Join Us to Optimize Health Through Cohort Research

Deliverable 5.3: Report on formal and informal educational activities through which the RRI concept is shared across different educational levels: Department of Epidemiology – Erasmus MC

Version 1.0

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Contents

List of Abbreviations

CSB	Citizen Science Board
Erasmus MC	Erasmus Medical Center
HI-NL	Health Innovation Netherlands
NIHES	Netherlands Institute of Health Sciences
RRI	Responsible Research and Innovation

Summary

This report concerns Deliverable 5.3 of the JoinUs4Health project (grant number 101006518). As leaders of the Work package "Formal and informal education", we summarize the formal and informal educational activities that we provided at the department of Epidemiology of the Erasmus Medical Center in the Netherlands, through which we share and teach the concept of Responsible Research and Innovation.

Introduction

In the last decade, Responsible Research and Innovation (RRI) has gained a huge policy importance. In the Horizon 2020 programme, funded by the European Commission, engagement with RRI principles were integrated into formal requirements of several funding instruments, with the aim to promote collective stewardship of science and innovation for addressing societal needs and expectations (1). The JoinUs4Health consortium (2), funded through such programme, aims to combine RRI and crowdsourcing methodologies to promote inclusive innovation and citizen engagement in research. One of the objectives of JoinUs4Health is to focus on better involvement of citizens, researchers, non-governmental organisations, and other stakeholder groups in science and innovation through multiple strategies, including providing targeted education. These educational efforts help to meet their needs to facilitate active participation in science. As leaders of the Work Package "Formal and informal education", we aimed to do so by:

1) engaging scholars, students, citizens and research participants in science and exposing them directly or indirectly to the concept of RRI within existing educational programs,

2) developing and implementing novel courses, podcasts and webinars that are specifically dedicated to (formal) teaching and applying of RRI principles.

Although promoting inclusive innovation and citizen engagement and thus promoting RRI in research can be established in different ways, teaching activities can be considered as a crucial means to establish RRI awareness (3). Previous approaches to teaching RRI included activities that were specifically labelled with "RRI" and others were not labelled with it. For example, courses or modules like "the philosophy of Responsible Innovation (4)" or "Introduction to RRI (5, 6)", in comparison to courses that did touch upon important RRI process dimensions - including underlying competence skills like Anticipation, Inclusion, Reflexivity and Responsiveness (AIRR) (see Deliverable 5.2 (7)) - such as courses on "Research Integrity" (8) or "lifelong learning skills" (9).

In this report, we present the activities that we initiated at the Department of Epidemiology (10) at the Erasmus Medical Center in collaboration with the JoinUs4Health consortium, through which we shared the RRI concept with and without RRI labels, across different educational levels. Practically, we carried out educational activities related to RRI in three different ways:

1) by directly teaching the concept of RRI formally;
2) by indirectly teaching RRI through competence teaching, and through project-based learning;
3) by informally practicing RRI on the institutional level, and becoming thereby a role model in such approach ('practice what you preach').

In this report, we will present our work according to the abovementioned structure. In this context, we will first highlight the historical background of the Department of Epidemiology, Erasmus MC where most of these activities started or find their origin.

The Department of Epidemiology: an evolving RRI hub

At the department of Epidemiology, (applied) epidemiological research and teaching are obviously part of the department's core business. It is important to realize that almost all researchers at the department of Epidemiology are closely involved with the design and data collection of the Rotterdam Study (www.ergo-onderzoek.nl). In this context, they have the chance to investigate topics that are relatively closer to society than in other biomedical research areas, and usually concern trends or disturbances in contemporary population health.

In addition, Epidemiology staff are closely involved in teaching knowledge, practical skills and professional competences to various educational levels. Currently four of our staff are programme directors (11) at the Netherlands Institute of Health Sciences (NIHES);

- Prof. Dr. Myriam Hunink; director NIHES and programme director Health Sciences,
- Prof. Dr. Kamran Ikram; programme director Clinical Research,
- Dr. Jeremy Labrecque; associate programme director Epidemiology, and
- Prof. Dr. Dimitris Rizopoulos; associate programme Director Biostatistics.

