Consolidated Operational Recommendations and Guidelines for Implementation

NUCLEUS project



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1 EXECUTIVE SUMMARY

How can we best place public interests at the heart of research and innovation? Are such principles of a more "Responsible Research and Innovation" (RRI) easily implemented in Research-performing organisations? If not, what are the obstacles to the systemic change? How can we challenge established policies and practices in order to place public interests at the heart of research and innovation?

The EU-funded "NUCLEUS" project, one of the largest RRI projects in Horizon 2020 programme, has addressed these questions and has contributed to an evidence-base enabling Research-performing organisations (RPOs) to anticipate the implications of their activities and plans, include relevant stakeholders upstream, to reflect and respond to those stakeholders' concerns and expectations. The goal was to identify pathways for turning RRI from a policy prescription into actual realities of transformative and sustainable institutional change.

The project was structured in two phases:

- Analysis of the conditions and obstacles for implementing RRI in RPOs;
- Experimentation with change in the governance and culture of ten RPOs worldwide.

NUCLEUS tested the principles of RRI through real-time experiments in ten research institutions across Europe, in China, Georgia, and South Africa. These experiments, shaped by the project's empirical research, involved implementing approaches and activities that would help to overcome institutional obstacles and demonstrate the benefits of RRI to each institution. Based on the learnings from these experiments, the following four steps should be taken:

- 1. Undertake a self-assessment to identify where your organisation currently stands in regards to RRI principle implementation
- 2. Develop an action plan based on the self-assessment. The action plan can also serve as a strategic planning tool for the institution.
- 3. Implement the action plan. Here the specific circumstances and audiences are fully contextualised to help support change in the institution.
- 4. Continuously reflect, analyse, evaluate, learn and improve. RRI is a continuing process, not a final outcome, which makes these steps a continuous process loop.

The project also supported the activities of 20 so-called 'Mobile Nuclei', one-off activities where participants in the consortium tested innovative approaches to reflect the concept of RRI in different contexts.

The NUCLEUS project used the analogy that RRI functions in the same way as cells in an organism. There are six cells within the organism, and the university is the central "cell" in which a nucleus is "embedded" and linked to a cluster of others cells: Public Policy, Public Engagement, Civil Society, Media and Economy. The aim has been to develop and nurture a productive 'metabolism' that integrates all these cells, fostering RRI processes that respond to diverse needs, values and socio-cultural environments.

IMPLEMENTING RRI IN RESEARCH-PERFORMING ORGANISATIONS 2

Appropriate use of language is critical in communicating and facilitating RRI, as different disciplines, cultures and institutions might use different terminology to describe aspects of RRI. The use of the term 'RRI' itself might be confusing or even detrimental to the cause as it can create defensiveness in the community. Therefore, the language used to discuss RRI should be adapted to the context in which it is used. The central principle is that research and innovation should connect and communicate with the context in which it is produced and circulated.

Implementing RRI in the governance and institutional culture will allow RPOs to better respond to societal challenges. 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 several key elements to be considered.

Building on the findings of other RRI projects, NUCLEUS results show that RRI processes require enriching the structures within RPOs and offering adequate training and support to realise this culture change within the RPOs and in the public sphere.



STEP 1: ASSESS

Undertake a self-assessment with regards to RRI integration:

- Identify <u>your</u> "RRI" within <u>your</u> institutions, among <u>your</u> partners
- Analyse what you can do to increase uptake RRI in your institution



RRI is a process in context, requiring professional facilitation, communication and organisation in the governance of research and innovation within an institution or region.



RRI needs to work as a set of outputs and outcomes, including, workshops, MOOCs, trainings, rewards and resources, HR awards schemes, that incentivise researchers and managers to do more RRI and that embed responsibility in all co-created research.

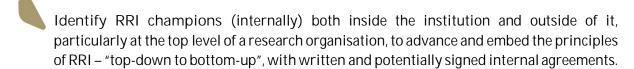


Understanding existing cultures and practices (both internal to the institution and external) gives the foundation for the introduction and sustained growth of RRI principles.

