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ProGReSS

## RRI Funder Requirements Matrix

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## Executive Summary

The RRI Funder Requirements Matrix completes a major fact-finding mission in comparing science funding strategies in Europe, the US, China, India, Australia and South Africa. A convergence of innovation systems requires exchange of information, especially on how resolving major societal challenges is achieved through science funding strategies. Thus this contribution to Work Package (WP) 5 will serve as a basis for the joint formulation of an RRI roadmap in WP7.

On the basis of the information produced in WP3<sup>2</sup>, the three RRI criteria (ethical acceptability, sustainability and societal desirability, von Schomberg 2013) are mapped against the requirements innovators must fulfil to obtain funding. One important finding of WP3 was that the RRI criteria are implemented at different stages of the funding process. Therefore we further differentiated the tools funders use to implement RRI criteria (whether they themselves call them RRI or not).

We identified three different levels in the process of funding that are relevant:

- RRI criteria can operate as **compliance** rules that those in receipt of funding must adhere to (e.g. obtaining ethics committee approval) or
- funders implement RRI criteria with the help of **societal engagement** tools, which focus on the process of science and innovation developments, or
- the RRI criteria are themselves a **research goal**, for instance research programs on the concept of sustainability.



To realize a good comparability between the country cases premier funding agencies were selected and analysed for each country. By mapping the three RRI criteria onto the three levels in the funding process (compliance, engagement and goals focused on grand challenges<sup>3</sup>) this report provides a global overview of how funders govern research funding in the light of RRI.

**The RRI Funder Requirements Matrix reveals that RRI is not established to a great extent at any funding organisation we looked at, except at the level of compliance with ethical acceptability and sustainability:**

<sup>2</sup> Schroeder D et al (2014) Funder Reports - How innovation is driven towards societal desirability through funding requirements, Report for FP7 Project "Progress", progressproject.eu.

<sup>3</sup> In line with other Progress deliverables, we equated "societal desirability" with tackling humanity's grand challenges as one possible way of filling the concept with substance.

- At the level of compliance ethical acceptability and sustainability are required by all funding organisations.<sup>4</sup>
- As already noted in WP3 deliverables, societal engagement is highly underrepresented in funder requirements. Only three funding bodies that we examined apply societal engagement tools at the level of societal desirability, only one at the level of ethical acceptability, and none at the level of sustainability.
- For the premier funding organisations we examined, RRI itself (divided into the three categories that ProGRESS has been using, following von Schomberg) is only rarely a research goal. Only two funding organisations describe ethical acceptability and sustainability as research goals while four refer to social desirability.
- Of the three RRI criteria – ethical acceptability, sustainability and social desirability - social desirability is the least implemented in funding policies.

The following summarizes our findings graphically.





























**Fig. 1: RRI Funder Requirements Matrix<sup>5</sup>:** Ethical Acceptability, Sustainability and Societal Desirability in premier funding organisations globally

Ethical Acceptability in premier funding organisations globally							
	ARC	NSFC	DFG	DST	NRF	Wellcome Trust	NSF
Compliance	✓	✓	✓	✓	✓	✓	✓
Engagement	✗	✗	✗	✗	✗	✓	✗
Goal <sup>6</sup>	✗	✓	✗	✗	✗	✓	✗






















<sup>4</sup> In terms of compliance, societal desirability is not meaningful, as it would either map fully onto "research goal" if it required that grand challenges are tackled through some research or it would produce an overly rigid requirement, namely that *all* research projects funded within any stream would solely address grand challenges.

<sup>5</sup> Progress is a co-ordination and support action, not a research project. Our fact-finding gives a helpful, global, and broad overview, which could be supplemented with more in-depth research.

<sup>6</sup> The ARC and the DFG are bottom-up rather than call-issuing research funders, which explains why they score X on the goal criterion in all three tables.

Sustainability in premier funding organisations globally							
	ARC	NSFC	DFG	DST	NRF	Wellcome Trust	NSF
Compliance							
Engagement							
Goal							

Societal Desirability in premier funding organisations globally							
	ARC	NSFC	DFG	DST	NRF	Wellcome Trust	NSF
Engagement							
Goal							

Whilst previous approaches to govern research and innovation have focused primarily on ethical acceptability and sustainability through ethics review, technology assessment and foresight, it is increasingly important to guide research and innovation towards outcomes that can improve human lives by tackling societal challenges. Here we show that social desirability is still a very weak element in the funding policies of premier funding organisations worldwide. By moving the RRI debates from the national or regional to the global level, these deficits might come more into focus.
















































## Introduction

Responsible research and innovation is ethically acceptable, sustainable and drives towards the common good, i.e. adheres to societal desirability (von Schomberg, 2013). State and private funding bodies globally aim to drive innovation towards meeting major societal aims and challenges. This report summarises the strategies of funders on a global scale in the context of RRI. It is based on a previous PROGRESS report that summarises public and charitably funded strategies from around the world (Australia, Brazil, China, Germany, India, Japan, the Netherlands, South Africa, the UK, and the United States) to achieve societal desirability<sup>7</sup>.

