Relationship management is key before starting innovation processes with multiple stakeholders.** Especially in the NUCLEUS Field Trips, a need for open discussions and close collaboration between various stakeholders was recognized as an essential requirement for RRI. Before designing collective research processes, a trust-building strategy needs to be conducted in dedicated platforms and forums, to establish relationships, manage expectations and foster on-going participation

#### **ADDRESS OBSTACLES BEFORE STARTING THE PROCESS**

**In order to sustainably develop and pursue RRI processes, potential obstacles need to be identified and addressed.** These could, for example, be gaps in communication, potential divergences of interests, structural or cultural differences between stakeholders from different sectors. The NUCLEUS Field Trips and Study showed that, while the RRI concept as such is appreciated, research executives anticipated communication problems between researchers and lay people. Other potential obstacles are the different socio-cultural understandings and practices of RRI. The NUCLEUS Field Trips revealed cultural differences on how RRI is perceived in different parts of the world.

Monitoring and analysing progress in overcoming obstacles will bring more understanding of influencing factors

#### **INCLUDE BACKGROUNDS, GOALS AND INTERESTS OF STAKEHOLDERS**

**Before establishing an RRI-process, make sure to develop a shared understanding of backgrounds, interests and expectations of all partners.** Instead of focusing on individual partners with a specific interest in the research process, scientists should identify stakeholders or lay people with different backgrounds and expectations. Academic partners from different disciplines should be involved as well. For example, social scientists and philosophers might be a good source for assessing social resistance.

#### **MOTIVATE BEFORE YOU DEMAND ACTION**

**Incentives are needed to encourage RRI in academic practice.** Next to increasing the knowledge about RRI in the scientific community, participants frequently mentioned the need to foster RRI via funding, incentives, career opportunities and support structures. Universities, researchers and societal actors need to be motivated and encouraged to contribute to RRI processes. To ensure credibility, incentives should come from within the academic setting: At a local level, funding and rewarding RRI efforts will support its implementation, just as acknowledging researchers' societal engagement. Training and coaching will improve researchers' skills and knowledge while RRI champions and role models can contribute to awareness and enthusiasm. Embedding RRI trainings in educational structures, e.g. in PhD schools or summer schools, will make RRI more sustainable.

#### **DO NOT IMPOSE RRI ON EVERY RESEARCH APPROACH IN YOUR INSTITUTION**

RRI considerations should not block specific research lines upstream and should not initially promote a particular technology. Rather, a plurality of research lines should be pursued. Since RRI is a process rather than a "recipe" a variety of approaches should be encouraged and tested within the academic community.

#### **BE AWARE OF SOCIO-CULTURAL DIFFERENCES**

RRI is a concept which may be applied in different social and political contexts, without naming it as such. The cross-cultural analysis of the NUCLEUS Study showed a strong need to develop individualized approaches to RRI process, which are related to different national development strategies or science policies.

Based on these recommendations, the implementation process described in the following chapter will strive to achieve:

**N**etworks of Stakeholders,  
**U**pholding Equality and Diversity,  
**C**elebrating RRI,  
**L**earning for Change,  
**E**ngaging with the Public,  
**I**nstitutionalising Change.



### 3 ACTION PLAN FOR THE IMPLEMENTATION PHASE

How do the considerations and recommendations set out in the previous chapter translate into action – and what kind of action?

This chapter proposes the steps to be taken in the implementation phase of NUCLEUS. Using the findings and approaches developed in the first two years of the project, these steps will help in enabling higher education institutions and funding programmes to better respond to societal needs and challenges.

One of the key findings from Phase 1 of the project was the importance of adapting RRI to individual and local circumstances. It would be counter-productive, therefore, to have a single, one-size-fits-all action plan imposed on all institutions. Instead what is set out below is:

1. a General Action Plan for all Nuclei to follow (3.1. and 3.2);
2. an Action Framework for Embedded Nuclei with actions and interventions for implementation (3.3).

The ten Embedded Nuclei have been set five goals:

- Build institutionalised bridges between the research community, stakeholders and the general public;
- Catalyse ongoing debates about the role of science in open societies;
- Develop, nurture and support new forms of transdisciplinary research including RRI principles in the scientific community
- Stimulate co-responsibility of all actors involved in the process of research and innovation;
- Question and redefine prevailing notions of ‘recipients’ and ‘agents’.

At the same time the 20 Mobile Nuclei will establish units to test the innovative RRI approaches in different settings and environments.

The steps set out below constitute a general action plan for both Embedded Nuclei and Mobile Nuclei to realise these goals. However, one of the key findings of Phase 1 was the importance of adapting plans to local circumstances. In addition to this general action plan, each Nucleus will have its own individual action plan tailor-made to its own context, its own strengths and the skills of the staff to be hired. The Action Framework is designed to help each Embedded Nucleus through that process. These plans will be further operationalised through the Organisational Manual (D5.1). The Organisational Manual will also include details of organisation and management strategies. For Mobile Nuclei

details can be found in the Mobile Nuclei Working Group Leuven Report and their Organisational Manual (D5.6).

Each Nucleus is encouraged to follow the steps and use the suggested tools (see Appendices) to ensure a common NUCLEUS approach, to build a NUCLEUS community and to help toward producing coherent recommendations for the RRI Guidelines at the end of the project. However, to reach the common goals and build the NUCLEUS community each Nucleus is also free to use other tools as well when that fosters the outcomes. As preparation for the RRI Guidelines, all Nuclei will deliver an analysis of what did (and did not) work at their institution. Reflection is part of the process of RRI and to measure the progress and impact additional evaluations will be organised by the NUCLEUS Monitoring and Evaluation team (part of WP7).

### 3.1 GENERAL ACTION PLAN FOR EMBEDDED NUCLEI

There are five sequential steps which incorporate three continuous activities. The rationale behind these steps is not only to ensure that each Nucleus is embedded in its host institutions, but also to enable each Nucleus in developing Recommendations for the RRI Guidelines that can be applied more broadly.

The five steps are sequential but not strictly chronological. Step 1 *Identify the context* clearly comes before Step 5 *Analyse progress*, but there is much overlapping of steps in between and Step 4 *Continuous Action* runs throughout the implementation phase. Though, a specific timeline for implementation is recommended in Section 3.4.

STEPS FOR THE EMBEDDED NUCLEI
Step 1: Identify the context
Step 2: Tailor goals and plan to local context
Step 3: Build on strengths and improve on challenges - select cases
Step 4: Continuous action
- Reflect and respond
- Build relationships
- Monitor and evaluate
Step 5: Analyse progress

#### STEP 1: IDENTIFY THE CONTEXT – MAPPING THE RRI LANDSCAPE

For any journey using any roadmap you need to know where you are starting from. One of the most important considerations to emerge from the research and community

building activities in the first phase is the need to understand the context in which each Nucleus is to be created. An initial self-assessment supplemented with a SWOT-analysis and a stakeholder analysis will provide this insight. Together, these three tools will provide the necessary groundwork for formulating goals for local RRI practices. For more details see also the description provided in Section 3.3 as well as Appendix D.

## **STEP 2: TAILOR GOALS AND PLAN TO LOCAL CONTEXT**

All Embedded Nuclei differ with respect to the state of the art of RRI and the skills of their staff. When setting goals and planning it is important to take into account these local contexts and skills. Setting local goals is based on the five goals of the Embedded Nuclei and will inspire the choice of in-depth, qualitative cases for the Nucleus. Some cases may focus on improving an aspect of RRI that is already strong while others may strive to improve or set up an aspect that is challenging and needs more efforts (step 3). This 'qualitative case-study approach' allows for the comparison of approaches across the ten Embedded Nuclei. For the formulation of goals, the selection of the cases, and the plan to work towards them, each Nucleus is advised to use tools such as outlined in Appendix D.

## **STEP 3: BUILD ON STRENGTHS AND IMPROVE ON CHALLENGES**

In this step, each Embedded Nucleus should select an aspect of RRI in which the host institution is already quite strong at and try to catalyse improvements. The Nucleus can build on these strengths.

The Nucleus could, for example, try to stimulate open access even further if junior research staff are already supportive of open access publishing. Catalysing open access for stakeholders (cells) and at different levels at the institutions could entail explaining the importance of open access publishing, lobbying professors or university staff to set up funds to cover the fee for open access publishing, or developing a F.A.Q. together with the library, et cetera, when national policies are lacking. Catalysing such actions can help to make open access more relevant for the institutions, laboratories, the researchers (and their careers) as well as for the other cells.

Each case in which RRI processes are applied needs to be set up and documented like a qualitative case-study. The methodology for this process will provide instructions on logging actions and meetings, documenting changes in institutional settings and successes (and how you celebrate them!). Keeping a log of all activities will help to make visible the efforts spend in the Nucleus.

While some cases developed in the Embedded Nuclei may build on strengths, others may focus on aspects of RRI which are not as far developed and more challenging to develop.

For example, a Nucleus might want to catalyse improvement in anticipating the societal impacts and consequences of research and innovation processes. The staff of the Nucleus can try to bring fundamental researchers and ethicists or social researchers together or even help them to apply for research grants together. Similarly, they could, in collaboration, develop training for PhD students to stimulate anticipation, bring in citizens and civil society organisations in engagement activities on research and innovation (inspiration for activities can be drawn from the Mobile Nuclei if needed). Using such a variety of actions, where many different stakeholders (cells) are invited to the process and several of the sub-goals are targeted allows for richer experiences.

#### **STEP 4: CONTINUOUS ACTION**

Knowing where it is starting from and the goals that have been set each Nucleus can now work towards attaining those goals. There are three modes of continuous action that will be helpful the professional development of each Nucleus. Indeed, wherever possible these three modes of action should also inform activity in the first three steps

##### **A. REFLECT & RESPOND**

Key elements of RRI are reflecting on the research and innovation process, anticipating outcomes and societal impacts, and responding to findings and to stakeholders' views. The continuous action *reflect & respond* captures this attitude of ongoing reflection on the process, progress, and changes in the local context. When needed, this reflection leads to adjustment of the goals and chosen approaches of the Action Plan of a Nucleus. As Nucleus staff are trying to catalyse something new in their institution, this is uncharted territory. Throughout the implementation phase mentors will stimulate the NUCLEI's capabilities and support the process of growth. More on mentoring will be included in the Organisation Manual for the Embedded Nuclei (D5.1) while the Embedded Nuclei Reports (M46) will describe recommendations for future RRI practices.

##### **B. BUILD RELATIONSHIPS**

The relationships between all cells (universities, public engagement, civil society, media, economy and public policy) are an essential element in the NUCLEUS project. Consequently, relationship management and building these relationships is one of the most important considerations that emerged from the first phase of NUCLEUS. Each Nucleus will build a local NUCLEUS community of practice.

A few suggestions for building NUCLEUS communities:

- Organise formal and informal meetings with the various stakeholders you identified.
- Invite people to join the NUCLEUS community.
- Formulate a common aim, as well as SMART sub goals.
- Discuss ways how to reach those common aims.
- Keep a log of all informal and formal meetings, events and others.

- Share your practices and learn from each other (mutual learning)
- Celebrate successes!

The communities will facilitate knowledge sharing and exchanging best practices within the consortium.

### **C. MONITOR & EVALUATE**

While each Nucleus will reflect on its own progress and will be mentored, NUCLEUS also provides monitoring and evaluation of each Nucleus by a consortium partner that is not involved in its activities. This is part of WP7. Such a process assures independent monitoring and evaluation. Different methodologies will be used, including questionnaires at the start, midterm, and at the end of the project. Each Nucleus will be visited by the monitoring team to conduct an on-site assessment. Details on the monitoring and evaluation can be found in WP7.

### **STEP 5: ANALYSE PROGRESS**

At this step, each Nucleus will analyse the cases developed in Step 3 (building on strengths and improving challenges). The collection of all twenty case studies will provide the NUCLEUS project with a rich variety of insights and experiences for a cross-case analysis. This will be a valuable contribution for the further development of the RRI Guidelines.

Each Nucleus will serve as a test-bed for the implementation of RRI. As with any test some results will be more encouraging than others and some Nuclei will be more successful than others. Whatever the degree of success, each Nucleus will provide valuable lessons. Learning why something did not work is valuable in narrowing down the conditions that apply for the successful future use of the cultural and organisational approaches. Failure can be as valuable as success. For example, Apollo 13 was described as a successful failure. It did not achieve its mission aims but provided the space programme with valuable lessons, maybe even more valuable than if the mission had succeeded. Likewise it should be expected that some of the Nuclei might be successful failures.

## **3.2 GENERAL ACTION PLAN FOR MOBILE NUCLEI**

Twenty Mobile Nuclei will bring RRI in practice via a variety of activities in mutual learning processes. In this section steps in the Implementation phase for these Mobile Nuclei are described more in detail which are based on the report from the Working Group meeting in Leuven. In Appendix F possible formats for the Mobile Nuclei are described. More detailed individual plans will be included in the Organisational Manual for Mobile Nuclei (D5.6). This Organisational Manual will also include details of mentoring, organisation and management strategies.

## STEPS AND CONTINUOUS ACTIONS

For the Mobile Nuclei the same steps are proposed for each activity but in a very condensed manner.

STEPS FOR THE MOBILE NUCLEI
Step 1: Identify the context
Step 2: Tailor goals and plan to local context
Step 3: Build and improve - Develop actions for cases
Step 4: Continuous actions
- Reflect and respond
- Build relationships
- Monitor and evaluate
Step 5: Analyse progress

### STEP 1: IDENTIFY THE CONTEXT – MAPPING THE RRI LANDSCAPE

While a complete stakeholder analysis can be of added value for the Mobile Nuclei as well, they might not need to have such a detailed overview of all other RRI actors. Since it is valuable to know who can be an ally or partner in an activity or event, *a quick stakeholder analysis as well as a SWOT analysis for each event* is advised.

### STEP 2: TAILOR GOALS AND PLAN TO LOCAL CONTEXT

The following questions can help guide the development of actions:

#### WHAT IS YOUR CONTEXT?

Start from the needs you have, your local challenges and shared motivations.

#### WHAT WILL BE YOUR GOALS?

What will be your scope and the impact you want to provoke? Meet the needs of society: what topic is relevant for the all included cells?

#### WHO WILL BE INVOLVED?

Think of the six cells that represent various stakeholder groups: media, economy, public engagement, civil society and policy makers, and universities. Ideally, an activity is aimed at multiple or all six cells.

### STEP 3: BUILD AND IMPROVE - DEVELOP ACTIONS FOR CASES

Keep in mind, Mobile Nuclei are **mutual learning experiences** where in processes of **co-creation** practices of RRI are developed and analysed. When successful, these can be adapted and repeated.

### **WHAT WILL YOU DEVELOP?**

- Keep it simple.
- Decide your format. There are various possibilities, as described in the Working Group meeting report, for example:
  - o Pick up an existing format that is innovative for you
  - o Create a brand-new format
  - o Create a trans-format, transform a non-participatory format into a participatory format
- Run the Mobile Nucleus as a test-bed

### **STEP 4: CONTINUOUS ACTIONS**

*What went well and what can be improved?*

- Reflect and respond - Be transparent and open to discuss your experiences.
- Build relationships – Build local communities
- Monitor and evaluate - Apply evaluation methods developed in WP7.

### **STEP 5: ANALYSE PROGRESS**

*What progress is made? What to do next?*

- Take risks and experiments. Mobile Nuclei are an opportunity to try something new
- Repeat when you consider it successful.

### **GENERAL CONSIDERATIONS:**

- Mobile Nuclei should focus on looking for real needs. What is really a need at a local level, a challenge and then work together, discuss and find solutions together.
- It is important to talk about the way how win-win situations can be created for all stakeholders including the researchers.
- Researchers will participate when they have the money to do so, and when they get profits from the university.
- Rather the process towards meeting the needs of society than the format is important.
- A Mobile Nucleus should not only focus on the kind of event one does. But, preferably, tries to get insight in the process, where changes are possible and find out that/how it makes a difference.
- Celebrate successes! Share the showcases.

