Achieving responsibility at Wageningen University & Research

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Executive summary

The role of science in society is under discussion. Societal controversies such as about the use of GMOs or intensive animal farming show that scientific research does not automatically translate into societal value. Specifically, it has been suggested that the autonomous, disciplinary research processes that are dominant at many universities are not well suited to address those problems because they are 'wicked': they can legitimately be defined in different ways, have no clear precedent, nor a clear solution or goal state.

The need to better embed WUR science in society in order to better address those problems is broadly recognised at WUR, and various initiatives have been undertaken to this effect. Responsible Research and Innovation (RRI) is a theoretical framework specifically designed to facilitate this. In particular, RRI can help to define a *research procedure* for embedding science in society, one that *anticipates* social and ethical consequences of innovations, that engages *inclusively* with societal stakeholders, that allows researchers to *reflect* on their own interests and values, and that is *responsive* to insights emerging during the research procedure. These are called the AIRR dimensions of RRI.

This *WUR Review and Outlook* assesses the current state of RRI and related initiatives at WUR, and offers concrete recommendations for strengthening or extending these initiatives. It is based on document studies and interviews conducted in the period 2017-2018. Topics addressed are: organisational responsibility for research goals and procedures; the AIRR dimensions; and the five RRI keys: ethics, gender and diversity, Open Access, public engagement and extracurricular science education. This summary mentions the issues that we found most pressing or relevant and presents our recommendations in table format.

Overall, WUR shows a number of clear strengths in relation to embedding science in society. WUR takes *responsibility* for societal issues in the domains of healthy food and the living environment, as witnessed by its mission, vision and strategic plan. It considers *multidisciplinary* research as very important; its

very organisational structure is one of *linking more fundamental* (WU) *research with more applied* (WR) *research;* and it has a historical tradition of aiming at 'science for impact'. It *supports initiatives* that fit under the banner of RRI, including those that are aimed at the organisation (e.g. the Gender Action Plan) and those that are aimed at society at large (e.g. the Science Shop, Wageningen Dialogues).

One general challenge for WUR is that its domains are characterised by an abundance of *wicked problems*. Hence, engaging with societal actors for addressing such problems is not only socially desirable: it is necessary. However, when it comes to awareness of and the ability to properly deal with wicked problems, there is a lot of *variation* among WUR researchers. The most important problem is that there is a *discrepancy* between *the desire for societal value creation and responsible research* that many interviewees had, and the *formal reward mechanisms* (annual evaluations, tenure-track requirements) that govern their behaviour at WUR, that focus on scientific publications and obtained research grants. We recommend that these be better aligned through *an explicit commitment to responsible research practices in WUR's policies governing research* and *the inclusion of societal value criteria and indicators in researchers' formal reward mechanisms*. Moreover, *expertise in societal value creation* among personnel should become more important in research team formation.

Some aspects of responsible research have a central institutional coordination and information point at WUR. This includes Corporate Communications & Marketing for science communication, and Corporate Value Creation for (societal) value creation. However, there is *no central institutional home* at WUR for responsible research and innovation in general, or for activities that fit the AIRR dimensions. Therefore, we propose *to create a WUR institutional home within one of WUR's Corporate departments for RRI / public engagement activities*.

Awareness of and engagement with *ethical issues in research* is a core dimension of research on wicked problems. In this regard, WUR has particular strengths when it comes to the *outcomes* of research, due to its strategic focus on societal challenges and its Corporate Social Responsibility agenda. Ethics in *research procedures* could be strengthened: while WUR has several ethics committees and subscribes to the VSNU Code of Conduct for Scientific Practice, courses in ethics are available but optional for most students and staff. We recommend to make following a course on responsible research, including but not limited to scientific integrity and societal engagement, *mandatory* for PhD researchers. This will allow WUR to maintain ethical standards in a dynamic and diversifying environment.

Ethics in *partnerships* is an issue that several interviewees brought up. WUR has extensive collaborations with the business sector, government and NGOs, but this sometimes results in tensions as their institutional goals are not always aligned. We note that the lack of clear partnership guidelines to manage those tensions can not only affect researchers working with non-academic partners, but also the image and reputation of WUR as an institution. Therefore, we recommend that WUR *adopt a policy for responsible partnerships*.

For a quick overview, we have summarised our full list of recommendations for discussion from the Outlook in Table 1 below. We start with the five recommendations that we consider most urgent and likely to have the most impact if implemented. We follow up with a number of recommendations for specific groups within WUR, organised in the categories 'WUR researchers and managers', 'WUR research and education institutions', 'WUR corporate departments' and 'WUR Executive Board'. Some recommendations may overlap, as multiple stakeholders may take action on one topic. Numbers in brackets refer to the section in the Outlook where the recommendation is elaborated upon.

Table 1   Recommendations for discussion, organised by WUR stakeholder

Main recommendations for discussion	
I.	Make an explicit commitment to responsible research practices in WUR's policies governing research (3.1).
II.	Include societal value creation criteria and indicators in formal reward mechanisms for researchers (3.1).
III.	Create an institutional home for RRI / public engagement activities within one of WUR's Corporate departments (3.2.1., 3.2.2, 3.3.4).
IV.	Introduce a mandatory course on responsible research, including but not limited to scientific integrity and societal engagement, for PhD researchers (3.1).
V.	Draft a policy on responsible partnerships on WUR or, preferably, VSNU level (3.3.1).

