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# Towards Responsible Research and Innovation: Approaches, Concepts & Tools

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# Overview

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## 1. Approaching the concept

- Why Responsible Research and Innovation?
- RRI in a nut shell
- Where does it come from?

## 2. Integrating RRI in research and innovation

## 3. Tools and Approaches

## 4. Short interactive session



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## Approaching the concept of RRI



RRI is the ongoing process of aligning research and innovation to the values, needs and expectations of society«

Italian Presidency of the Council  
of the EU (2014)

# Why Responsible Research and Innovation?

## Science

- Reproducibility crisis
- Productivity crisis

## Society

- Partly eroding trust in science
- Resistance to (some) new technologies and innovation
- Growing influence of misinformation, „fake facts“, conspiracy theories

## Policy and politics

- Research and innovation increasingly expected to deliver on numerous goals (economic, environmental, health, societal)
- Growing influence of populist, anti-science political parties



# Why Responsible Research and Innovation?

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## Science

- Reproducibility crisis:
  - 70% could not reproduce data of colleagues
  - „Science goes wrong“: 90% of 2nd stage clinical trials fail (lead article Economist, 2013)
- Productivity crisis:
  - The number of drugs approved by the US Food and Drug Administration (FDA) per US Dollars spent on R&D has halved roughly every 9 years since 1950
- „Publish or perish“ pressure might entail questionable research practices and reduce relevance  
(Credit to René von Schomburg)

## Society

- Partly eroding trust
  - research scandals or perceptions of biased research have led to public skepticism
- Resistance to (some) new technologies and innovation
  - Debates about some new, disruptive technologies such as GMOs reflect the need for taking societal perspectives into account
- Growing influence of misinformation, „fake facts“, conspiracies

# Why Responsible Research and Innovation?

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## Policy and politics

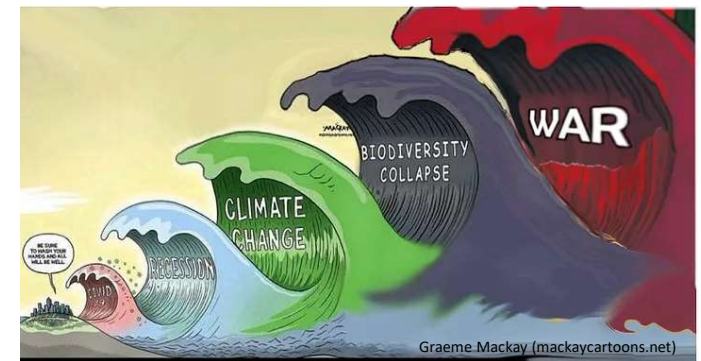
- The European Union as well as the European governments want research and innovation to contribute to economic goals, to find solutions to environmental and social challenges  
At the same time, European governments are under increasing pressure to legitimize high public investments in research and innovation  
→ need to show that investments are in the interest of the people
- Growing influence of populist, anti-science political parties

# Why Responsible Research and Innovation?

## Multi-crisis and disruption

- Our societies are facing unprecedented ecological, economic and political disruptions – involving highly complex challenges, from climate change and environmental degradation to the proliferation of surveillance technologies and unsustainable consumerism
- Various waves of scientific and technological innovation played and plays a role in these interconnected processes
- Against this background, the profile of science and technology has changed: Once heralded as drivers of progress and emancipation, they now are often perceived as potentially disruptive threats

→ How can science and innovation again become part of the solution?





# Why Responsible Research and Innovation?

## Some fundamental questions

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### 1. Avoiding the wrong impacts of research and innovation

Technological development is ubiquitous in liberal, market economies; it is only restricted by (risk) regulation.

However, the development of many emerging science and technologies is fast, regulation usually lags behind.

→ *How can we make sure that science and innovation do not create severe problems (now or down stream) for the environment or society?*

### 2. Creating the right impacts of research and innovation

Our societies are facing numerous grand challenges. Research and innovation are needed to help solve these challenges.

→ *How can we make sure that research and innovation contribute to what is good for society?*

# Why Responsible Research and Innovation?

## Some fundamental questions

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### 3. Who are we to decide what are the right (and wrong) impacts of science and innovation?

Researchers and innovators are experts in justifying (and sometimes hyping) their inventions and projects. We are trained in emphasizing the benefits of our research and toning down potential problems.

One cannot assume that the researchers' own assessments represent a neutral view on the benefits and burdens of an innovation for society.