In the previous report a bottom-up approach was used to examine the global diversity of funding strategies. In addition a template based approach was chosen to map funding requirements against the European Commission's five RRI action points: societal engagement, open access, gender equality, ethics and governance; and science education<sup>8</sup>. This dual strategy laid the basis to analyse RRI in the context of funding in a comparable way, but which remained country specific.

When mapping funding requirements onto the five Science with and for Society (Swafs) RRI action points, it was obvious that ethics and governance is the most widely implemented RRI action point globally, whilst societal engagement is only achieved in full in the Netherlands, through a requirement in the "Responsible Innovation" program.

Table 1: RRI Action Points Globally

RRI criterion							Trust	
Societal engagement								
Open access								
Gender equality								
Research and innovation governance								
Scientific education								

\* limited

X = not required, ✓ = required of all applicants, -> = required in some programs.

In the following analysis by country we start with a short overview of the research and funding landscape in the relevant country before introducing *the* (or one of the) premier research funding organisations. For this organisation we differentiate funding policies between compliance issues,

<sup>7</sup> Schroeder D et al (2014)

<sup>8</sup> <http://ec.europa.eu/programmes/horizon2020/en/h2020-section/science-and-society>.

engagement<sup>9</sup> efforts and prescribed research goals with respect to each of the three levels of RRI: ethical acceptability, sustainability and societal desirability.

One additional result of our country analysis of funding policies<sup>10</sup> was that RRI criteria can relate to different instruments and often appear at different stages of the research and innovation process.

RRI criteria are implemented in funding policies by instruments of **compliance** on two levels: first, as a prerequisite for research, in order to obtain funding at all, and second, as rules researchers have to adhere to in the course of their studies. For example researchers who plan to perform studies on genetically engineered organisms, have to show how they can handle confinement issues within adequate laboratory facilities to ensure environmental protection. Hence, in this case the RRI criterion *sustainability* is implemented by instruments of compliance. We understand sustainability here in the narrow sense of safeguarding the resources and quality of life of current and future generations by protecting the environment. Usually, compliance with certain instruments has to be shown *prior* to the start of any research.

Funders also implement RRI criteria with the help of **societal engagement** tools. For instance, funders might request that public consultation programs are run to ensure that the outcomes of any research will meet the expectations, values and needs of society. Sometimes public consultations are also organised by the funders themselves, prior to setting research goals in specific funding calls.

RRI criteria are also implemented in the research and innovation process by defining **research goals**. For instance, any call on developing ethical codes of conduct for research would be a research goal in the area of ethical acceptability. For this report, we are using the broad strategy of equating goal-oriented funding focused on grand challenges (as defined within the country) with societal desirability. Hence, any specific calls with the goal to tackle a grand challenge will be counted as societally desirable research.

This report maps the three above criteria (compliance, engagement and goals focused on grand challenges) onto country cases to provide an overview of how funders globally govern research in line with the RRI definition used for this report (von Schomberg, 2013).

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<sup>9</sup> <http://ec.europa.eu/programmes/horizon2020/en/h2020-section/public-engagement-responsible-research-and-innovation>

<sup>10</sup> Schroeder D et al (2014)

## RRI Funding Requirements in Australia

### Research and funding in Australia

The Australian Government supports science, research and innovation through four major components: National Health and Medical Research Council (NHMRC) research funding (\$808 million), Australian Research Council (ARC) research funding (\$741 million), Cooperative Research Centres (CRC) research funding (\$165 million), and Research Block Grants (\$1.67 billion). Together, these account for approximately 37% of total Australian Government support for research and innovation, which in the 2011-2012 financial year equated to AU\$9 billion (Australian Government, 2013, p.2). The first three of these constitute *direct* research funding which is distributed by the Australian Government to individual researchers and research teams at universities or other approved higher education providers through competitive processes coordinated by various Commonwealth Government Departments. The fourth, the Block Grants, are given to universities to conduct their own research.

### Premier funding organisation

The ARC is a statutory agency which distributes Australian government research funding via the National Competitive Grants Program. This incorporates the Discovery Program, which supports fundamental research, and the Linkage Program, which supports applied research; “projects which are collaborative between higher education researchers and other parts of the national innovation system” (Australian Research Council, 2013a). In the 2011-2012 financial year, the National Competitive Grants Program distributed AU\$741.8 million, of which about three quarters was spent on the Discovery Program and the remaining quarter on the Linkage Program (Australian Research Council, 2012, pp.190-192).

Both Discovery and Linkage Projects are assessed (among other selection criteria) against the “economic, environmental and/or social benefit to Australia” that the proposed research would provide. The Linkage Projects scheme is more immediately linked to societal interest, in that Linkage Projects must include at least one non-university partner (e.g. industry, CSOs) which must make a significant contribution in cash and/or in kind to the project (Australian Research Council, 2013a).

### Ethical acceptability, sustainability and social desirability as a funder requirement at the ARC









The ARC reports on ethical standards required of staff, ARC-funded researchers, and ARC committee members and assessors. For ARC-funded researchers, compliance with principles such as those outlined in the *Australian Code for the Responsible Conduct of Research* (2007); the *National Statement on Ethical Conduct in Human Research* (2007); and similar documents; is required and clearly stated in funding rules and contracts (Australian Research Council, 2012, p.91).