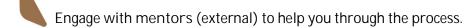


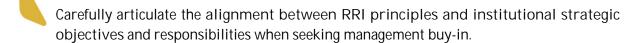
STEP 2: PLAN

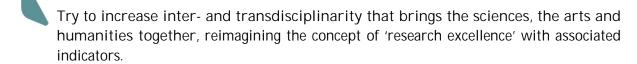
Develop an action plan based on the self-assessment. The action plan can also serve as a strategic planning tool for the institution. It can be useful to:







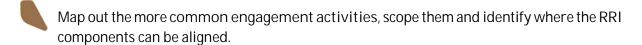




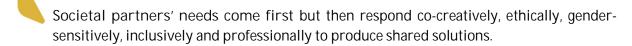


STEP 3: IMPLEMENT

Implement the action plan. Here the specific circumstances and audiences are fully contextualized to help support change in the institution.







Include external mentoring and internal group reflections in developing, critically (self)evaluating and monitoring action plans. Expertise may also come from publics, media experts, policy experts, CSOs and enterprise agencies.



Self-reflection is a necessary, continuous and iterative process. Implementation of critical institutional reflection, analysis, evaluation, learning and improvement at key stages, and mutual learning with new and collaborating partners.



If there are enough critical points, the culture eventually changes.



Link up RRI nuclei regionally, globally, for a Living RRI Network, through similar projects.

Finally, RRI is a continuing process, not a final outcome, which makes these four steps a continuous process loop.

The four-step process can be illustrated as bellow:



Figure 1 – Steps to implement RRI in RPOs.

A web tool has been developed (http://evaluation.nucleus-project.eu/) to facilitate a more user-friendly process, consistent and less time-consuming. It also directly links all the steps that each institution will complete for the implementation and evaluation.

Based on the findings of the project, stemming from the four steps outlined above, a more detailed roadmap has been devised to help RPOs implement RRI into their governance and culture:

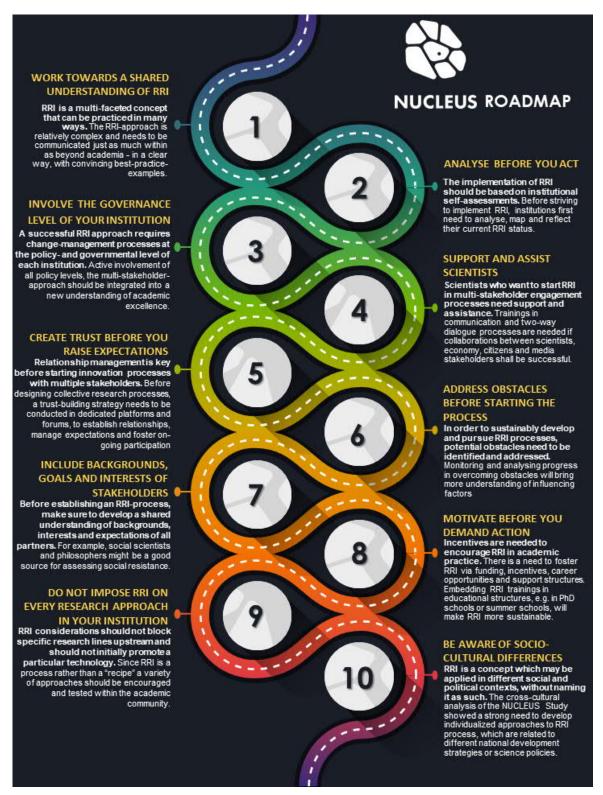


Figure 2 - RRI Roadmap for RPOs.

This overall process is guided by a number of principles summarised below:

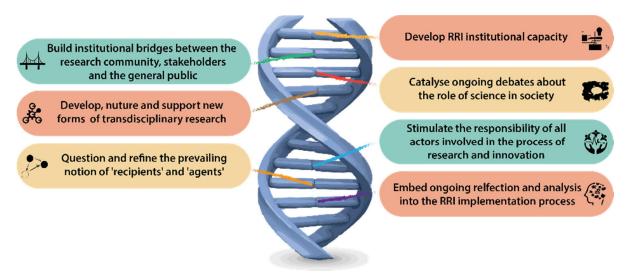


Figure 3 – NUCLEUS principles for implementing RRI

While recognising the five keys – Ethics, Gender Equality, Open Access, Public Engagement and Science Education 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 inter-relations among different institutions and frameworks.

