

1. *What is responsible research and innovation?*

Research and innovation constantly change our world. From the Internet and mobile phones, to climate change and new cancer treatments, science and technology have the potential to transform our lives. These developments also create new risks and new ethical dilemmas. Responsible Research and Innovation (RRI) seeks to bring these issues into the open, anticipate the consequences and directions of research and innovation, and involve society in discussing how science and technology can help create the kind of world and future we want.

2. *Why responsible research and innovation?*

Increasingly powerful science and technology have granted humans unprecedented scope to intervene in our surroundings, from altering ecosystems and the Earth's climate at the global scale to manipulating the minute building blocks of matter and life itself. In addition, as a society we face great challenges –from healthy ageing to sustainability, from global health to resource security. Research and innovation have the power to tackle these challenges, but their success is not guaranteed.

Research and innovation will always be at least partly unpredictable, but this does not excuse irresponsibility. Understanding and taking responsibility for these developments goes well beyond just science and scientists. Such developments profoundly affect all our lives. The direction and purpose of research and innovation, the distribution of its outcomes (both positive and negative), the uses of new technologies, and maintaining a focus on solving pressing problems are matters that we, as a society, need to discuss and choose together.

3. *What should responsible research and innovation look like?*

RRI is not one thing. It will vary across institutions, cultures and areas of science and technology. However, it will have one key, central feature: it will put the needs of ordinary citizens at its centre. Companies will still need to make profits in a market economy, but RRI will re-orientate research from “can this make money?” to “how can this fulfil the needs of society within the market?”

4. *What about ‘fundamental’ research?*

Fundamental research is not aimed at meeting the immediate, material needs of society. The deep insights into the world in which we live –from sub-atomic to universal scales, from the micro-biotic to the global environment– are a vital part of human culture. RRI applies to all stages and aspects of research, including fundamental research. It demands that the knowledge gained be open and accessible to all, and that its starting point be engagement with as many of the world's citizens who want to participate in creating that new knowledge as possible.

5. *Whose needs, whose challenges?*

How, then, to uncover the needs of our fellow citizens? Over the last few decades, we have seen many experiments that foster involvement of the public in discussions and policy decisions regarding science, collaboration between scientists, ethicists and social scientists, open source and user-driven innovation, citizen science and more

besides. We should encourage such experiments, join them up and encourage the institutions that fund, regulate and govern science and innovation to respond to them. RRI means experimenting further and improving upon existing practice. It means paying close attention to current developments, be they positive efforts by scientists to take responsibility for emerging technologies, or institutional and cultural barriers that are stopping progress. RRI also encompasses research ethics, gender and other forms of inclusion, open access to scientific data and publications, and scientific education. Scientists and innovators should be encouraged to take responsibility for the futures they help shape. But the responsibility is not individual, nor is it theirs alone. The challenge is to find collective ways to take care of the future.

6. Examples of promising RRI practices

During the coming months, the RRI Tools project will look at existing practices that may have RRI potential, as we can learn from 'real world' experiences with RRI. These promising practices of responsible research and innovation should exert a variety of features brought to light in the RRI information sheet.

RRI is about anticipating how our decisions regarding research and innovation might shape the future and about reflecting on our actions, while being open and transparent about these decisions and actions. It should not merely recognize the needs and wishes of stakeholders, but also shape directions of research and innovation in response to a diverse set of perspectives and to changing circumstances. RRI aims to create a society in which responsibility for our future is shared by all people and institutions involved and in which research and innovation practices strive towards ethically acceptable, sustainable and socially desirable outcomes.

The RRI Tools project aims to collect a variety of promising practices: they can be instruments, projects, programmes, or organisations. For each type of RRI practice we provide you with an example from the Netherlands. We kindly ask you to come up with one promising RRI practice in the region you live or work and note down some basic information about that practice on the attached question sheet in preparation to the workshop.

Example of instrument: Techno-moral vignettes (Rathenau Institute)

To envision possible futures for synthetic biology Rathenau Institute (Netherlands) wrote a number of techno-moral 'vignettes'; short stories describing possible futures of technology in our society and lives. Techno-moral vignettes are not speculative predictions of the future, but describe possible future events based on current developments in and knowledge of the research fields relating to the technology. They are called techno-moral because they explore both the different fields of application of the technology and the moral concerns raised by it. The vignettes can be seen as a promising practice of RRI as they try to open up the discussion about how technology can affect our world, ideas, needs, values and ideals. The vignettes invite everybody to think about if and how innovations can improve our world, aiming not only to include the general public, but scientists and politicians as well. This instrument could be used for a broad range of innovations and to seek a better understanding of how these innovations could change the way we live and how they may contribute to a better world.

Example of project: 'Seeking Sociable Swine' (Wageningen University, VU Amsterdam, and the Institute for Pig Genetics)

In the Netherlands animal welfare in animal production has acquired a permanent place on the political, scientific and private agenda. Within the research project 'Seeking Sociable Swine', researchers from different disciplines worked together to create a shared solution for animal welfare improvement in pig production. From the start of the project stakeholders were involved via a multi-stakeholder dialogue, facilitating the process of reflecting on one's own and the total diversity of perspectives at stake. The aims of the project were dual: while generating scientific knowledge (animal genetics research), the research realises a problem-oriented, learning intervention and functions to contribute to sustainable development.

Example of programme: Responsible Innovation (NWO, 'Maatschappelijk verantwoord innoveren')

The Dutch research funding program NWO/MVI (Responsible innovation) is directed at technological developments that presumably have large (both positive and negative) impacts on individuals and societies. These developments encompass on the one hand new emerging technologies, such as nanotechnology and ICT, and on the other hand technological systems in transition, such as agriculture and health. The program contributes to socially responsible innovation by broadening and deepening the study of ethical and societal aspects of technological trajectories in both national and international contexts. Interdisciplinary collaboration and a pro-active design perspective aim to ensure that the understanding of ethical and societal aspects is actively incorporated into the innovation trajectories.

Example of organisation: The Netherlands Lung Foundation

The Netherlands Lung Foundation (NLF) is considered one of the pioneers of patient involvement in health research in the Netherlands. It consists of both a research-funding agency and a patient organisation, which hold a strong relationship. The NLF might be called an example of an RRI organisation, as they try to incorporate stakeholder involvement as a 'normal practice' in their organisation. Because of the double role of the NLF, they hold an extensive network including researchers, health professionals, and patients. Acknowledging the value of all perspectives for addressing lung disease related issues, NLF includes them in agenda setting activities. Furthermore, NLF acquired a leading role among health funding agencies in the Netherlands by developing other forms of patient involvement: it changed its guidelines for proposal writing (e.g., submitting a 'lay summary' so that patients can judge the proposals), it communicates patient involvement for the research community (e.g., by presenting at scientific conferences and via publications), it participates in various international projects where patient involvement plays a role, and it established a pool of about twenty patients that received a two-day training course on patient involvement to prepare them to engage in research and gain insight into how researchers work and think. All these initiatives lead to better informed and more needs-oriented research and a stronger connection between the patient organisation and the research section.