

RRI in FLAG-ERA Graphene

WORKSHOP

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Norwegian Institute for
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#RRI
inHE

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Background – why RRI?

Europe wants research and innovation in order to create jobs, find solutions to societal problems, be a knowledge-based society and continue as a powerful global actor

BUT European states and the European Union need to show that research and innovation is in the interest of the people to justify strong public investments

- * Experiences, such as with GMOs, have led to public resistance to new technologies
 - * Research scandals or perceptions of biased research have led to public skepticism
 - * Social skepticism to scientific establishment ‘elites’
- new such experiences must be avoided
- by developing research policies that stimulate new reflections on responsibility within science and innovation environments themselves and by facilitating informed dialogue between scientists, innovators and the public

Trust in science is at stake!



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RRI – a response



Funders have been responsive to this situation



Responsible Research and Innovation (RRI) is one response



co-creation, citizen science, open science are other responses

3 – NORSTUS Norwegian
Institute for Sustainability
Research

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A bit of history

Responsibility and emerging technologies has been on the agenda for 30 years in research and innovation policy

- Biotechnology – The Human Genome Project 1990 (ELSI program)
- Nanotechnology, ICTs
- ELSI seen as add-on and hostile to tech (looking for problems) → Since 2011 RRI has been an overall framework for responsibility in emerging technologies in Europe – as a way to do S&I right
 - Promoted by research funders
- RRI is both a theoretical, policy and practical approach

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Fundamental topics for RRI

1. AVOIDING THE WRONG IMPACTS OF S&T

Technological development appears everywhere and in liberal, capitalist societies this is possible as long as it is not in conflict with risk regulations

- For emerging science and technologies (biotechnologies, nanotechnologies, ICTs) the development takes place so quickly that risk regulation lags behind

→ How can we make sure that science and innovation don't create problems now or down the road?

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Fundamental topics for RRI

2. CREATING THE RIGHT IMPACTS OF S&I

Our society have some grand challenges that R&I needs to contribute to solving

→ How can we make sure that science and innovation contributes to what is good for society?



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Fundamental topics for RRI

3. WHO ARE TO DECIDE WHAT ARE THE RIGHT (AND WRONG) IMPACTS OF SCIENCE AND INNOVATION, ANYWAY?

Scientists and innovators are experts in justifying (and hyping) their inventions and projects; we are trained in spelling out the benefits of our research and toning down the potential problems

One cannot assume that the scientists' and innovators' own assessment represents a neutral assessment of the benefits and burdens of the inventions for society

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

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Fundamental topics for RRI

4. THE RESPONSIBILITIES OF RESEARCHERS AND INNOVATORS

- 'Science takes the credit for penicillin, while society takes the blame for the bomb'
(Jerry Ravetz 1975)

→ Many actors are involved in the research and innovation process, what are the responsibilities of the individual scientists or innovators versus all the other actors that modify how R&I meets the world?

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What is RRI? → EC's approach

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.

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.

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.



What is RRI? → UK and Norwegian approach

The screenshot shows the EPSRC website with a navigation menu at the top: #, FUNDING, RESEARCH, INNOVATION, SKILLS, NEWS, EVENTS AND PUBLICATIONS, ABOUT US. The main content area is titled 'Framework for Responsible Innovation'. A green arrow points to the 'Anticipate, reflect, engage and act (AREA)' section in the left-hand navigation menu. The main text on the page includes:

EPSRC is committed to developing and promote Responsible Innovation. This site reaffirms our own commitment and sets out our expectations for the researchers we fund and their research organisations.

Introduction

Responsible Innovation is a process that seeks to pursue creativity and opportunities for science and innovation that are socially desirable and undertaken in the public interest. Responsible Innovation acknowledges that innovation can raise questions and dilemmas, it often anticipates in terms of processes and realisation and unpredictable in terms of impacts, beneficial or otherwise. Responsible Innovation creates spaces and processes to explore these aspects of innovation in an open, inclusive and timely way. This is a collective responsibility, where funders, researchers, stakeholders and the public all have an important role to play. It includes, but goes beyond, considerations of risk and regulation, important though these are.