The *Australian Code for the Responsible Conduct of Research* specifies that institutions have responsibilities to “maintain an environment that fosters responsible research” and that this includes the provision of a research governance framework that demands compliance with laws and regulations (National Health and Medical Research Council, Australian Research Council and Universities Australia, 2007, p.1.3). In Australia, such laws and regulations cover the broad range of areas characteristic of industrialized nations, including areas relevant to sustainability such as Work Health and Safety (previously known as Occupational Health and Safety) and Environment, including hazardous substances. As legislatively required, the ARC also reports on “Measures being taken to minimise the impact of the ARC’s activities on the environment” (Australian Research Council, 2012, p.94, pp.224-225).

As the ARC is a bottom-up research funding organisation without specific calls, RRI as a research *goal* can therefore not be set by the institution. Public engagement exercises are not required by the ARC in order to obtain funding.

Table 1: Funder ARC:

RRI criterion	Compliance	Engagement	Goal
Ethical acceptability			
Sustainability			
Societal desirability (grand challenges)	n.a.		

## RRI Funding Requirements in China

### Research and funding in China

In China, the research landscape is highly diverse. As of the end of 2012, there were 2,138 universities<sup>11</sup> specialising in a broad range of research and scholarly disciplines, and 3,674 research institutions funded by governments at all levels, 714 of which are affiliated with the Central Government of the People's Republic of China and 2,964 of which are affiliated with local governments of China<sup>12</sup>. Importantly, many research institutions such as the Chinese Academy of Social Sciences, the Chinese Academy of Sciences, and the Chinese Academy of Agricultural Sciences are both high-profile academic organizations and think-tanks. In 2012, the Chinese government provided approximately €28.74 billion for research and innovation, 66.5% of which were allocated to research institutions affiliated with governments at all levels and 33.5% of which were allocated to universities.<sup>13</sup>

### Premier funding organisation

In China, the Natural Science Foundation of China (NSFC) is an important public funding organisation affiliated with the State Council and in charge of the National Natural Science Fund. The NSFC supports both basic research and applied research, and the funding portfolio consists of the research block, the talent block and the infrastructure block. The research block accounts for about 70% of the overall funding. The majority of the funding budget is from the investment of the central government. The annual increase rate in the past ten years was about 25%. In 2013, the total amount of funding was 23.8 billion RMB (€2.99 billion), 17 billion RMB (€2.13 billion) of which was investment by the central government.

### Ethical acceptability as a funder requirement at the NSFC

The NSFC actively promotes ethically acceptable research and innovation. It has endeavoured to promote the construction of academic norms conducive to the healthy development of science and technology and to advocate widely accepted science ethics. Furthermore it aims to guide the personnel engaged in science and technology administration and scientific research to form ethical performance views and value preferences. With regard to programs on medicine and the life sciences, the NSFC has issued a series of ethical requirements and regulations published by authorities concerned. Compliance with ethics rules are therefore funding requirements.

### Sustainability as a funder requirement at the NSFC

An innovation-driven economy is the agreed alternative to the current focus on manufacturing that protects resources for future generations and is more environmentally friendly. In order to

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<sup>11</sup> "List of University Approved by the Ministry Of Education", <[http://www.gov.cn/banshi/2012-08/14/content\\_12758.htm](http://www.gov.cn/banshi/2012-08/14/content_12758.htm)>, accessed 12 August 2014.

<sup>12</sup> National Bureau of Statistics of China, <<http://data.stats.gov.cn/workspace/index;jsessionid=670B74D579F07DCA1A258A68B8B34B43?m=hgnd>>, accessed 13 August 2014.

<sup>13</sup> "2012 Statistical Bulletin of the National Science and Technology Funding", <[http://www.mof.gov.cn/zhengwuxinxi/caizhengshuju/201309/t20130926\\_993359.html](http://www.mof.gov.cn/zhengwuxinxi/caizhengshuju/201309/t20130926_993359.html)>, accessed 13 August 2014.









support China's sustainable development, the NSFC has greatly strengthened the cultivation of talented personnel which an innovation-driven economy depends on heavily, more so than a manufacturing economy. Hence, education-driven efforts are an indirect contribution to sustainability goals. The NSFC has established an integrative set of programs funding personnel throughout research careers as well as continuous improvement of infrastructure construction to support the transformation of the pattern of economic development. Furthermore, the NSFC has actively funded research and development of Instruments and Equipment to further advance scientific exploration. In this indirect sense, compliance with sustainability rules are funding requirements as the entire nation is driven towards a cleaner, more environmentally friendly innovation economy.

### Societal desirability as a funder requirement at the NSFC

China is still the largest developing country in the world and the principal contradiction is still one between the ever-growing material and cultural needs of the people and the challenges of addressing major societal issues. The NSFC not only provides general intellectual support for social and economic development, but also renders directly scientific solutions to problems of strategic importance encountered during the course of social and economic development. For instance, the Major Program intends to solve major scientific problems emerging from either scientific or socioeconomic development questions and provide scientific support for the optimization and upgrading of industrial structures and the development of strategic emerging industries.

