

U N I V E R S I T Y O F B E R G E N

Centre for the Study of the Sciences and the Humanities

«Responsible Research and Innovation» as an Emerging Principle in European Research & Innovation Policy

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Main Points

- RRI (Responsible Research and Innovation) is an emerging principle in R&I policy in Europe
- Introduction to RRI as an EU/EC concept
- Introduction to RRI as a «philosophical» concept
- RRI is interesting because it may be an opportunity for new forms of (and ideologies of) governance of research and innovation



Prologue: RRI \neq Grand Challenges

LUND DECLARATION – JULY 2009

THE LUND DECLARATION

EUROPE MUST FOCUS ON THE GRAND CHALLENGES OF OUR TIME

- European research must focus on the Grand Challenges of our time moving beyond current rigid thematic approaches. This calls for a new deal among European institutions and Member States, in which European and national instruments are well aligned and cooperation builds on transparency and trust.
- Identifying and responding to Grand Challenges should involve stakeholders from both public and private sectors in transparent processes taking into account the global dimension.
- The Lund conference has started a new phase in a process on how to respond to the Grand Challenges. It calls upon the Council and the European Parliament to take this process forward in partnership with the Commission.

The global community is facing Grand Challenges. The European Knowledge Society must tackle these through the best analysis, powerful actions and increased resources. Challenges must turn into sustainable solutions in areas such as global warming, tightening supplies of energy, water and food, ageing societies, public health, pandemics and security. It must tackle the overarching challenge of turning Europe into an eco-ef-

and the research community as well as interaction with major international partners. Meeting the challenges should involve public-private partnerships, including SMEs, with their potential to develop excellent and sustained problem-solving capacity. It will require Member States to develop more pro-active strategies on research priorities at regional, national and Community level. The Framework Programme for Research must also



Prologue: RRI \neq Grand Challenges



21 November 2014

Rome Declaration on Responsible Research and Innovation in Europe

Responsible Research and Innovation (RRI) is the on-going process of aligning research and innovation to the values, needs and expectations of society.

Decisions in research and innovation must consider the principles on which the European Union is founded, i.e. the respect of human dignity, freedom, democracy, equality, the rule of law and the respect of human rights, including the rights of persons belonging to minorities.

Prologue: Grand Challenges – an idea that caught on



4.2. Grand Challenges to inspire support for research

The proposal we make is to focus continued effort on ERA by engaging with a series of Grand Challenges that capture the political and public imagination and connecting ERA with these challenges. So far, most of our





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21st Century Grand Challenges

Grand Challenges are ambitious but achievable goals that harness science, technology, and innovation to solve important national or global problems and that have the potential to capture the public's imagination.

Grand Challenges are an element of the President's *Strategy for American Innovation* because they help catalyze breakthroughs that advance national priorities. On April 2, 2013, President Obama called on companies, research universities, foundations, and philanthropists to join him in identifying and pursuing the Grand Challenges of the 21st century.

Grand Challenges Can:

- Help create the industries and jobs of the future;
- Expand the frontiers of human knowledge about ourselves and the world around us;
- Help tackle important problems related to energy, health, education, the environment, national security, and global development; and
- Serve as a "North Star" for collaboration between the public and private sectors.





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21st Century Grand Challenges

Grand Challenges at IU Bloomington



Dear Colleagues:

The universitywide [Bicentennial Strategic Plan for Indiana University](#) makes the identification and pursuit of research Grand Challenges one of its central priorities.

Grand Challenges may be defined as problems whose scope spans institutional and disciplinary boundaries, whose solutions require new knowledge, new tools, and new treatments. At IU and at IU Bloomington, we are harnessing strengths in every field to identify and address big questions whose answers lie beyond the frontiers of current knowledge.

The IU Board of Trustees, President Michael A. McRobbie and the leadership of the university, the Indianapolis and Bloomington campuses, the School of Medicine, and the IU Foundation have joined together to identify \$300 million of existing and anticipated funding that can be invested in Grand

Challenges over the next five years.

Prologue: RRI \neq Grand Challenges

- Similarities
 - Emerging R&I policy principles
 - Based in something more and other than the «linear model» of R&I («basic science – applied science – innovation»)
 - Aim to strengthen the science-society relationship
- Differences
 - In recognition and importance
 - In content
 - Grand challenges: thematic foci of R&I («what»)
 - RRI: organisation and mode of R&I and its interaction with civil society («how»)



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What is RRI?