As a public funder of research, we have a responsibility to ensure that our activities and the research we fund, are aligned with the principles of Responsible Innovation, creating value for society in an ethical and responsible way. EPSRC does not wish to be prescriptive about how Responsible Innovation is embedded in the research and innovation process. We recognise that some researchers are already well engaged with this agenda. We also recognise that different approaches might be required for different research areas. There may be instances where detailed consideration is preferable or even unavoidable. In other areas of research, a responsible innovation approach may be highly recommended, or even required. As such we recommend that all researchers demonstrate awareness of and commitment to, the principles of Responsible Innovation. Taking an approach that encompasses the following steps, should

Jack Stilgoe, Richard Owen & Phil Macnaghten: Framework for Responsible Innovation

4 dimensions of RRI in Engineering and Physical Sciences Research Council (EPSRC)

To be responsible, R&I needs to engage in:

1. Anticipation – assessing potential future implications of the research
2. Reflection – reflecting on values affected by the research and own motivations
3. Engagement – involving others in these reflections and anticipations
4. Action/Responsiveness – being prepared to change and adapt the planned research in response of new knowledge or stakeholder concerns

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Fundamentally

- Addressing societal needs
- Avoiding undesirable side effects
- Integrating responsibility into research and innovation practices → responsibility cannot be outsourced (but collaboration is good!)
- Taking responsibility related to
 - *social, environmental, ethical or political issues*

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Stilgoe et al., Research Policy, 2 (9) 1568-1580

Table 1
Lines of questioning on responsible innovation.

Product questions	Process questions	Purpose questions
How will the risks and benefits be distributed? What other impacts can we anticipate?	How should standards be drawn up and applied? How should risks and benefits be defined and measured?	Why are researchers doing it? Are these motivations transparent and in the public interest?
How might these change in the future? What don't we know about? What might we never know about?	Who is in control? Who is taking part? Who will take responsibility if things go wrong? How do we know we are right?	Who will benefit? What are they going to gain? What are the alternatives?

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Table 2
Four dimensions of responsible innovation.

Dimension	Indicative techniques and approaches	Factors affecting implementation
Anticipation	Foresight Technology assessment Horizon scanning Scenarios Vision assessment Socio-literary techniques	Engaging with existing imaginaries Participation rather than prediction Plausibility Investment in scenario-building Scientific autonomy and reluctance to anticipate
Reflexivity	Multidisciplinary collaboration and training Embedded social scientists and ethicists in laboratories Ethical technology assessment Codes of conduct Moratoriums	Rethinking moral division of labour Enlarging or redefining role responsibilities Reflexive capacity among scientists and within institutions Connections made between research practice and governance
Inclusion	Consensus conferences Citizens' juries and panels Focus groups Science shops Deliberative mapping	Questionable legitimacy of deliberative exercises Need for clarity about purposes of and motivation for dialogue Deliberation on framing assumptions Ability to consider power imbalances Ability to interrogate the social and ethical stakes associated with new science and technology Quality of dialogue as a learning exercise
Responsiveness	Deliberative polling Lay membership of expert bodies User-centred design Open innovation Constitution of grand challenges and thematic research programmes Regulation Standards Open access and other mechanisms of transparency Niche management ⁸ Value-sensitive design Moratoriums Stage-gates ⁹ Alternative intellectual property regimes	Strategic policies and technology 'roadmaps' Science-policy culture Institutional structure Prevailing policy discourses Institutional cultures Institutional leadership Openness and transparency Intellectual property regimes Technological standards

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The RRI keys, and beyond

1. Gender & diversity
2. Open Science (open access and open data)
3. Science education (increasing public understanding of science)
4. Ethics (research ethics and integrity)
5. Public Engagement
- ...
1. Sustainability and the SDGs
2. Societal fairness and equity



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Why/how is RRI important in projects related to FLAG-ERA Graphene?

Graphene related projects can have social, environmental, ethical or political implications

- ❖ How can graphene research contribute to solve real needs?
- ❖ How can we avoid that new graphene applications create new environmental, health or social uncertainties?
- ❖ When research in this ERA-net changes value chains, how can we make sure this is done in a socially responsible way?
- ❖ How can we embed this research in society to increase possibility for stakeholder input, and – ultimately – the right/responsible uptake of this research in real world practices
- ❖ Etc.

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Results from the survey

- All the keys are considered relevant (scores between 3.75 and 4.25)
- The keys you would like most assistance with is Open Science and Public engagement
- The support you have asked for is training, infrastructure, money, time and expertise
- Some quotes:
 - Bridge the gap between scientific community, stakeholders and policy makers with online communication platforms.
 - Assistance by experts, person time to spend in these tasks, training online on RRI issues. Participation to norms committees (EN, ISO, OCDE).
 - We may expect help in the dissemination activities through different means. Finding collaboration with other consortia or researchers to access interdisciplinarity would be also helpful.