In addition, Dr. Radjesh Manna, our current theme director is appointed as the director of the Graduate School (12) that provides research master and PhD programmes in the biomedical field. On the departmental level, this means that about 70% of our staff is involved in teaching.

Finally, the department chair (Prof. Dr. M. Arfan Ikram) leads the **diversity and inclusion** taskforce and serves as a role model for other departments in the institution being one of the most

diverse and inclusive departments in the institution. Here, we present some facts from our self-assessment report for the period 2013-2018: In our department, six of the eleven principal investigators are female. At the time of submitting this deliverable, ages of the principal investigators range from 31 to 66. We actively promote participation in talent programs among our gifted female scientific employees. This includes the Erasmus Female Career Development Program, the Erasmus Young Talent Program, and the UNESCO-L'Oréal Fellowship for Women in Science. One of the largest percentages of diversity in the Erasmus MC may be found among our 11 current principal investigators, who come from five different ethnic backgrounds. Additionally, in our department, we value, embrace, and promote people with disabilities. We have resources available to meet their requirements (e.g., wheelchair access, adapted workload and assignments matching their needs and possibilities).

This unique combination of the abovementioned factors allows its researchers to

- understand the **infrastructure** of the institution and act accordingly,
- be in favourable **leadership** positions to negotiate changes on the institutional level and
- feasibly update **educational** programs.

Motivated by longstanding research collaborations and recent societal developments, the department has been actively involved in programs that contribute to innovation at the institutional level. After joining the JoinUs4Health consortium in 2020, several of these developments accelerated, especially those related to RRI that were either set up or gained a significant boost after joining the consortium.

1. Direct and formal teaching of RRI-principles

In this section, we highlight the development of a minor program (also known as a secondary specialization) for third-year bachelor students entitled "From Science to Society". Our involvement in the JoinUs4health consortium and availability of funds to hire personnel to meet the consortium objectives was a crucial first step that allowed us to think about the role of education in sharing the RRI philosophy. Leveraging this momentum, we explicitly sought to expand existing collaborations with other parties that aim for similar goals, like the R.I.O.T. (Reproducible, Interpretable, Open and Transparent) Science Club (13), Impact at The Core (14) for impact-driven education and the Erasmus Arts2030 (15) for the new medical curriculum. These collaborations shaped our understanding of what educational material should be developed, that meets the needs and expectations of all involved parties, especially those of the students. This

minor served as a pilot to project-based learning of the Erasmus Arts2030 program, the new medical curriculum of the Erasmus MC, which we will discuss further in chapter 2.

From Science to Society: a 10-week interdisciplinary course:

Views on what should be considered a 'successful' scientist are changing. Scientists are expected to produce high-quality research that is also societally relevant and societally impactful. This demand for societal impact is widespread across disciplines, and was the very basic need of a 10-week minor that we designed based on the RRI philosophy. To train a future-proof generation of scientists, we designed an interdisciplinary course that fosters skills in three key areas to achieve societal impact: science communication, RRI & open science as well as public engagement. By using Project-based Learning as our main pedagogical approach (16), we provide students with the opportunity to develop responsible skills and practices. Besides following inspirational lectures and interactive workshops, student's interface directly with societal stakeholders, who provide students with pressing societal or scientific questions at the start of the course. Students subsequently address these within small groups of peers through project work and are encouraged to engage other external stakeholders in their project and as such to understand and apply principles of responsible and open science. The course manual will be published on www.joinus4health.eu.

From idea to realization

In the section, we briefly describe the steps we took to come from idea to implementation of the minor.

1) Availability of funds from the JoinUs4Health consortium. This allowed us to appoint a coordinator to take care of several projects including the coordination of this course. The organization of this minor took in total one year and five months (between July 2021 and December 2022) and including the steps as described below.
2) Understanding the infrastructure of the institution in which we are acting, to see how the course would fit in existing structures.
3) Timely negotiations with minor program coordinators to explain the need and importance of our work. (July 2021).
4) Timely submission of the new minor application form. (February 2022)
5) Regular negotiations with consultants and education advisors from the R.I.O.T. science club and Impact at The Core, who happened to have the same vision and mission as we did for the consortium. We are especially grateful for the team of the Impact at The Core

for their support by covering the expenses of the education advisors. (February – August 2022).