Italian Presidency
of the Council
of the European Union italia2014.eu



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Horizon 2020

- (22) With the aim of deepening the relationship between science and society and reinforcing public confidence in science, Horizon 2020 should foster the informed engagement of citizens and civil society in research and innovation matters by promoting science education, by making scientific knowledge more accessible, by developing responsible research and innovation agendas that meet citizens' and civil society's concerns and expectations and by facilitating their participation in Horizon 2020 activities. The engagement of citizens and civil society should be coupled with public outreach activities to generate and sustain public support for Horizon 2020.

activities; targeted public consultations, including, where appropriate, consultations of national and regional authorities or stakeholders; and transparent and interactive processes that ensure that responsible research and innovation is supported.

- (l) responsible research and innovation including gender;

The relationship between science and society as well as the promotion of responsible research and innovation, science education and culture shall be deepened and public confidence in science reinforced by activities of Horizon 2020 favouring the informed engagement of citizens and civil society in research and innovation.



Horizon 2020

- (22) With the aim of deepening the relationship between science and society and reinforcing public confidence in
- (f) develop the governance for the advancement of responsible research and innovation by all stakeholders (researchers, public authorities, industry and civil society organisations), which is sensitive to society needs and demands, and promote an ethics framework for research and innovation;

making scientific knowledge more accessible, by developing responsible research and innovation agendas that meet citizens' and civil society's concerns and expectations and by facilitating their participation in Horizon 2020 activities. The engagement of citizens and civil society should be coupled with public outreach activities to generate and sustain public support for Horizon 2020.

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What is RRI?

Horizon 2020 on RRI: R&I agendas should “meet citizens’ and civil society’s concerns and expectations”, and that transparency and public participation are necessary dimensions of responsibility.

Rene von Schomberg (2011) defined RRI as follows:

a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view on the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products.



What is RRI?

Expert Group on the State of Art in Europe on RRI (2013): RRI refers “to ways of proceeding in Research and Innovation that allow those who initiate and are involved in the processes of research and innovation at an early stage (A) to obtain relevant knowledge on the consequences of the outcomes of their actions and on the range of options open to them and (B) to effectively evaluate both outcomes and options in terms of moral values (including, but not limited to wellbeing, justice, equality, privacy, autonomy, safety, security, sustainability, accountability, democracy and efficiency) and (C) to use these considerations (under A and B) as functional requirements for design and development of new research, products and services.”

Furthermore, RRI “requires the research and innovation process to be designed in a way that allows for the consideration of ethical aspects and societal needs. This implies an issue orientation of research and innovation and calls for stakeholder involvement in these processes.”

*Accordingly, the group saw RRI as signified by being **anticipatory, inclusive, reflexive and responsive.***



7 Annex I – Definition of RRI

Responsible Innovation

"Responsibility" is a philosophical notion that has become prominent in the last century in ethical theory and in moral discourse. There are various ways to explicate the term and there are many different paradigms, theories, accounts and connotations. Some argue that "responsibility" has become a central organizing concept in modern moral and social discourse. Others argue that its centrality is undeserved. In the world of work and the professions where we speak of "professional responsibility", and in the world of international criminal and humanitarian law where we speak of "the responsibility to protect". What responsibility in each of those cases entails is the subject of discussion and debate: How does responsibility get apportioned and distributed, what is collective responsibility, how is responsibility related to other key moral concepts, such as "duties", "rights" and "obligations", "needs" and "interests"? How can we be responsible in a world that is characterized by chance, complexity and emergence, how does our advanced knowledge of the brain affect our conception of personal responsibility?

Responsibility is predicated primarily of persons and is derivative of their actions. Strictly speaking the paradigm case of responsibility is "the responsibility of a person for his or her actions – in light of his or her intentions – and their effects in the world". We say for example that "John is responsible for the breaking of the vase". Alternatively we can say that it was "John's responsibility to prevent the breaking of the vase", or that it was "his responsibility to put it in a safe place". We can also speak of "a responsible person". More recently however the qualification "responsible" has become attached to events and processes which are quite separate from any identifiable individual agent. We can thus also talk about "a responsible way of proceeding", "a responsible investment", "a responsible procedure" or an "irresponsible bonus structure". With respect to Technology, Applied Science and Engineering we now have come to talk about "Responsible Research" and "Responsible Innovation".