Recommendations for specific groups / departments

WUR researchers and managers

PhD researchers	• Discuss opportunities for value creation, ethical aspects of research and good science with supervisor (e.g. in annual evaluations) and colleagues (3.1, 3.2.3, 3.2.4, 3.3.1, 3.3.4);
	• Incorporate the AIRR dimensions in research (3.1);
	• Seek cooperation with individuals, groups or departments at WUR who have experience with societal value creation (3.1);
	• Publish Open Access (3.3.3).
Other WUR researchers	• Discuss opportunities for value creation with manager in annual evaluations (3.1);
	• Start discussions on societal value creation, ethics and good science with colleagues (3.1, 3.2.3, 3.3.1, 3.3.4);
	• Incorporate the AIRR dimensions in research (3.1);
	• Seek cooperation with individuals, groups or departments at WUR who have experience with societal value creation (3.1);
	• Publish Open Access (3.3.3).

Chair holders; Business Unit managers	• Facilitate the formation of teams beyond the chair group / Business Unit level to address wicked problems. (3.1); • Discuss opportunities for value creation and OA publishing with personnel in annual evaluations (3.1, 3.2.4, 3.3.3); • Start discussions on societal value creation, ethics and good science with colleagues (3.1, 3.2.3, 3.3.1, 3.3.4); • (Chair holders) Educate PhD supervisors about the importance of discussions on ethics, societal value creation and good science with PhDs (3.1, 3.2.3, 3.3.1, 3.3.4); • Organise OA education activities during staff meetings (3.3.3).
Science group management	• Facilitate the formation of teams beyond the science group level to address wicked problems. (3.1); • Increase awareness of knowledge and skills present in different groups and Business Units (3.1); • Remove barriers for / facilitate cooperation between WU and WR (3.1); • Keep endorsing and strengthening the Gender Action Plan 2.0 in the science groups (3.3.2); • Reintegrate the Gender and Diversity Studies chair group and appoint a new full professor (Social Sciences Group) (3.3.2).
WUR research and education institutions	
Dean of Research	• Educate PhD supervisors about the importance of discussions on ethics, value creation and good science with PhDs (3.1); • Develop a vision on and strategy for incorporating societal value creation activities in research processes. (3.1).
PhD council	• Support PhDs in discussing opportunities for value creation, ethical aspects of research and good science with supervisor (3.1).
Wageningen Graduate Schools (WGS)	• Educate PhD supervisors about the importance of discussions on ethics, value creation and good science with PhDs (3.1); • Start discussions on societal value creation, ethics and good science with researchers (3.1, 3.2.3, 3.3.1, 3.3.4).
WUR corporate departments	
Department of Corporate Communications and Marketing / Project group Wageningen Dialogues	• Continue encouraging reflexivity and responsiveness among researchers participating in dialogues (3.2.3, 3.2.4); • Continue to actively support dialogues between researchers and societal stakeholders (3.3.4).
Department of Corporate Value Creation	• Develop indicators for societal value creation (3.1); • Uphold the clear vision on and commitment to the Science Shop as part of WUR's societal value creation strategy (3.3.4).
Department of Corporate Human Resources / Gender Action Plan 2.0 Monitoring Group	• Keep endorsing and strengthening the Gender Action Plan 2.0 in the science groups (3.3.2); • Extend the Gender Action Plan 2.0 to include diversity in a wider sense (3.3.2).
WUR Executive Board	
Executive Board	• Develop a policy on team formation for dealing with wicked problems and the role and value of personnel with expertise on societal value creation therein (3.1); • Extend the responsibilities of WUR's Dean of Research to include developing a vision on and strategy for incorporating societal value creation activities in research processes. (3.1); • Develop a tenure track option with a focus on value creation (3.1); • Remove barriers for / facilitate cooperation between WU and WR (3.1); • Make RRI an integral part of WUR's investment theme(s) (3.1).

Introduction

The relation between science and society is changing. If science aims to remain relevant to society, it must change as well. After the Second World War, a general optimism regarding science and technology prevailed. The idea, what we henceforth call the 'classical view', was to let scientists set their own agenda and do their work autonomously. They would ensure that basic research would be done and translated into applications that would then 'automatically' benefit society.[1]

However, this vision has been challenged on both a practical and a theoretical level. On a practical level, widespread societal resistance against technological developments such as GMOs and intensive animal farming has shown that not taking *societal values* into account during the research and development process can lead to a backlash against research, even if the researchers had the best of intentions. The rise of social media has added to this challenge, making the spread of both genuine and misinformation much easier and faster.

On a theoretical level, the classical view has been accused of *organised irresponsibility*,[2] where the scientists who have created risky technologies (think of the current debates on pesticides and the decline of the insect population) are nevertheless not held accountable for their consequences - and neither is anyone else. Worse, it has been argued that the method proposed in the classical view only works well to address one kind of problems: *tame problems*, that have definite problem formulations and clear solutions, such as mathematical equations. However, many of our societal challenges are the more complex *wicked problems*. Wicked problems are characterised by properties that make them 'resistant to resolution', and cannot be resolved only by the disciplinary skills of scientific experts. These properties include: having no single correct formulation; having no 'right' or 'wrong' solutions; cannot be addressed by trial-and-error testing; and are unique and thus

unprecedented.[3] Climate change is an example of such a problem: it is contested what exactly the problem is (some parties focus on the burning of fossil fuels, others on destroying carbon sinks, etc.); there is no 'right' solution, but many possible courses of action with benefits and drawbacks; we have climate models but only one planet to properly test with; and the problem is unique in human history.