### **SWOT ANALYSIS FOR MOBILE NUCLEI**

1. Before you start the SWOT analysis, it is helpful to have a good overview of your organisation as well as the goal(s) of your event.

2. Identify Strengths, Weaknesses, Opportunities and Threats related to RRI, your event, and your mobile Nucleus, preferably by using policies, vision and mission statements.
3. The strengths, opportunities, threats and weaknesses need to be realistic; i.e. they either exist or can realistically be expected to become influential in the period you prepare, hold, and evaluate your event(s). Specifically, look for SWOTs related to the key themes of RRI: engagement of stakeholders and public; science education & outreach; gender; open access; research ethics including anticipation of impacts and consequences; governance.
4. Focus on the most important and realistic SWOTs. The identified SWOTs should be the most important ones, the ones you really need to take into account in developing your plans. If you have identified many SWOTs, prioritise and include the top five for each SWOT.
5. Write down your findings concisely.

#### **STAKEHOLDER ANALYSIS FOR THE MOBILE NUCLEI**

- For each relevant cell, identify the main stakeholder(s).
- Researchers are essential. Think which other stakeholders could be relevant
- For each stakeholder, try to find sources describing views on RRI. It could be that you have to deduct those from their views on related issues, such as corporate social responsibility. If you cannot find any information on their views at all, consider interviewing them to find out. Make a short summary of their views.
- See where cooperation might be possible: Can you organise something together? Can you invite them to attend? Can they have a role in your event, e.g. by giving a talk?

### **3.3 NUCLEUS ACTION FRAMEWORK FOR EMBEDDED NUCLEI**

One of the key findings of Phase 1 revealed the importance of developing plans to suit local circumstances. The Working Groups for Embedded Nuclei also highlighted that different institutions were at a different stage, or level, in terms of embedding RRI into the structure and culture of their institution. The NUCLEUS Action Framework, which will be used by all Nuclei, will provide the foundation for Embedded Nuclei partners to develop the localised action plans (using the Action Plan Template in Appendix D4). By adopting these tools, Embedded Nuclei will develop locally relevant top-down strategies and bottom-up initiatives that align and deliver the shared goals for Embedded Nuclei. The actions in the Framework provide further detail on implementing the five steps as given in the general action plan.

The NUCLEUS Action Framework therefore enables each Embedded Nucleus to introduce step-changes in the localised structures and culture towards embedding RRI during and following the lifecycle of the NUCLEUS project. It also offers the prospect of continued growth and improvement beyond the life span of the NUCLEUS project.



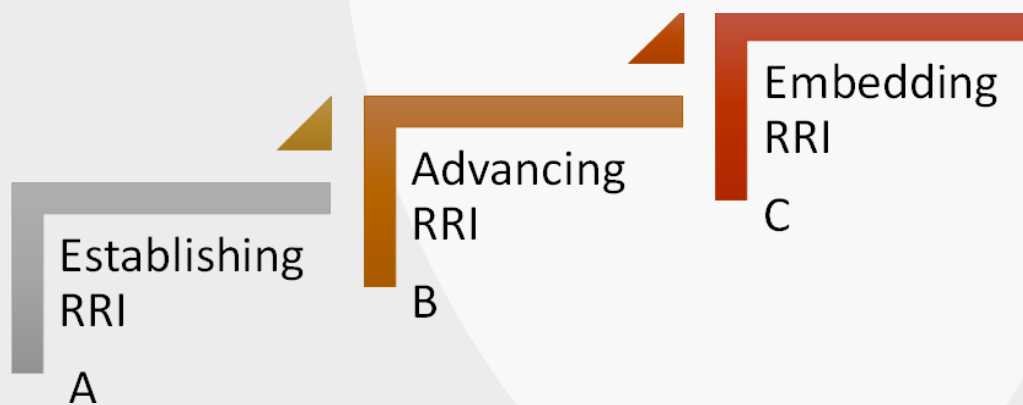
The NUCLEUS Action Framework consists of 8 Actions. Actions 1 and 2 focus on understanding the current context of the institution and setting up the leadership, operational units and support required to develop and deliver a step-change towards embedding RRI. The Actions provide pragmatic approach while working on Steps 1 and 2 of the general action plan. Actions 3-7 consist of suggestions to work towards developing the 'Goals for Embedded Nuclei' as listed in the NUCLEUS grant proposal. These align with Steps 2 to 4 in the general action plan. Action 8 refers to the continuous reflection and monitoring of the developments of the NUCLEUS unit which aligns with Steps 4 and 5 in the general action plan.

Each action consists of interventions aligning with three levels of proposed RRI implementation (Establishing RRI, Advancing RRI, Embedding RRI). These interventions are derived from the different strands of phase 1 of the NUCLEUS project (Studies (WP3), Field Trips and Working Group (WP4) as well as recommendations from other RRI projects and literature.

Each Embedded Nucleus will populate their own Action Plan template (refer to Appendix D4 for example) which is based on the Actions and interventions outlined in the Action Framework for Embedded Nuclei. The specific initiatives, processes and procedures undertaken will be unique to each institution and will be subject to the level at which they start (level A – Establishing RRI, Level B – Advancing RRI, Level C- Implementing RRI)- which is informed by the data emerging from the context mapping exercises. Institutions are advised to satisfy the majority of the interventions of Level A before progressing to Level B and further. Depending on the institutional base level - actions in Level C might realistically be achievable after the project. If this is the case, please identify some key long-term actions and include words '*post-project*' in the time-frame. Most of the interventions and actions listed should be achievable or striving towards the next level stage during the project lifecycle.

As is the case with the Nuclei, this framework will be 'tested' and reviewed during the Implementation Phase - it therefore acts as a guide only. Interventions are grouped based on feedback during the Working Group meetings. They are not necessarily sequentially listed. The NUCLEUS Action Framework will be reviewed over the lifecycle of the project and any additions/amendments will be highlighted in D5.2 and during the final reporting phases. Each intervention will be explained in more detail in D5.1 The Organisational Manual instructions for developing the local Action Plans based on the shared NUCLEUS Action Framework will also be contained in this forthcoming document.

The three levels are:



- **Level A - Establishing RRI** – The institution has a portfolio of initiatives and processes that engage internal and stakeholders. Evidence is demonstrated of taking measurable steps to introduce RRI practice to these existing initiatives and processes that impact a limited number of internal groups, cell(s), or particular stakeholder groups.
- **Level B - Advancing RRI**– The institution develops formal systems and processes to encourage RRI practices with internal and external stakeholders. This involves a more systemic change that affects wider internal communities and/or involves a number of stakeholders and is reflected in internal policies at departmental or section level.
- **Level C - Embedding RRI** – The institution reflects the needs of societal actors needs and integrates them into the strategic plans and policies as well as in the values and actions of the academic and administrative practices

The 8 Actions in the Embedded Nucleus Action Framework are as follows:

- **Action 1:** *Conduct RRI context mapping:* identify, extend and enrich the processes that already exists
- **Action 2:** *Develop RRI Policy, Committee and Strategy:* create structures to engage thought leadership and build RRI institutional capacity
- **Action 3:** *Build institutional bridges between the research community, stakeholders and the general public:* foster trust, dialogue and dynamic communications with internal and external stakeholders
- **Action 4:** *Catalyse ongoing debates about the role of science in open societies* – encourage ongoing reflection, discussion and consideration in public and academic circles about the role of society in the research process.
- **Action 5:** *Develop, nurture and support new forms of transdisciplinary research - external stakeholders have the opportunity to collaborate with researchers, when appropriate*

- **Action 6:** *Stimulate co-responsibility of all actors involved in the process of research and innovation - External stakeholders have the opportunity to collaborate with researchers, when appropriate*
- **Action 7:** *Question and redefine the prevailing notion of 'recipients' and 'agents'- More researchers are open to working with stakeholders to include diverse range of inputs and opinions into the research decision making process*
- **Action 8:** *Embed ongoing reflection, analyse processes and procedures for Nuclei – monitoring and evaluating progress during the implementation phase*

There are many and diverse ways in which these actions map on to the levels depending on local circumstances. The following table outlines interventions, arising from phase one of the project, for how an institution can establish and enhance its RRI approaches and practices.

**ACTION 1: CONDUCT RRI CONTEXT MAPPING – IDENTIFY, EXTEND AND ENRICH THE PROCESSES THAT ALREADY EXISTS**

*This action is focused on understanding each Embedded Nuclei predisposition to RRI related initiatives, and procedures. It is a critical starting point for each institution to create the local action plan.*

- |                  |   |
|------------------|---|
| <b>LEVEL A-C</b> | <ul style="list-style-type: none"> <li>• Conduct RRI context mapping assessment exercises as listed below. Please refer to Appendix D for full detail on each exercise/tool The use of a multi-method triangulation approach for the context mapping will support the Nucleus understand the baseline level (Establishing RRI, Advancing RRI, Embedding RRI) and inform the formulation of the local action plan.</li> <li>A. Two-part NUCLEUS Self-Assessment to map out the existing structures and initiatives which align with RRI principles and the extent to which engagement with each of the Stakeholder Cells (Refer to Appendix D.2)</li> <li>B. SWOT analysis (Refer to Appendix D.1)</li> <li>C. Theory of Change (Refer to Appendix D.3)</li> </ul> |
|------------------|---|

**ACTION 2: DEVELOP RRI POLICY, COMMITTEE AND STRATEGY – ENGAGE THOUGHT LEADERSHIP AND INSTITUTIONALISED CAPACITY BUILDING**

*This action comprises of setting out a clear rationale and structure for developing RRI approaches and practices within the institution and with external stakeholders. A successful RRI approach requires change-management processes at the policy- and governmental level of each institution. This action also includes the development of policies and incentives for the research community to engage RRI practices and research*

- LEVEL A**
- Appoint a person/group that are responsible for catalysing a step change in the Embedded Nucleus institution. This person/unit's goal is to create an institutional structure aimed at promoting, facilitating, encouraging and supporting research partnerships between academics and the societal actors (See Appendix E for sample job specification)
  - Identify key functions/personnel/initiatives in the institute which can support the implementation of RRI
  - Engage senior leadership commitment to the NUCLEUS project during pre-implementation. The NUCLEUS Shared Vision Statement (Refer to Appendix E) communicates the main goals of the Embedded Nuclei over the project lifecycle. Senior leadership of the Embedded Nucleus, the mentoring institution and NUCLEUS project management show commitment to deliver these goals by signing and retaining a copy.
  - Develop Nucleus Action Plan (Refer to example Action Plan in Appendix D3) based on information presented in the self-assessment exercises and with support from the designated mentor. The NUCLEUS Action Plan sets out measurable short, medium and long-term objectives and outcomes the unit will undertake to deliver the 8 actions (Refer to NUCLEUS Framework).
  - Develop an institutional RRI Policy (template will feature in D5.1 The RRI Policy contains the rationale for embedded RRI in the local institution. It communicates the vision and the key objectives of the unit and is worded to suit the culture of the institution and the institutional strategy.
- LEVEL B**
- Set up a cross-functional RRI committee consisting of representation – ideally at a senior level, from relevant functions across the University (e.g. Human Resources, Communications, Research School etc.). The RRI context mapping exercise will inform which functions are most appropriate. Have a set of clearly defined terms and clear minutes/actions items from each meeting. Effectively run meetings will support the Nucleus unit in each institution extend and share the responsibility for embedding RRI across the University.
  - Set-up a reporting structure to share developments and progress at pre-defined intervals over the project lifecycle with senior leadership
  - Develop procedures to identify and appoint RRI Champions within the institution and from external stakeholder groups
- LEVEL C**
- Establish an incentivise and reward system for researchers engaging with RRI practices and approaches
  - Work with senior leadership to embed RRI as a cross-cutting theme in the institutions strategic policies
  - Lobby local/national funding agencies to include RRI as an evaluation criterion for the selection and funding of research
  - Include representatives from all societal stakeholder groups in programme boards and committees (where appropriate)

**ACTION 3: BUILD INSTITUTIONAL BRIDGES BETWEEN THE RESEARCH COMMUNITY, STAKEHOLDERS AND THE GENERAL PUBLIC: FOSTERING TRUST, DIALOGUE AND DYNAMIC**

## **COMMUNICATIONS WITH INTERNAL AND EXTERNAL STAKEHOLDERS, BUILDING A 'COMMUNITY OF PRACTICE'**

*Bridges represent the two-way dialogic process of exchanging ideas between the Embedded Nucleus and representatives from the six stakeholder cells; Universities and scientific institutions, public policy, public engagement, media and economy. It involves established platforms and opportunities that create and foster dialogue communications and dynamic relationships between institutions and the 6 stakeholder cells. It includes having active involvement at all policy levels*

- LEVEL A**
  - Draw from 'RRI concept mapping exercises' to identify engaged stakeholders (internally and externally)
  - Develop an established and sustainable 'network' that involves representatives from the six cells.
  - Set up processes for RRI training provision for researchers to engage with different societal actors, using an RRI approach using language which is accessible to the group in question
- LEVEL B**
  - Establish strategic linkages established between the NUCLEUS unit and with representatives from societal stakeholder groups (the six cells) – extend links to actors which have little prior engagement with the institution
  - Dedicate a physical space and/or virtual space where stakeholders and researchers can share interests/ask questions
  - Standardise procedures on public involvement with research beyond involvement of pressure groups are reviewed/developed with an RRI focus
  - Develop and provided to key societal actors (policy makers, media, public engagement institutions, universities, civil society).
  - Create platforms (leverage existing ones) for sharing best practice approaches across stakeholder network
- LEVEL C**
  - Set-up processes and systems to link external stakeholder ideas formally into the research process with societal actors acknowledged on papers as contributing authors
  - Societal actors (six cells) formally work with institutions to develop RRI policies and protocols

### **ACTION 4: CATALYSE ONGOING DEBATES ABOUT THE ROLE OF SCIENCE IN OPEN SOCIETIES – ONGOING REFLECTION, DISCUSSION AND CONSIDERATION IN PUBLIC AND ACADEMIC CIRCLES ABOUT THE ROLE OF SOCIETY IN THE RESEARCH PROCESS**

*This action refers to creating opportunities to extend the governance discussion to encompass questions of uncertainty (in its multiple forms), purposes, motivations, social and political constitutions, trajectories and directions of innovation. It includes the generation of discussion on anticipatory approaches to scientific developments. Although it could form part of the process, it does not mean that debates are scheduled public events. Debates in this context refer to generating discussion about science and research with the societal actors.*

- LEVEL A**
  - Create informal and formal opportunities for researchers and other institutional staff to contribute to discussions on RRI, the risk and impact of scientific developments

- Organise opinion polls, focus groups, surveys and workshops aimed at gathering information on RRI activities and attitudes of institutional staff and external stakeholders
  - Promote awareness and reflection of relevant ethical and societal issues across different units in the institution
  - Access opportunities to create awareness of RRI through events, online marketing, such as social events, exhibitions, leaflets, public meetings and conferences. Challenge negative perceptions of RRI and epistemological approaches to RRI
- LEVEL B**
- Develop media-training for researchers, which is RRI focused, and supports them to ask questions to societal actors at the start of the research process
  - Foster stakeholder engagement that embraces open and transparent communication about risk and impact
  - Make research results and information on scientific processes accessible to all levels of society
  - Develop professional competences and ethical codes amongst journalists and science journalists (in partnership with EUSJA)
- LEVEL C**
- Academic researchers consider the role and impact of societal actors in their research
  - Embed reflection activities throughout the institutional research process

**ACTION 5: DEVELOP, NURTURE AND SUPPORT NEW FORMS OF TRANSDISCIPLINARY RESEARCH INCLUDING RRI PRINCIPLES IN THE SCIENTIFIC COMMUNITY - EXTERNAL STAKEHOLDERS HAVE THE OPPORTUNITY TO COLLABORATE WITH RESEARCHERS, WHEN APPROPRIATE**

*Transdisciplinary research can be defined as research which moves beyond the bridging of divides within academia to engaging directly with the production and use of knowledge outside of the academy (Toomey et al 2015). In this approach, societal impact is laid out as a central aim of the research at hand. Solutions that emerge from the research may additionally be put into place through an action-oriented process built on direct collaboration with the groups involved (Klein 2004). In the NUCLEUS project, the Embedded Nucleus will engage with the stakeholders (cells) at the early stages of the research process to enable new forms of transdisciplinary research which embed the RRI principles.*