The use of "responsible" in the expression "responsible innovation" is comparable to the use of "lazy" in the expression "a lazy chair": strictly speaking the chair is not lazy. The word "lazy" in this expression refers to chairs that invite and accommodate people who can be said to be lazy, who feel lazy, are lazy, or behave as if they were lazy. Strictly speaking it is not the innovation itself that is responsible. Responsible Innovation is a truncated and indirect way of referring to contexts in which people are the appropriate subjects of responsibility claims and who either feel responsible, or who can be held or can be made responsible. "Responsible Innovation" can thus be used to refer in the realm of innovation to whatever invites, accommodates, stimulates, enhances, fosters, implies or incentivizes responsible action and the mental states that are typically associated with it.

Responsible Research and Innovation refers to ways of proceeding in Research and Innovation that allow those who initiate and are involved in the processes of research and

innovation at an early stage (A) to obtain relevant knowledge on the consequences of the outcomes of their actions and on the range of options open to them and (B) to effectively evaluate both outcomes and options in terms of moral values (including, but not limited to wellbeing, justice, equality, privacy, autonomy, safety, security, sustainability, accountability, democracy and efficiency) and (C) to use these considerations (under A and B) as functional requirements for design and development of new research, products and services.

Building on these requirements, in a European context the following points of reference should be reflected in the design of research and innovation processes and products:

1. **Ethical acceptability** which includes compliance with both the EU charter on fundamental rights as well as the safety of products regarding the acceptable risk of products.
2. **Orientation towards societal needs** which includes an orientation towards contributing to achieving objectives of sustainable development (consisting of economic, social as well as environmental aspects) and contributing to achieving normative objectives such as "equality of men and women" or an improvement of the "quality of life" which are also core European objectives expressed in the Treaty on European Union.

This implies on the one hand that RRI is directed at technological advance also fostering the competitiveness of the European economy and its innovation capacities. On the other hand RRI is directed at providing solutions to the Grand Challenges that societies face today such as environmental degradation, climate change or the ageing of society, etc. In this way, RRI serves common European values that drive EU policy.

An important distinction to be made in responsibility discourse is between (i) the articulation of the conditions of application of the concept and (ii) the determination of whether these conditions are satisfied in a particular situation. The first is a conceptual or criteria matter and the second is a moral issue. The first concerns the conditions that must be satisfied in order to be able to hold someone responsible at all, or to make someone responsible, or to put it in a different way, it concerns the felicity conditions of saying "I hold you responsible". These types of conditions roughly correspond with types of excuses people use to deny that they can be held responsible at all, because they believe that one or more of the necessary conditions for responsibility are not satisfied.

First, there is a condition related to freedom, choice, feasible options and real alternatives and relatedly with control and the absence of force and coercion. John is not held responsible when it turns out that he was pushed, or forced at gun point, or suffers from severe obsessive compulsive disorder, when he was not in control, or linked by means of wayward or devious causal chains to what happened. Nor can John be made or held responsible if the above freedom limiting conditions are known to apply to him. From this condition it seems reasonable to assume that Responsible Innovation implies that relevant agents should have options open to them, make an effort to look for alternative courses, actively articulate alternative options, reflect about their choices and alternatives.

Secondly, there is a condition of knowledge. If John didn't know what he was doing, did not know that his actions would cause damage, then he cannot be held responsible. If someone has lied to him, or deceived him, or he was provided with incorrect information, then he can-

not be held responsible. So ignorance provides a criteria excuse. This knowledge condition is of great importance for responsible innovation. An innovation process counts as responsible only if it has been designed, organized and managed in such a way that it provides the relevant persons and stakeholders with relevant knowledge.

A third condition is sometimes referred to as "moral capacity". People lacking in certain moral capacities, which seem required for moral awareness, perception, judgement and moral reasoning cannot be said to be responsible. As a consequence in criminal court cases persons lacking in moral capacities are then not evaluated in terms of a moral legal vocabulary but instead in the terms of a medical and psychiatric vocabulary. Applied to responsible innovation this would imply a moral capacity, sensitivity and in general a capability to evaluate actions, options, consequences and knowledge in ethical terms on the part of researchers and those involved in innovation processes.

It is important to note that those who see to it that they do not have alternative options, do not have knowledge or lack moral capacities cannot escape responsibility. Culpable or self-caused ignorance e.g. does not excuse of course. If you chose to look away from a victim in an accident, which would not make it acceptable to refrain from helping the victim, because you did not know that he was bleeding to death. In this case you could have known and you ought to have known. This is a crucial observation for our analysis, since it helps us to see that there is in this case a higher order responsibility to see to it that the knowledge condition of responsibility is satisfied. Similarly there is a higher order responsibility to see to it that the first and second criteria can be satisfied.