A particularly insidious characteristic of wicked problems is that 'simple' or 'merely technical' solutions to them *always* create new problems. For example, biofuels to replace fossil fuels have created concerns about land grabbing and food pricing; and co-firing biomass in coal power plants has created concerns about deforestation and lack of biodiversity in production forests. In order to address wicked problems without creating new ones, a different way of doing science is required that includes engagement with multiple scientific disciplines, but also with non-scientific expertise and societal parties, and negotiating a way forward rather than 'discovering a solution'.

Responsible Research and Innovation (RRI) has emerged as a new theoretical framework to govern science and innovation processes in the face of wicked problems. It has been designed to enable researchers to cope with and even flourish in the changing relationship between science and society. RRI means 'taking care of the future through collective stewardship of science and innovation in the present'. This is done through *anticipating* possible consequences and risks of research, to map out risks and opportunities; *including* relevant stakeholders in the research process from the start onwards, to make sure that all relevant framings, worries and ideas are taken into account; *reflecting* on one's own role as a researcher, including e.g. personal values and conflicts of interest; and *responding* to this input by altering the

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[1] See e.g. Vannevar Bush's (1945) *Science: The Endless Frontier: A Report to the President*. U.S. Government Printing Office, Washington, DC.
[2] Beck, U. (1992). *Risk Society: Towards a New Modernity*. London: Sage Publications.

[3] Rittel, H.W.J. and Webber, M.M. (1973). Dilemmas in a General Theory of Planning. *Policy Sciences* 4: 155–169.

research project or innovation trajectory if needed.[4] This is also called the RRI AIRR framework (anticipation – inclusion – reflexivity – responsiveness). RRI has in a few years become widely adopted in Europe as a tool for bringing together existing concerns regarding the relation between science and society, ranging from gender diversity and Open Access to science education and research ethics.

This report has been developed by the project "Responsible Research and Innovation in Practice" (RRI-P) that is funded by the European Commission. It aims to understand barriers and drivers to the successful implementation of RRI- and similar practices in research and funding organisations. The report is divided into a descriptive Review and a prescriptive Outlook component. The Review component assesses the current state of RRI and related initiatives at Wageningen University and Research (WUR), based on an analysis of WUR policy documents (such as its Annual Reports) and interviews with WUR employees conducted in the period 2017-18. The Outlook component develops perspectives for future initiatives, drawing on the interviews as well as on recommendations from the RRI literature and best practices identified in the RRI-P research project.

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[4]   Stilgoe, J., Owen, R., & Macnaghten, P. (2013). Developing a framework for responsible innovation. *Research Policy*, *42*(9), 1568-1580.

Part A

Review

1. "Responsibility" as an organising concept at WUR

Due to its historical roots in the *Rijkslandbouwhogeschool,* WUR has a strong tradition of taking an applied and impact-focused perspective. The institutional culture of WUR clearly contrasts with universities that have a tradition of conceptualizing "applied" and "basic" research as competing institutional priorities. Questions of responsibility do therefore not concern *whether* WUR should aim for societal impact, but rather *what* impacts are prioritized and *how* this prioritisation is done.

As an analysis of key documents at WUR shows, WUR understanding of impacts has considerably broadened in recent years. Starting from a focus on economic impacts, both documents and interviews have indicated a clear trend towards a broad understanding of "impact" that prominently includes factors from well-being of individuals to sustainable interactions with environments. This is perhaps best illustrated with the creation of the department of Corporate Value Creation in 2017 and its investigation into defining and measuring societal value creation. This ambition to have impact in a wider sense is also reflected in the WUR mission statement: *'To explore the potential of nature to improve the quality of life'.*

As an analysis of the Annual Reports since 2007 illustrates, this ambition to have a broader societal impact has increasingly been reflected by explicit statements about the responsibility of WUR as a research organisation. Figure 1 represents substantial mentions of "responsibility" in the annual reports of WUR (i.e. excluding phrases such as *x is responsible for the budget of y*) and shows a clear growth of programmatic interest in the responsibility of WUR as an organization.