- LEVEL A**
- Discuss mechanisms for facilitating stakeholder/transdisciplinary projects with relevant functions in the institution
  - Discuss mechanisms for facilitating stakeholder/transdisciplinary projects with funding agencies
  - Societal actors are issued information about the opportunities to engage in academic research
  - Meetings with local funding agencies highlighting scope and importance of having more transdisciplinary research
  - Build/leverage existing systems to encourage younger researchers to meet with relevant societal actors at the research funding application stage
  - Co-developing resources and sharing case studies to share etc amongst Embedded Nuclei
  - Organise RRI awareness meetings with policy makers and funding agencies
- LEVEL B**
- Develop the researcher competency framework for RRI research

- Assess the number of research projects that demonstrate stakeholder inclusion and track over period of time
- LEVEL C**
- Develop societal innovation vouchers aimed at incentivising researchers to explore research lines which solve local/global societal issues
  - Explore and develop an RRI certification mark (or equivalent) with funding agencies/policy makers

**ACTION 6: STIMULATE CO-RESPONSIBILITY OF ALL ACTORS INVOLVED IN THE PROCESS OF RESEARCH AND INNOVATION**

*The 6 NUCLEUS 'cells' are essential partners in order to receive and transmit signals, thus interacting with and reacting to the impulses from academia. Through this "responsiveness", they actively contribute to long-term productive relationships - an essential factor for successfully conducting RRI. Stimulating the co-responsibility requires understanding the expectations of the stakeholder group. It involves identifying what and how the parties can contribute and having an openness as well as a willingness to act together.*

- LEVEL A**
- Create simple, effective ways of outlining key RRI terminology along with practical examples for implementation for all societal actors
  - Develop an RRI training structure and procedures aimed at encouraging researchers to interact with societal actors using an RRI approach
  - Promote awareness to all societal actor groups (6 cells) in relation to their role in RRI (on social media, local media outlets, conference dissemination, civil society groups)
  - Develop specific forum(s) where expectations of stakeholder groups are shared openly and ideas for future collaboration, using an RRI approach are shared
- LEVEL B**
- Create opportunities for internal and external stakeholder groups to engage in dialogic interactions with researchers -training, workshops on the role of each actor
  - Create an institutional structure aimed at promoting, facilitating, encouraging and supporting research partnerships between academics and communities
  - Develop simple, effective document outlining key RRI terminology along with practical examples for implementing RRI in the institution with societal actors
- LEVEL C**
- Create official processes that embed RRI principles for the involvement of stakeholders from the six cells into research (e.g. into the description of roles for actors to sit on Stakeholder Network – see criteria 1) or within contracts between institutions and partners.
  - Create opportunities for stakeholders and researcher participation in the development of local, national and international ethics committees and guidelines
  - Establish contact points for citizens interested in actively taking part in research
  - Include "societal impact" as a criterion of research programmes

**ACTION 7: QUESTION AND REDEFINE THE PREVAILING NOTION OF 'RECIPIENTS' AND 'AGENTS'**

*This action is focused on supporting researchers develop the knowledge, skills and abilities to become a responsible researcher – to become more open to working in an ethical manner with a diverse range of stakeholders, to exchange views on research topic and to include these views in the research process, when appropriate. This action is focused on moving to socially and ethically based participatory and co-produced science. It includes building awareness for researchers that the development of research is more impactful if societal views are integrated throughout the process.*

- LEVEL A**
  - Develop a competency framework for ‘responsible researcher’
  - Train researchers on engaging with societal actors using RRI focused approaches – the role of researchers and societal partners
  - Evidence of support systems being implemented to enable researchers to engage with societal actors
  - Develop case studies of researchers that have engaged in RRI practices and share examples so researchers can identify with how RRI can be practiced
- LEVEL B**
  - Introducing social and ethical responsibility as an education subject from high school to doctoral training
  - Promote RRI as an aspect of continuous professional development for researchers and innovators
  - Create an online library of RRI literature and best practices
  - Explore the design of an engagement process that is acceptable to scientists, e.g., by conducting a survey or a focus group among researchers
  - Establish platforms and competences centres which support public engagement networks; connect researchers and citizens; and support RRI activities with practical expertise.
  - Embed RRI training/training on Participatory Research in educational structures, e.g. in PhD schools or summer school
- LEVEL C**
  - Include RRI as an evaluation criterion for the selection and funding of research development and promotion of a RRI certification mark.
  - Include RRI as an aspect of continuous professional development for researchers and innovators

#### **ACTION 8: EMBED ONGOING REFLECTION, ANALYSE PROCESSES AND PROCEDURES**

*Nuclei will serve as a test-beds for implementation. They will implement mechanisms and series of tools to monitor quantitative, qualitative data during the two-year period (WP7). This action is focused on integrating monitoring and reflection into the operational and working practices of the Nucleus unit in each institution. This action focuses on shared lessons learned, noting successes and celebrating failures and adapting as required to the needs of the institution – all interventions which will contribute towards delivering informed recommendations for implementing RRI in HEIs.*

- LEVEL**
  - Appoint a person that will facilitate the process of data gathering
- A-C**
  - Set up a system to reflect, track and monitor how RRI practices have shaped the organisational culture
  - Complete NUCLEUS mentoring log after each mentoring meeting
  - Create mechanisms for monitoring, evaluating and reporting RRI (Refer to Monitoring and Evaluation Report D7.3)
  - Capture attitudes of staff/researchers/external stakeholders on RRI at the beginning of the implementation phase, during at the end of the Nucleus Implementation phase
  - Create platform to share ‘lessons learned’ amongst Mobile and Embedded Nuclei - celebrate failure
  - Develop qualitative case studies per institution outlining how RRI can be implemented in a scientific institution
  - Appoint a person that will facilitate the processes of data gathering



- Review implementation progress in respect to the action plan and evaluation indicators
- Administer NUCLEUS Self-Assessment Tool at pre-determined intervals during project implementation
- Support WP5 & WP7 with data collection - questionnaires, interviews, focus groups
- Utilise already existing data in the institution's files (primary data)- where appropriate

### **3.4 TIMELINE FOR IMPLEMENTATION**

Embedded and Mobile Nuclei will commence implementation from November 2017 until August 2019. The timeline (figure 1) includes the key action points for developing Mobile and Embedded Nuclei as well as the key project milestones and deliverables - primarily WP5 reports on Nuclei Implementation (WP5) and Monitoring and Evaluation (WP7).

Further detail on how the Embedded Nuclei and Mobile Nuclei will work to deliver these plans and modules will be outlined in D5.1 and D5.6 – The Organisational Manuals for Embedded and Mobile Nuclei.

During the Implementation Phase the Embedded Nuclei will be supported by their respective mentors. Meetings with the mentors will take place on a monthly basis. A mentoring log will be kept by the Embedded Nuclei institution following each meeting. This process will support the capacity building and progress tracking of the institution.

Although it is not finalised, meetings and workshops to support the progression of Nuclei are tentatively scheduled to coincide with the 2018 Annual Conference in Malta. Other proposed workshops may include a meeting of Mobile Nuclei participants before or after the EUSEA conference in Madrid in May 2018 and a working group for Embedded Nuclei in February 2018.

The Nuclei will be monitored throughout the Implementation Phase with case analysis and cross case analysis for Embedded Nuclei scheduled for July 2018 through instruments such as focus groups, interviews and questionnaires.

The report outlining the progress of each Nucleus 'test bed' will be compiled and issued to the European Commission in June 2019 (M46). Following this report, the final Recommendations for Embedded and Mobile Nuclei RRI Guidelines will be submitted in July 2019(M47) with the final Evaluation and Monitoring Report scheduled in August 2019 (M48).

Figure 1 illustrates the implementation timeline for Embedded and Mobile Nuclei.

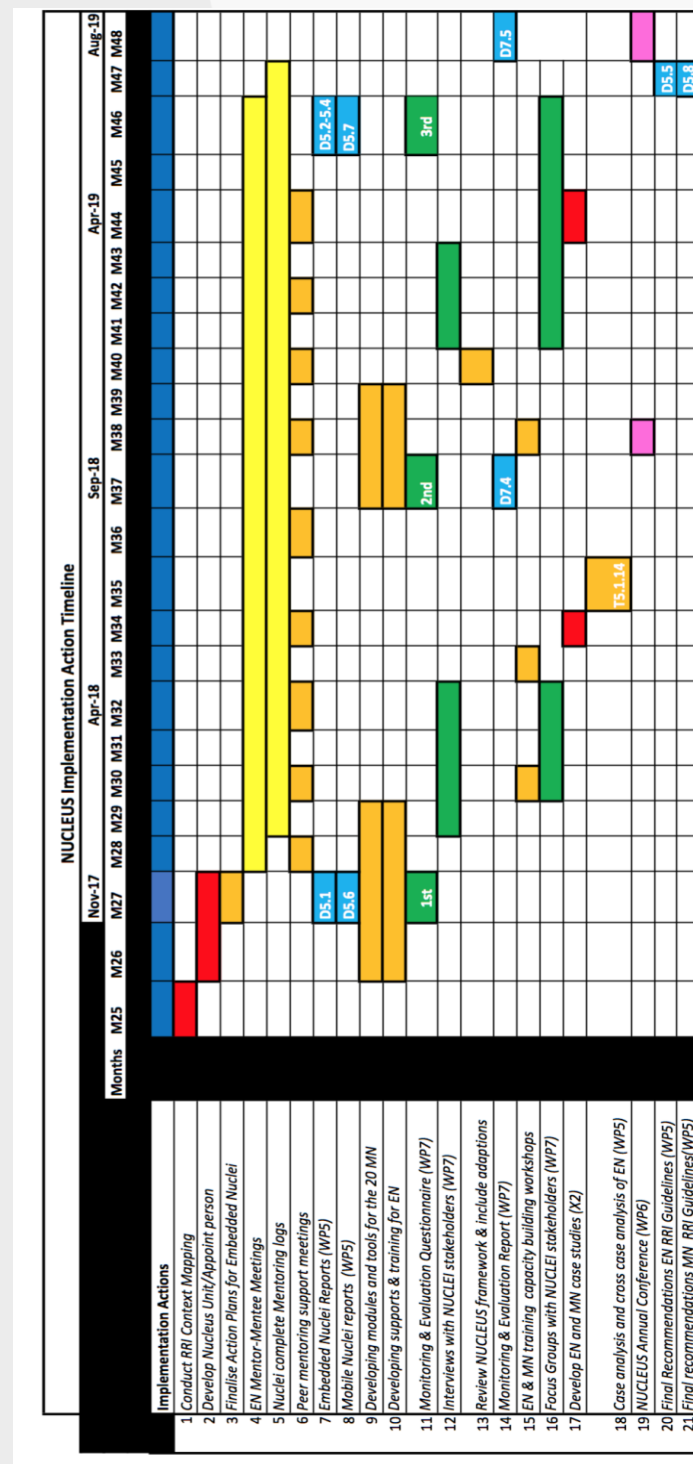


Figure 1: NUCLEUS Implementation Timeline

## 4 CONCLUSION AND OUTLOOK

Implementing RRI in the governance and culture of scientific institutions will allow universities to better respond to societal challenges. Since RRI is a process in which a variety of academic and non-academic stakeholders work together during the whole research and innovation process, the implementation of this concept requires some key interventions to be considered:

In order to achieve a new understanding of innovation, public engagement, creativity and learning RRI requires new structures and formats, as well as trainings and support for scientists and stakeholders - both inside of Higher Education Institutions and in the public sphere.

The Implementation Roadmap shows how these new structures and formats can be developed. Ten Embedded and 20 Mobile Nuclei will test these structures and formats in the second part of the project. The experiences gained and reflected in these Nuclei will be monitored, documented, evaluated and reported to give applicable recommendations to scientific institutions in Europe and beyond. They will be made accessible via an “**RRI-DNA**” applicable beyond the project timeline.

Throughout the implementation phase mentors will stimulate the capabilities and support the process of growth in the Embedded Nuclei. This non-prescriptive way makes the most of the learning of the mentoring institutions and provide scope to develop practical solutions for the Embedded Nuclei. These will also detail the steps to take for building sustainable NUCLEUS communities. In parallel, EUSEA will support the coordination of the Mobile Nuclei. Further detail on the support and guidance to deliver the action plans for Mobile and Embedded Nuclei will be contained in Organisational Manuals D5.1 and D5.6.

Summarising the first two years of the project, the implementation of RRI into academic practice can be built upon these steps:

**N**etworks of Stakeholders,  
**U**pholding Equality and Diversity,  
**C**elebrating RRI,  
**L**earning for Change,  
**E**ngaging with the Public,  
**I**nstitutionalising Change.

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## APPENDIX A: OVERVIEW OF NUCLEI

List of **Embedded Nuclei** and their mentoring partners:

- **Beijing** (University defined by CRISP), China (supported by Aberdeen)
- **Ilia State University**, Tbilisi, Georgia (supported by Dublin)
- **Mathematical Institute of the Serbian Academy of Sciences and Arts** (MISANU) (supported by Edinburgh)
- **Pretoria** (University defined by SAASTA), South Africa (supported by Edinburgh)
- **Rhine-Waal University**, Germany (supported by Aberdeen)
- **Ruhr-University Bochum**, Germany (supported by Aberdeen)
- **Nottingham Trent University**, UK (supported by Dublin)
- **Université de Lyon**, France (supported by Dublin)
- **University of Malta**, Malta (supported by Edinburgh)
- **University of Twente**, Netherlands (supported by Edinburgh)

List of **Mobile Nuclei**:

Additional Mobile Nuclei will be contacted after evaluation of the first series of events:

- **UniverCity Bochum**, Germany
- **Science City Hannover**, Germany
- **Nottingham City Council**, UK
- **Science Office, Bielefeld Marketing GmbH**, Germany
- **Delft University**, the Netherlands
- **CALMAST**, Ireland
- **Vetenskap**, Sweden
- **Psiquadro**, Italy
- **Wissenschaft im Dialog**, Germany
- **Wroclaw University**, Poland
- **EUSEA**, Austria
- **Festival of Curiosity**, Ireland
- **Fundació Catalá**, Spain
- **Ilia State University**, Tbilisi
- **BAST**, China
- **Ciencia Viva**, Portugal
- **IBM**, Ireland
- **Sanger Institute**, UK
- **Bristol Natural History Consortium**, UK

## **APPENDIX B: REVIEW OF RRI LITERATURE AND OTHER RRI PROJECTS**

### **RRI LITERATURE**

There is already a large and growing academic discourse on RRI. The diversity in the literature shows the many sides of RRI, a diversity which is mirrored in the NUCLEUS studies.

### **THE CONCEPT OF RRI AND THE NUCLEUS PROJECT**

As with so many other projects the starting point for NUCLEUS is the definition of responsible research and innovation given by Von Schomberg (2013, p.19):

“Responsible Research and Innovation is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to 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).”

The implication of this, according to the European Commission, is 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.”

This, in turn, means:

“In practice, RRI is implemented as a package that includes multi-actor and public engagement in research and innovation, enabling easier access to scientific results, the take up of gender and ethics in the research and innovation content and process, and formal and informal science education.”

Similarly, Stilgoe, Owen and Macnaghten (2013, p.1570) say:

“Responsible innovation means taking care of the future through collective stewardship of science and innovation in the present.”

This definition relates responsible innovation to four dimensions: improved anticipation in governance; reflexivity on the part of actors and institutions; inclusion of new voices in the governance of science and innovation; and responsiveness, so that systems of innovation can be shaped to be as responsive as possible (Stilgoe et al, 2013: 1570-1572). The multi-dimensional character of RRI was a prominent finding in the first phase of the NUCLEUS project.

### **FOCUS IN THE ACADEMIC DISCOURSE ON CONCEPTUALISING RRI**

In academic discourse on RRI there is less attention to implementing RRI than there is for other subjects. While most literature focuses on understanding RRI, there are fewer publications on implementing RRI. Moreover, approaches to implementing RRI differ

with respect to the aspect of RRI they focus on and the method used. Approaches focus for instance on stakeholder and public engagement, ethics, or science education.