→ Can we will nudge you to take a broader view on the keys?

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A broader view on the RRI keys

- ❖ Gender → Diversity in general, assessing the way the research may influence differences in society
- ❖ Open science → Not only about data repositories, but can potentially impact on how you view IP issues etc?
- ❖ Science education → Can this also mean that you learn more about other disciplines?
- ❖ Public engagement → Is one-way dissemination enough, or is it about learning from the publics or other stakeholders?
- ❖ Ethics → Is it only about not breaking research ethics rules? Can ethics also mean a reflection on the potential ethical issues the research can have longer term? Privacy, new scientific uncertainties, dual use, change of production systems, impacts on human identity, etc.?

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Some tools for further reflection when you 'get home'

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The screenshot displays the RRI Tools website interface. At the top, there is a navigation bar with links for 'LANDING ON RRI', 'TOOLKIT', 'TRAINING', 'RRI COMMUNITY', and 'REGISTER/LOGIN'. Below the navigation bar is a search section with a search bar containing the text 'I am looking for...' and a 'SEARCH' button. A dropdown menu below the search bar shows filters for 'Text', 'Artificial Intelligence', 'Project', and 'Library Element'. On the left side, there is a 'Filter resources by:' sidebar with sections for 'Type', 'Useful for', and 'Address'. The main content area shows a grid of search results for 'Library Element', including items like 'Special Issue on "Governing artificial intelligence, ethical, legal and technical issues/burden and challenge"', 'Statement on Artificial Intelligence, Robotics and Autonomous Systems by the European Group on Ethics in Science and New Technologies (EGE)', 'The 100 Global Trends for 2030: Opportunities for a Sustainable, Inclusive and Resilient Future', 'How to Optimize Human Biology: Where Genome Editing and Artificial Intelligence Collide', 'Artificial intelligence (AI) in healthcare and research', 'Open Letter to the European Commission on Artificial Intelligence and Robotics', and 'A Global Civic Debate on Governing the Rise of Artificial Intelligence'. The 'Courier' logo is also visible at the bottom of the results grid.

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Societal Readiness Thinking Tool

Gate 1 Gate 2 Gate 3 Gate 4

AI AfaaLzYsSly_Kbod6XA8eA

NEW HORIZON

Entry points
Think about responsibility as an integral part of it

Keys

- Public engagement (3)
- Open access (0)
- Science education (2)
- Gender (2)
- Ethics (1)

Conditions

- Anticipate (5)
- Reflect (1)
- Include (0)
- Respond (0)

Gate 1
Select a question

Questions Answered

Why should this project be done?
[Add] [Remove]

At which phases in the project will stakeholder involvement have the most crucial impact, and why?
[Add] [Remove] [Answer]

Have relevant stakeholders been involved in defining the research problem?
[Add] [Remove] [Answer]

Will the project contribute new knowledge of relevance for science education, and how?
[Add] [Remove] [Answer]

Could the outcomes of this project benefit from incorporating a gender dimension into research content, and how?
[Add] [Remove] [Answer]

What are the possible gender and sex dimensions of the problem at stake?
[Add] [Remove] [Answer]

How may your project contribute to improve
[Add] [Remove] [Answer]

Add question
Generate PDF

G1

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Societal Readiness Thinking Tool

Gate 1 Gate 2 Gate 3 Gate 4

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NEW HORIZON

Entry points
Rethink the project plan in the light of PR

Keys

- Public engagement (3)
- Open access (0)
- Science education (1)
- Gender (2)
- Ethics (3)

Conditions

- Anticipate (3)
- Reflect (2)
- Include (3)
- Respond (1)

Recommended methods

- SATORL
- Foresight methods

Gate 2
Select a question

Questions Answered

How might the project benefit from involving stakeholders in identifying methods for data collection and empirical testing?
[Add] [Remove] [Answer]

Can you imagine possible scenarios of future associated with the methods and data you are using?
[Add] [Remove] [Answer]

Who has been involved in designing the data collection / testing?
[Add] [Remove] [Answer]

Did the data collection give rise to new contributions about potentially relevant stakeholders, and why?
[Add] [Remove] [Answer]

Will it be possible for interested citizens to contribute to the collection of data, and how?
[Add] [Remove] [Answer]

What is the sex and gender composition of the subjects included in the collected sample?
[Add] [Remove] [Answer]

Add question
Generate PDF

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Our role today

- * Give feedback based on the survey and the presentations
- * Reflection partners in the group sessions
- * General feedback in the plenary session