"Responsibility" in the WUR Annual Reports
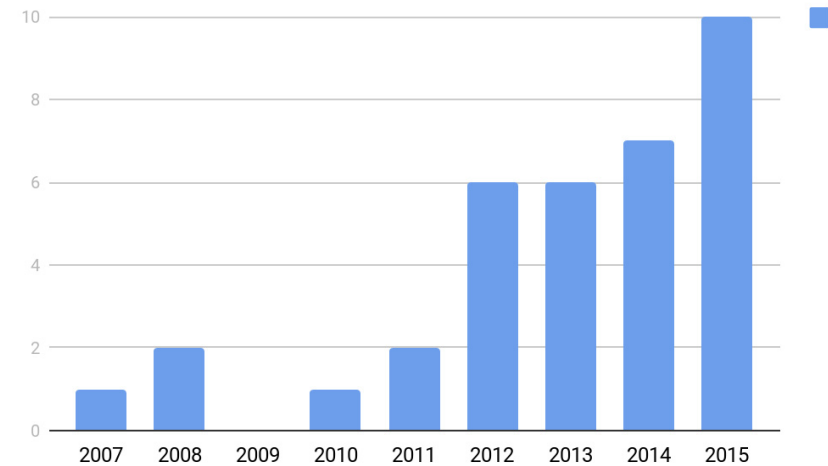
This development in the institutional culture of WUR is not only reflected in the quantitative growth of references to "responsibility" but also in the overall status of responsibility-considerations in the annual reports. Between 2007-2011, the annual reports refer to "responsibility" using case-specific examples such as environmental permits that "include responsibility aspects in the areas of energy, water and waste"[5] (Annual Report 2007), an educational program that challenges prospective students "to take responsibility for matters such as climate change, deforestation, urbanisation and healthy nutrition"[6] (Annual Report 2008), and publications on "responsible forestry management: Multi-stakeholder design of forest governance and accountability arrangements" (Annual Report 2009). In contrast, recent annual reports go beyond individual

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[5]   http://edepot.wur.nl/218885
[6]   http://edepot.wur.nl/218886

cases but present WUR itself as a responsible institution: "Wageningen UR is committed to a responsible approach to nature."[7] (Annual Report 2013); "Wageningen UR considers a responsible approach to nature and the environment as well as the welfare of animals to be of utmost importance. This principle applies to all activities Wageningen UR engages in."[8] (Annual Report 2014); "With this annual report Wageningen UR wishes to show that sustainability and social responsibility are valued at all levels of the organisation"[9] (Annual Report 2015).

The emergence of responsibility as an organizing concept at WUR is not only reflected in the annual reports but also in the interviews that have been conducted by the research team. For example, one corporate employee emphasized that issues of responsibility have played a crucial role in rethinking "*valorisation*" at WUR in the past 5 years in the sense that valorisation criteria have been broadened to increasingly incorporate societal factors beyond economic impact.[10] This trend is also reflected in the indicators that are used in the annual reports. At the same time, several interviews mentioned conceptual hurdles of including indicators for wider societal impacts such as difficulties of operationalisation and quantification.

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[7] http://edepot.wur.nl/310513
[8] https://www.wur.nl/upload_mm/0/7/7/af710241-7bc0-4977-8a56-a59c7c9a0ccf_Anual%20report%202014%20Wageningen%20UR.pdf
[9] https://www.wur.nl/upload_mm/5/7/5/d1114593-7d6a-4488-bcef-7dce51f09374_Jaarverslag%20Wageningen%20UR%202015_UK_08-07-2016_bookmarks_Totaal.pdf
[10] 'Valorisation' basically is making good use of academic knowledge, e.g. by education of the public, cooperation with societal stakeholders, obtaining patents, etc.

2. Institutionalization of Responsibility

WUR's core documents (e.g. annual reports, strategic plans, corporate brochures) clearly show that it aims to take responsibility for addressing global challenges. However, WUR typically does not go into procedural aspects, such as who gets to define those challenges, or whether its current ways of doing scientific research are the best ways to address them. In this section, we reflect on how responsibility at WUR is institutionalised through the study of documents and interviews. We make this institutionalisation of responsibility concrete by showing how it is expressed through common frameworks of (1) Global Challenges, or the problems that WUR aims to help address; (2) Procedural Dimensions, or the ways in which it does (or should do) so; and (3) RRI Keys, or particular topics that require specific attention in order to get the most value out of those research processes.

2.1 Global Challenges

WUR primarily sees its responsibility in terms of addressing global societal challenges.[11] Incidentally, the RRI concept is also inspired by the need to find effective ways to address those challenges. Already before the adoption of the concept by the EC, the Lund Declaration of 2009 emphasized that European governance of science and technology "must [address] sustainable solutions in areas such as global warming, tightening supplies of energy, water and food, ageing societies, public health, pandemics and security."[12] Furthermore, von Schomberg's (2013) influential conceptualization of RRI identifies "the 'grand challenges' of our time [as] normative anchor points" that should shape the

governance of research and innovation.[13] The institutional culture of WUR clearly converges with this perspective on global challenges. Indeed, the role of WUR in addressing pressing societal problems is commonly emphasized in the presentation of the institution and its strategic direction:

1. The *Corporate brochure WUR 2017* introduces the ambitions of WUR through a "global challenges" perspective. The first paragraph of the brochure reads: "Our world is changing. The population is growing fast and prosperity is increasing in many regions. Around the world, land use for food production is reaching its limits. The climate is visibly changing while fossil fuels are becoming ever scarcer. Meanwhile, people are attaching more importance to healthy, safe and sufficient food." The second paragraph positions the ambitions of WUR in the context of these challenges: "It is this changing world that is the real specialisation of Wageningen University & Research – the domain of good and safe food & food production, food security and a healthy living environment. In essence we not only develop knowledge but also help to apply it."[14]

2. *Vision Statement*: While the short WUR vision statement does not mention "innovation" or "responsibility", it is largely an articulation of the global challenges idea, phrased here as "urgent challenges": "The world is changing radically. The world's population is growing while the population of the western world is aging. The pressure on land use is increasing, thus giving less environmentally damaging forms of food producing more chance. The climate is changing and fossil fuels become scarcer, which

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11   The notions of 'global challenge', 'grand challenge' and 'societal challenge' are all used interchangeably here to refer to roughly the same concept, much as WUR itself does, e.g. in the Strategic Plan 2015-2018. Popularised in the EU by the Horizon 2020 funding programme, such challenges are long-term, large-scale research goals posed by a variety of societal actors, not just business. By their nature, addressing them requires at least a multi-national, multi-disciplinary approach. See Flink, T. and Kaldewey, D. (2018). The new production of legitimacy: STI policy discourses beyond the contract metaphor. *Research Policy* 47: 14-22.