Workshops where experts and stakeholders discuss, for instance, synthetic biology are a form of engagement (Douglas & Stemerding, 2013) as are societal dialogues on nanotechnology (Krabbenborg & Mulder, 2015; Simakova & Coenen, 2013; Stilgoe, 2007). Improving the reporting in newspapers on neurotechnologies can contribute to a better and more realistic understanding of the technological developments and applications in the field (De Jong et al., 2015). Involving experts and stakeholders and societal dialogues contribute to more inclusive research and innovation processes. Societal dialogues and improving reporting will also lead to a better understanding of science and technology in society.

To stimulate thinking about social and ethical aspects of research, social scientists can organise regular talks with industry R&D researchers (Flipse et al., 2013). Or, completing a ‘risk register’ could be required in a call for funding (Owen & Goldberg, 2010). Other ideas for implementing RRI concern checklists (for anticipatory ethics in ICT, see Brey, 2012), multiple forms of technology assessment (see for instance Fischer & Rip, 2013), privacy impact assessments in ICT (Wright et al., 2011), or thinking about and incorporating values in the design process (Van den Hoven, 2013).

Each method has best practices and challenges related to the use of that specific methodology for that function. Those best practices and challenges are also influenced by the specific research field they are applied in and the local context. It was therefore not possible to distil generally applicable best practices and challenges for ‘the’ implementation of RRI from the literature. Once again, diversity appears to be a key characteristic of RRI.

Research conducted by Hartley et al. (2016) suggests that RRI is often viewed negatively by researchers. Their participants described RRI as ‘another hoop to jump through’ (p8) in an already long list of top-down imposed requirements. They were unclear of the aims and purpose of RRI, considering it, instead, as a “tick-box”, buzzword, or fad. Troublingly, Hartley et al. (2016, 7-8) found strong objections to the philosophy of RRI. Participants were hostile to the notion of civil society involvement in research and believed governments should set overarching research priorities, thus shifting responsibility for the democratisation of research to a government level. In general, there was a lack of imagination, among the participants, about what RRI might look like in practice. They found it difficult to define what constitutes RRI and what values RRI might have to scientific research. Nevertheless, Hartley et al. (2016) found evidence that many researchers were already practicing RRI without recognising it as such. The

implementation of RRI would, thus, entail the re-labelling and extension of existing practices.

Hartley et al. (2016) add that training and education are vital to achieve a cultural change. They argue that researchers in social sciences and humanities are best placed to offer this training to colleagues in STEM.

Institutional change becomes more urgent and likely when RRI becomes integral at a policy level. There is a need for policy makers and research councils to adopt a standardised and coherent definition of RRI and place RRI at the forefront of policy making (Hartley et al. 2016). Indeed, despite holding research council funding with RRI requirements, the researchers interviewed by Hartley et al. (2016) displayed little knowledge of RRI or research council RRI frameworks. They did, however, make reference to other frameworks for considering the social dimensions of science.

### **EVALUATING RRI IN PRACTICE CREATES A BODY OF KNOWLEDGE**

Ways of (proposed) practicing RRI include various events and methods to include stakeholders, governance structures, improving journalism on new technologies, as well as revisiting the classics in literature and use those stories to inspire debates on new technologies. It is notable, however, that evaluations of the practices are rarely reported. Reporting evaluations, including how barriers and obstacles were overcome, is helpful to create a robust body of knowledge on the broad range of possibilities of practicing RRI (Schuijff & Dijkstra, in preparation).

### **OTHER EUROPEAN PROJECTS**

NUCLEUS is neither the only nor the first project on RRI. A review of the main findings from other projects on RRI showed that already many barriers to implementing RRI were identified such as (amongst others) attitudes to RRI, lack of clarity, or a lack in skills and resources, but RRI also leads to opportunities ranging from bringing science and society closer to creating opportunities for new networks.

### **RESPONSIBLE-INDUSTRY PROJECT**

Commencing in 2014, the Responsible-Industry Project 'intends to demonstrate how industry can work together with societal actors to integrate principles and methodologies of RRI into research and development processes' (Porcari et al., 2015, p8). The project is funded by the EU 7<sup>th</sup> Framework Programme.

Training and education in RRI will address the social dimensions of science and encourage the growth of socially responsible researchers over the long term (Hartley et al. 2016). The Responsible-Industry project contends that acceptance and up-take of RRI

rests on the diffusion of ethical culture at all levels. The project recommendations include (Porcari et al., 2015, p59):

1. Introducing social and ethical responsibility as an education subject from high school to doctoral training.
2. Introducing education and training in ethics and RRI as part of the research funding process.
3. Promote RRI as an aspect of continuous professional development for researchers and innovators.
4. Provide an online library of RRI best practice.

### **RRI TOOLS**

Between 2014 and 2016, the RRI tools project developed a ‘Training and Dissemination Toolkit on Responsible Research and Innovation. It was one of five projects specifically focussing on RRI in the EU’s 7<sup>th</sup> framework programme.

The RRI tools project identified a variety of opportunities, for researchers and institutions, presented by the implementation of RRI. These opportunities include (Smallman et al., 2015, p19-41):

1. Bringing science and society closer via: two-way dialogue and increased transparency; enabling closer collaboration between science and society; and placing stakeholders at the heart of the research and innovation process.
2. Advancing democracy by: better engaging with traditionally under-represented groups; creating more informed and engaged citizens; and developing clearer processes and guidelines for involving citizens in research.
3. Improving innovation by: increasing competitiveness and creativity in the market, and encouraging better innovations by focussing on new minds and stakeholders.
4. Improving the culture of science and scientific careers by: expanding the role of scientists in society; helping scientists feel they are making a difference; and providing new learning; training opportunities at different stages of the scientific career; and identifying new questions and target areas for research.
5. Supporting learning by: connecting research and practice; encouraging network building; and improving formal science communication.
6. Creating new opportunities for new networks between research institutions, organisations and external stakeholders.
7. Providing access to new sources of funding related to the RRI process.

Any explanation, of the slow uptake of RRI across Europe, must take into consideration the numerous barriers to its implementation. The RRI Tools project, for example, identified a range of obstacles to implementing RRI. These include:

1. Attitudes to RRI, encompassing issues relating to: lack of “buy-in” due to lack of perceivable benefits or institutional requirements; resistance to change; and the tendency toward short-term thinking.
2. The culture of science, which includes issues of: scientific outcomes being unpredictable and uncertain, thus, making it difficult to predict societal impact; the pressure upon scientists to publish, therefore, limiting opportunities to engage with RRI activities; reluctance to share data prior to publication; productivity valued over social relevance; and strong boundaries between disciplines.
3. Lack of a clear definition of and rationale for RRI and the concept of RRI being difficult to communicate.
4. Difficulties in creating and maintaining relationships between science, industry and society, given their differing interests.
5. Lack of resources, in terms of time, money, people and infrastructure, as well as an overall lack of funding for RRI.
6. A shortage or absence of skills such as, lack of expertise and training to support researchers implementing RRI and poor communication skills amongst researchers.
7. Uncertainty around who is qualified and/or responsible for defining RRI.
8. Difficulties in engaging with the public, whether due to the lack of public interest in science or motivation to get involved, or due to the difficulties in locating and/or recruiting a representative public sample.
9. The economic situation within Europe causing issues of mistrust between science and society; a lack of public funding; and increasing competition between Europe and developing economies which frames RRI as an impediment to innovation.

(Smallman et al., 2015, p44-59)

### **ENRRICH**

The Enhancing Responsible Research and Innovation through Curricula in Higher Education (EnRRICH) project is a Horizon 2020 funded project that aims to ‘improve the capacity of students and staff in higher education to develop knowledge, skills and attitudes to support the embedding of Responsible Research and Innovation (RRI) in curricula’ (EnRRich, 2015).

The EnRRICH project (2016) argues for the embedding of RRI into higher education curricula. They suggest three key design principles to facilitate the uptake of RRI in higher education:

1. Education *for* society – This involves a reflection on the purpose of education. RRI explicitly aims to align science with societal challenges. There is a need, therefore, to provide students with opportunities to engage in educational processes and

practices within societal challenges areas (e.g. health, sustainable agriculture, transport, climate change, security, etc.). This initiates a process of reflection by which educators consider the ways in which their module or program is linked to societal changes.

2. Education *with* society - This involves not only targeting social challenges but meeting societal actors' needs, values and aspirations, while tackling those challenges. HE curriculum should, thus, facilitate an interplay between academia and society whether that be through a *light approach* (classroom based learning of PE/RRI methods) or a *deep approach* (real time collaborations with social actors).
3. Education to "whole" persons – Students need to learn and develop across multiple domains:
  - Cognitive domain – knowing and understanding the complex issues of our time, and using acquired knowledge to propose and evaluate new solutions to these issues.
  - Affective domain – nurturing a sense of social responsibility.
  - Physical domain – tangible and physical expressions of cognitive and affective capacities.

### **RES-AGORA**

The RES-AGorA project launched in 2013 and is one of five projects specifically focussing on RRI in the EU's 7<sup>th</sup> framework programme. The aim of the project is to 'develop a normative and comprehensive governance framework for Responsible Research Innovation' (RES-AGorA, 2013a).

In spite of the opportunities presented by RRI, research has shown a relatively slow uptake across Europe. Observations, from the RES-AGoRA project's (2016) RRI monitoring, suggest that RRI is not a mainstreamed concept across the field of European research and innovation (see table 1). RRI is simply not a common term in the vocabularies of funding bodies, research institutions and organisations, and civil society. This is not to suggest that there has not been examples of RRI. On the contrary, the RES-AGoRA project found widespread examples of commitment to RRI. Quite commonly researchers are actively engaged in processes of RRI without actively applying the specific terminology. There is an absence, therefore, of a homogenous approach to RRI across Europe. There exists instead, a diversity of "bottom-up" responses that are greatly dependent on the social, economic, cultural and political contexts of each European state (RES-AGoRA, 2016, 118).



<b>RRI is fairly unknown</b>
Greece, Hungary, Iceland, Poland
<b>RRI is getting limited attention</b>
Austria, Czech Republic, Denmark, Finland, Germany, Lithuania, Ireland, Italy, Spain
<b>RRI is actively discussed</b>
France, Netherlands, UK

(source: RES-AGoRA, 2016, p122)

The RES-AGoRA project (RES-AGoRA, 2016, p122-124) noted, that in countries such as Greece, Hungary and Lithuania, a lack of resources, funding and experience also represent a barrier.

In order to foster a culture of RRI among researchers, RRI needs to be incentivised. Incentives aimed at motivating individual researchers such as, prizes and awards, employment opportunities and career and professional development, encourage RRI. (RES-AGoRA, 2016). For the Responsible-Industry Project (Porcari et al., 2015, p55-56), RRI can be incentivised by: rewarding best practice; introducing RRI as an evaluation criterion for the selection and funding of research; and the development and promotion of an RRI certification mark.

### **RESPONSIBILITY**

The RESPONSIBILITY project was launched in 2013 and aimed ‘to create a network of stakeholders that would adopt and diffuse a common understanding in RRI between different actors in Europe and around the globe’ (RESPONSIBILITY, 2013). It was one of five projects specifically focussing on RRI in the EU’s 7<sup>th</sup> framework programme. The project formulated a set of practical recommendations aimed at fostering and supporting RRI in various research settings.

The RESPONSIBILITY project (2016) formulated a set of practical guidelines aimed at fostering a culture of RRI among researchers. The guidelines encourage researchers to:

1. ‘Seek for external impulses and feedback’.
  - Engage with both professional and societal stakeholders.
  - Learn from and build on previous research.
  - Take an interdisciplinary approach to research.
2. ‘Get your epistemological merits out of the ivory tower’.

- Make research results accessible to all levels of society.
  - Identify and address knowledge gaps within your research area.
  - Promote the communication of your research area.
3. 'Provide Capabilities for Adaptions'.
- Consider the societal meaning and value of scientific curiosity.
  - Embrace simplification and accessibility when communicating research.

Embed reflection activities throughout the research process.

### **GREAT**

Commencing in February 2013, the GREAT project aimed to 'develop an empirically based and theoretically sound model of the role of responsible research and innovation governance'. It explored the developing partnerships between stakeholders, researchers and policymakers present within innovation networks and the ways in which these partnerships impact upon knowledge production and policy (GREAT, 2013). It was one of five projects specifically focussing on RRI in the EU's 7<sup>th</sup> framework programme

### **RRI-PRACTICE**

RRI-Practice project is a Horizon 2020 funded project launched in 2016. It aims to 'bring together a unique group of international experts in RRI to understand the barriers and drivers to the successful implementation of RRI both in European and global contexts; promote reflection on organisational structures and cultures of research conducting and research funding organisations; and identify and support best practices to facilitate the uptake of RRI in organisations and research programmes' (RRI-Practice, 2016a).

### **ENGAGE2020**

Launching in 2013, Engage2020 is an EU 7<sup>th</sup> Framework funded project which aims to 'increase the use of engagement methods and policies by mapping what is practiced and spreading awareness of the opportunities amongst researchers, policy makers and other interested parties' (Engage2020, 2013).

The Engage2020 (2015, 2) project suggests, in regards to public engagement, there is a need to:

1. Establish, and monitor the impact of, civil society councils which allow civil society to have a voice in research agendas in the EU.
2. Establish platforms and competences centres which: support public engagement networks; connect researchers and citizens; and support PE activities with practical expertise.

3. Bridge the gaps between disciplines by establishing new research structures which enable interdisciplinary, problem oriented, and community related research.

Establish contact points for citizens interested in actively taking part in research.

By adapting the Engage2020 project (2015, 1-2) public engagement recommendations for policy makers, it can be argued there is a need to:

1. Put RRI at the forefront of policy making.
2. Establish national institutions and infrastructures focussed on RRI.
3. Implement codes of conduct to support RRI in the policy making process.
4. Introduce long term follow up and evaluation of RRI outcomes.
5. Formulate standardised procedures on public involvement with research so as to extend stakeholder involvement beyond pressure groups.
6. Include “societal impact” as a criterion of research programmes.
7. Include civil society representatives in programme boards and committees.

At a policy level, and indeed an institutional level, it is imperative that funding is available for RRI activities. Again adapting the recommendations of Engage2020 to the RRI context, there is a need to provide funding structures and incentives that are supportive of RRI. RRI should be a mandatory element of problem oriented research and funding bodies should include RRI outcomes among the criteria for the evaluation of research projects.

By adapting the Engage2020 (2015, 3) public engagement activities, it can be argued that:

1. Actors at all levels need to build their capacity in RRI related skills and methods.
2. The inclusion of RRI in the curricula of higher education institutions and secondary schools should be encouraged.
3. Interdisciplinary collaboration should be encouraged.
4. Dedicated multidisciplinary programmes of RRI research should be introduced.
5. RRI journals and conferences should be established.

### **PE2020**

Beginning in 2014, PE2020 is a three year EU 7<sup>th</sup> framework funded project aimed at identifying, analysing and refining innovative public engagement tools and instruments for dynamic governance in the field of Science in Society.

The PE2020 project suggests establishing an “action plan” for institutional change. The project’s five step plan acts as a useful manual to instigating institutional change. Although originally concerning public engagement activities, the plan can be developed as follows:

1. Develop an action plan aimed at ‘identifying, testing and progressively stabilising new practices and new institutional arrangements’. The action plan should include a set of objectives, such as: embedding RRI in institutional strategies; creating a dedicated RRI unit; ensuring adequate resources; capacity building; promoting RRI culture; providing support to researchers; and establishing RRI networks (PE2020, 2017b, no pagination).
2. Establishing a team who are institutionally responsible for the action plan, ensuring they are well resourced and supported by top management (PE2020, 2017b).
3. Assessing current RRI procedures and practices adopted by the institution, as well as gathering staff attitudes towards RRI (PE2020, 2017b).
4. Combining top-down (engagement of management) and bottom-up (engagement with staff) approaches to structural change (PE2020, 2017c).
5. Demonstrating the usefulness of RRI to management so as to allow RRI to take root within the organisation (PE2020, 2017c).