→ *How can societal groups/the public be involved in discussions about science and innovation so that we researchers can take a broader perspective?*

### 4. Responsibilities of researchers and innovators

→ *Many actors are involved in research and innovation processes. What are the responsibilities of the individual researcher or innovator versus all the other actors that modify how R&I meets the world?*

(Credit to Ellen-Marie Forsberg)

## RRI in a Nut Shell

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Developments in science come along with promises for progress *and* concerns

If science is both part of the problem *and* the solution, then we need mechanisms and concepts to consciously deal with this tension

RRI is meant to make science more responsive towards societal dimensions, to improve the relationship between science and society

## RRI in a Nut Shell

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### **Directionality of R&I:**

- addressing societal challenges (sustainability, security, well-being etc.)
- anticipation of risks and taking ethical concerns into account
- aligning technology and innovation with societal values and demands

### **Some suggestions how to perform and govern research and innovation responsibly include:**

- involvement of stakeholders
- encouragement of actors' responsiveness and forward-looking attitude

# RRI in a Nut Shell

## Definitions

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### Some definitions

*“Responsible innovation is a collective commitment of care for the future through responsive stewardship of science and innovation in the present.”*

Richard Owen et al. (2013)

*“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).”*

René von Schomberg (2012)

*“Responsible research and Innovation is an approach that anticipates and assesses potential implications and societal expectations with regard to research and innovation, with the aim to foster the design of inclusive and sustainable research and innovation.”*

European Commission

*“RRI implies 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.”*

European Commission

# Where does it come from?

## Diverse conceptual roots

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RRI builds on and integrates elements of numerous approaches dealing with the improvement of the relationship between science and society

- Technology Assessment
- Risk assessment, environmental impact assessments
- Anticipatory governance
- ELSA/ELSI research
- Foresight
- Value sensitive design
- Research integrity
- Research ethics
- Bioethics
- Corporate social responsibility (CSR), business ethics
- Sustainability transitions
- Participatory and transdisciplinary research
- ...

# Where does it come from?

## Historical development of RRI

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### Academia

- long-standing discourse
- process of institutionalisation (academic journals, e.g. JRI), conference themes, university chairs and curricula

### RRI has been taken up and strongly promoted by the European Union

- Rome Declaration on RRI in Europe (2014)
- Horizon 2020: RRI as a cross-cutting theme
- RRI as a guiding principle (sometimes as a requirement) for projects applying for funding in Horizon Europe (e.g., ERA)



### National and regional research funders and research organisations have followed and taken up RRI

- e.g. in Norway, the Netherlands, the UK
- In some European countries and regions as well as abroad (e.g., Australia) similar approaches are being used, but called differently
- OECD and UNESCO follow similar responsibility ambitions
- Industry (e.g., EIRMA, EARMA)



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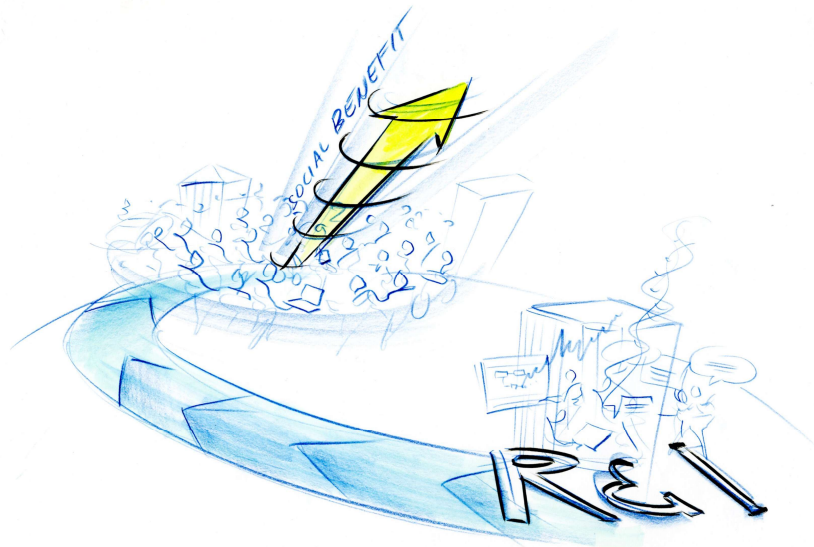
Integrating RRI in research and innovation





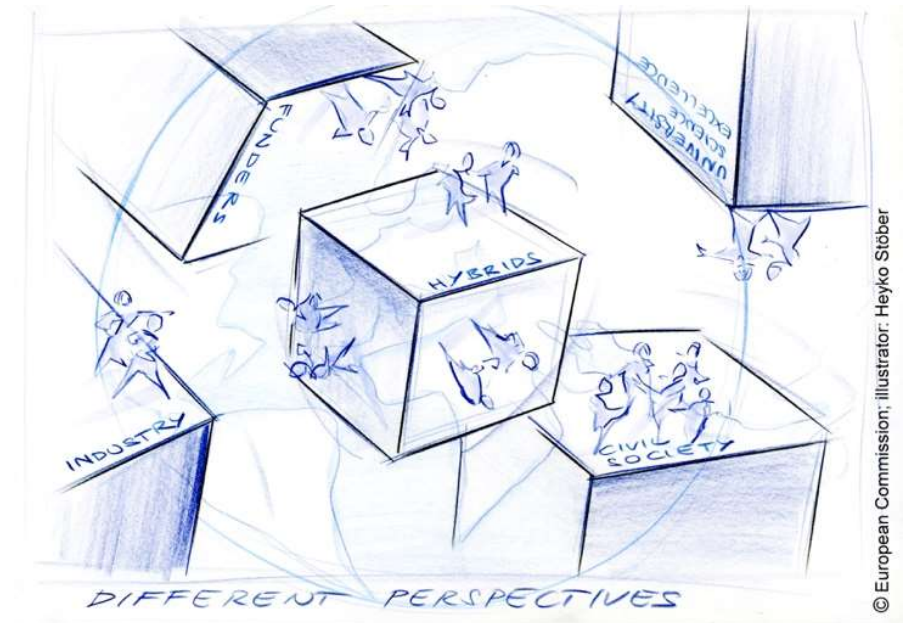
To put it simply, RRI means ...