12   http://www.vr.se/download/18.7dac901212646d84fd38000336/

13   von Schomberg, R. (2013) A Vision of Responsible Research and Innovation, in Responsible Innovation: Managing the Responsible Emergence of Science and Innovation in Society (eds R. Owen, J. Bessant and M. Heintz), John Wiley & Sons, Ltd, Chichester, UK. doi: 10.1002/9781118551424.ch3

14   http://edepot.wur.nl/328195

offers the possibility of utilising profitable sustainable alternatives. And there is the growing need for healthy, versatile, adequate and safe food."[15]

3. The *Strategic Report 2015-2018* also frames the future positioning of WUR in terms of a grand challenge perspective: "Since our inception, we have been driven by our desire to make a significant impact. This is our inspiration: Science for Impact. We contribute to solutions for major social issues such as the world food problem, climate change, the development of a circular economy, conservation of nature and biodiversity, and poverty reduction."[16]

WUR does not only embrace a "grand challenges" perspective in its self-presentation but also in its practical investment priorities. For example, the Strategic Plan 2015-2018 identifies five investment themes that are of crucial importance for addressing wider societal problems on a global scale.: (1) Global One Health, (2) Resource Use Efficiency, (3) Resilience, (4) Metropolitan Solutions, and (5) Synthetic Biology. Moreover, these themes are explicitly acknowledged to require both fundamental and applied research, and to require an interdisciplinary approach. Thus, they make good use of what WUR considers to be its core strengths. Five interviews on WUR's intranet, taken in the fall of 2017, detail how the priority area leaders for the investment themes aim to achieve results.[17] Noteworthy is that all of them mention public-private partnerships or cooperation with business, both as a way to gain access to new markets and to help relevant business sectors address challenges in their fields. Some of them mention Dutch or EU funding schemes; Metropolitan Solutions is the only theme that extensively stresses its connection with multiple kinds of stakeholders, including municipalities and international organisations.

As the interviews indicate, WUR's way of taking responsibility for global challenges cannot be seen apart from its support of private-public relationships. WUR has a close relationship with the business sector,

ideologically (WUR endorses the 'Dutch Approach' to research and innovation as organised in a 'golden triangle' of government, business and expertise centres[18]), financially (e.g. contract research, co-financing, matching) and physically (e.g. the nearby Business & Science Park or the FrieslandCampina Innovation Centre on the campus). Moreover, if we look at trends over time, funding from the Ministry of Economic Affairs for Wageningen Research is expected to continue to decline.[19] Similarly, direct government funding for Wageningen University has not grown in proportion to the growing student enrolment over the past years and there is no reason to believe this trend will change.[20],[21] For both Wageningen University and Research, market orientation and engagement with businesses is therefore envisioned as a way to acquire additional funding, or compensate for losses of funding elsewhere.

Cooperation with business has several advantages for WUR: it can yield research funding; businesses are societal stakeholders whose voices *should* be included in research on wicked problems; and it allows WUR to work on various grand challenges (e.g. one interviewee stressed that the sustainability demands of value chain partners on farmers had much more effect than governmental prescriptions). Indeed, by engaging with business challenges from a research perspective, WUR can help businesses to reflect on their own processes and practices and become more responsible and sustainable.

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15   http://www.wur.nl/en/About-Wageningen/Mission-and-vision.htm
16   https://www.wur.nl/upload_mm/5/e/b/929b8071-3b1a-416c-bb43-0630b726e75c_8412101823_CC_strategisch%20plan_UK_LR.pdf
17   These can be found on https://intranet.wur.nl/umbraco/en/about-wur/misson-strategy/strategic-plan/ under the heading 'Where can I find information on the priority areas?'

18   Strategic plan 2015-18, section 6 on 'Value creation'.
19   Strategic Plan: Priority area 'The future of applied research'. https://intranet.wur.nl/umbraco/en/news/strategic-plan-priority-area-the-future-of-applied-research/
20   Strategic plan 2015-18, section 2 on 'Trends and challenges'. While recently the cap on increasing direct government funding has been partly abolished (e.g. https://resource.wur.nl/en/show/Budget-Day-more-cash-for-education-and-applied-research-WUR-to-get-22-million-extra.htm), longer-term trends confirm the stated expectations. According to the VSNU, for the past 40 years direct university funding as percentage of Dutch BBP has declined (to 0,54% in 2014), while student numbers have grown (https://www.vsnu.nl/bekostiging-universiteiten.html). They claim that over the period 2000-2017, this means that direct university funding per student has declined with 25% (https://www.vsnu.nl/dalende-rijksbijdrage.html). See also the Rathenau Institute's factsheet on direct university funding at (https://www.rathenau.nl/nl/wetenschap-cijfers/het-geld/inkomsten-en-prestaties-nederlandse-universiteiten-onderwijs).
21   WUR used to be the only Dutch university to be funded by the Ministry of Economic Affairs. In 2017, WU funding was, like that of other universities, provided by the Ministry of Education, Culture and Science. See https://resource.wur.nl/en/show/WUR-henceforth-part-of-three-ministries.htm.