Public engagement is not required to obtain funding from the NSFC. The NSFC directs the areas of research significantly and research is undertaken on all three RRI criteria (goals).

Table 2: Funder NSFC

RRI criterion	Compliance	Engagement	Goal
Ethical acceptability			
Sustainability			
Societal desirability (grand challenges)	n.a.		

## RRI Funding Requirements in Germany

### Research and funding in Germany

In Germany the research landscape is highly diverse, with 390 universities specialising in a broad range of research and scholarly disciplines and a range of non-university research institutions like the Helmholtz Association of German Research Centres, the Max Planck Society and the Fraunhofer-Gesellschaft. In addition, the Federal Government funds 41 Federal Research Institutes to provide a scientific basis for policy making and the Federal States of Germany (Länder) fund another 100 institutes to support local research needs.

In 2011, the German government provided approximately 21 billion Euros for research and innovation (Federal Ministry of Education and Research 2013) and in 2013, the Federal Ministry of Education and Research and the Federal Ministry of Economy alone spent around 8.9 billion Euros and 2.9 billion Euros respectively on Research & Development (R&D) in Germany. With approximately 19,000 foundations, private donors are also an important pillar of German research funding.

### Premier funding organisation

The *Deutsche Forschungsgemeinschaft* (DFG, German Research Foundation) is the main public funding organisation for science and research in Germany, which serves all branches of science and the humanities. The DFG is an association under private law and it is run by the scientific community itself. Its members are research institutions, research universities, the academies of sciences and humanities, the Max Planck Society and the Fraunhofer Society. Most of the DFG funds come from the German states and the federal government. Its annual budget of around 2.5 billion Euros is underwritten by Germany's federal (67.1 %) and state governments (32.7 %) as well as the EU and private donors.

The DFG is predominately funding basic research. Applied research is mostly funded by the German Federal Ministry of Education and Research. The DFG promotes science and research in all its branches, with a particular focus on advancing young researchers. It does not therefore run any program that is defining a specific **research goal**, like for example any of the grand challenges. However by funding excellent research based on the foundational goal of "research freedom" (*Forschungsfreiheit*), research goals often meet one of the RRI criteria coincidentally.

As a self-organized funding organization the **societal engagement** in funding decisions is limited to the scientific community and to representatives of the German states and the federal government. Thus RRI is not implemented at the DFG in terms of societal engagement. Likewise, the DFG runs no specific calls focused on grand challenges. (Within Europe, grand challenges were defined in the Lund Declaration as tightening supplies of energy, water and food, pandemics, ageing societies, global warming, public health and security (Lund Declaration 2009)). However RRI criteria are implemented on the level of **compliance**.

Ethical acceptability as a funder requirement at the DFG

DFG-funded researchers and institutions must comply with ethical rules in specific research contexts such as studies involving humans and animals and must abide by the DFG's rules on safeguarding good scientific practice. Public engagement on what is ethically acceptable is not required to obtain funding. Also ethical acceptability is not a research goal.






Sustainability as a funder requirement at the DFG

DFG funded research must be in compliance with sustainability rules and must show how researchers avoid significant adverse effects on the environment. In the case of studies falling under the remit of the Convention on Biological Diversity (CBD) compliance rules are specifically adapted by DFG rules<sup>14</sup>. With regard to studies involving genetically modified organisms (GMO) researchers and institutions need to adhere to the Genetic Engineering Act (Gentechnikgesetz)<sup>15</sup>. It is not a prerequisite however, that the research projects run public engagement programs on how to achieve compliance with sustainability rules nor is the DFG running any direct programs to promote undertaking research on sustainability (e.g. climate change).

Societal desirability as a funder requirement at the DFG

Societal desirability is not implemented at the DFG either at the level of compliance, or at the levels of societal engagement, or in the research goal definition. However the central goal of the DFG that is formulated in its statutes §1<sup>16</sup> is promoting research in general and young researchers in particular; providing advice to parliaments and public authorities on scientific matters and fostering relations with the private sector and between scientists and academics at home and abroad. Thus the DFG is serving the society only on a very general level.

Table 3: Funder DFG

RRI criterion	Compliance	Engagement	Goal
Ethical acceptability			
Sustainability			
Societal desirability (grand challenges)			

<sup>14</sup> [http://www.dfg.de/formulare/1\\_021e/1\\_021e.pdf](http://www.dfg.de/formulare/1_021e/1_021e.pdf)

<sup>15</sup> [http://www.dfg.de/foerderung/programme/einzelfoerderung/sachbeihilfe/formulare\\_merkblaetter/index.jsp](http://www.dfg.de/foerderung/programme/einzelfoerderung/sachbeihilfe/formulare_merkblaetter/index.jsp)

<sup>16</sup> [http://www.dfg.de/en/dfg\\_profile/statutes/index.html](http://www.dfg.de/en/dfg_profile/statutes/index.html)

## RRI Funding Requirements in India

### Research and funding in India

Funding for S&T in India is primarily from government sources while private sector funding is largely towards applied R&D. The funding by the different departments and ministries is based on the priorities and needs identified in official policies such as Five Year Plans. The Department of Science and Technology (DST) and the Department of Biotechnology are the two major funders in basic and applied research.