6) Preparing the study manual, course schedule and inviting guest lecturers from different disciplines (June-September 2022).

7) Coordinating the course, supervising students and actively attending course lectures. (August-December 2022).

8) Evaluating the course, advertising and maintaining the connections with actors, lecturers and stakeholders throughout the full period of the course.

How is the RRI concept shared during this minor?

The course has been <u>designed</u> according to the RRI process dimension and policy agendas as proposed by the European Commission (**Figure 1**). As the course timeline shows in Figure 1, the first week was dedicated to expose students to the relatively new concept of RRI. This included <u>lectures</u> and <u>workshops</u>. Thereafter, each week was dedicated to one stakeholder group, in which prominent lecturers in that field were invited to speak about how they incorporate RRI in their field. In addition, RRI <u>skills</u> were also taught throughout the course. Students had several workshops to improve their communication and presentation skills for a wider audience. Finally, students could <u>practice RRI</u> by jointly working on their societally relevant problem.
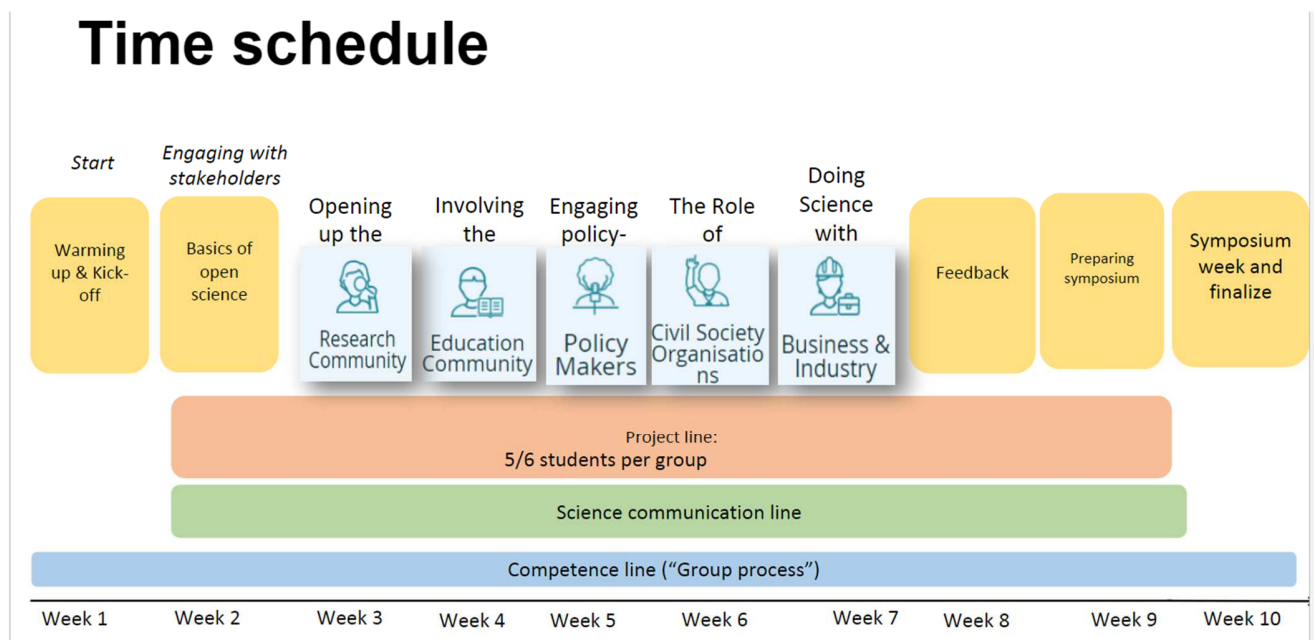

Figure 1. Course timeline "From Science to Society" August– November 2022

2. Indirect RRI teaching

The second way how we carry out RRI related activities is by 1) indirectly teaching RRI through **competence teaching** and 2) providing **relevant education,** that deals with real-world issues by incorporating project-based learning to the curricula.