3 RECOMMENDATIONS FOR POLICY

At the closing conference of the project, NUCLEUS published a Joint Declaration together with its sister project RRI-Practice and 11 other European initiatives, urging the European Commission to make RRI a key objective of the upcoming framework programme, Horizon Europe.

Published in the *Journal of Responsible Innovation*: doi.org/10.1080/23299460.2020.1764837

Recognising that the EU has been a pioneer in responding to the issues at stake through the early political adoption of RRI and throughout the last three European framework programmes, (most importantly the Science-with-and-for-Society, SwafS, programme) ground-breaking conceptual and practical work on RRI has been achieved. Now, in view of the next framework programme, a top-down political approach is needed in order to better address 21st century's societal concerns. The European Commission should combine the operationalisation of RRI into criteria for funding with the further nurturing of individual capacities of the actors in research and innovation. The EU is the right actor to take a leading position in the field as previous initiatives, such as the Rome Declaration on Responsible Research and Innovation in Europe, have highlighted. Such initiatives have not lost any of their urgency, so a call for immediate action is deemed necessary.

Recommendations to the European Commission on embedding RRI in Horizon Europe:

- 1. In cases in which RRI or RRI-related concepts are included in research and innovation actions, applicants in these programmes/calls should be asked to outline how their projects relate to RRI, based on guidelines for how to embed RRI effectively and how to measure societal impact. The proper inclusion of RRI actions must involve specified tasks, deliverables, milestones and budgets in order to be convincing. If the described RRI actions are not designed systematically, this should affect the overall evaluation significantly. Criteria for assessing this, both in the proposal and in subsequent delivery, should be communicated to applicants, evaluators and reviewers.
- Interdisciplinary collaboration should be encouraged. Including researchers from Social Sciences and Humanities (SSH) usually increases the quality of RRI actions, such as citizen engagement or ethical deliberation. Including other initiatives and organisations, such as Technology Assessment organisations or NGOs can also have an important function in making projects more transdisciplinary.
- 3. Treat RRI components as research: the RRI measures in an integrated project (e.g. stakeholder engagement, citizen science, co-creation) should be based on an understanding of how such actions can be done well, and the methods and results of RRI actions should be published. Only in this way can continuous further development, quality improvement and learning effects be achieved.
- 4. Projects should consider integrating all aspects of RRI; simply picking one aspect (research integrity, for instance) is to fragment RRI. Instead, when applying, for instance, citizen science in an integrated project this should be done in a reflective, inclusive and open way.
- 5. It must be clear that citizen science, open science and co-creation are aspects of RRI, but responsibility in research and innovation also includes being anticipatory, inclusive, reflexive and responsive, and includes considerations of fairness (social, gender, etc.) and sustainability. Open science, citizen science and co-creation agendas should be considered in this broader perspective and reference to RRI should be made. Funding calls that include RRI,

- open science, citizen science and co-creation should be informed by evidence from past RRI research endeavours. Specific guidelines to include open science, citizen science and cocreation activities in Horizon Europe should be related to RRI.
- 6. An RRI Hub should be funded by the EC in order to ensure quality in the mainstreaming of RRI, co-creation, public engagement and citizen science in the whole framework programme. This hub should build on and further cultivate the RRI knowledge base. It should advise, train, consult, assess and provide quality control and be a resource for those who include RRI related activities in Horizon Europe. It should also provide experts for the assessment of these aspects of research and innovation proposals and project activities, and for relevant committees and boards.
- 7. The different advisory boards and committees in Horizon Europe, especially in relation to emerging science and technologies, as well as the mission-oriented programmes, should include competence in RRI, or at least transdisciplinary competence (including civil society representatives). In the further operationalisation of Horizon Europe's mission-oriented approach, RRI should be viewed as integral.

ANNEX I: LEARNINGS FROM 'MOBILE NUCLEI' IMPLEMENTATION

A Mobile Nucleus (MN) was an event or activity that a host organisation agreed to include or incorporate into existing events or projects. It could be part of running science communication or science dissemination event (e. g. science festival, science week, researchers' night or other regular formats). In some cases, an enlargement or a further development of an existing activity was considered a MN as well the host organisations were of different kinds: universities, NGOs, science centres or municipalities among others.