### Premier funding organisation

The funding allocation for different funding departments/agencies in the 12<sup>th</sup> Five Year Plan (2012-17) is as below. Of these the DST is the premier agency for research funding while the Department of Scientific and Industrial Research (DSIR) funds the Council for Scientific and Industrial Research under which many national laboratories conduct research in applied R&D.

Table 4: Indicative Outlay for the Twelfth Five Year Plan

<b>S&amp;T Departments/Agencies</b>	<b>12<sup>th</sup> Plan (2012-2017) Outlay (in INR 000'000) (in billion €)</b>	
Department of S&T (DST)	215,960	2.765
Department of Biotechnology (DBT)	118,040	1.512
Department of Industrial and Scientific Research (DSIR)	178,960	2.292
Department of Atomic Energy (DAE)	198,780	2.545
Ministry of Earth Sciences (MoES)	95,060	1.217
Department of Space (DOS)	397,500	5.090
<b>Total</b>	<b>1,204,300</b>	<b>15.421</b>

Source: GOI (2012)

The DST<sup>17</sup> was established in 1972. Apart from funding S&T it runs programs on S&T for societal development and rural development, and enhancing women's participation in S&T, and through the INSPIRE Program it provides financial support to thousands of students at different levels of education to pursue a career in S&T. Through the Science and Engineering Research Board it awards research grants for major R&D projects. In addition to these roles it has an autonomous organization for popularizing science and encourages science communication.

### Ethical acceptability as a funder requirement at the DST

Most funding agencies in India, including the DST, require adherence to the guidelines on ethics including guidelines on conducting research on human subjects. Hence ethical acceptability is a funder requirement in terms of compliance.

Proposals are peer reviewed or reviewed by experts and are expected to meet various guidelines set by the funding agency regarding compliance, project monitoring and financial management. Public engagement is not mandatory or a criteria in assessing proposals. For science

<sup>17</sup> [www.dst.gov.in](http://www.dst.gov.in)

communication and science popularization there are different agencies and hence the funders do not put any conditions on public engagement or communication. Ethical acceptability is no specific research goal within the DST funding structure.









### Sustainability as a funder requirement at the DST

Requirements to adhere to national and international legal instruments such as worker safety or the Cartagena Protocol are part of the DST's funding requirements. Hence sustainability is a funder requirement in terms of compliance. However, no engagement exercises are set for this requirement. On the other hand, the DST funds many projects on sustainability including on climate change research, where the research goal is specifically directed towards sustainability.

### Societal desirability as a funder requirement at the DST

Whilst the DST funds basic research, a proportion of research funded by the DST aims to tackle grand challenges such as poverty alleviation or specific challenges such as safe water supply. Societal desirability is therefore a research goal as defined in this report (tackling grand challenges).

Table 5: Funder DST India:

RRI criterion	Compliance	Engagement	Goal
Ethical acceptability			
Sustainability			
Societal desirability (grand challenges)	n.a.		

## RRI Funding Requirements in South Africa

### Research and funding in South Africa

In South Africa, gross domestic expenditure on R&D amounted to R22, 209 billion (€1.6 billion) in the 2011/2012 financial year. The government and business sectors were the largest funders of R&D during this period - funding 43.1% (R9.5 billion or €664 million) and 39.0% (R8.6 billion or €601 million) respectively (DST 2014). Most of the 2011/2012 government R&D funding was awarded to higher education institutions such as the 23 universities in South Africa and science councils, which include the Council for Scientific and Industrial Research, the Human Sciences Research Council, the Agricultural Research Council, and the Medical Research Council.

While private research funding falls largely outside of the national policy framework, all government funding must align to the ten-year Science and Technology Innovation Plan (DST 2008), which builds on the government's broad socio-economic mandate - particularly the need to sustain and advance economic growth; and the National Development Plan which aims to eliminate poverty and reduce inequality by 2030 (NPC 2012).

### The premier funding organisation

The National Research Foundation (NRF) is the main governmental body responsible for allocating funding to researchers in South Africa. Reporting to, and largely funded by the Department of Science and Technology, the NRF promotes and supports research in all fields of knowledge, (although before 2002 it focused on natural science and engineering disciplines only). Funding from the NRF is largely directed towards academic research, developing high-level human resources, and supporting national research facilities. Beneficiaries include academics, postgraduate students, and to a lesser extent, the private sector.

Projects funded by the NRF should at a minimum address national priorities as outlined in the National Development Plan. Many NRF-supported research projects, however, have since 2008 been focused on the five 'Grand Challenges' identified in the Department of Science and Technology's ten-year innovation plan (DST 2008). The Grand Challenges are areas which address a range of social, economic, political, scientific, and technological issues of relevance to the National System of Innovation, and are designed to stimulate multidisciplinary thinking whilst tasking South Africa's researchers with answering urgent questions. The five challenges, combined with the National Development Plan's goals, thus define the NRF's **research goal**.