**Producing relevant research results  
& societal uptake / impacts**



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**Including multiple stakeholders & reflecting on  
different perspectives & anticipating effects**



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# Institutionalising RRI in research and innovation practices

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## General consideration for the realisation of RRI

1. RRI is also about the direction research should take. Who defines desirable directions, on what grounds and based on which processes?  
→ Procedures need to be in place to address contestation and facilitate the capabilities of actors to engage in constructive negotiations
2. Numerous governance instruments for R&I already exist, often addressing the aims and ambitions of RRI (CSR, CoC, ethical reviews, TA etc.)  
→ Governing R&I towards more responsibility should take into account and build on existing governance arrangements, learn from them and constructively integrate them
3. Responsibility in R&I is a context-specific, emergent process. It is important that RPOs adjust and adapt the spirit of RRI to their own circumstances  
→ Actors themselves are best placed to determine the specific content of RRI

# Institutionalising RRI in research and innovation practices

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## Four main dimensions of innovation governance aiming at RRI

- **Anticipation:** Are possible impacts (risks and benefits) of a technology anticipated by the researchers, and are these insights integrated in the research and innovation process?
- **Inclusiveness:** Does the university/RPO/company engage in dialogues with stakeholders, and are the insights from these dialogues integrated into the decision-making processes?
- **Reflexivity:** Does the research group reflect on its impact on society, its purposes, motivations and values? And are these reflections integrated into the research and innovation processes?
- **Responsiveness:** Are the research and innovation processes responsive to societal needs, and is it organized in such a way that it responds to new insights?

(Stilgoe et al. 2013)

# Institutionalising RRI in research and innovation practices

## Understanding put forward by the European Commission

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### Definition of the EC

*Responsible Research and Innovation (RRI) implies 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.*

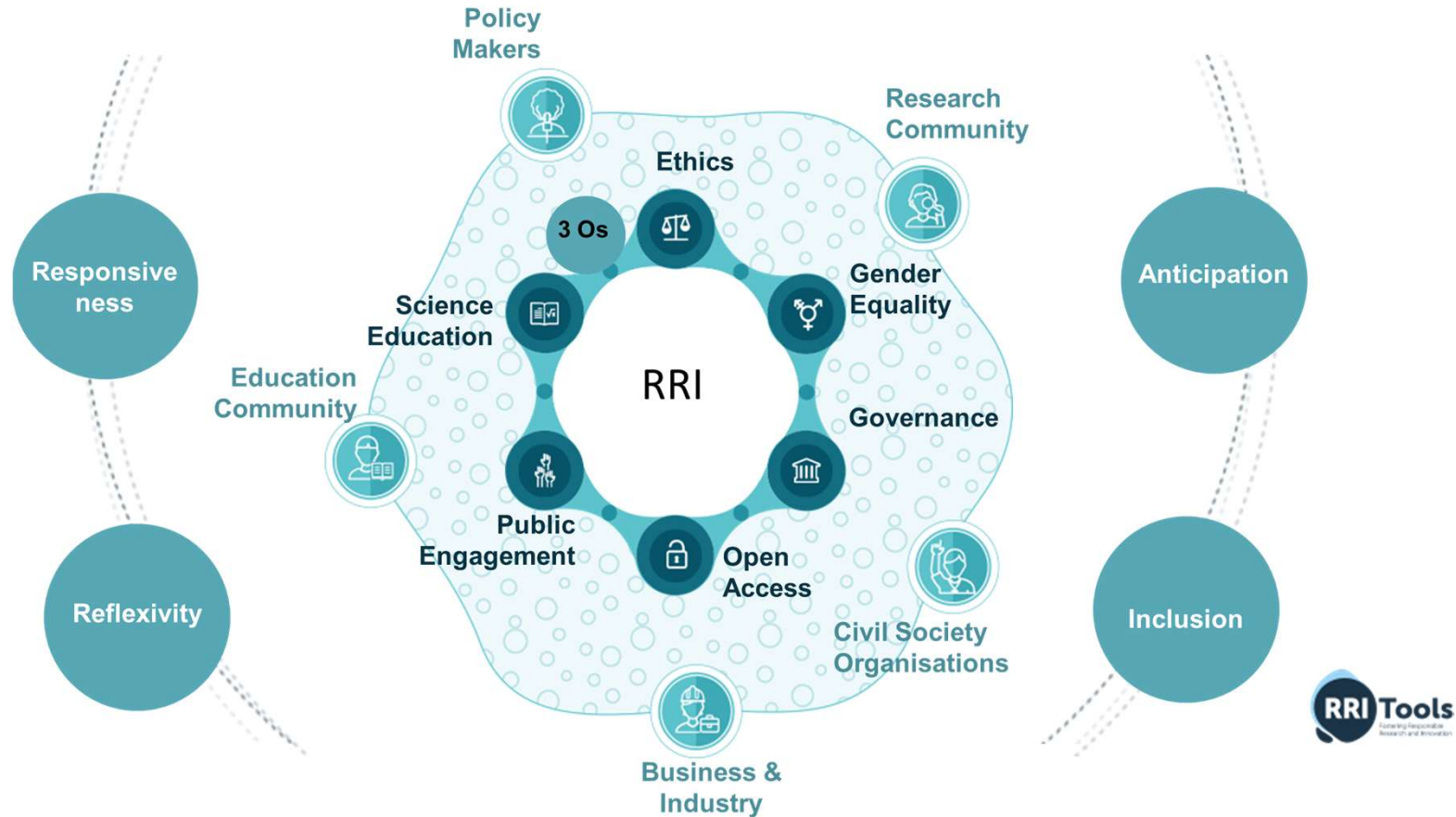
### Operationalization of RRI via 5 Key Dimensions:

- Public Engagement
  - Open Access
  - Gender Equality
  - Ethics
  - Science Education
- 
- Sustainability and the SDGs
  - Societal justice



# Institutionalising RRI in research and innovation practices

## RRI – A systemic view including areas of activity, principles and keys



# RRI in view of European Researchers

## Selected insights from a large European Survey

### Survey on practices and perceptions of RRI among European researchers

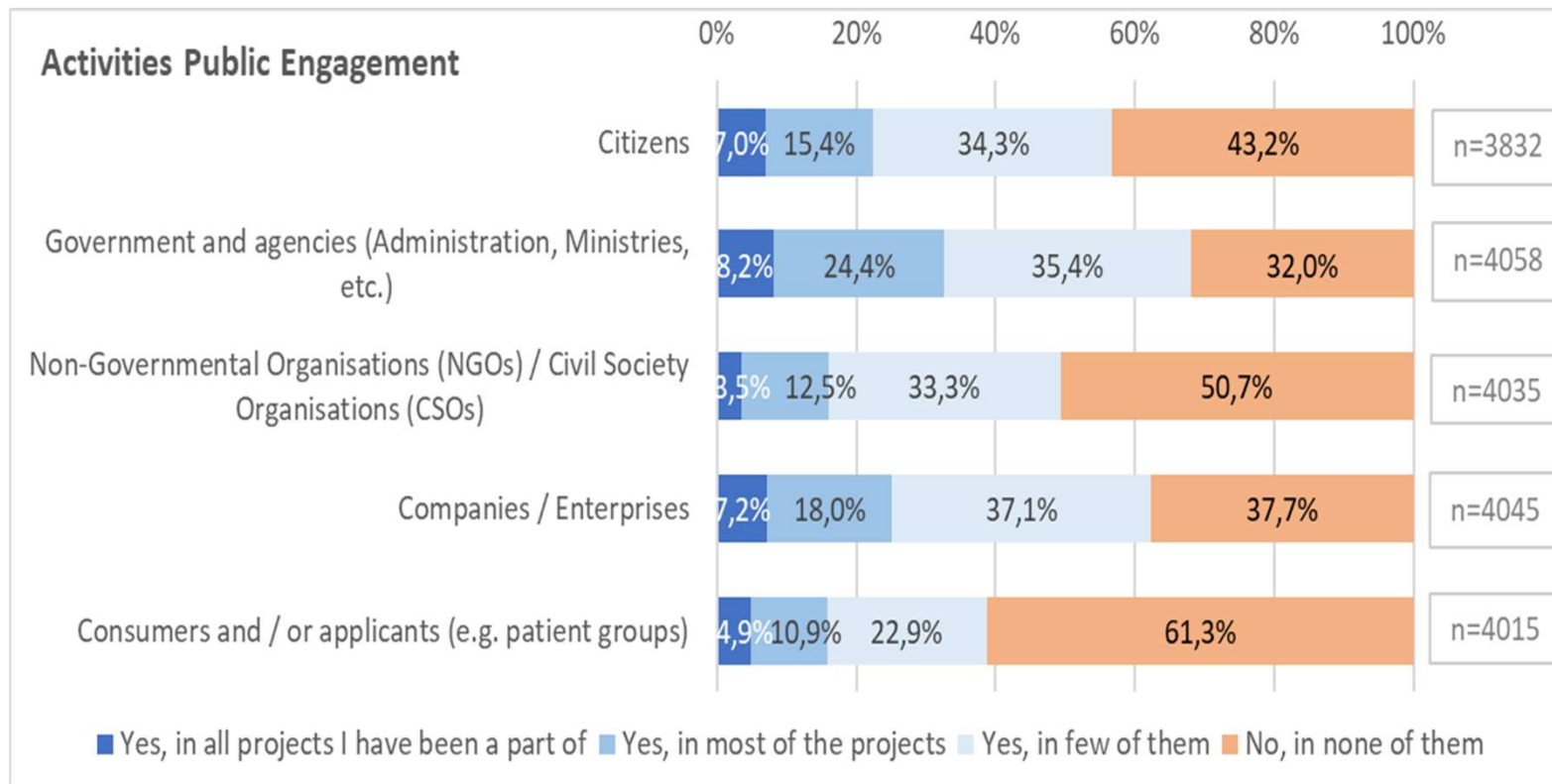
- Gross sample: 127.395 researchers in 29 European countries
- a total of 5.420 researchers participated (participation rate: 5.2%; 3.382 researchers completed the survey (completion rate 3.2%))
- Sample characteristics:
  - 54% male, 41% female
  - geographic representation: Scandinavia and Western Europe most widely represented
  - disciplinary representation: 23% social sciences and economics, 21% natural sciences, 17% engineering and technology, 16% medical and health sciences
- Source: SUPER MoRRI project, 3rd Monitoring Report D2.5 (2023)  
<https://zenodo.org/communities/supermorri>