MN formats were co-defined in a collaborative process involving the NUCLEUS partners and the host organisations. The "Mobile Nuclei Menu" consisted of seven different formats all of which focused on inviting different partners and addressing new audiences (see Table 1). The implementation, the content and the participants of the MN varied – depending on the respective context as well as the needs and individual profiles of the host organisations.

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

Table 1: The Mobile NUCLEI Formats.

The learnings can be grouped into the following topics and themes:

a) Positive effects of science engagement

- Science public engagement formats and activities can have a real impact on the relationship between scientific stakeholders and institutions within society – by potentially building up much needed trust between different stakeholders as a base for future collaborations.
- Science engagement can stimulate co-responsibility of actors involved in the process of research and innovation.
- Results of discussions can be picked up as ideas for future collaborative projects.
- Even individual events and activities can enable inclusion of a variety of stakeholders in innovation processes and this experience can catalyse for inclusion not to be a random outcome but to become an intention and part of a strategy.
- Engagement activities can enhance a community's sense of belonging, when topics are chosen and interaction happens in a familiar and meaningful way.

b) Conditions for enabling science engagement

- Get rid of complex terms, communicate in an easy and understandable language and avoid jargon because terminologies can trigger misunderstanding and resistance. Be precise, specific and relatable (break out of the RRI bubble).
- Provide spaces for "safe talks" where different stakeholders feel comfortable to communicate in an open and honest way.

c) Considerations for sustainable science engagement

- Consider adopting an umbrella topic that allows you to align different events towards an overarching aim – for example the Sustainable Development Goals. A large societal or political perspective can be helpful in provoking change.
- Initiatives on RRI are often coming 'only' from the scientific community other stakeholders don't 'own' them. Ideally, RRI processes should be aligned with the aims and intentions of all/different stakeholders involved. Take this into account during project development.
- There is still a feeling within the RRI community that there are no ways of making the values of RRI really relevant for all stakeholders in the scientific community such as individual researchers or people within science management: What is the added value?
- City and regional administrations can be helpful in building bridges and sustainable structures. These processes need a back-up from strong stakeholders and policymakers, such as Mayors or other high political leaders.

ANNEX II: IMPLEMENTATION & EVALUATION INSTRUCTION GUIDE

This is a guidance document to support you successfully complete the 2nd implementation and evaluation cycle. The guide also includes comprehensive instructions on using the newly developed NUCLEUS Web Tool. The tool is based on the NUCLEUS Implementation Framework, which has been revised according to the feedback from all partner institutions and Executive Board members after the 1st Implementation period. The tool is designed to support the 10 Embedded Nuclei in the implementation and evaluation of their activities through 3 interlinked steps:

- 1) Self-Assessment questionnaire. You can select specific elements that correspond to the fields on which you are active. You need to fill in in detail what is the status of your institution regarding the element selected and in relation to the existing RRI landscape - both internal and external. The next step is unlocked only after successfully submitting the Self-Assessment.
- 2) Action Plan. This is linked to the first step; the elements selected for the Self-Assessment questionnaire will be directly introduced to the Action Plan. You can additionally select more elements in case you plan to address them. Relevant interventions are proposed according to the elements selected and institutions are asked to fill detailed information about how they plan to integrate them, the engaged cells etc. The Action Plan will serve as a strategic planning document for your institution's implementation phase.
- 3) Self-Reflection questionnaire. After each defined implementation period (check the timeline at the end of the document) you will complete the Self-Reflection questionnaire, reflecting on the implementation of the proposed interventions.

In addition to the NUCLEUS Web Tool and similar to phase 1 of implementation, you will also complete an Interim Report at the end of each implementation period. This report will support the project gather essential qualitative data. All interim reports in addition to the data collected in the Self-Assessment Questionnaire, Action Plans and the Self-Reflection Tool will provide a picture of progress over the course of the three implementation periods.