The five areas are: the bio-economy; astronomy; energy security; global change science; and human and social dynamics - focused on improving understanding of shifting social dynamics, and the role of science in stimulating growth and development.



It is important to note that South Africa's Grand Challenges are conceptualised somewhat differently from those usually incorporated internationally under the banner of 'Grand Challenges', and, with the exception of energy security, equate more to areas of research focus, rather than to challenges per se. The National Development Plan, in contrast, is more in line with the country's development priorities (see Box 1). For the purposes of this discussion we include both in our analysis.

### Box 1. Priority actions of the National Development Plan.

1. A social compact to reduce poverty and inequality, and raise employment and investment.
2. A strategy to address poverty and its impacts by broadening access to employment, strengthening the social wage, improving public transport and raising rural incomes.
3. Steps by the state to professionalise the public service, strengthen accountability, improve coordination and prosecute corruption.
4. Boost private investment in labour-intensive areas, competitiveness and exports, with adjustments to lower the risk of hiring younger workers.
5. An education accountability chain, with lines of responsibility from state to classroom.
6. Phase in national health insurance, with a focus on upgrading public health facilities, producing more health professionals and reducing the relative cost of private health care.
7. Public infrastructure investment at 10 percent of gross domestic product, financed through tariffs, public-private partnerships, taxes and loans and focused on transport, energy and water.
8. Interventions to ensure environmental sustainability and resilience to future shocks.
9. New spatial norms and standards – densifying cities, improving transport, locating jobs where people live, upgrading informal settlements and fixing housing market gaps.
10. Reduce crime by strengthening criminal justice and improving community environments.

The NRF supports both basic and applied research, and also funds 'Blue Skies'<sup>18</sup>-type research. In the 2012/13 financial year, the NRF's operating budget was around €161 million (NRF 2013). At its most ambitious, public engagement would take place at the choice of Grand Challenges. As far as can be discerned, public consultation did not inform the Department of Science and Technology's choice of Grand Challenges, therefore **societal engagement** did not play a role in defining these goals. Wider consultation was undertaken to establish the priorities of the National Development Plan, and the panel of Commissioners drew on a wide range of sectors and positions, although the process was not strongly participative.

<sup>18</sup> Described as multi-dimensional self-initiated, curiosity-driven inquiry that necessitates high investment risks, it addresses new phenomena as well as pushes the frontiers of knowledge.  
<http://www.nrf.ac.za/division/kfd/instruments/blue-skies>

### Ethical acceptability as a funder requirement at the NRF

For research carried out at tertiary institutions, the NRF expects the relevant university to ensure that ethical considerations - including environmental protection - are taken care of through the university ethics structures. Certain RRI criteria would then be attained at the compliance level. Ethical rules are not a research goal of the NRF, but 'ethics and integrity' are embraced as core values of the organisation. Grantholders in certain NRF-supported programmes are required to maintain the highest ethical and safety standards in conducting research, particularly when human and animal subjects are involved. It remains the responsibility of the project leader to comply with all relevant regulations in this regard, including those of the institution at which the research is carried out. An ethical clearance certificate (where applicable) has to be submitted to the NRF in respect of successful applications before funding can be released. No public engagement is required in terms of understanding what is ethically acceptable in order to obtain funding.









### Sustainability as a funder requirement at the NRF

Under the Grand Challenge of 'Global Change Science', the NRF supports research on sustainability issues such as climate change. In terms of compliance with sustainability rules, the NRF expects researchers to abide by the terms set out by their host institution and to comply with relevant legislation such as the National Environmental Management Act. Applications proposing substantial environmental degradation would not be considered for funding by the NRF review panel, should the applicant not give this due consideration, or recommend ways of minimising harmful impacts (R. le Roux, pers comm., 11 August 2014). A 'sustainable environment' is embraced as part of the vision of the NRF and comprises the focus of many of the research areas. It is not necessarily a funder requirement for every proposal, however. There is no evidence of public engagement to determine sustainability goals.

### Societal desirability as a funder requirement at the NRF

As described, research funded by the NRF has to be in line with national priorities such as poverty alleviation or the reduction of inequality or correspond with one of the Grand Challenges. A key objective of the NRF is to contribute towards improving the quality of life of all South Africans. Societal desirability can thus be seen as a research goal. However, there are no specific reporting requirements to measure societal desirability. Several of the NRF's divisions include support for public outreach or societal engagement - some issue grants for community engagement, while others aim to stimulate the interaction between science and society. The intention for engagement is thus strong for some, but not all initiatives.

**Table 6: Funder: The National Research Foundation, South Africa**

RRI criterion	Compliance	Engagement	Goal
Ethical acceptability			
Sustainability			
Societal desirability (grand challenges)	n.a.		