However, public-private cooperation may also give rise to tensions, as goals of businesses are usually not perfectly aligned with those of academia. While WUR's scientific integrity code does prescribe professional norms and standards for WUR employees in general, it does not mention how to deal with those specific tensions. Furthermore, by making the business sector so relevant for its bottom line, WUR risks prioritising its interests and framings over those of other important stakeholders. This could in turn make it more challenging to adequately tackle the wicked problems those cooperations are intended to address. Indeed, several interviewees were concerned that the Executive Board was too much focused on economic value creation and too little with legitimate and urgent research for which little or no private funding is available.

We do not mean to imply here that public-private partnerships are by definition problematic, but rather that *a discussion on how to organise those partnerships and what to look for in partners at WUR* would help researchers to navigate those tensions and create more societal value within public-private partnerships. Such a discussion would be useful to help navigate tensions in other kinds of partnerships as well (e.g. with the government or NGOs). We will go deeper into this point in the section on 'public engagement' and in the Outlook section on 'opportunities for ethical reflection at WUR'.

2.2 Procedural Dimensions

"Grand challenges" play an important role in WUR's vision statement of what it aims to address, as well as in stimulating current debates among researchers at WUR. However, as two Wageningen researchers investigating RRI at WUR already have noted: 'Wageningen UR needs to go beyond interdisciplinarity and public-private partnerships as the way to approach grand challenges, some of which are wicked problems.'[22] Rather, a substantive notion of responsibility in this context needs to engage with procedural questions of how grand challenges are identified and prioritized; who gets to be included in the process; and at which stage.

RRI offers a method to engage with these questions in a structural way, through its AIRR framework. As said in the introduction, this framework emphasizes *anticipating* consequences of innovations; *including* stakeholders in research processes to negotiate priorities, methods, and envisioned impacts; *reflecting* on how one's own assumptions and interests shape the research; and *responding* to the insights resulting from these methods. With regard to this framework, the interviews indicated at least two kinds of barriers: one that pertains to *institutional structure*, or the way the university is formally organised, and one that pertains to *institutional culture*, or the 'unwritten rules' that govern employee behaviour. In this sub-section we first look at barriers and drivers at WUR for organising AIRR activities, before turning to an analysis of the status of the AIRR dimensions themselves at WUR.

1. In terms of *institutional structure*, it was noticeable that various anticipation, inclusion and reflexivity initiatives by individual researchers and research teams were pointed out while it remained less clear how such initiatives are institutionally embedded and fostered. In one of the interviews, public engagement activities were described as largely "scattered" and "fragmented" in the overall structure of WUR. Another interviewee remarked that initiatives such as the Wageningen Dialogues were a laudable way to increase public engagement. However, their impact would remain limited as long as researchers would receive no structural incentive to engage in communication activities (as they do for e.g. publishing in journals with a high impact factor).
    Fragmentation appears to be an apt description given that core documents such as the annual reports do not indicate larger integrative efforts along any of the AIRR dimensions, but do illustrate a variety of initiatives. For the RRI keys there tends to be less fragmentation, with one responsible institution (e.g. the library for Open Access) or several (e.g. Studium Generale, Wageningen Academy and several others for science education).

2. In terms of *institutional culture*, one recurrent topic of conversation was the character of public involvement. The social sciences in WUR have a long tradition of research on public engagement and various cross-disciplinary activities exist to integrate this social science expertise with the life sciences at WUR. However, one of the worries that is especially prevalent at the social sciences department is that a more substantial interpretation of public engagement along the AIRR dimensions does not always match the

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[22] Brouwers, J. and Wigboldus, S. (2014). Responsible Research and Innovation – Between funding opportunity and corporate commitment. Briefing note. http://edepot.wur.nl/304847.

understanding and interests of life science research groups. This worry was described as a tendency to "attach" public engagement components to rather autonomous research projects and to focus on questions of technology acceptance and dissemination. This has its roots in the classical view on science, that good science is done autonomously and by disciplinary specialists, to be disseminated to the public once it is done.

Institutional structures and institutional cultures can constitute barriers for procedural responsibility along the AIRR dimensions. Of course, these challenges are not unique to WUR but commonly found across universities and research institutions. On the other hand, the review process identified several institutional drivers of AIRR activities at WUR as well.