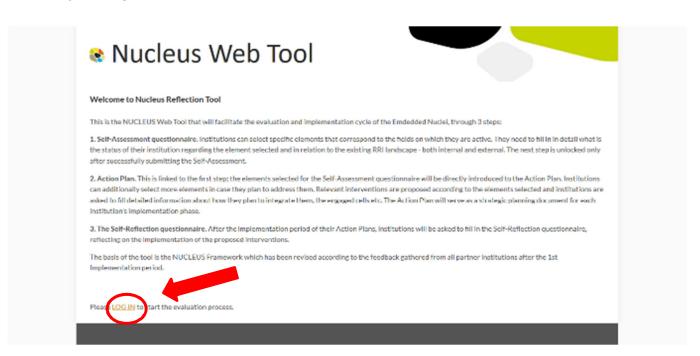
NUCLEUS WEB TOOL INSTRUCTIONS

STEP 0: LOG IN

You can access the NUCLEUS Web Tool through the url: <u>evaluation.nucleus-project.eu</u> Or alternatively via the NUCLEUS website (<u>http://www.nucleus-project.eu</u>) by pressing the NUCLEI EVALUATION button:



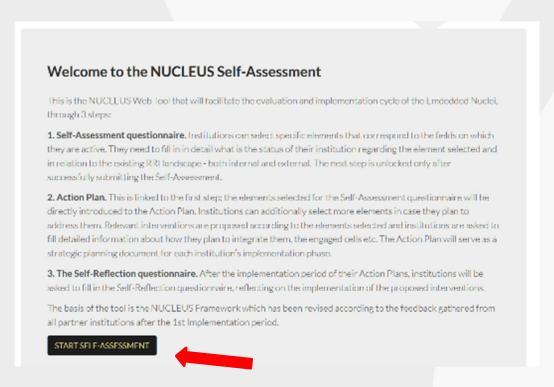
Each EN will be given individualised credentials (user name and password) via email, so they can log in to the web tool.





STEP 1: Self-Assessment Questionnaire

Once you are logged in you will get a message that you need to fill in the Self-Assessment questionnaire by pressing the button "Start Self-Assessment":



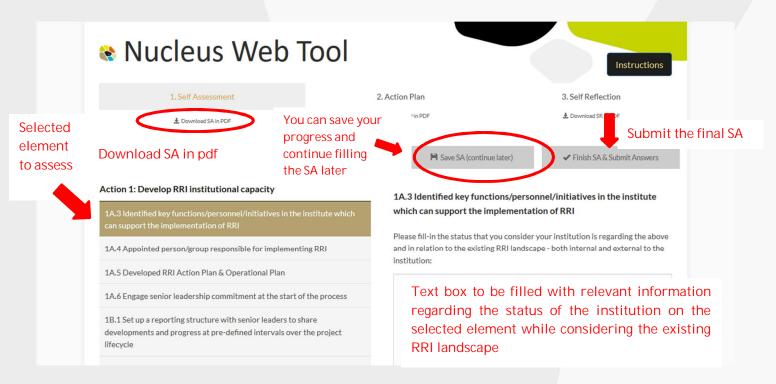
Once you click the button you are directed to the Self-Assessment questionnaire page. There is a complete list of all the elements from the NUCLEUS Framework, per Action.

You can select whichever element you think your institution addresses: it is not obligatory to select all elements. Once you select an element, a text box appears where you need to fill in detailed information on the status of your institution regarding the selected element and also in relation to the existing RRI landscape internal and external to the institution. The selected element will be highlighted and you can continue selecting and filling in the relevant info for the next element. (*Note: Even though it is not obligatory to fill in info on all the elements, it is necessary to fill in elements corresponding to all 6 Actions*).

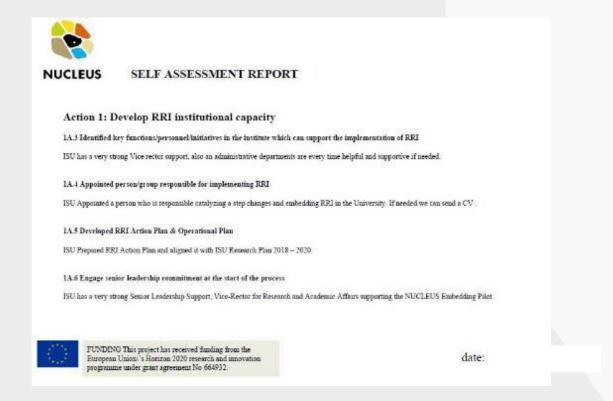
You can save your progress and fill it in later. Also, you always have access to a downloadable pdf form of the SA. To proceed to step 2 you need to click the "Finish SA & Submit answers" button.