Word Cloud with the most common associations with RRI



# RRI in view of European Researchers

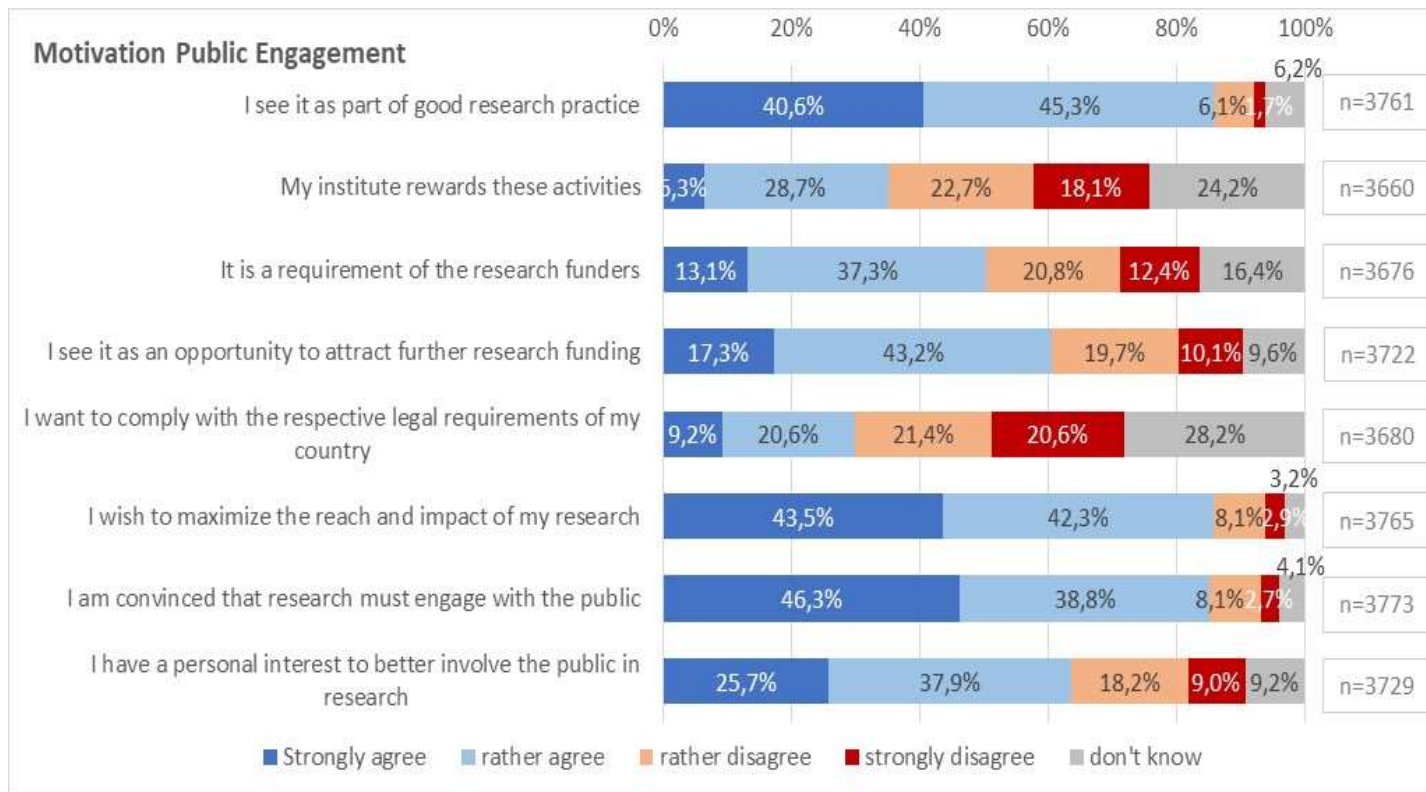
## Practice of Public Engagement





# RRI in view of European Researchers

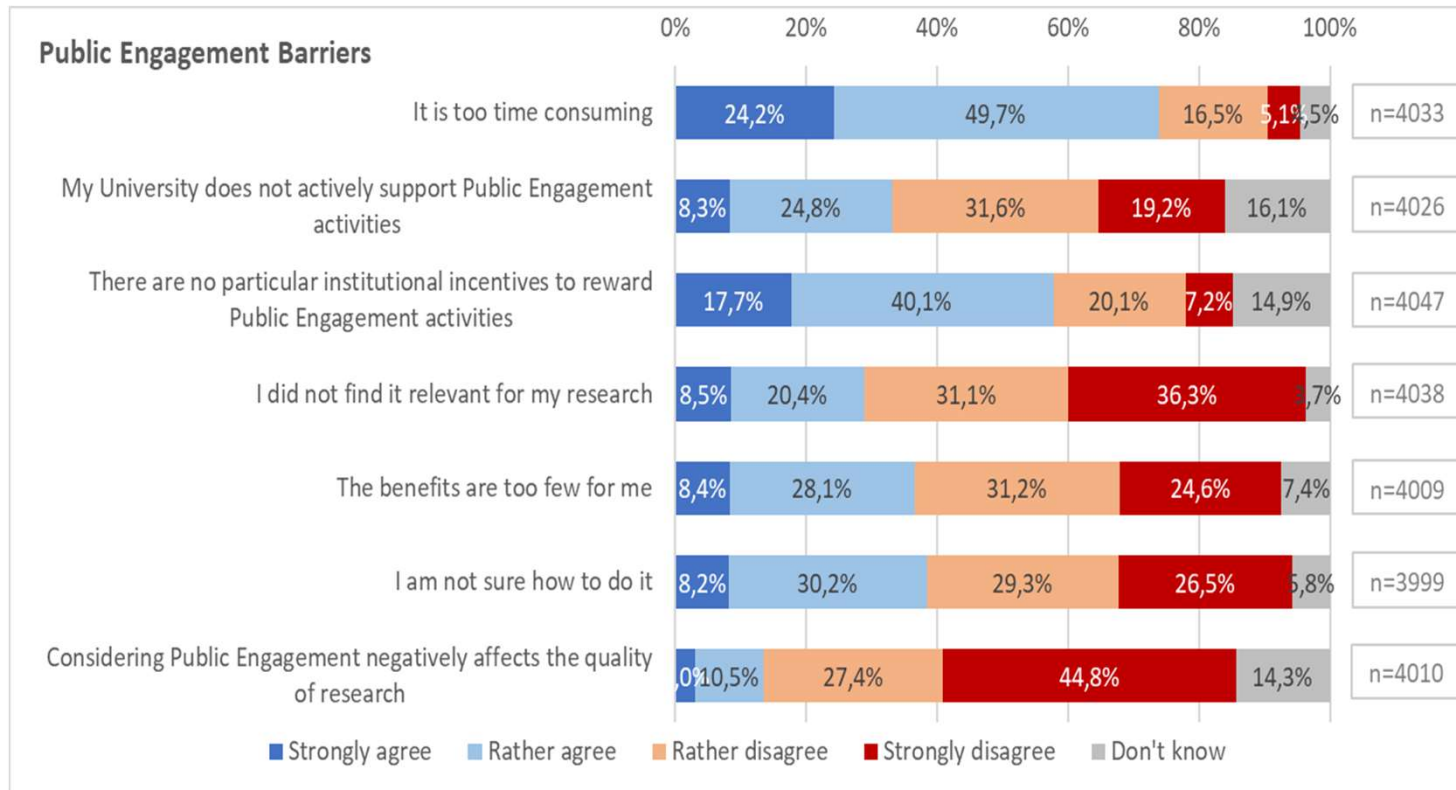
## Motivation to engage with non-academic actors





# RRI in view of European Researchers

## Barriers to public engagement



# Institutionalising RRI in research and innovation practices

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## Conducive factors

- Decisive role of dedicated leaders and/or groups of actors within the organisation (“institutional entrepreneurs”)
- External requirements (e.g., evaluations including RRI elements)
- Supportive internal incentive systems
- Experience with ethics and sustainability issues increases organisations’ openness for RRI (“RRI literacy”)

## Barriers and risks

- Strong overload of tasks
- Lack of knowledge and capabilities
- Organizational norms and belief systems in conflict with RRI ambitions
- Current reward system for academic careers (“publish or perish”)
- RRI as a “tick-boxing” exercise without meaningful transformation of practices (“responsibility-wash”)