The project also emphasises the importance of the ongoing involvement of all research and teaching staff. Again developing the project’s strategies to the RRI context, institutional change necessitates:

1. Regularly communicating RRI at all institutional levels.
2. Organising opinion polls, focus groups, surveys and workshops aimed at gathering information on RRI activities and attitudes.
3. Awareness raising events, such as social events, exhibitions, leaflets, public meetings and conferences.
4. Establishing RRI networks or mobilising existing ones.
5. Establishing RRI awards and recognitions (PE2020. 2017d).

Additionally, there exists barriers related specifically to the execution of public engagement activities. Research conducted by the PE2020 project (2017a) suggests that public engagement is afforded only a marginal role within research institutions. At an institutional level, there is a lack of recognition for public engagement activities in terms of rewards and career advancement. This is compounded by a lack of managerial support for researchers who promote or participate in public engagement activities. At a cultural level, there is a widespread perception that public engagement is time consuming and unnecessary.

### **MAINSTREAMING COMMUNITY UNIVERSITY RESEARCH PARTICIPANTS**

These guidelines are an initiative of the UNESCO Chair in Community Based Research and Social Responsibility in Higher Education, under the project “Mainstreaming Community

University Research Partnerships” (CURP), supported by International Development Research Centre (IDRC), Canada (UNESCO, 2015).

The Mainstreaming Community University Research project’s (UNESCO, 2015) guidelines to institutionalising socially responsible research can also be adapted to the RRI context. These guidelines suggest establishing an institutional “structure” to support, what they refer to as community university research partnerships. These guidelines can also be applied to RRI. They advise institutions to:

1. Look for favourable national policies that endorse RRI or advocate such ideas.
2. Identify institutional policies oriented toward RRI.
3. Consult with internal and external stakeholders so as to establish a common platform for an informal exchange of ideas and perspectives on such a partnership.
4. Identify funding incentives at institutional/national levels.
5. Create an institutional structure aimed at promoting, facilitating, encouraging and supporting research partnerships between academics and communities.
6. Operationalise the structure
  - Decide what kind of governance structure e.g. co-governance by institution and community, sole governance by the institution etc.
  - Put in place staff responsible for the execution of duties.
  - Appoint an appropriate leader.
  - Mobilise funding and resources.
7. Clearly demarcate the functions/activities the structure is expected to perform.
  - Devising modes of integration of RRI within academia.
  - Partnering with local civil society organisations.
  - Capacity building of students/staff in RRI.
  - Building linkages with local/national networks promoting RRI.
  - Prepare annual plans and budgets in line with the functions and activities it is expected to perform.
8. Creating mechanisms for monitoring, evaluating and reporting RRI

### **MORRI**

The Monitoring the Evolution and Benefits of Responsible Research and Innovation project (MoRRI) is a EU funded project that aims to ‘provide scientific evidence, data, analysis, and policy intelligence to support directly Directorate General for Research and Innovation (DG-RTD) research funding activities and policy making activities in relation with Responsible Research and Innovation’ (MoRRI, 2014).

It is clear that there is a need to monitor and evaluate RRI within research institutions and organisations. The Monitoring the Evolution and Benefits of Responsible Research and Innovation project (MoRRI) produced a set of relevant metrics and indicators to be used in RRI monitoring (MoRRI, 2015). They are as follows:

#### *Gender Quality*

1. Share of Research Performing Organisations (RPOS) with gender equality plans
  - Has the organisation implemented a gender equality plan or equivalent?
2. Share of female researchers by sector
  - Indicating the (under)representation of women in research and its differentiation by sectors.
3. Share of research funding organisations promoting gender content in research
  - When allocating research and development funding, did the organisation include the gender dimensions in research content?
4. Dissimilarity index
  - Theoretical measurement of the percentage of women and men who would have to move to another field of science to ensure a gender balanced distribution across fields.
5. Share of RPOs with policies to promote gender in research content
  - Does the organisation include a gender dimension in research and innovation content of programmes, projects and studies?
6. Glass ceiling index
  - Compares the proportion of women in grade A positions to the proportion of women in academia.
7. Gender wage gap
  - The observed unadjusted difference in average gross annual earnings of male and female paid employees as a percentage of the average gross annual earnings of male paid employees.
8. Share of female heads of research performance organisations
  - Specify the gender of the person who is head of the organisation.
9. Share of gender-balanced recruitment committees at RPO
  - How many recruitment committees for leading researcher positions did the organisation set up for the recruitment of researchers? How many reached the threshold of 40% of the under-represented sex?
10. Number and share of female inventors and authors
  - The analysis of the number and share of female inventors and authors/researchers in different scientific and technological fields / disciplines, across EU28 and associated countries, over time, shows the representation of women in the respective fields and sectors.

### *Science Literacy and Science Education*

1. Importance of societal aspects of science in science curricula for 15-18 year olds.
  - To what extent societal aspects of science and technology are mentioned in the curricula as important aspects that teachers should consider and teach.
2. RRI-related training at RPOs
  - To what extent RRI-related aspects, thus ethical, economic, environmental, legal and social aspects, are part of the education of young researchers.
3. Science communication culture
  - The degree of institutionalisation, political attention, scale and diversity of actor involvement, traditions for popularisation within academia, public interest in science and technology, and training and organisational characteristics of science journalism.
4. Citizen Science Activities in RPOs
  - Does the RPO conduct citizen science projects? How many in the past 3 years? How many people participated? What are the outcomes?

### *Public engagement*

1. Models of public engagement in science and technology decision making
  - The degree of formalized structures / mechanisms at the national level for involving citizens in decisions around science and technology, and the extent to which citizens are de facto involved in making decisions.
2. Policy-oriented engagement with science
  - Measuring actual engagement practice among citizens. Do they attend public meetings or debates about science and technology? Do they sign petitions or join street demonstrations on matters of nuclear power, biotechnology or the environment? Do they participate in the activities of a non-governmental organisation dealing with science and technology related issues?
3. Citizens preferences for active participation in science and technology decision making
  - What is the level of involvement citizens should have when it comes to making decisions about science and technology?
4. Active information search about controversial technology
  - Degree of active information search among citizens have heard and talked and/or searched for information, have heard but not talked and/or searched for information, have not heard.
5. Public engagement performance mechanisms at the level of research institutions.
  - The level of public engagement mechanisms implemented within universities and research institutions.

6. Dedicated resources for public engagement
  - The budget share reserved for PE activities within universities and research institutions.
7. Embedment of PE activities in the funding structure of key public research funding agencies
  - Whether a country's largest and most prominent research funding bodies allocate competitive funding to activities where PE elements explicitly are targeted.
8. Public engagement elements as evaluative criteria in research proposal evaluations
  - Whether a country's largest and most prominent research funding bodies take PE elements into account for the evaluation of research and innovation projects.
9. R&I democratization
  - The extent to which mechanisms for efficiently involving citizens in decisions around R&I at the national level are in place; and civil society organisations are formally involved in decisions about R&I at the national level.
10. National infrastructure for involvement of citizens and societal actors in research and innovation
  - The degree of development of the national infrastructure for involvement of citizens and societal actors.

### *Ethics*

1. Ethics at the level of universities
  - The level of mechanisms that should safeguard the observance of ethical standards in research ethics and research integrity that are implemented within universities.
2. National Ethics Committees Index
  - Measures existence, output, impact and quality of NECs by measuring the publication of work results, the organisation of public events, classification of existing public involvement mechanisms, involvement of target groups and the existence and quality of websites.
3. Research Funding Organisations Index
  - Captures the input, output and context of mechanisms dealing with ethics and societal implication or research in public and private research funding organisations.

### *Open Access*

1. Open Access Literature



- The number and share of publications that have free online accessibility,
- 2. Data publications and citations per country
- 3. Social media outreach/take up of Open Access Literature and open research data
  - How OA European publications and data publication are being disseminated across social media tools.
- 4. Public perception of Open Access
  - Public perception of online free availability of the results of the publicly funded research in the EU.
- 5. Funder mandates
  - If and how many funder mandates for open access publishing there are in the EU.
- 6. RPO support structures for researchers as regards incentives and barriers for data sharing
  - Practices and perceptions of the incentives and barriers for and against data sharing in RPOS.

#### *Governance*

1. Composite indicator of RRI governance
  - Bring together indicators on gender, PE, open access and ethics to provide an evaluation of member state governance systems.
2. Existence of formal governance structures for RRI within research funding and performing organisations.
  - Whether RRI is seen as priority issues for organisations and is supported by a formalised governance structure.
3. Share of research funding and performing organisations promoting RRI
  - How widespread the RRI framework is through national research and innovation systems by determine the share of research funding and RPOs promoting the RRI framework.

## **APPENDIX C: RECOMMENDATIONS FROM PHASE 1 NUCLEUS**

Each element of the NUCLEUS work in Phase 1 produced a set of recommendations. Reproduced below are the recommendations as reported in the deliverables for each respective element. This set of recommendations informed the “considerations” as discussed in Chapter 2 of the Implementation Roadmap

It should be noted that although these recommendations were considered in developing the Roadmap they were not necessarily adopted in the final recommendations from Phase 1.

### **C. 1 RECOMMENDATIONS FROM THE EUROPEAN INTERVIEW STUDY**

Regarding Science for Society, participants considered it important to address societal problems in their research. However, they also feared to lose scientific autonomy and productivity if societal impact is indiscriminately required for all fields, types and stages of research. Research directed at understanding and early phases of the research process were seen as not suitable for being subjected to advice from society. Therefore, RRI should be implemented with moderation in order to prevent an antagonistic response in the scientific community. However, the drawback is that societal demand only gets heeded after a lot of resources have already been spent on a line of research which then might be rejected eventually. One way to prevent premature closure of research lines is to support a diversity of research upstream. Society can effectively intervene in later stages when uncertainty of outcomes is reduced. Also, to anticipate social resistance to technologies, analysis of their social context is relevant. This can be accomplished early on by scientists collaborating with technology-assessing disciplines. Therefore, the following recommendations for RRI implementation suggest themselves:

#### **GENERAL**

- Appeal to the desire of scientists to solve societal problems and to do socially relevant research.
- Maintain fundamental research not directed at societal aims and grant room for exploratory research.
- Do not privilege or block specific research lines upstream but pursue a plurality of research lines to widen the leeway for societal choice and to enable serendipitous findings.
- Take societal demands into close consideration in research stages approaching practical use.
- Anticipate societal resistance beforehand by instigating an interdisciplinary dialogue with social groups.

#### **FOR THE NUCLEI**

- Communicate to scientists the opportunities of RRI for solving societal problems and improving lives.
- Be aware of differences regarding demand-driven research between research fields, types and stages.
- Bring researchers producing technology and assessing its societal impact together for anticipating possible societal resistance.

#### **SCIENCE WITH SOCIETY**

- Engagement possibilities for dissemination were widely recognised among study participants. Knowledge of the variety of engagement formats, especially more interactive ones seemed to be lacking and should be improved. Stakeholders were seen as an important source of information about demands but their biased interests were seen as obstacles to a more substantial involvement. A possible remedy is the inclusion of a variety of different stakeholders who bring different interests to bear so that research is not skewed by singular interests. Engagement of lay people was said to be hindered by their lack of knowledge about scientific topics. Educating them beforehand might make their influence more acceptable to scientists. In general, the design of the engagement process is a major concern of participants and needs clarification and conceptual work to alleviate worries. Regarding different research fields, applied research with relevance to non-scientists was seen as most suited for engagement.

#### **GENERAL**

- Communicate benefits of external engagement, e.g., identification of needs, anticipation of societal impact, but also raise interest and support for science.
- Prevent one-sided stakeholder influence by appeal to a variety of differently biased stakeholders; do not only rely on industry.
- See to it that influences from all social actors come from a broad range of values and interests so that an inclusive socially responsible research agenda can emerge.
- The design of the engagement process needs clarification and conceptual work.
- Engagement should concentrate on applied work.

#### **FOR THE NUCLEI**

- Enhance researchers' knowledge of engagement possibilities, especially of more interactive formats.

- To overcome the obstacle of unbalanced stakeholder influence, identify stakeholders with different interests regarding a certain research project or a field of research that is prominent in your institution; pay special attention to non-industry stakeholders.
- Explore the design of an engagement process that is acceptable to scientists, e.g., by conducting a survey or a focus group among researchers.

### **RRI AS DEFINED BY THE EUROPEAN COMMISSION**

Although participants supported conducting research in accordance with societal needs and values, they often focussed on either public engagement or research ethics to achieve this. Awareness of the different features of RRI should be fostered in the scientific community. Also, in order to be useful in practice, the definition of RRI needs to become more concrete and include, for example, details on the engagement process (see above). To shoulder the additional burden created by RRI implementation (administration, communication etc.), respondents strongly emphasised the need for funds, incentives and support. It also became clear that RRI is not a concern in countries where science operates under poor funding opportunities and lacking support.

### **GENERAL**

- Provide information and tools clarifying what the RRI concept means for the scientific community.
- Elaborate and specify what RRI means in practice.
- Keep the additional effort required from scientists for RRI at a minimum.
- Identify effective and resourceful ways researchers can incorporate RRI into current structures.
- Create funding opportunities, career opportunities, incentives and support structures (e.g. for communication) for RRI.
- Be aware of national differences in RRI prioritisation.

### **FOR THE NUCLEI**

- Organise an event that aims at informing Leading Researchers and Research Executives about RRI and to familiarize them with the concept and its benefits.
- Identify role models at your institution who already engage in RRI and bring them together with other interested scientists for an exchange about how RRI might be implemented in practice.
- Foster a dialogue among institutions, funding agencies and scientists how RRI can be incentivized, e.g., by organising a debate about how RRI can be acknowledged in calls for proposals or via scholarships.

## **C.2 RECOMMENDATIONS FROM THE CULTURAL ADAPTATION STUDY**

### **FOR GOVERNMENTS**

- Work towards open and innovative research with minimum levels of regulations.
- Continue efforts to raise levels of scientific literacy. ☐ Increase trust in science by installing (soft) policy measures that promote research ethics and open communication about research findings.
- Share knowledge and research experiences with (developing) countries, for example by stimulating open access and open communication.
- Develop a knowledge-base of best practices of responsible research and innovation.

### **FOR RESEARCH INSTITUTES**

- Play a leading role in developing social responsibility and community-oriented research.
- Increase trust in science by stimulating research ethics, attention to impacts of research and open communication about all research findings.
- Create and facilitate means, such as platforms, to exchange knowledge and best practices on science communication and engagement.
- Use incentives to embed responsible research and innovation in universities and research institutes.
- Recognize and facilitate role models.
- Stimulate equal access to universities

### **FOR RESEARCHERS**

- Acknowledge the efforts of researchers regarding science popularization, science education and engagement.
- Train researchers to engage with the public and in science communication.
- Educate the public to enlarge the numbers of researchers; to raise awareness of research findings; and to increase trust in science.
- Raise awareness and train researchers in research ethics.

Responsible research and innovation is aiming to improve the science-society relationship. By looking at concepts, policies and practices in China and South Africa, the two cases in this study provided an enriched insight in aspects playing a part in the science-society relationship. The mixed-methodology led to the collection of more diverse data to build the cases. However, qualitative findings, although allowing for greater comprehensiveness, never can be conclusive. The Implementation Roadmap will include findings from the Field trips and the European interview study as well

### C.3 RECOMMENDATIONS FROM THE FIELD TRIPS

In summary, the main recommendations put forward from the Field Trips were:

- **Relationship management between universities and societal actors**  
Barriers between universities and societal actors could be overcome through dedicated personnel who bring groups together. In addition, opportunities that support researchers and societal actors to inhabit each other's working environments or in neutral spaces can aid the creation of long lasting and fruitful partnerships.
- **Incentives for embedding RRI in research**  
Funding schemes and measurements of research success all provide opportunities for RRI to be embraced and embedded. In addition, we also need to consider the incentives societal actors require to engage with RRI, for example voucher schemes that support industry to develop solutions for societal benefit.
- **The language of RRI**  
The NUCLEUS project needs to provide a clear definition of how RRI can be implemented by researchers, institutions and societal actors.
- **Self-Assessment**  
There is a clear need for the partner Nuclei to understand what systems already support RRI within their institution and identify what opportunities exist at a local level to embed RRI.
- **Training**  
Training will be an important tool for establishing RRI within institutions and will be required in a variety of context beyond simply supporting others in understanding what RRI is.
- **Local Knowledge**  
The Field Trips have generated valuable 'on the ground' local knowledge of initiatives that are already established and how to bring about change and influence. This information will be vital for the next steps of the NUCLEUS programme as the Nuclei are established.