A. Competence teaching

In our previous deliverable (Deliverable 5.2 (7)) we highlighted a set of projects, including the "Enhancing Responsible Research and Innovation in Curricula of Higher Education (**EnRRICH**) project", a H2020 project that aimed to develop a framework to re-design education curricula from a RRI perspective. The project proposed a set of context-independent competencies, which they called the **RRI competences** that can be embedded in curricula to help students to practice RRI. Naturally, the RRI competences include a set of skills that are articulated across the four RRI dimensions (anticipation, reflexivity, inclusiveness and responsiveness), as mentioned earlier (**Figure 2**).

Within the context of this report, we can mention here two examples of communication courses that we teach: Presentation Skills for All Audiences (17) and Science Communication (18). In both courses, we consciously incorporate multiple aspects of the RRI competence framework as presented in **Figure 2**. We also want to highlight the Junior Medical School program, in which we provide a set of RRI competences.
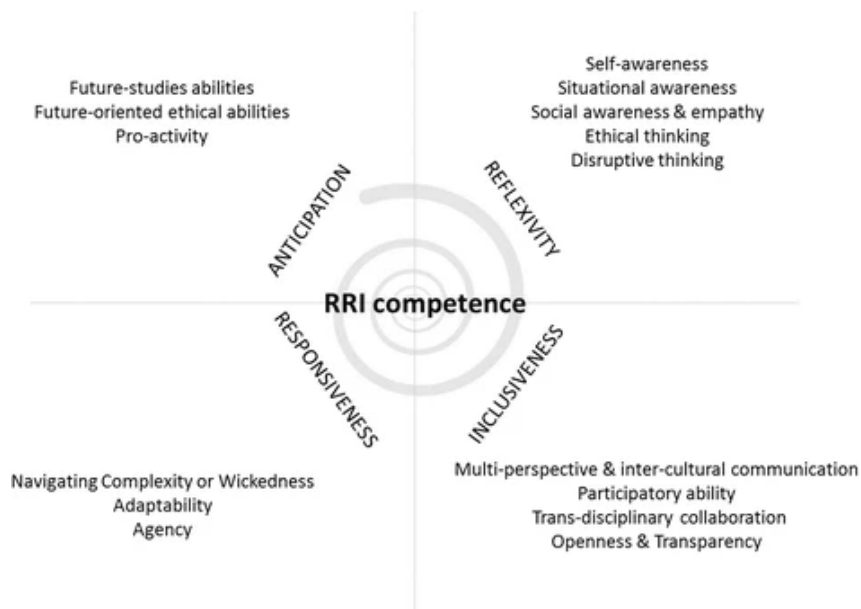
Figure 2. Responsible Research and Innovation (RRI) competence framework as proposed by Tassone et. al. from the EnRRICH project https://link.springer.com/article/10.1007/s10734-017-0211-4 #Fig2 (19)

The Junior Med School (JMS) (20)

The Junior Medical school is a two-year program that was initiated in 2006 and is dedicated to high school students who have high affinity with the fields of medicine and scientific research. Excellent students, those with high marks and great motivation are nominated by their own school to participate. Out of 50 nominations, the JMS committee selects each year around the 25 students. The department of Epidemiology has a leading role in this program. Each year researchers from all departments at the Erasmus MC can submit a research proposal. This proposal is then added to the list of proposals, from which students can choose their topic of interest. Research proposals from the department of Epidemiology are selected every year, and research outputs by our JMS students won the prize for the best presentation <u>for three years in a row now</u>, as judged by an independent jury.

The JMS program exists of the following parts:

- The JMS summers school (2 weeks)
- 10 days of lectures and lab visits
- Research (4 weeks): Students select a research topic and experience real life research supervised by an experienced researcher.
- Final report and presentation: awards for the best report and presentation.