1. The *Science Shop* is an established institution at WUR for public engagement and has been a crucial instrument of dialogue between science and society at WUR for more than 25 years. The Science Shop fulfils an important role for various parties, namely:
   - It provides *civil society organizations* who have little funds of their own with opportunities to receive research support;
   - It provides *WUR* with opportunities to contribute to the societal significance of its research and widen its network of relevant stakeholders;
   - It provides *WUR students* with opportunities to hone their skills on real-life cases and engage in interdisciplinary collaborations.
   For example, recently completed projects include activities of the Vereniging Buitenstad to promote the "green character of Almere", the use of urban agriculture for foundations that focus on reintegration in the labour market, and the cooperation of entrepreneurs and volunteers in the creation of local food initiatives. While the Science Shop is clearly doing important work, the review process also indicated that it has often been in a precarious position at WUR and its institutional position remains somewhat ambiguous, both with regard to prestige and funding.[23] Given that similar developments have led to the closing of many Science Shops at other universities in the Netherlands, it seems appropriate to rethink its potential and importance by embedding it in a wider RRI framework. Its

recent structural positioning in the department of Corporate Value Creation (see the Outlook, section 3.3.4: strengthening public engagement at WUR) is a promising development, as is its recent positive evaluation and the decision to continue funding for the next four years.

2. When it comes to other forms of public engagement, the strongest asset of WUR is the close integration of social science and life science research across Chair Groups and Research Institutes. While the use of this multidisciplinary expertise for RRI is not institutionalised, except for the investment themes, many research groups have initiated promising projects. For example, the synthetic biology group is actively concerned with the integration of RRI perspectives in their research and the EVOCA project employs an RRI perspective by using digital technologies and citizen science to address development challenges in Africa.

3. One recent initiative from the executive board that seems to fit the AIRR dimensions very well is the *Wageningen Dialogues*. The Dialogues have the goal to "shape our contacts with stakeholders and society [...] in the form of dialogue."[24] (A *dialogue* is oriented towards consensus or co-creation, and reflection on one's own position relative to that of others. Managed properly, it is a suitable tool for analysing and addressing wicked problems. Dialogues are often contrasted with *debates*, which are rather oriented towards confrontation, winning arguments and convincing others.) Currently, Wageningen Dialogues is just beyond an exploration phase, where working formats have been found and several dialogues have been organised that both researchers and stakeholders have been enthusiastic about. However, the Dialogues lack visibility, as so far all but one have been invitation-only to facilitate organisation and mutual trust. What long-term effects this initiative will have on the institutional structure and culture of WUR will depend on the way it will be supported and institutionalised within the organisation. This, again, depends on how it will be integrated in WUR's formal reward structure: organising a proper dialogue is a time-intensive process, while its anticipated benefits are mostly intangible and long-term. Noteworthy, though, is that WUR plans to build a *Dialogue Centre* on campus, specifically designed to facilitate dialogues. This, and a recent positive evaluation, suggests that the Wageningen Dialogues

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[23] In 2016, the Science Shop's annual report listed a budget of 426k€. This is 0,2% of the funding Wageningen University received from the Ministry of Economic Affairs that year (182,4M€), according to its own annual report 2016.

[24] http://www.wur.nl/nl/Over-Wageningen/Wageningen-Dialogues/Waarom-willen-we-dialogen.htm

initiative is anticipated to remain an important part of WUR's public engagement strategy for the foreseeable future.[25]

Below we move on from general procedural considerations to a specific examination of anticipation, inclusion, reflexivity and responsiveness at WUR.

2.2.1 Anticipation at WUR

Anticipation of future effects of research has a negative and a positive dimension. The negative dimension concerns the anticipation of risks, whether ecological, societal or economical. The positive dimension concerns the anticipation of possible beneficial effects, implementation trajectories, market opportunities, collective vision-building, etc. In the classical view, anticipation was not seen as a core task for researchers, as it was assumed that scientific research would automatically yield beneficial results for society. This attitude is still evoked in words such as 'innovation' and 'scientific progress', that often conflate 'new' with 'improved'. However, the growth of societal concerns over scientific developments, especially with regard to wicked problems, has shown that research and innovation are not necessarily desired, or without problems. Therefore, anticipation of opportunities, risks and impact on society is necessary to ensure that innovations will actually be improvements.

Anticipation can be linked to inclusiveness (such as when a group of stakeholders brainstorms together about possible uses and risks of a new technology) or reflexivity (such as when researchers develop their own vision of what the new technology could do for society, and thus reflect on what they consider societally valuable). Finally, anticipation has a moral element to it: it can help researchers take responsibility for the effects their research will have on society, by considering those effects and (re)designing their research so that risks can be avoided or beneficial effects enhanced. Methods of anticipation can be, but are not limited to, technology assessment, scenarios and foresight methods.

Based on our interviews and document studies, we found *little evidence of systematic anticipatory activities at WUR*. There is anticipation on several levels, namely, anticipation of societal challenges (such as climate change and food insecurity) and anticipation of strategic challenges (such as declining

funding from the government) and the recognition that both of these kinds of challenges should be dealt with. Strategic challenges tend to be discussed at WUR at the relevant corporate department (particularly, that of Corporate Strategy & Accounts). However, overall there is still a trust that existing ways of doing research will be sufficient to address the societal challenges. Moreover, as several interviewees noted, big promises and optimistic visions in grant proposals tend to be (financially) rewarded, while researchers have little if any accountability afterwards for any lack of results, or problematic results due to a lack of critical reflection. (Note that this is a problem of Dutch/EU research funding in general, rather than for WUR specifically).