Check the screenshot below:





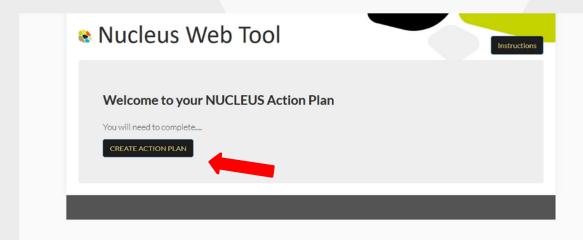
Once you finish and submit your answers you will receive an email with your SA Report in pdf format (it can be also downloaded from the Web Tool) as demonstrated below:





STEP 2: Action Plan

In order to proceed to the second step, <u>first you need to properly submit the final version of the Self-Assessment questionnaire</u>. Once you have successfully submitted it, the Action Plan page will be unlocked.



The Action Plan will serve as a strategic planning document for each institution's implementation phase. The Action Plan development page is interlinked with the Self-Assessment responses: the elements that you had selected for the Self-Assessment Questionnaire will automatically appear in the Action Plan. You have the option of <u>adding additional elements</u> in case you plan to address them in the next implementation period. Just click on the "<u>Add More Elements</u>" button and the list of all the elements will appear so you can choose accordingly.

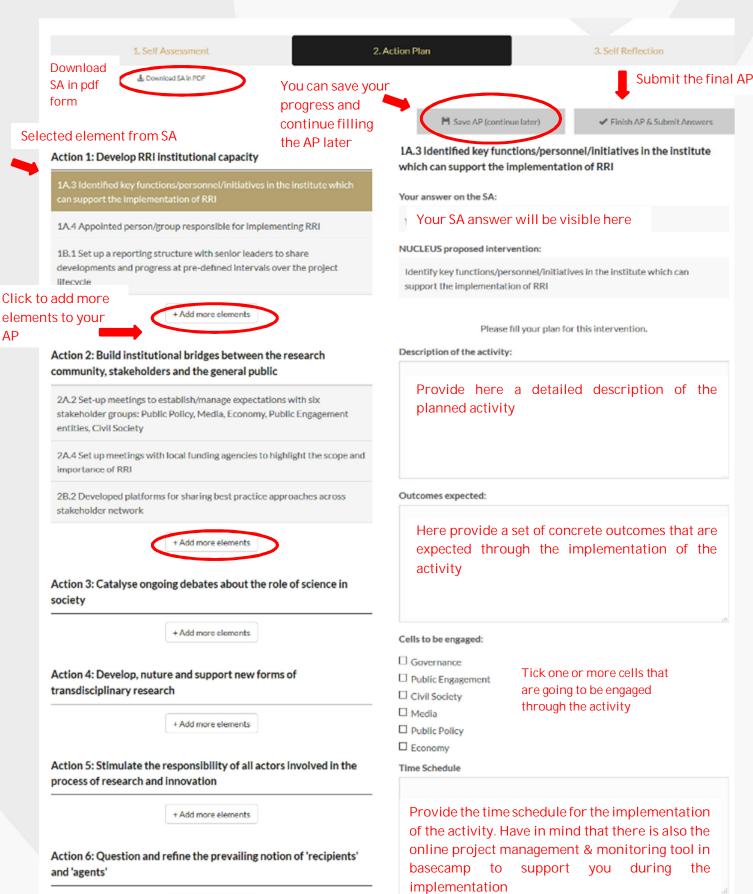
After you select an element for the Action Plan, on the right side of the page you will see a relevant <u>NUCLEUS intervention</u> different for each element. Also, the related answer to the SA will be visible. Then you will be asked to fill in different text boxes regarding your plans in implementing this intervention. More specifically:

- A description of how you plan to deliver the chosen element
- Concrete expected outcomes of this activity/intervention
- What 'cells' (societal actors) will be engaged through the planned intervention
- The expected time schedule for delivering the intervention (it must be specific and with the implementation phase)