## RRI Funding Requirements in the UK

### Research and funding in the United Kingdom

The UK operates a two-track approach to publicly funded research. One channel of funding is through block grants direct to UK universities with the primary objective of supporting an effective research infrastructure. This funding route is through the four higher education funding councils of England, Scotland, Wales and Northern Ireland. The level of funding received by individual higher education establishments is based on the quality and volume of the research in individual departments within those institutions and is assessed through the Research Excellence Framework (REF). HEFCE has almost €2bn allocated to research funding for 2014-15. The second channel of funding is through specific project grants provided by seven UK Research Councils covering medicine, biosciences, engineering, social sciences, economics, environment, and the arts and humanities. The combined Research Councils funding for 2014-15 is €3.25bn. Other funding for health research is also provided by the Department of Health through the National Institute of Health Research (NIHR). A further €750m of UK health research funding is provided by the Wellcome Trust a private charitable trust.

### The Premier Private Funding Organisation in the UK

The Wellcome Trust is by far the largest UK-based private funder of research and the 2nd largest funder of medical research in the world. Set up by Sir Henry Wellcome in 1936, it is a global charitable foundation that is independent of both political and commercial interests. Funding resources come from a substantial initial investment from Sir Henry Wellcome's company in 1936. Since then, income has been generated through investments in property, public and private equities, and cash. The current invested endowment is about £15bn.

The Trust's mission is to support the brightest minds in biomedical research and the medical humanities. Within this remit funding is available for biomedical research, technology transfer, international research on public health or tropical diseases in low to middle income countries, public engagement, society and ethics and, under the heading of Medical Humanities, activities across a range of fields that include anthropology, classics, the creative arts, English, history, medicine, philosophy, psychology and sociology.

### Ethical acceptability as a funder requirement for The Wellcome Trust

While the Wellcome Trust does not have a single specific set of ethical guidelines relating to the research it funds, ethical practice is included within the Trust's Guidelines on good research practice which also includes criteria of integrity, openness, adherence to professional guidelines, primary data and sample handling, publication. The ethical practice criteria also require consideration of potential risks of the misuse of research. The Trust also stipulates in its Grant Conditions<sup>19</sup> that all research must comply with relevant national laws, that necessary and

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<sup>19</sup> [http://www.wellcome.ac.uk/stellent/groups/corporatesite/@sf\\_central\\_grants\\_admin/documents/web\\_document/wtx026668.pdf](http://www.wellcome.ac.uk/stellent/groups/corporatesite/@sf_central_grants_admin/documents/web_document/wtx026668.pdf)

appropriate ethical and other approvals must be obtained, that all animal research, wherever carried out must as a minimum comply with UK standards and requirements and that all funded organisations or individuals must sign up to the Concordat to Support Research Integrity<sup>20</sup>.

In addition the Trust has published a series of Policy and Position Statements on specific and sometimes contentious areas of research which they may fund<sup>21</sup>. These include *inter alia* areas of activity such as animal research, bioterrorism and biomedical research, stem cell research, use of personal information in research, research involving human subjects including those in lower and middle income countries. While the focus of these Statements is on the Trust's position in relation to such research they also address many of the associated ethical issues that must be taken into account and therefore also provide specific guidance to grantees.

Through its programme of public engagement, the Wellcome Trust provides €12m annually to promote the engagement of people from all walks of life to consider, question and debate key issues in science and society as well as ethics.

In addition there is a separate funding stream for exploring the social and ethical aspects of biomedical research and health. Hence, ethical acceptability is a research goal.

### Sustainability as a funder requirement of The Wellcome Trust

It is the Trust's policy to conduct business in an environmentally accountable manner, in compliance with all relevant environmental legislation and to minimising any adverse environmental impacts. Sustainability (as in resource and quality of life protection for future generations) is not a research goal of the Trust, as it falls outside of its remit and neither are public engagement exercises designed to meet sustainability criteria.

### Societal desirability as a funder requirement at The Wellcome Trust

The Wellcome Trust's vision, to achieve extraordinary improvements in human and animal health, underpins all its funding provisions, and this vision is fully concordant with the grand challenges of humankind, especially since the Trust has a special focus on improving health in low and middle income countries.

The Trust's five strategic challenges of maximising the health benefits of genetics and genomics, understanding the brain, combating infectious disease, investigating development, ageing and chronic disease, and connecting environment, nutrition and health<sup>22</sup>, have been chosen because they are believed to be the biggest challenges currently facing human and animal health: these challenges therefore are consistent with both the Trust's overall vision and with a funding criterion

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<sup>20</sup> <http://www.universitiesuk.ac.uk/highereducation/Pages/Theconcordattosupportresearchintegrity.aspx#.U-4R6vldXzg>









<sup>21</sup> <http://www.wellcome.ac.uk/About-us/Policy/Policy-and-position-statements/index.htm>

<sup>22</sup> [http://www.wellcome.ac.uk/stellent/groups/corporatesite/@policy\\_communications/documents/web\\_document/WTDV027438.pdf](http://www.wellcome.ac.uk/stellent/groups/corporatesite/@policy_communications/documents/web_document/WTDV027438.pdf)

of social desirability. The Trust's advocacy of sharing of research data and Open Access Publishing in order that new knowledge may lead to maximum benefit for health and for the public is societally desirable, both nationally and internationally.

The Wellcome Trust also monitors the outcomes and impacts of projects that it funds, and conducts public engagement on issues relating to science and society.