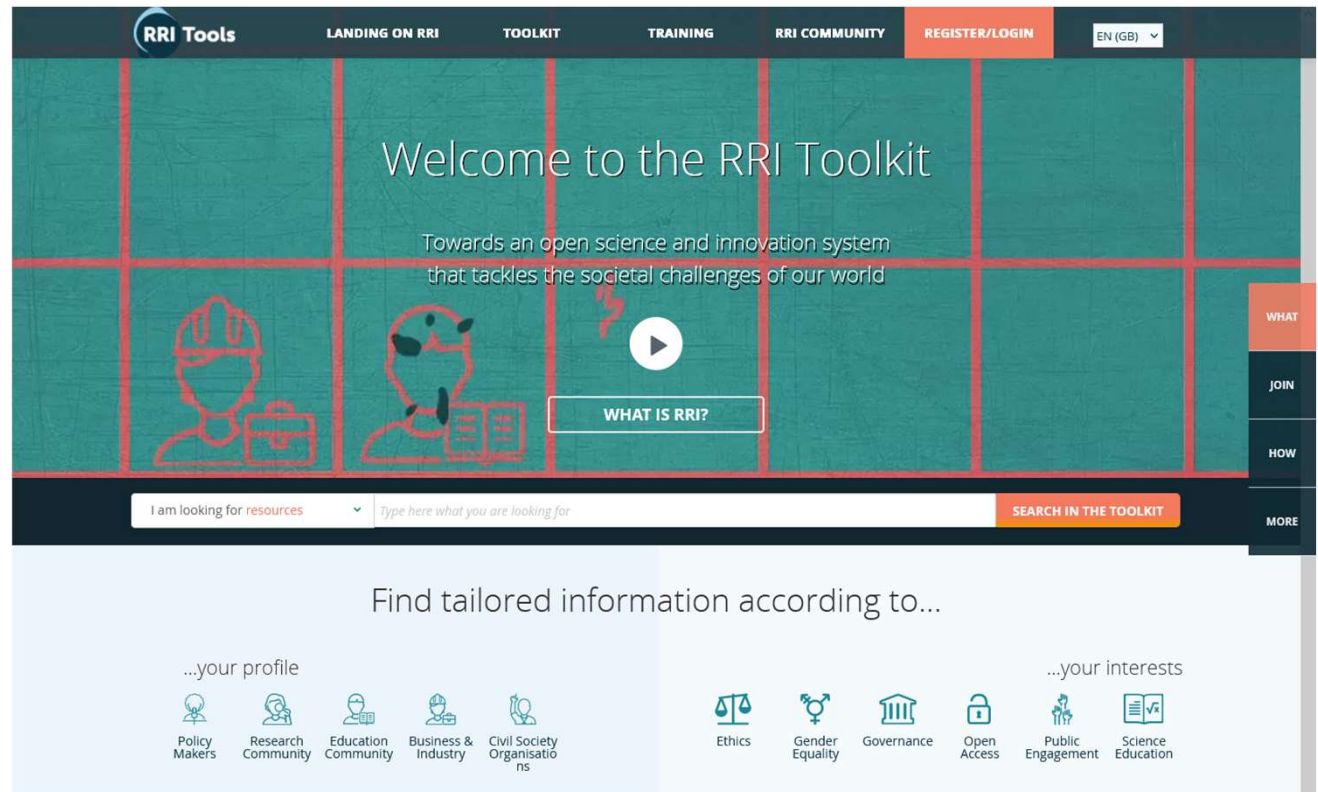
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## Tools and Approaches

# Tools to support responsible research and innovation practices

## RRI Tools

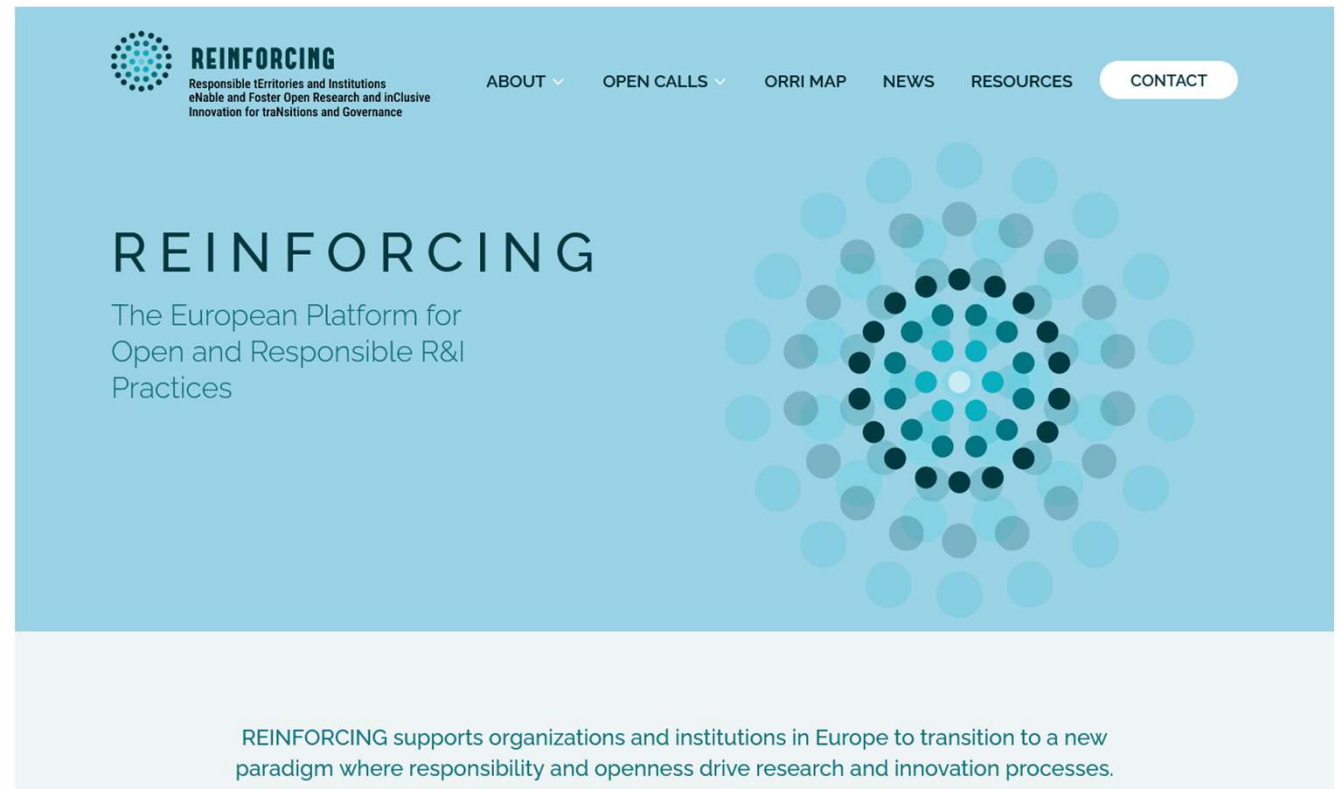
- <https://rri-tools.eu/>
- Online portal / repository
- training material
- tailored for different user groups (research community, business, CSOs, policy...)