After completion of the program, students will be automatically eligible to enrol to the medical school. In general, 80% does actually enrol to the medical school after attending the JMS program. These also show excellent performance, usually join the Erasmus Honours Academy, and end up doing an extra research master.

How is the RRI concept shared during the JMS program?

During the JoinUs4Health project, two students (Jaap Zoon and Rosanne van Dongen) visited the department of Epidemiology to work on time-trends in healthcare avoidance during the COVID-19 pandemic. During their visit, we taught them the basic concepts of epidemiology, but also directed much attention to the value of appropriate <u>science communication</u> and involvement of societal stakeholders. We discussed with them the prototype of the JoinUs4Health platform (21) and the potential that could be achieved through active platform participation of societal stakeholders to benefit research.

Students ended their project with a presentation during a symposium that is attended by their teachers, parents and other interested invites. The students used the skills they learned during their visit to our department to present the results to the general audience. We are happy to share

that Jaap and Rosanne won the 2022 societal-impact award; the Gerrit-Jan Mulder price (22) for their presentation on trends in healthcare avoidance during the COVID-19 pandemic.

B. Relevant education

As discussed in chapter 1, we leveraged project-based learning in the minor From Science to Society as our main pedagogical approach to provide students the opportunity to develop responsible skills and practices by dealing with societally relevant issues.

Our role as leaders of the Work Package "Formal and informal education" in the JoinUs4Health consortium, helped us to expand our existing collaborations with parties that had similar goals as ours, namely: using education to prepare pupils for future societal challenges. This is also how we agreed to use the knowledge gained in this minor to serve as a pilot for the new Erasmus Arts 2030 project: the new medical curriculum. As such, the JoinUs4Health project directly contributed to a significant institutional change at Erasmus MC: more than 400 medical students will follow four 4-week courses in their first two years of their bachelor program (total of 16 weeks) training that are informed by RRI principles.

Erasmus Arts 2030: the new medical curriculum of the Erasmus MC (15)

Next-generation doctors will become increasingly involved in discussions and decisions about the boundaries of care, meaningful and sustainable care, solidarity, and about justified costs of healthcare. Erasmus MC aims to provide top education that appeals to talented, ambitious, and curious students and that not only connects but also prepares them for the healthcare and health issues of tomorrow.

Erasmus MC is designing a new medical curriculum ('Erasmusarts2030'): Erasmus MC aims to train students to become academically broadly trained medical doctors who are well prepared for new technological developments and are societally engaged at the same time. For that purpose, the new curriculum will develop and incorporate elective tracks in the Bachelor Erasmusarts2030, which will be continued in the Master. In four different thematic tracks, students learn to deal with health issues with a societal impact on the basis of problem-based project learning: 1) Medical Sciences, 2) Sustainable Public Health, 3) Health & Technology, and 4) Healthcare Organization & Policy. These thematic tracks are an entirely new feature of our curriculum and will enable students to work on societal and health(care) problems of their own choice together with citizens, patients, teachers and students from other faculties as well as business partners and other stakeholders.

12

The educational framework of project-based learning will be implemented in these tracks, which asks for a different role of teachers as supervisors as well as of students, but also asks for a different organization of education. Given that each year 410 students enrol in our Bachelor of Medicine, it is of utmost importance that these tracks are carefully developed, designed, and (at least partly) tested before the start of the new curriculum in September 2024.

To lead this huge institutional change, we have so far designed and almost finished two 4-week pilots during the JoinUs4Health project. This new Minor programme allows second-year medical students to learn these new skills (e.g. how to critically analyse a real-life societal problem related to healthcare, how to manage a project, how to collaborate with peers, etc.) and how to gain (societal) impact. The 4-week course manual of one of these pilots will be published on www.joinus4health.eu in due course.

3. Practicing RRI

The third way in which we carry out RRI related activities is by demonstrating how we adopted the RRI mentality in practice and participate to reflective practices. These practices can vary from our excitement about RRI in our talks and social media presence to actively participating in hands-on practices that bring science closer and faster to society. Here highlight two initiatives A) the Citizen Science Boards and B) our contribution with Health Innovation Netherlands.