## APPENDIX D: TOOLS AND METHODS

### D.1 NUCLEUS: SWOT ANALYSIS

Organisations can have many different characteristics and operate in widely differing contexts. These characteristics and contexts can either help, hinder, or be neutral to achieving common goals. Recognizing these characteristics and how the organisation can be affected by its environment is important information to navigate towards goals.

A SWOT analysis can be helpful in identifying the factors of, in and outside an organisation that can affect the realisation of goals. SWOT stands for *strengths, weaknesses, opportunities and threats*. Analysing these four factors can assist in developing a plan to work towards the goals of the Nucleus project. The results of the analysis are often presented in a matrix, but other forms can be used as well.

The Nuclei will undertake the SWOT analysis of strengths, weaknesses, threats, and opportunities to support them **identify key factors that are favourable and unfavourable to achieve the objective of embedding of RRI in the governance and culture of the Nuclei.**

The following characteristics are adopted from

- Strengths: Things that are good now – maintain them, build on the and use as leverage
- Weaknesses: characteristics that place RRI at a disadvantage to others
- Opportunities: Elements in the supporting external environment that the Nucleus could capitalise on to embed RRI.
- Threats: Elements in the external environment that could inhibit the successful implementation of RRI.

In the SWOT analysis, it is important to base the assessment on sources, such as, policy documents, vision statements, or interviews. Strengths and weaknesses are characteristics; they describe what an organisation, or Nucleus, is (not) known for. Opportunities and threats identify factors that can positively or negatively influence the future of an organisation. Opportunities and threats can be both internal to a complex organisation as well as external, e.g. new evaluation criteria or changes in funding. Identified SWOTs should be realistic and relate to the short to midterm. Try to formulate the identified SWOTs concisely but accurately; the goal is to get a clear overview to plan future actions on.

NUCLEUS SWOT ANALYSIS		
	Internal factors to RRI, i.e. characteristics of current organisation	External factors to RRI that might influence the organisation
Positive factors to the implementation of RRI	<b>STRENGTHS</b> <ul style="list-style-type: none"> <li>○ What is going well and should not be changed?</li> <li>○ What is going well, yet can be improved?</li> <li>○ What do others perceive as your strengths?</li> <li>○ What can you do or realise that other stakeholders cannot? What sets us apart from similar institutions or institutions in the other cells?</li> <li>○ Is there any RRI expertise that people consult you for?</li> </ul>	<b>OPPORTUNITIES</b> <ul style="list-style-type: none"> <li>○ Which factors within your organisation can be beneficial for RRI in your institute?</li> <li>○ Which factors outside your institute can be beneficial for RRI?</li> </ul>
Negative factors to the implementation of RRI	<b>WEAKNESSES</b> <ul style="list-style-type: none"> <li>○ What is not going as well as we would like, yet we will not try to change?</li> <li>○ What is not going as well as we would like and will we try to improve?</li> <li>○ What do others see as our weaknesses?</li> <li>○ For what will others never come to us? For which type of expertise or skill will other stakeholders always consult someone from outside our organisation?</li> </ul>	<b>THREATS</b> <ul style="list-style-type: none"> <li>○ Which factors within your institution may restrict the implementation of RRI?</li> <li>○ Which factors outside your organisation can be harmful for RRI your organisation/your Nucleus?</li> <li>○ What factors outside your institution would negatively impact the successful implementation of RRI?</li> </ul>



## D.2 NUCLEUS: SELF ASSESSMENT TOOL



# RRI SELF-ASSESSMENT TOOL

### INTRODUCTION

This document contains the NUCLEUS Self-Assessment Tool which is designed to support the partners who will host one of the 10 Embedded Nuclei investigate and understand the current state of the RRI landscape within their institution. Inspired by the [EDGE Tool](#) but extended to include RRI, this tool will provide each of the 10 institutions with a 'snapshot' of the RRI landscape in the implementation process.

### THE AIM AND USE OF TOOL (AND EMERGING DATA)

The tool should help you not only to assess what RRI activity there is at your institution but also to assess what information there is about RRI. Remember that what NUCLEUS recognises as "RRI" may take different forms and different labels in different situations.

The data emerging from the self-assessment tool will provide you, your mentor and Embedded Nuclei colleagues with the essential information needed to establish the starting point for your institutions RRI journey. It will be a reference point from which you can develop and build the Embedded Nucleus in your institution and a useful means of reflecting and tracking progress of the NUCLEUS unit during the Implementation Phase of the project.

### ABOUT THE NUCLEUS RRI SELF-ASSESSMENT TOOL

- As mentioned, this is a self-assessment tool. It does not provide a definitive assessment of RRI at any particular institution
- The tool is designed to be part of the process of developing the Embedded Nucleus at each institution. The tool will support each Embedded Nucleus investigate what aspects related to RRI exist in each institution. The tool therefore will not always produce definite answers. In fact, it is expected to produce as many questions as answers.
- The NUCLEUS tool is a matrix that assesses aspects of an institution against features of RRI. The range of features has been reduced as far as possible so that more space is created for discussion. A single question is applied to each combination of institutional aspects and RRI features:
- The tool asks you to "Assess each combination of feature/aspect on a scale of 1-4". These scores relate to the levels given in the Action Framework of the Implementation Roadmap.

**TIP** You might also want to refer to the "[Self-Reflection Tool](#)" produced by RRI Tools. They also published it as a little red book (which you may find more user-friendly). This has a chapter on each of the RRI features and a series of questions to help you think about RRI at your institution. But please keep in mind that our NUCLEUS approach is less focused on the 5 keys applied by this toolkit, but focuses more on the interrelatedness of universities in a context with other stakeholders.



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#### USING THE NUCLEUS RRI SELF-ASSESSMENT TOOL

It is the responsibility of each NUCLEUS partner representing an Embedded Nucleus to complete the self-assessment using the tool. A series of meetings will also be set up with your Mentor. Should you wish to seek support from your mentor during the completion of this exercise, please liaise with him/her.

*Step 1:* Populate the categories as per listed in Part 1 and Part 2 of the tool with concrete examples and references. Please insert weblinks etc. where possible. Complete the categories as much as possible and identify any gaps in your knowledge.

*Step 2:* If you do not have the necessary information to complete the self-assessment tool then you need to take note of what is missing and seek it out and complete the self-assessment.

*Step 3:* Highlight areas where evidence of RRI is stronger and areas where it is less evident. Remember the language or use of the term RRI does not have to be explicitly used for it to exist.

*Step 4:* The tool is designed to prompt discussion. It is designed to start the process of identifying where the current gaps are, the departments/structures and resources that could be further developed and the challenges in making this happen.

*Step 5:* Arrange meetings with your mentor, discuss each category and collectively decide on the rating for each category. Refer to section 'Rating RRI in your institution'

**TIP** *The aim of this tool is to start a discussion, not to end one.*



## NUCLEUS

### RATING RRI IN YOUR INSTITUTION

The descriptors for each score are kept as simple as possible and intended as guidelines. The circumstances and culture at each institution will be different so it is important that you consider how the simple descriptors translate for your own institution.

In particular, you should consider what a higher score would look like. For example, if you give your institution a score of 2 in one part of the matrix, what would you need to do for the score to be a 3 and how could you show that a 3 had been achieved?

Considering the higher scores in this way will give you the basis (in conjunction with other tools such as SWOT and Stakeholder Analysis, Theory of Change) for devising local action plans with measurable outcomes.

#### GUIDE FOR EACH SCORE:

1. "Establishing" (including weak or not at all)
2. Some but irregular: not formalised, widespread or properly supported
3. Good with some degree of formalisation, support and spread across institution
4. "Embedded"

### NEXT STEPS, SUPPORT AND DEADLINES

The completion of this tool will be the basis for the start of the implementation phase for your institution's Embedded Nucleus. It will also provide your mentor with the critical information needed to support you.

The tool can be used to help you survey the RRI landscape at the start of the implementation process. Together with regular monitoring and evaluation you can also use the tool to check on progress. A timeline for implementation is provided in the Implementation Roadmap

For more information on the Embedded Nuclei, please contact WP Leaders, Dublin City University:

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## THE SELF-ASSESSMENT TOOL...LET'S BEGIN

### PART 1

Assess each combination on a scale of 1-4 where 1 is “establishing” and 4 is “embedded”.

NUCLEUS Self-Assessment Tool Part 1		Features of RRI <sup>(1)</sup>			
		Public Engagement	Gender Equality	Open Access and transparency	Ethics
Aspects of the institution	<b>Structures and hierarchies</b> (eg. Committees, line management, people with specific responsibilities etc.)				
	<b>Policies</b> (Written policies including mission statements, strategic plans etc.)				
	<b>Communication</b> (Consider both external and internal communication of RRI)				
	<b>Staff</b> (eg. rewards, career progression, promotion, workloads etc.)				
	<b>Students and curriculum</b> (eg specific courses, modules, summer schools etc.)				

**TIP** The more examples you can list in each cell the better. The cells can be expanded to fit all the relevant information.



#### HOW TO SCORE:

The **Action Framework** in the Implementation Roadmap sets out three levels for describing how embedded RRI is in an institution. These can help you enter scores (1-4) into the matrix:

- **LEVEL A - ESTABLISHING RRI** – The institution has a portfolio of initiatives and processes that engage internal and stakeholders. Evidence is demonstrated of taking measurable steps to introduce RRI practice to these existing initiatives and processes that impact a limited number of internal groups, cell(s), or particular stakeholder groups. (Score 1)
- **LEVEL B - ADVANCING RRI**– The institution develops formal systems and processes to encourage RRI practices with internal and external stakeholders. This involves a more systemic change that affects wider internal communities and/or involves a number of stakeholders and is reflected in internal policies at departmental or section level. (If you think this is weak, score 2. If you think this is strong, score 3)
- **LEVEL C - EMBEDDING RRI** – The institution reflects the needs of societal actors needs and integrates them into the strategic plans and policies as well as in the values and actions of the academic and administrative practices. (Score 4)

The **General Action Plan** in the Implementation Roadmap sets out five Steps for implementation which are common to all Nuclei. Step 4 is “Continuous Action”. Use this Self-Assessment Tool not only to start the process of implementation but also as part of the continuous action of reflecting and responding to that process. Together with regular monitoring and evaluation you can use this tool to assess progress.





## NUCLEUS

### NOTES ON PART 1:

The “features” at the head of each column in the matrix are 4 of the 5 RRI “keys” used by the EC.

**Public Engagement** fosters R&I processes that are collaborative and multi actor: all societal actors work together during the whole process in order to align its outcomes to the values, needs and expectations of society.

**Gender Equality** is about promoting gender balanced teams, ensuring gender balance in decision-making bodies, and considering always the gender dimension in R&I to improve the quality and social relevance of the results.

**Open Access** addresses issues of accessibility to and ownership of scientific information. Free and earlier access to scientific work might improve the quality of scientific research and facilitate fast innovation, constructive collaborations among peers, and productive dialogue with civil society.

**Ethics** focuses on (1) research integrity: the prevention of unacceptable research and research practices; and (2) science and society: the ethical acceptability of scientific and technological developments.

The five “keys” give direction to the EC’s policy on RRI: Ethics, Gender Equality, Open Access, Public Engagement and Science Education. NUCLEUS recognises these as a valuable part of the RRI landscape and takes into account the findings and recommendations of RRI projects which, in a large majority, follow the “key” approach.

However, while recognising the keys as common landmarks in the RRI landscape a major aspect which distinguishes the NUCLEUS approach from other RRI projects is that it is less focused on the five keys and more oriented towards co-responsibility with and responsiveness to different stakeholders. Instead of focusing on the keys as the sole indicators of RRI, the NUCLEUS concept reflects the idea of interrelations among different institutions and frameworks.

**This makes it all the more important that you complete Part 2 of this tool which focusses on the cells that are central to the NUCLEUS approach**



## PART 2

The guiding principle in the NUCLEUS project is that cells work together in an organism. In the process of developing an embedded Nucleus, it is important that self-evaluation includes considering how the university “cell” works with the other cells.

- a. Using specific examples show how the university cell works with other cells.
- b. Are there any examples where three or more cells work together (ie your own university cell with two or more other cells)?

NUCLEUS Self-Evaluation Tool Part 2		Examples
<b>Cells</b>	Public engagement	
	Civil Society	
	Media	
	Economy	
	Policy making	

### **D.3 THEORY OF CHANGE APPROACH FOR EMBEDDED NUCLEI**

The guidance notes below outline how Embedded Nuclei partners can use the Theory of Change approach (ToC) to develop a clear, concise, outcome driven approach to realise the primary goal of embedding RRI into the governance structures of their institutions.

#### **WHAT IS THEORY OF CHANGE?**

Theory of Change is an outcome-based approach which focuses on applying critical thinking to identify the short-term and intermediate steps that need to occur to realise the long-term result or outcomes which support change (Vogel, 2012). It supports groups logically map out the connections between activities or interventions, outputs and outcomes that occur in each step along the way (Talpin et al, 2013).

Theory of Change is both a process and a product. It is the process of on-going critical reflection and learning which produces insights that can support development of strategy design, implementation as well as supporting evaluation and impact assessment through the diagrams and narratives (James, 2011; Vogel, 2012). By continually reflecting upon, monitoring and updating this process and items at regular intervals, this approach supports the ongoing implementation decision making as well as the monitoring and evaluation process.

#### **WHY ARE THEORIES OF CHANGE USEFUL FOR EMBEDDED NUCLEI?**

- The Theory of Change has evolved from the field of monitoring and evaluation of social change and to people using it for creating more complex, systematic or networked based approach to societal change (James, 2011). This context is similar for the Embedded Nuclei as they aim to create a networked based culture change approach, catalysing changes inside and outside the university setting.
- The NUCLEUS tools adopted to assess the current RRI landscape in designated host institutions revealed the cultural and structural diversity. The Theory of Change supports the 10 institutions to have a shared general approach, with each Nucleus focused on achieving the same ultimate goals. The flexible nature of the model means however that the 10 institutions can develop evidence-based measurable action plans with feasible interventions that directly supports implementation in the particular institution.
- The Theory of Change encourages on-going questioning of what might influence change. This tool can be used therefore to support WP7 develop a suite of measurable indicators that will encourage change during the Implementation Phase (WP5).
- RRI as revealed in WP3 + WP4 analysis is a term not commonly known amongst stakeholders. The Theory of Change visualisation can therefore help Embedded Nuclei partners explain the goals and impact of the Nucleus unit in a clear and concise way.