# Tools to support responsible research and innovation practices

## REINFORCING

- <https://reinforcing.eu/>
- Will integrate / replace RRI Tools
- update and expand RRI Tools repository
- Issues calls for booster and incubator grants (up to 60k)



# Tools to support responsible research and innovation practices

## FoTRRIs Cookbook

- <https://fotrris-h2020.eu/material-for-uptake/>
- Step-by-step guide to create RRI projects aiming at sustainability transitions



# Tools to support responsible research and innovation practices

## Shared Green Deal Toolbox

- <https://sharedgreendeal.eu/publications/>
- Toolbox aiming to support research projects aiming to embed responsibility principles in their work
- the toolbox draws on the RRI principles of anticipation, reflexivity, inclusion, and responsiveness





# Tools to support responsible research and innovation practices

## ENGAGE 2020

- <https://engage2020.eu>  
<http://actioncatalogue.eu>
- Decision support tool for finding the right method for inclusive research
- provides over 50 different engagement methods







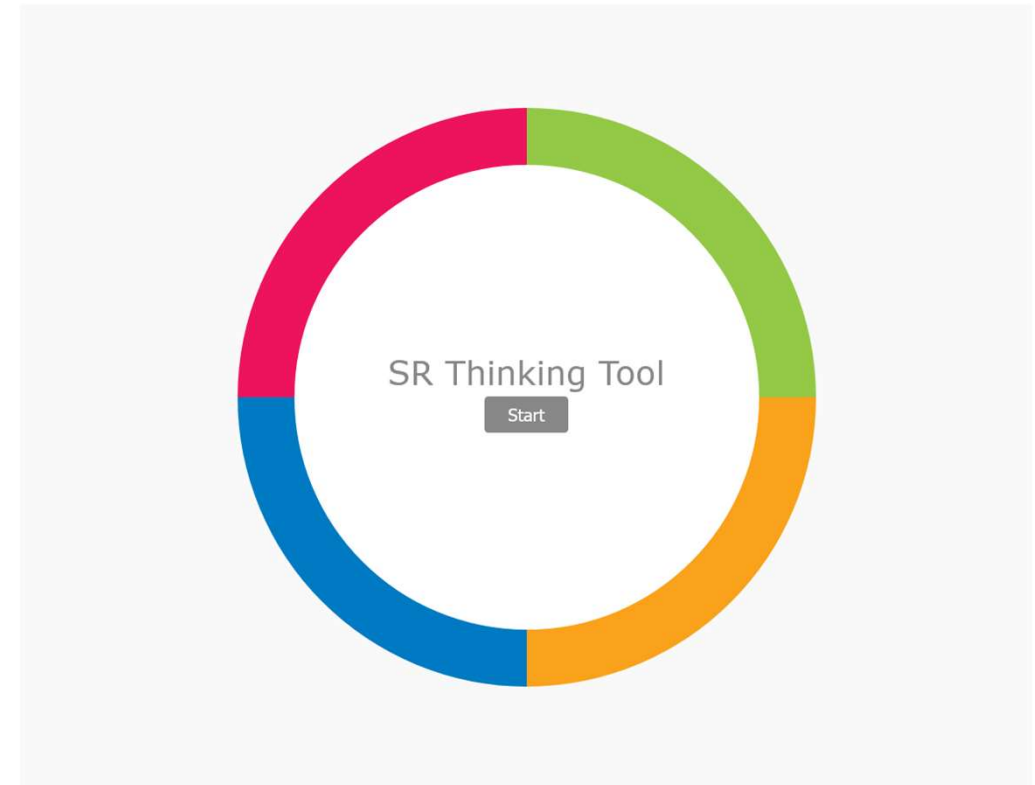
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Interactive session

# Tools to support responsible research and innovation practices

## Societal Readiness Thinking Tool

- <https://thinkingtool.eu>
- Please split up in groups (3-4) and try out the tool
- What is your initial assessment?
  - Could the tool prove useful when you design one of your next research projects?
  - Where are weaknesses?
  - What should be improved?



## Contact

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***RRI is a way to do research that  
takes a long-term perspective on  
the type of world in which we  
want  
to live.***

# Sources and References

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## Credit and acknowledgements

Slide 6 strongly draws on a MOOC of René von Schomburg (2023), RWTH Aachen University

<https://renevonschomburg.wordpress.com/2023/04/14/why-responsible-innovation/>

Slides 9, 10 are based on a presentation given by Ellen-Marie Forsberg (2021), Norsus

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