A. Citizen science boards

Besides promoting societal engagement through education, the JoinUs4Health project also aims to create Citizen Science Boards (CSB) in each of the collaborating countries (the Netherlands, Germany and Poland) that includes different stakeholder groups like citizens, teachers and policy makers. CSB members have the specific task to review the conceptual framework of the JoinUs4Health project, engage in decision-making regarding platform activities and inform future project decisions as well as communication of project outcomes.

We – the Dutch cohort partner in this consortium - have established a CSB ('Burgerraad voor Wetenschap') and had two rounds of meetings with it so far. We emphasized the importance of joining the CSB on our websites and social media accounts. We also were physically present in the city by joining the Science Café in Rotterdam, where we got the chance to promote our consortium work and kindly invite the citizens to think with us on how to bring science closer to society (**Picture 1**).

13

Picture 1. Science Café November 2022 with Dr. ir. Natalie Terzikhan promoting the citizen science board and inviting citizens to join.

B. Health Innovation Netherlands (HI-NL): Roundtables

One of the other activities that brings us closer to society is our collaboration with Health Innovation Netherlands (HI-NL) (23). HI-NL is multi-stakeholder infrastructure, in which all relevant experts in the medical field – from patients, to insurers to medical doctors - are present, and where medical innovations find their way to the user faster through contribution of all those stakeholders.

HI-NL organizes round tables, where all relevant stakeholders are invited to share their expert opinion on promising innovations and give constructive feedback on it to help fasten the process of market adoption in a safe and cost-effective manner. In our collaboration with HI-NL we have the role of the "case team". This role is characterised in three phases as presented in **Figure 3**. Step 1 includes preliminary desk research performance to the innovation and stakeholder identification. Step 2 includes leading the round table discussions and interacting with the experts. Step 3 includes writing an independent summary and feedback report to advice the innovator on how the steps that are needed to bring the innovation to the society in a fast, safe and reliable way.

This collaboration demonstrates our viewpoint on how our choices for collaboration make science reliable, open, inclusive and closer to society.
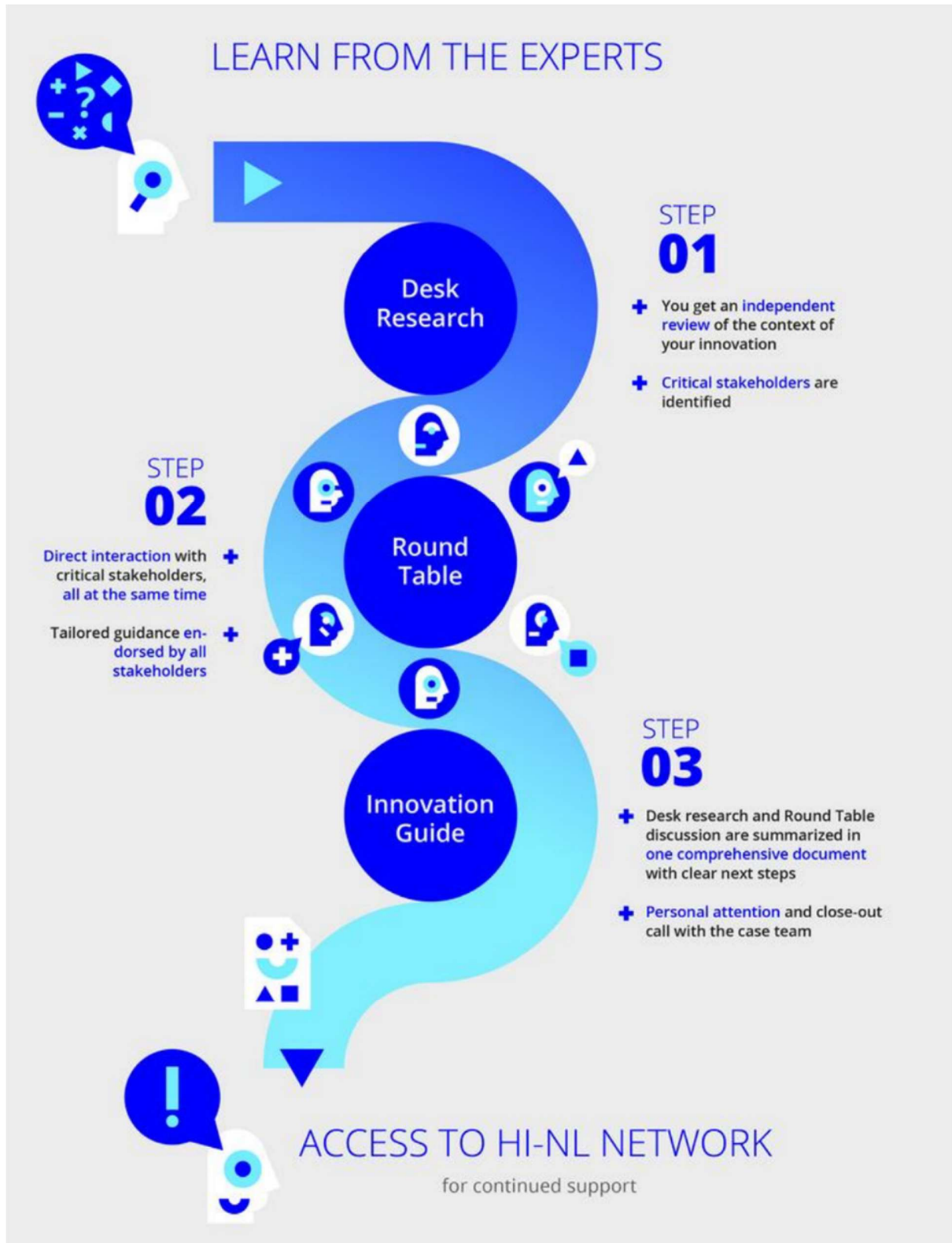
14