Table 7: Funder: **The Wellcome Trust**

RRI criterion	Compliance	Engagement	Goal
Ethical acceptability			
Sustainability			
Societal desirability (grand challenges)	n.a.		

## RRI in Funding in the United States

### Research and funding in the United States

Research in the United States is carried out by a variety of organizations: 69% of 2011 research and development was done by the business sector (\$294.1 billion); 15% by universities and colleges (\$63.1 billion); 12% by federal agencies (\$49.4 billion); and 4% by other non-profit institutions (\$17.8 billion). There are over 2,719 colleges and universities in the US as well as a range of non-university research institutions such as the Rand Corporation, Scripps Institute for Oceanography, and the Salk Institute.

In 2012, the US government spent approximately \$62.6 billion on non-military research, the majority (41.3%) on medicine and related fields of life science, 17.4% on engineering, and 9.7% on the physical sciences. (AAAS, 2014). With over 86,000 foundations that collectively held \$715 billion in assets in 2012 and gave \$52 billion for research and other philanthropic projects during that same year, private foundations hold a strong place in funding research in the US (Foundation Center, 2014).

The National Research Council, which is the operating arm of the non-governmental National Academy of Sciences and the National Academy of Engineering, is an institution with the goal of improving government decision-making and public policy in the areas of science, engineering, technology, and health by providing independent, expert advice. The National Research Council and the National Academies are often called upon by Congress to help set science and engineering policy and provide independent assessment of government programs in these areas.

### The Premier Private Funding Organisation in the US

The National Science Foundation (NSF) supports fundamental research and education in all *non-medical* fields of science and engineering.<sup>23</sup> With an annual budget of about \$7.2 billion (fiscal year 2014), the NSF supports around 24% of all federally supported basic research conducted in US institutions of higher learning. In some fields, such as mathematics, computer science, economics, and the social sciences, the NSF is the major source of federal funds.

The NSF issues about 11,500 limited-term grants a year with an average duration of about three years. With the stated mission, “to promote the progress of science, to advance the national health, prosperity, and welfare, to secure the national defence,” the agency often funds programs that seek to fulfil specific **research goals** based on societal needs, as well as funding projects that contribute to the knowledge base of science and engineering.

The agency also supports the education of future scientists, engineers, and educators through the research they support by requiring that students be included as researchers in the programs they

fund, as well as through separate programs that aim at strengthening science and engineering education from the elementary grades through the postdoctoral.

The federal government decides research goals and funding, not the NSF. The NSF merely carries out these decisions, setting research policy only within narrow limits. While the NSF does not engage the public directly in discussion of societal desirability it does require researchers who receive its funds to discuss how they will disseminate the results of their projects to a wider audience that includes the public. Dissemination activities can include public forums and other similar social engagement activities. Nonetheless, the NSF does implement the majority of RRI criteria on the level of **compliance**, with a handful of funding initiatives pursuing societal goals.

### Ethical acceptability as a funder requirement at NSF

NSF funded researchers and institutions must comply with ethical rules in specific research contexts, such as studies involving humans and animals. Researchers must also comply with good scientific practice, such as following rules governing conflicts of interest. Any student employed in research on an NSF-funded project is also required to go through training in the responsible conduct of research. However, public engagement on what is ethically acceptable is not required to obtain funding, and the NSF also has no specific calls for undertaking research on what is ethically acceptable.

NSF also goes beyond some funding agencies in how far it requires principal investigators to go to ensure diversity in the students and researchers they include in the study. For example, principal investigators running NSF's Research Experience for Undergraduates (REU) programs are required to make sure that over half of the participants come from universities and colleges where research opportunities in science, technology, mathematics, and engineering are limited. In the call for proposals, the NSF specifically asks principal investigators to list names of institutions they will contact to recruit students from underprivileged backgrounds, and outline specific actions they will take to attract members of underrepresented groups, including women, racial minorities, and persons with disabilities. One of the review criteria for REU proposals is the appropriateness of the recruitment plan, and proposals that fall short in this area are not funded (NSF, 2013).

### Sustainability as a funder requirement at NSF









NSF funded research must comply with US environmental rules. Researchers must state in their proposal how they will avoid significant adverse environmental effects in the proposed research. The National Environmental Policy Act of 1969 requires that federal agencies consider the environmental impact of major federal actions significantly affecting the quality of the human environment. If a proposed project might have an environmental impact, the proposal must furnish sufficient information to assist NSF officials in assessing the environmental consequences of supporting the project.

No engagement activities are required to obtain public views on how sustainability should be defined and achieved. However, some research goals, such as reducing climate change, aim at responding to major sustainability challenges (NSF, 2014).

### Societal Desirability as a funder requirement at NSF

Social desirability is not implemented at the NSF at the level social engagement, or in defining research goals. In its mission statement, however, NSF undertakes to promote the nation's health, security and welfare through its funding initiatives, and provides important opportunities to young researchers of all backgrounds. In this way, the NSF takes a step toward the RRI goal of social desirability.

Table 8: Funder NSF

RRI criterion	Compliance	Engagement	Goal
Ethical acceptability			
Sustainability			
Societal desirability (grand challenges)	n.a.		



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