Important consequences follow from these conditions of responsibility for the explication of Responsible Innovation. Persons ought to see to it that these conditions are realized or optimized once they have accepted responsibility for X in a forward looking sense. If one says "I take responsibility for R&D project", one accepts an obligation to actively bring about the conditions under which responsibility can be ascribed to oneself for this project: to work on alternative options, to have relevant knowledge and have the required moral capacity to evaluate options and choices in terms of their ethical acceptability and social desirability.

These considerations do not only place requirements on the research and innovation products but also requires the research and innovation process to be designed in a way that allows for the consideration of ethical aspects and societal needs. This implies an issue orientation of research and innovation and calls for stakeholder involvement in these processes. Hence, in general, Responsible Research and Innovation should aim at being (Stigöe et al 2012):

- **Anticipatory:** Anticipation asks researchers and innovators to include new perspectives in the research and innovation process and to think through various possibilities to be able to design socially robust agendas for risk research and risk management.
- **Inclusive:** Inclusiveness asks researchers and innovators to involve diverse stakeholders (such as users, NGOs, etc.) in the process to broaden and diversify the sources of expertise and perspectives.
 - **Reflexive:** Reflexivity asks researchers and innovators to think about their own ethical, political or social assumptions to enable them to consider their own roles and responsibilities in research and innovation as well as in public dialogue. Reflexivity should raise awareness for the importance of framing issues, problems and the suggested solutions.
 - **Responsive:** If research and innovation claims to be responsible, if it has the capacity to change its direction or shape when it becomes apparent that the current developments do not match societal needs or are ethically contested. Hence, responsiveness refers to the flexibility and capacity to change research and innovation processes according to public values.

This shows that RRI has to be a key part of research and innovation process and should be considered already at an early stage and at different levels such as the individual scientist, research and innovation projects as well as in research programmes and the institutional level. However, individual actors will not deliver RRI on their own. Instead, RRI can be established as a collective, inclusive and system-wide approach.



What is RRI?

Responsible research and innovation: From science in society to science for society, with society

Richard Owen^{1,*}, Phil Macnaghten² and Jack Stilgoe¹

1. Introduction: the emergence of responsible innovation in EU policy discourse

The terms ‘responsible innovation’ and ‘responsible research and innovation’ have a history stretching back a decade (Hellstrom 2003; Guston 2004; Owen et al. 2009a; Owen and Goldberg 2010; von Schomberg 2011a,b; Lee 2012; Armstrong et al. 2012), and even further if cognate terms such as ‘responsible development’ are included (National Nanotechnology Initiative (2007) and National Research Council (2006)¹ in the USA: see Fisher and Rip (in press) for further discussion). Indeed, these terms are heirs to even earlier discussions about research integrity and the ethical, legal and social implications of research in areas such as genomics. They also have roots in visions for collaborations between social, natural and physical scientists that address the wider dimensions of science and innovation early on (evident for example within the 5th and 6th EU Framework Programmes and their calls for socio-technical integration (Rodriguez et al, in press)) and

calls for greater public engagement with science and technology (variations in which are analysed at an EU-wide level by Mejlgaard et al. (pp. 741–50, this issue)). Further roots include, but are not limited to, integrated approaches such as technology assessment in its various forms (Schot and Rip 1996; Guston and Sarewitz 2002) and anticipatory governance (Karinen and Guston 2010), some of which have been formalised within decision-making processes, such as the so-called ‘Danish model’ for technology assessment based on public participation and deliberation (e.g. through consensus conferences), (see Mejlgaard et al. pp. 741–50, this issue).

Over the last two years the concept of responsible research and innovation (RRI) has gained particular visibility and traction in an EU, and specifically European Commission (EC) policy context. Evolving from discourses of socio-technical integration within and beyond the EC Science in Society programme, RRI may also reflect recognition of the limitations of extant policy approaches to managing ethically-problematic areas of

many stakeholders as possible in the research and innovation process. **Research and innovation must respond to the needs and ambitions of society, reflect its values and be responsible . . . our duty as policy makers (is) to shape a governance framework that encourages responsible research and innovation.** (Geoghegan-Quinn 2012, bold text as in original statement)

Responsible Research and Innovation means that societal actors 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 European society. RRI is an ambitious challenge for the creation of a Research and Innovation policy driven by the needs of society and engaging all societal actors via inclusive participatory approaches.