Figure 3 Health Innovation Netherlands (HI-NL) roundtable and the role of the case team in bringing the innovation closer to the society; figure reference http://www.healthinnovation.nl

15

Conclusion

In this report, we summarized our main activities in which we shared the RRI philosophy. Here, we demonstrated that investment in the culture of the workplace, its inclusivity and employee diversity, in this example that of the Department of Epidemiology of the Erasmus MC, creates the space for its employees to be seen and flourish in the organization. We also demonstrated the power of collaboration. Joining forces and expanding existing collaborations not only allowed us to offer a unique minor course to third year bachelor students in different universities, it also resulted in a bigger wave of change on the institutional level. Using the 10-week minor course as pilot to change a whole medical curriculum was something we could not foresee when applying for funding for the JoinUs4Health project.

Earlier we published Deliverable 5.2 (7), a summary of published recommendations on how to implement RRI in Educational institutions. Here, we learned that it was easier to implement RRI, if we take into consideration three layers of the organization:

1) the organizational aspects of the institution, including its identity, culture and infrastructure,

2) the role of the leaders and policy makers in that organization, and how the scale, incentives, and timing of the collaborations, and planned actions play a huge role in making RRI implementation successful, and finally.

3) the role of the educators.

In hindsight, we see that all these three factors were taken into account in our actions, which explains why it was relatively easy to teach and practice RRI formally and informally, and to create a bigger wave of positive effects that resulted in sustainable changes on the institutional level.

Future ambitions

In the remaining 12 months of the project, we aim to:

1- develop webinars that are open and accessible for everyone;
2- work on a podcast series that aims to discuss basic concepts of epidemiology and causal inference in an easy and understandable language for the general public;
3- contribute to the design of the Dutch National Centre for Science Communication in collaboration with other universities and medical centres in the Netherlands:

4- host a second, improved edition of the From Science to Society course in 2023-2024, and to aim for recording of lectures to give other (partner) institutions the tools to offer the same concept in their countries;

5- further strengthen our collaborations with parties that aim to implement RRI and open science in Education.

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