You can access to your previously submitted Self-Assessment questionnaire through downloadable PDF file. Also, you have the option to save the progress and continue the Action Plan later. To properly submit the Action Plan and unlock step 3 you need to click the "Finish AP & Submit answers" button. Please check the screenshot below:



ΑP



Use this button to navigate upwards on the page and insert content to selected actions



+ Add more elements



Once you finish and submit your answers you will receive an email with your Action Plan in pdf format (it can be also downloaded from the Web Tool) as demonstrated below:

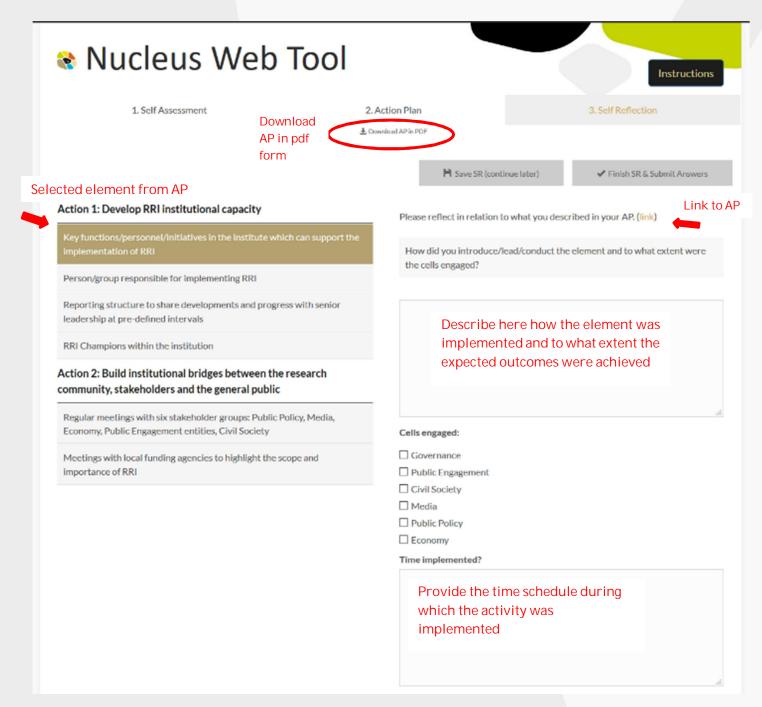


The Action Plan will be locked upon submission for the period in question. If any changes to the submitted Action Plan for the period occur, including the addition of additional work or if an element selected cannot be delivered, all Embedded Nuclei partners must complete an Amendment Report, which can be found here on Basecamp.

STEP 3: Self-Reflection

The third step of the NUCLEUS Web Tool is the Self-Reflection questionnaire. It is linked with the activities described in the Action Plan. The same activities/elements from the Framework will automatically appear in the Self-Reflection questionnaire so that institutions can respond to reflective questions on their implementation.





Once you finish and submit your answers you will receive an email with your Self Reflection Report in pdf format (it can be also downloaded from the Web Tool). The Self Reflection Report includes both the content from the Action Plan and the answers to the Self Reflection Questionnaire for each selected element/activity.





SELF REFLECTION REPORT

Page 1: Answers from the **Action Plan**

Action 1: Develop RRI institutional capacity

1A.3 Identified key functions/personnel/initiatives in the institute which can support the implementation of RRI

Your answer

NUCLEUS Proposed Intervention

Identify key functions personnel initiatives in the institute which can support the implementation of RRI

Description of activity

Provide here a detailed description of the planned activity

Outcomes expected

Here provide a set of concrete outcomes that are expected through the implementation of the activity

Cells to be engaged

Time schedule

Provide the time schedule for the implementation of the activity. Have in mind that there is also the online project management & monitoring tool in



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

date:



NUCLEUS

SELF REFLECTION REPORT

Page 2: Answers from the Self-Reflection

date: 11/01/2010

basecamp to support you during the implementation

Indicator

Key functions/personnel/initiatives in the institute which can support the implementation of RRI

Related Question

How did you introduce/lead/conduct the element and to what extent were the cells engaged?