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The Responsible Research and Innovation framework consists of 6 keys:



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- 1. Public engagement*
- 2. Gender equality*
- 3. Science education*
- 4. Open access*
- 5. Ethics*
- 6. Governance”*



The Road to RRI: ambivalence towards S&T

- After WW2: the atomic bomb and nuclear power, Union of Concerned Scientists, Pugwash
- 1950s/60s: *How medicine saved the life of ethics* (Stephen Toulmin; Henry Beecher 1966)
- 1970s-90s: recombinant DNA, cloning and genetic engineering; GMO controversies in Europe
 - Global environmental problems, climate change...
- *Ethical development of science and technology (?)*



ELSI, ELSA, Integrated ELSA, RRI...

- *ELSI: Ethical, legal and societal/social implications*
 - James Watson and the Human Genome Project
- ELSA: Ethical, legal and societal/social aspects
- Biotechnology: a multitude of laws, guidelines, regulations, ethics committees and procedures
- Integrated ELSA
- EU: Science and / in / with-and-for Society programmes
- EU Code of conduct for Responsible Nanosciences & Nanotechnologies
- EU Horizon 2020: RRI – Responsible Research and Innovation





COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 07/02/2008
C(2008) 424 final

COMMISSION RECOMMENDATION

of 07/02/2008

on a code of conduct for responsible nanosciences and nanotechnologies research



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3.1 Meaning

N&N research activities should be comprehensible to the public. They should respect fundamental rights and be conducted in the interest of the well-being of individuals and society in their design, implementation, dissemination and use.

3.2 Sustainability

N&N research activities should be safe, ethical and contribute to sustainable development serving the sustainability objectives of the Community as well as contributing to the United Nations' Millennium Development Goals¹¹. They should not harm or create a biological, physical or moral threat to people, animals, plants or the environment, at present or in the future.

3.3 Precaution

N&N research activities should be conducted in accordance with the precautionary principle, anticipating potential environmental, health and safety impacts of N&N outcomes and taking due precautions, proportional to the level of protection, while encouraging progress for the benefit of society and the environment.

3.4 Inclusiveness

Governance of N&N research activities should be guided by the principles of openness to all stakeholders, transparency and respect for the legitimate right of access to information. It should allow the participation in decision-making processes of all stakeholders involved in or concerned by N&N research activities.



3.5 Excellence

N&N research activities should meet the best scientific standards, including standards underpinning the integrity of research and standards relating to Good Laboratory Practices¹².

3.6 Innovation

Governance of N&N research activities should encourage maximum creativity, flexibility and planning ability for innovation and growth.

3.7 Accountability

Researchers and research organisations should remain accountable for the social, environmental and human health impacts that their N&N research may impose on present and future generations.



Social Robust Knowledge and Technology

- Context of discovery
- Context of justification
- Context of application
- Context of implication



H. Nowotny, P. Scott & M. Gibbons:
Re-Thinking Science, Polity 2001
see also B. Latour: *The Pasteurization of France*

- *A 21st century view of science must not only embrace the wider societal context, but be prepared for the context to begin to talk back.*
- *Reliable knowledge will no longer suffice, at least in those cases, where the consensuality reached within the scientific community will fail to impress those outside.*
- *In a 21st century view of science, more will be demanded from science: a decisive shift towards a more extended notion of scientific knowledge, namely a shift towards socially robust or context-sensitive knowledge.*

(Helga Nowotny 1999)



Helga Nowotny
President European
Research Council

Photo <http://ec.europa.eu/research/eurab/cvnowotny.html>

STS interacting with, helping shape the science

- Science is open-ended
- Technology has uncertain and unexpected side-effects
- Science, technology and society are co-produced (Sheila Jasanoff)
- Good science is a matter:
 - of valid and reliable knowledge that also leads to good



Hard and Soft Governance of S&T

- The S&T of the future exist as sociotechnical imaginaries
- Some imaginaries has to be acted upon
 - Early warnings and worst-case scenarios
 - Prohibitions, regulations, safety schemes, monitoring schemes
- RRI: The production, understanding and debate of such imaginaries is an ethical and democratic challenge



“The Responsible Research and Innovation framework consists of 6 keys:

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- 2. Gender equality*
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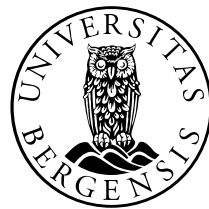
Von Schomberg: “Governance of use, governance of risk and now governance of innovation”



Will «RRI» catch on?

- RRI has become a part of scholarship in ethics, science and technology studies, «philosophy of science in practice»
- Horizon 2020: «Science with and for Society»
- Horizon 2020: «Mainstreaming of RRI»
- The Rome Declaration
- National R & I policies
- Epilogue: RRI combines better with «grand challenges» than «linear model»





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