- The Theory of Change will be developed with support from the NUCLEUS mentors. It will build upon the data from the NUCLEUS Self-Assessment Tool and from the Stakeholder Analysis and SWOT analysis.
- The NUCLEUS mentors can facilitate and support the mentees build the initial Theory of Change by firstly engaging in detailed discussion and then using the online tool [www.mindmeister.com](http://www.mindmeister.com) to design the outcomes graphically. These graphs will be accompanied by a narrative, summarising the graphic into clear concise action plan. The initial graphic and narrative plans represent the first phase of the implementation plan.
- As detailed in the NUCLEUS mentoring policy, monthly meetings between with mentees and mentors will take place (mostly via online meetings). During these meetings, the Theory of Change graphic will be used as focal point for discussion on learnings and progress. Should any changes be required to achieve the goal, the Theory of Change has the flexibility to adapt to these dynamic contexts. The visualisation can also be adapted.
- The following steps outline the key principles in relation to developing a Theory of Change. These steps will be adopted by the 10 Embedded Nuclei during the Implementation phase
- Further detail on these steps will be outlined in the Organisational Manual (D5.1)

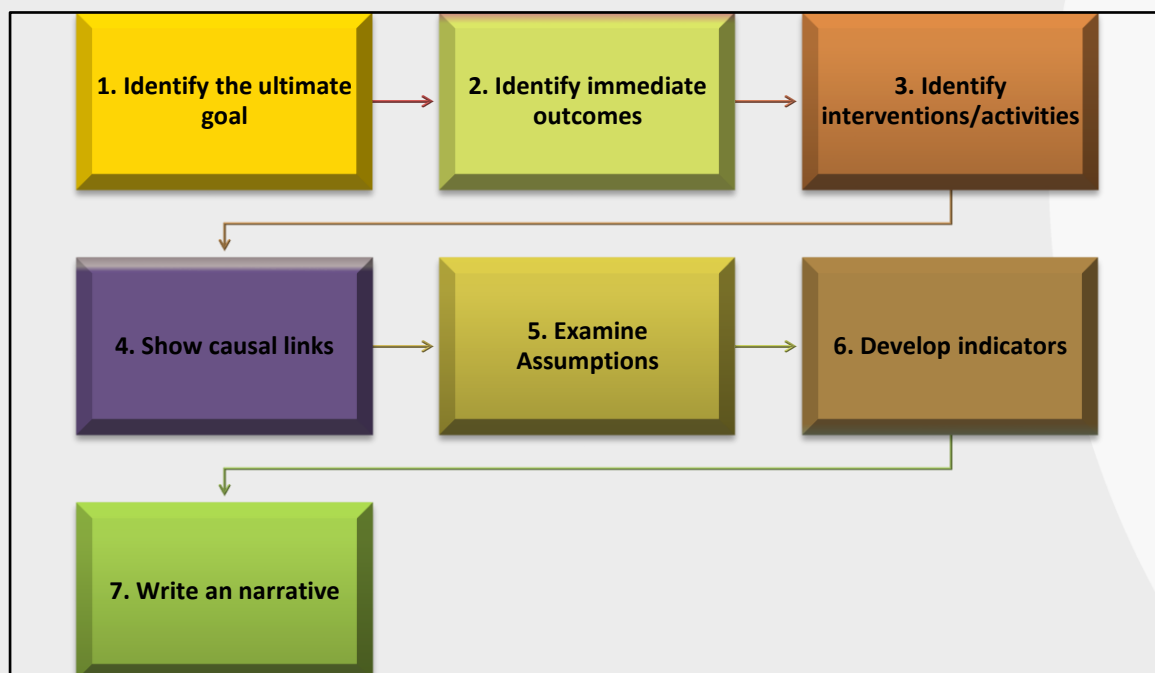


Figure 2: STEPS for NUCLEUS ToC

#### D.4 EXAMPLE – EMBEDDED NUCLEUS ACTION PLAN

This is an example template only. Each Embedded Nucleus will populate their own Action Plan template which is based on the Actions and interventions outlined in the Action Framework for Embedded Nuclei. The specific initiatives, processes and procedures undertaken will be unique to each institution and will be subject to the level at which they start (level A – Establishing RRI, Level B – Advancing RRI, Level C- Implementing RRI)- which is informed by the data emerging from the context mapping exercises.

<b>Embedded Nucleus Action Plan -EXAMPLE</b>					
<b>Institution Name</b>	NUCLEUS University				
<b>Embedded Nucleus Profile</b> <i>Max 200 words</i> <b>Narrative informed by SWOT/Self-Assessment</b>	<p>NUCLEUS university is <b>situated</b> in the heart of Responsible City, the second largest city in Commission.</p> <p>Established in 2020</p> <p>The <b>primary focus of research</b> here is .....</p> <p>Current <b>institutional mission/focus</b>.....</p> <p>Our current <b>strengths for embedding RRI</b> - engagement with stakeholders internally/externally?</p> <p>Current <b>challenges</b>.....</p> <p><b>Opportunities</b> with NUCLEUS project...</p>				
<i>Base level (Level A, B or C)</i> <i>(according to the NUCLEUS self-assessment)</i>	<p>A (WITH SOME ELEMENTS OF B)</p> <p>The institution engages with X, X, X stakeholder but this is not done in a systematic way. There is a couple of people in the institution that have tried to set-up initiatives with an RRI focus but it has not received support from senior leadership to-date</p>				
	<b>Intervention/Strategy/Initiative</b>		<b>Desired Outcome</b>	<b>Time-frame</b>	<b>Societal Actors engaged</b>
<b>Action 1:</b> <i>Conduct RRI Context Mapping- identify, extend and enrich the processes that already exists</i>	<b>Level 1A-C</b>	Conduct context mapping exercises (assessment, SWOT, ToC)	Insight into the internal system and connections with stakeholders is gained. This information will be used as a basis for realistically embedded RRI into the institution	M25	University-  Internal functions that engage with stakeholders  Functions that focus on the ethics, gender
<b>Action 2:</b> <i>RRI Policy, Committee and Strategy - Thought leadership and institutionalised</i>	<b>Level 1A</b>	Localise the Job spec to institutional context. Post job advert, interview & select candidate  Prepare an RRI policy. Align with current university	Hire Nucleus person to support with the implementation process – person who will be the ‘catalyser’	M25-M27  M29-M30	University

<i>capacity building</i>		strategy/language where possible.	RRI is communicated in line with the institutional vision – ensuring greater opportunity to gain ‘buy-in locally’	M29-30	
		Liaise with head of doctoral school & research support office. Establish the format for bi-monthly meetings and project updates			
		Liaise with public engagement team to establish how PE champions are identified – discuss scope to include RRI in the remit.	Opportunities to leverage existing platforms which have worked in the institution are understood.	M29-M30	
	<b>Level B</b>	Invite key personnel from HR, ethics, PR, library, research school to discuss RRI- present the role of the institution – seek commitment to engage in actions and to meet at agreed periods over the course of the project	Responsibility and ownership for embedding RRI is shared beyond the Nucleus unit	M33-M32	
		In committee meeting discuss the best format and structure for sharing updates with senior leadership. Suggest 1 representative from leadership attend the meeting – can be rotated	Senior leadership are aware and can input into action and the delivery	M29-M33	
		Profile RRI champions on institutional social media and in researcher monthly blog. Highlight what they are doing and how they are doing	Overcome issue that researchers cannot envision what RRI is in practice	M30-M46	
	<b>Level C</b>	Liaise with HR/research school to trial a reward structure	Researchers are motivated to consider societal impact	M40-M42	
<b>Action 3:</b> <i>Build institutional bridges between the research community, stakeholders</i>	<b>Level A</b>	Work with internal stakeholders (research, knowledge exchange and development and alumni offices) to identify existing networks of external stakeholders	Cross institutional support and awareness of existing relationships	M29-M46	University / Media /Civil Society/ Policy Makers / Industry/ Public Engagement

<i>and the general public</i>		<p>Attend one-to-one meetings with representatives of external stakeholders and discuss RRI and common goals and potential projects.</p> <p>Invite external stakeholders to develop and deliver training for researchers to engage.</p> <p>Broker relationships with individuals within the university as appropriate.</p>	<p>Develop a sustainable 'network', Built on Trust</p> <p>Build researchers' capacity to engage</p> <p>Support researchers' and externals to develop relationships and projects</p>		
	<b>Level 1B</b>	<p>Identify stakeholder groups that do not currently work with the institution and determine common interests.</p> <p>Work with existing external stakeholder groups or networks and contribute to existing events or activities.</p> <p>Establish teams whose roles are to broker relationships between external stakeholders and researchers for each of the cells, ensuring that there is internal signposting between teams.</p> <p>Establish regular networking events to share best-practice, inspire and celebrate work between researchers, staff and external stakeholders.</p> <p>Have senior management posts with remits for external engagement (eg vice principals/ deputy vice chancellors etc)</p>	<p>Expand the network</p> <p>Build long-term relationships and develop trust</p> <p>Institutionalise support for the researchers to undertake RRI</p> <p>Raise awareness of RRI projects internally and externally, foster new relationship and create opportunities for joint projects. Have high level champions for RRI</p>	M29-M46	University / Media /Civil Society/ Policy Makers / Industry/ Public Engagement
	<b>Level 1C</b>	<p>Host a high level informal meeting with university senior</p>	<p>Build trust, buy in and identify ways</p>	M29-M46	University / Media /Civil Society/

		<p>management and senior representatives of external network/organisations to determine common interests.</p> <p>Develop Memorandum of Understanding (MOU) between the University and institutions. Host a prestigious event for the signing of the MOU inviting a wide variety of individuals.</p> <p>Ensure external representative sit on governing boards and committees and all research committees.</p> <p>Establish a comprehensive programme of training on co-creation skills for researchers and external partners.</p> <p>Develop institution wide RRI strategy in collaboration with external stakeholders.</p>	<p>of working together</p> <p>Providing leadership and “permission” for staff to prioritise working with external organisations</p> <p>Provide opportunities for external to have a voice at decision making levels in academia</p> <p>Build capacity internally and externally for high quality, high impact research outcomes</p> <p>Create a mutually beneficial and sustainable approach to RRI</p>		Policy Makers / Industry/ Public Engagement
<i><b>Action 4:</b> Catalyse ongoing debates about the role of science in open societies</i>	Level 1A	<p>Work with internal communications to run a poster campaign about issues around RRI</p> <p>Film interviews with university professors and externals about RRI and share on intranet</p> <p>Organise a series of university wide seminars on RRI with invited speakers from external stakeholders and funding bodies</p>	<p>Raise awareness and interest in RRI</p> <p>Raise awareness and interest in RRI</p> <p>Provide a forum for internal discussion on RRI Promote awareness and reflection of</p>	M36-M46	University/ Internal comms Media/

		Engage a PhD Student to research internal attitudes to RRI	relevant ethical and societal issues across different units in the institution		
		Develop a media training course for researchers	Establish a base level  Researchers have the skills to communicate and raise critical questions with publics		
	<b>Level 1 B</b>	Work with external stakeholders to develop a novel interactive platform for public discussion about difficult topics. (eg Cabaret of Dangerous Ideas <a href="http://codi.beltanenetwork.org/">http://codi.beltanenetwork.org/</a> )	Make research results and information on scientific processes accessible to all levels of society	M36-M46	University / Media
		Develop training for researchers to participate in the platform	Empower external stakeholders to contribute to the discussion  Ensure quality of the engagement and enable researcher to participate fully	M29	
	<b>Level 1 C</b>	Ensure appropriate external representatives sit on all research project boards and ethics boards.	Academic researchers consider the role and impact of societal actors in their research	M29-M46	University
		Research funding is contingent on the researcher consulting or involving appropriate external representatives.	Academic researchers consider the role and impact of societal actors in their research		

<b>Action 5:</b> <i>Develop, nurture and support new forms of transdisciplinary research including RRI principles in the scientific community</i>	<b>Level 1A</b>	<p>Meet with government research representatives to discuss focus of future themes and directions. Introduce them to values of more transdisciplinary research.</p> <p>Plan a programme of development for students to meet and present to stakeholder groups</p> <p>At RRI committee discuss practicalities of hosting transdisciplinary projects within the institution.</p>	<p>Increased awareness of the values of transdisciplinary research which will 'sow the seed' for future funding programmes that focus on this area.</p> <p>Establishing the values of transdisciplinary research at the student stage. Test this model for a larger programme with researchers.</p> <p>Understanding of the way in which transdisciplinary projects might work in practice and any potential barriers to this approach.</p>	M29-M46	Funding bodies/ Policy makers
	<b>Level 1B</b>	<p>Host RRI focused sessions with funding agency representatives and researchers to develop ideas for transdisciplinary research</p> <p>Develop and run a session to bring researchers planning new grant applications with stakeholders for an exploratory session.</p>	<p>New ideas for research themes that embed transdisciplinary research will be imagined.</p> <p>New grant applications that embed stakeholder needs from the start will be created.</p>	M29-M46	
	<b>Level 1C</b>	Develop a certification with funding agencies that recognise excellent RRI practice	Recognition that RRI principles are of value to the research process.	M40-M46	
<b>Action 6:</b> <i>Stimulate co-responsibility of</i>	<b>Level 1A</b>	Create a toolkit of RRI terminology with a short exercise appropriate for stakeholders	Enabling others to understand what RRI is trying to	M42-M46	Policymakers

<i>all actors involved in the process of research and innovation</i>		<p>Run training sessions with researchers focused on outlining the principles of RRI, the benefits and practical steps of what they can do.</p> <p>Contact identified key individuals from economy and civil society groups (these cells were identified as growth areas in the self-assessment) to build relationships between them and the university. Establish their expectations and how they might collaborate with research.</p>	<p>achieve and how they can explain the principles to others.</p> <p>Empowering researchers to embed and include RRI within the research process.</p> <p>Societal actors will be involved within research and innovation process.</p>		
	<b>Leve 1 B</b>	<p>Create intranet webpages and presence of RRI expertise within the institution so researchers know where to go to get support.</p> <p>Create external webpage with contact information for societal actors to connect with researchers.</p> <p>Generate a forum for interactions between researchers and societal actors – in a neutral location for all sides.</p>	<p>The research community will know how they can be supported in embracing the RRI principles.</p> <p>New societal actors can contact the institution and get involved with research.</p> <p>A trigger for longer lasting relationships between research and stakeholders.</p>	M29-M46	University
	<b>Leve 1 C</b>	<p>Ensure training and induction procedures at all levels at the university include the definition of RRI and contact details for support.</p>	<p>A clear message from the start to all new staff that RRI is an important part of the institution</p>	M29-M46	



		<p>Include RRI principles within official contracts between the university and external bodies.</p> <p>Create clear policy for the involvement of public partners within the research process (with ethics departments)</p>	<p>All parties will begin any endeavours from a starting point where the principles of RRI are embedded and agreed.</p> <p>No exploitation of public partners will occur within the research process. Both sides will be clear on the expectations.</p>		
<p><b>Action 7:</b> Question and redefine the prevailing notion of 'recipients' and 'agents'</p>	<p><b>Level 1 A</b></p>	<p>Identify a doctoral training group that promotes co-production processes and work with them to create and pilot a researcher development framework focused on RRI.</p> <p>Work with a doctoral training group in a different discipline (eg medicine) to test and adapt the researcher development framework created previously.</p>	<p>Identify good practice in RRI and ensure the next generation of researchers are exposed to it.</p> <p>Sharing good practice across disciplines</p>	<p>M29-M46</p>	
	<p><b>Level 1 B</b></p>	<p>Establish a reverse fellowship programme – supporting external stakeholders to have a residency within a research group.</p> <p>Create a Citizen Science group that works with local community groups to develop and contribute to research projects in their own interest</p> <p>Encourage researchers to include external stakeholders as co-author of papers.</p>	<p>Expose researchers to other forms of expertise and knowledge, create relationships and new projects</p> <p>Empower local citizens to set the research agenda on things that matter to them.</p> <p>Formally acknowledge the contribution of</p>	<p>M29-M46</p> <p>M46</p>	

			external stakeholders		
	Level 1 C	<p>Ensure appropriate external representatives sit on all research project boards and ethics boards.</p> <p>Provide training for Research Support Staff in RRI so they can advise and monitor research funding applicants about the requirements in RRI .</p>	<p>Empower external stakeholders to contribute to decision making processes</p> <p>Embed the expectations into the universities systems and provide support to researchers</p>	M29-M46	
<i>Action 8: Embed ongoing reflection, analyse processes and procedures</i>	Level 1 A	<p>Create a project timeline with set points for reflection and measurements. These to coincide with discussions with mentor.</p> <p>Understand what data is currently gathered and used for reporting within the institution to see if there is overlap with RRI principles.</p>	<p>Reflections will take place regularly at appropriate points in the process where follow up actions can be discussed and put into process.</p> <p>Current data can be used as a tool to measure how the institution is embracing RRI principles and if data to understand this isn't available then this can be identified and addressed.</p>	M29-M46	
	Level 1 B	Collect data on attitudes to RRI within the institution using tools such as questionnaires/polls and focus groups	The efforts of the NUCLEUS project in culture change and attitudes can be assessed.	M29-M46	
	Level 1 C	Develop, with input from senior staff from research and reporting departments a sustainable process of monitoring and	An ongoing process of reflections on RRI within the	M29-M46	University Senior leadership +

		progressing RRI actions within the institution.	institution can be established.		RRI Committee
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## APPENDIX E: INSTITUTIONAL DOCUMENTS

### E.1 VISION STATEMENT



## SHARED VISION STATEMENT

### *An Embedded Nucleus*

NUCLEUS is a European Commission project under the Horizon 2020 Research and Innovation programme that develops, supports and implements inclusive and sustainable approaches to Responsible Research and Innovation (RRI) within the governance and culture of research organisations in Europe and beyond. It is an international collaboration that is developing innovative approaches to overcome the structural and cultural barriers to RRI in scientific institutions. The objective of the project is to stimulate an approach to research and innovation which reflects societal needs. By establishing test-beds ("Nuclei") in ten institutions, the project will offer practical recommendations for the cultural and organisational implementation of RRI.