Describe here how the element was implemented and to what extent the expected outcomes were achieved

Cells engaged Governance, Public Engagement, Civil Society

Time implemented

Provide the time schedule during which the activity was implemented

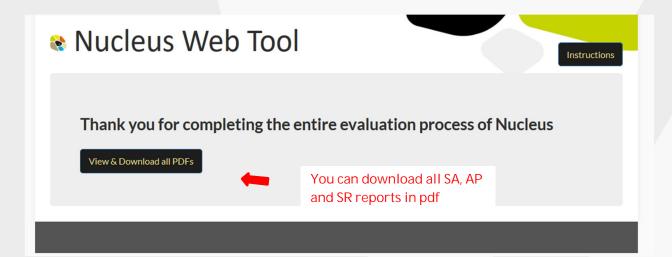
1A.4 Appointed person/group responsible for implementing RRI



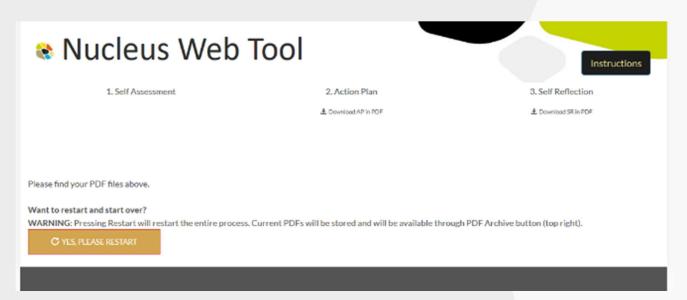
FUNDING This project has received funding from the European Union\(^i\)s Horizon 2020 research and innovation programme under grant agreement No 664932.

Once you finish the whole cycle by successfully completing the Self Assessment, Action Plan and Self reflection you can view/download all developed reports:





After you press the above button you can select to restart the whole process from the beginning.



Please note that while starting the whole cycle from the start, all previous pdf reports will be stored and will be accessible through the "Archive" button:







Welcome to the NUCLEUS Self-Assessment

This is the NUCLEUS Web Tool that will facilitate the evaluation and implementation cycle of the Emdedded Nuclei, through 3 steps:

- 1. Self-Assessment questionnaire. Institutions can select specific elements that correspond to the fields on which they are active. They need to fill in in detail what is the status of their institution regarding the element selected and in relation to the existing RRI landscape both internal and external. The next step is unlocked only after successfully submitting the Self Assessment.
- 2. Action Plan. This is linked to the first step; the elements selected for the Self-Assessment questionnaire will be directly introduced to the Action Plan. Institutions can additionally select more elements in case they plan to address them. Relevant interventions are proposed according to the elements selected and institutions are asked to fill detailed information about how they plan to integrate them, the engaged cells etc. The Action Plan will serve as a strategic planning document for each institution's implementation phase.
- 3. The Self-Reflection questionnaire. After the implementation period of their Action Plans, institutions will be asked to fill in the Self-Reflection questionnaire, reflecting on the implementation of the proposed interventions.

The basis of the tool is the NUCLEUS Framework which has been revised according to the feedback gathered from all partner institutions after the 1st Implementation period.

START SELF-ASSESSMENT

Interim Report

In addition to using the NUCLEUS Web Tool all ENs will complete the Interim Report after the end of the implementation period, similarly to what was done in the 1st Implementation phase. The template for this will be shared by WP5 Leader, DCU. The completion of the document allows partners to include qualitative account and insights into progress made with each Action in the NUCLEUS Action Framework. By the completion of the project, each institution will have 3 reports completed. The qualitative accounts on progress will support the project partners develop final policy recommendations while also supporting you provide evidence of progress since the Implementation Phase to your senior leadership.



DOCUMENT DESCRIPTION

This report summarises the main results of the NUCLEUS project.

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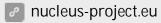
DISSEMINATION

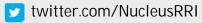
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PROJECT

NUCLEUS was a four-year, Horizon 2020 project bringing Responsible Research and Innovation (RRI) to life in universities and research institutions. The project was coordinated by Prof. Alexander Gerber from Rhine-Waal University. For more info, please visit the NUCLEUS website, or contact the coordinator: info@nucleus-project.eu

NUCLEUS ONLINE





facebook.com/NucleusRRI



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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 Engagement Association · 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