**[Institution]** is a beneficiary of the project and a member of the NUCLEUS Consortium. It has agreed to set up a Nucleus in the governance of its institution, spreading the RRI approaches to the academic community and related non-academic institutions.

Working together, the NUCLEUS project and **[Institution]** will endeavour to:

- build institutionalised bridges between the research community, stakeholders and the general public
- catalyse ongoing debates about the role of research in open societies
- develop, nurture and support new forms of transdisciplinary research, including RRI principles, in the scientific community
- stimulate co-responsibility of all actors involved in the process of research and innovation
- question and redefine prevailing notions of "recipients" and "agents"

In doing this, the **[Institution]** will be supported by a leading partner from the Consortium to enable mutual and interrelated learning processes, coaching, training and mentoring. Together with the other Embedded Nuclei in the project, the Embedded Nucleus at **[Institution]** will attempt to institutionalise interactions between evidence-based research and the complex world of public decision-making.



**FUNDING** This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 664932.

**CONSORTIUM PARTNERS** Beijing Association for Science and Technology · Bielefeld University · China Research Institute for Science Popularization · City of Bochum · Delft University of Technology · Dublin City University · European Science Events Association · European Union of Science Journalists' Associations · Ilia State University · Mathematical Institute of the Serbian Academy of Sciences and Arts · Nottingham City Council · Nottingham Trent University · Psiquadro · Rhine-Waal University of Applied Sciences (Coordinator) · Ruhr University Bochum · Science City Hannover · Science View · South African Agency for Science and Technology Advancement · University of Aberdeen · University of Edinburgh · University of Lyon · University of Malta · University of Twente · Wissenschaft im Dialog



## SIGNATORIES

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[Name] Date  
[Title]  
[Mentee institution]



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[Name] Date  
[Title]  
[Mentor institution]



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[Name] Date  
[Title]  
NUCLEUS Project

## E.2 JOB SPECIFICATION



### NUCLEUS PROJECT OFFICER

#### *Job background & summary*

NUCLEUS is a four-year, Horizon 2020 project investigating how to make Responsible Research and Innovation (RRI) a reality in universities and research institutions.

Responsible Research and Innovation (RRI) is the European Commission response to science-society interactions by focusing on gender, engagement, open access, science education, ethics and governance issues in the development of science and technology. A major goal of this transdisciplinary project will be to facilitate the communication and governance of research and innovation which continuously reflects on and responds to societal needs guided by the principles of RRI. In order to achieve this, NUCLEUS (which stands for New Understanding of Communication, Learning and Engagement in Universities and Scientific Institutions), will combine the RRI resources of 26 institutions from 15 countries, among them leading representatives of 14 universities, to collaboratively identify, develop, implement and support inclusive and sustainable approaches to RRI. By means of a mutual learning and exchange process, the project will reach out beyond the European Research Area by including renowned scientific institutions in China and South Africa.

Using the results of the first phase of the project, 'RRI test beds' will be implemented in 10 selected universities across Europe and beyond. These test beds, or Embedded Nuclei will encourage innovation and reflection in institutional governance; institutional processes and/or individual (researcher) perceptions in RRI

**[NAME OF INSTITUTION/UNIT]** is currently seeking a NUCLEUS Project Officer who will be responsible for setting up and coordinating the systematic implementation and progress reporting of the Embedded Nucleus for [University/Institution].

The role will involve developing and supporting a culture change within the University. The post holder will effectively identify and build institutional bridges between the research community, stakeholders and the general public. The post holder will develop, nurture and support mechanisms that will catalyse new forms of transdisciplinary research.

The post holder will report to **[NAME OF PERSON REPORTING TO]** and will work in partnership with **[unit post holder will sit in]**.



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**CONSORTIUM PARTNERS** Beijing Association for Science and Technology · Bielefeld University · China Research Institute for Science Popularization · City of Bochum · Delft University of Technology · Dublin City University · European Science Events Association · European Union of Science Journalists' Associations · Ilia State University · Mathematical Institute of the Serbian Academy of Sciences and Arts · Nottingham City Council · Nottingham Trent University · Psiquadro · Rhine-Waal University of Applied Sciences (Coordinator) · Ruhr University Bochum · Science City Hannover · Science View · South African Agency for Science and Technology Advancement · University of Aberdeen · University of Edinburgh · University of Lyon · University of Malta · University of Twente · Wissenschaft im Dialog



#### *Capabilities and Aptitudes*

- Positive attitude to working with unestablished structures/processes
- Excellent interpersonal and communication skills, oral, written and presentation
- Good mediation and facilitation skills
- Ability to work unsupervised and as part of a team
- Ability to work confidently with senior leaders within the University and with external partners from industry, civic society, media, and policy-making.
- A strategic thinker who can identify, develop and support the delivery of the NUCLEUS project goals
- Given the nature of this role, the successful candidate must also have a willingness to travel, including trips abroad

#### *Key contacts/Relationships*

The successful candidate will work with the following

- Report to local NUCLEUS project lead
- Interact with the NUCLEUS project staff at Rhine-Waal University in Germany, and the mentor institution
- Support the project lead in influencing and engaging institutional and external leaders, including [Principals, Vice-Principals and Assistant Principals, Heads of College, Deans and Heads of School; government Ministers, and parliamentarians; other partners and external stakeholders].

#### *Remuneration*

This post is a 22 month fixed term contract. Salary will be in line with the level of experience held. *[Each Nucleus has 22 person months- The decision on how this contact is appropriated will be made by the host institution]*

## APPENDIX F: MOBILE NUCLEI FORMATS

### MOBILE NUCLEI FORMATS WP5 NUCLEI IMPLEMENTATION

#### INTRODUCTION

This is the summary of the design process we developed to have a set of formats to offer to the Mobile Nuclei Hosts. The partners directly involved are EUSEA (coordinating this task as well), WiD and Psiquadro.

#### BACKGROUND FRAMEWORK

The formats selected meet several requirements, firstly coming from the objectives that the WP5 Nuclei Implementation has. Together with this framework, we considered the Leuven Working Group conclusions, the Capacity Building Recommendations (D 4.10) and the approach of the Nucleus Project, which is focusing in the interrelatedness and collaboration of different stakeholders involved in the Research and Innovation landscape. The following chart shows the complete theoretical framework we have as a background:

TABLE 1. BACKGROUND CONSIDERATIONS FOR THE MODULE'S DESIGN

OBJECTIVES	(1)Build institutional bridges between the research community, stakeholders and general public	(2)Catalyze ongoing debates about the role of science in open societies	(3)Develop, nurture and support new forms of transdisciplinary research including RR principles in the scientific community	(4)Stimulate co-responsibility of all actors involved in the process of research and innovation		(5)Question and redefine prevailing notions of “recipients” and “agents”
CELLS	Cell University	Cell Public Policy	Cell Public Engagement	Cell Media	Cell Civil Society	Cell Economy
D4.10	Recommendation 1: Relation management between Universities and societal actors	Recommendation 2: Incentives	Recommendation 3: Language of RRI	Recommendation 4: Self-assessment	Recommendation 5: Training	Recommendation 6: Local Knowledge

Our DoW states that Mobile Nuclei consists of a set of 4-5 modules, as a Menu offer, from which the Hosts choose and agree to include in existing events that they organize, they run or they are involved in. The formats represent RRI, and will encourage discussion, engagement and participation of several target groups. Table 2 shows an overview of the proposed formats and Table 3 shows the Modules in more detail, highlighting how they



fulfill the requirements coming from different aspects of the project. Once agreed that these will be the Menu to be offered, the detailed guidelines for each of them will be written.

**TABLE 2. OVERVIEW OF THE PROPOSED MODULES**

Name	Type
1. RRI Training for researchers and scientists. Kind of “Quick start guide in RRI” or “RRI Basecamp, getting a grip of the basics” (and more)	Training
2. Science and you: installation to collect peoples’ connections/expectations/feelings to science	Installation
3. Hackatons on real problems in cities *Only if there is a planned activity like this that could be enhanced with the Mobile Nucleus budget	Co-design
4. RRI stakeholder workshop: open discussions for close collaborations- (Mapping and navigation sketch)	Open discussion
5. Pop-up Science Shop on specific issues	Co-design
6. Discussion formats for citizens: Fish bowl / Reverse science café	Open discussion
7. Design Thinking Experience	Co-design

**TABLE 3: PROPOSED MODULES FOR MOBILE NUCLEI**

Name of the format	<b>RRI Training for researchers and scientists. Kind of “Quick start guide in RRI” or “RRI Basecamp, getting a grip of the basics” (and more)</b>
Type of activity	Training
Objectives and Recommendations addressed	Objective (2) Catalyze ongoing debates about the role of science in open societies Objective (4) Stimulate co-responsibility of all actors involved in the process of research and innovation; Recommendation 3: Language of RRI; Recommendation 5: Training
Best suitable for (Cells involved)	University, Researchers, scientists, Public engagement officers, Media
Aims /Questions that could help answering	Awareness raising in RRI -1 day workshop with 20 participants involved -feedback on the local problems, barriers and opportunities WHY: Because researchers, scientists are more naturally connected and involved in RRI and they are the fundamental starting point for involving others. How many ways of understanding RRI exist? Is RRI a unique approach that stands on its own?
How to be evaluated?	-Feedback questionnaire -Follow-up with participants after some weeks
Resources or comments	-Nucleus guideline, University of Aberdeen, engage2020.eu, rritools.eu, rritools Hub people

Name of the format	<b>Science and you: installation to collect peoples’ connections/expectations/feelings to science.</b>
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Type of activity	Installation that invites people to write their thoughts and feelings: board, a tree with hanging papers, a huge umbrella with hanging raindrops, etc. In a final session : (if the case is they have a stage) a moderator would comment on the people's declarations or have some people to role play some statements
Objectives and Recommendations addressed	Objective (2) Catalyze ongoing debates about the role of science in open societies Recommendation 6: Local Knowledge
Best suitable for (Cells involved)	University, Researchers, scientists, Public engagement, (Science festivals), Media
Aims /Questions that could help answering	How many ways of understanding RRI exist? Is RRI a unique approach that stands on its own?
How to be evaluated?	-Number of ideas or notes gathered, Notes about the event, Analysis of the results
Resources or comments	-Nucleus guidelines, engage2020.eu, rritools.eu

Name of the format	<b>Hackathons on real problems in cities</b> <b>*Only if there is a planned activity like this that could be enhanced with the Mobile Nucleus budget</b>
Type of activity	Hackathon
Objectives and Recommendations addressed	Objective (3) Develop, nurture and support new forms of transdisciplinary research including RR principles in the scientific community Objective (4) Stimulate co-responsibility of all actors involved in the process of research and innovation Objective (5) Question and redefine prevailing notions of "recipients" and "agents" Recommendation 1: Relation management between Universities and societal actors Recommendation 6: Local Knowledge
Best suitable for (Cells involved)	University researchers, Civil Society, Public Policy, Economy. Public engagement, Media
Aims /Questions that could help answering	To co-design solutions/ prototypes for real needs Do good ideas come up specially when gathering different stakeholders in solving problems?
How to be evaluated?	Documentation of the process with analysis of the ideas, participants and applications of the results
Resources or comments	

Name of the format	<b>RRI stakeholder workshop: open discussions for close collaborations- (Mapping and navigation sketch)</b>
Type of activity	Workshop, World Café format
Objectives and Recommendations addressed	Objective (1) Build institutional bridges between the research community, stakeholders and general public Objective (2) Catalyze ongoing debates about the role of science in open societies Objective (4) Stimulate co-responsibility of all actors involved in the process of research and innovation Objective (5) Question and redefine prevailing notions of "recipients" and "agents" Recommendation 1: Relation management between Universities and societal actors

	Recommendation 3: Language of RRI Recommendation 6: Local Knowledge
Best suitable for (Cells involved)	Media, Economy, Public engagement, Public policy University, Civil Society
Aims /Questions that could help answering	Identify common topics and ways to collaborate in the short-term future. How can we better work together in the scientific arena?
How to be evaluated?	Documentation of the event and results -follow-up on the new collaborations and ideas
Resources or comments	

Name of the format	<b>Pop-up Science Shop on specific issues</b>
Type of activity	Co-design activity
Objectives and Recommendations addressed	Objective (1) Build institutional bridges between the research community, stakeholders and general public Objective (3) Develop, nurture and support new forms of transdisciplinary research including RR principles in the scientific community Objective (4) Stimulate co-responsibility of all actors involved in the process of research and innovation Objective (5) Question and redefine prevailing notions of “recipients” and “agents” Recommendation 1: Relation management between Universities and societal actors Recommendation 6: Local Knowledge
Best suitable for (Cells involved)	Civil Society, Public engagement, University researches
Aims /Questions that could help answering	Triggers (transdisciplinary) student projects based on real needs. And motivates to know each other Which are the topics where the researcher’s interests and the community needs converge? How can we translate that into community-based research?
How to be evaluated?	-Documentation of the process and the different perspectives -Follow up of students’ projects
Resources or comments	

Name of the format	<b>Discussion formats for citizens</b>
Type of activity	Fish Bowl , Open discussion
Objectives and Recommendations addressed	Objective (4) Stimulate co-responsibility of all actors involved in the process of research and innovation Objective (5) Question and redefine prevailing notions of “recipients” and “agents” Recommendation 3: Language of RRI Recommendation 6: Local Knowledge
Best suitable for (Cells involved)	University researchers, Civil Society Media, Policy makers, Economy
Aims /Questions that could help answering	Open discussions for exchanging ideas on topics that have local relevance Can we really reach scientific evidence-based policy making?
How to be evaluated?	-Documentation of the discussion and results -Possible influence on research topics or policy making Depending on the topic, the documentation would be given to the relevant actor working on that.
Resources or comments	

Name of the format	<b>Discussion formats for citizens</b>
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Type of activity	Reverse Science cafés, Open discussion
Objectives and Recommendations addressed	Objective (4) Stimulate co-responsibility of all actors involved in the process of research and innovation Objective (5) Question and redefine prevailing notions of “recipients” and “agents” Recommendation 3: Language of RRI Recommendation 6: Local Knowledge
Best suitable for (Cells involved)	Media, Economy, Public engagement, public policy, University, Civil Society
Aims /Questions that could help answering	What is open science and what are its benefits?
How to be evaluated?	-Documentation of the discussion and results
Resources or comments	Pe2020.eu

Name of the format	<b>Design Thinking Experience</b>
Type of activity	Workshop
Objectives and Recommendations addressed	Objective (4) Stimulate co-responsibility of all actors involved in the process of research and innovation Objective (5) Question and redefine prevailing notions of “recipients” and “agents” Recommendation 1: Relation management between Universities and societal actors Recommendation 6: Local Knowledge
Best suitable for (Cells involved)	Media, Economy, Public engagement, public policy, University, Civil Society
Aims /Questions that could help answering	Involves all stakeholders with their needs and fosters co-design and local knowledge
How to be evaluated?	-Documentation of the discussion and results -Follow up of people’s projects/ ideas
Resources or comments	