Explicit, substantial anticipatory activities in research processes are only included on an ad hoc basis. In general, WR seems to be more concerned with those than WU. This is possibly because its contract research and focus on applied rather than fundamental science naturally brings questions of successful implementation and societal effects to the forefront. An example of a good practice is the Centre for Development Innovation (CDI)'s work on multi-stakeholder partnerships and the Theory of Change. Interestingly, an interviewee from the Communications department noted that it greatly matters how, where and when you bring a story to create the desired impact. Though this shows that the Communications department is aware of the need to anticipate effects of communication, it has not (yet) led to discussions on how, where and when *research* should be done to create the desired impact.

2.2.2 Inclusion at WUR

Of the four AIRR dimensions, *inclusion* of different kinds of stakeholders in the research process seems best embedded at WUR. Inclusion has a *practical* and a *moral* dimension. Practically speaking, including different kinds of stakeholders in a research process can help uncover different framings, values, arguments, visions and fears, and thus provide the researcher with a better overview of the various aspects of the wicked problem. It can also help in creating broad public support for research and innovations aimed at dealing with the problem. Morally speaking, if research and innovations are expected to have an impact on the lives of people, according to the principle of free, prior and informed consent, those people should have a say in whether they find that acceptable, and if so, under which conditions.

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[25] See https://resource.wur.nl/en/show/Blueprint-Dialogue-Centre-finished.htm.

In the classical view, this kind of early, pervasive inclusion is not necessary. Scientists determine what avenues of research and innovation are most fruitful and work on that autonomously. Society will eventually benefit from the results. So the only 'inclusion' activity needed is that of disseminating results at the end of the project. However, especially for wicked problems, different stakeholders will have different visions on what the problem is and what would be a good way to address it. Moreover, approval from a broad range of stakeholders will be needed to properly embed innovations in society. Therefore, inclusion of relevant stakeholders in scientific research and innovation processes is necessary to ensure that results will be widely accepted in society.

In this Review we specifically look at inclusion along gender and diversity lines (section 2.3.2); making research available to everyone through Open Access schemes (section 2.3.3); engagement of societal stakeholders in the research process (section 2.3.4) and extracurricular education opportunities, that is: education beyond the curriculum for WUR students, and education of non-WUR students (section 2.3.5). In general, though there is no central institution in WUR to coordinate inclusion of stakeholders in the research process, several institutions cover aspects of this dimension. Furthermore, there are many relevant initiatives on the level of individual researchers and projects. Most salient WUR-wide examples are the Corporate Communications & Marketing department that facilitates science communication activities; the Wageningen Dialogues, to facilitate dialogues between science and society; the Corporate Value Creation department that is developing a WUR vision on societal value creation; and the Science Shop that offers societal stakeholders who lack funds for contract research access to WUR students and staff, on a limited scale.

2.2.3 Reflexivity at WUR
The dimension of *reflexivity* deals with facilitating researchers to reflect on their own role in the research project. Unlike assumed by the classical view, researchers are never disinterested truth-seekers – and fortunately so. Rather, WUR researchers generally are very passionate and invested in their work. *Reflexivity* allows them to take a step back and critically examine their own drives, values, interests and possible blind spots. Especially for wicked problems, that can be framed and conceptualised in multiple 'right' ways, reflexivity is necessary to help researchers discover personal biases and ways to address problems that they might otherwise have missed.

Though reflexivity as such is not institutionalised at WUR, there are various trends and initiatives that can help promote it. One such trend is the *ongoing work to integrate WU and WR research and to promote multidisciplinary cooperation*, for example, through the current investment themes.[26] As researchers from different backgrounds tend to have different visions on and solutions for problems, such cooperations facilitate reflection on one's own ideas and assumptions. *Wageningen Dialogues* also aims to stimulate reflection, though it is currently too early to say whether this indeed occurs systematically. *Studium Generale* facilitates reflection as well, though its main public is students rather than WUR employees. The same holds for *OtherWise*, an organisation by and for WUR students and alumni that explores issues of environmental and social justice.[27]

One specific form of reflection is *reflecting on ethics and scientific integrity* in research: this dimension will be covered in section 2.3.1. A final form of (meta-)reflexivity is *doing research on how to properly do RRI, societal engagement, deal with wicked problems, etc.* An example of a good practice here is, again, the Wageningen Dialogues, that has been set up with advice and help of the Strategic Communication group. Another good example is the WR cross-cutting research programme *Social Innovation for Value Creation*, which studies the relations between innovation and value creation. Often, however, such research remains limited to specific projects, chair groups or Business Units and has little impact on WUR as a whole.

2.2.4 Responsiveness at WUR
Anticipation, inclusion and reflexivity exercises on their own cannot do good unless researchers can be *responsive* to their results. This, again, depends for a large part on the *formal reward structure* of WUR: is being responsive actually incentivised in some way? Again, there is a salient difference here between WR and WU. As WR mostly does contract research for societal stakeholders, its researchers need to be responsive to their concerns or risk customer dissatisfaction and diminishing project funding. (Note, though, that a researcher can be responsive to customer concerns but not to those of other societal stakeholders). This is much less of an issue for WU. As one interviewee put it: research funding organisations reward plans, not actual impact.

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[26] The proposal for a future investment theme is 'navigating trade-offs in an uncertain world', which would also be strongly compatible with WU – WR, multidisciplinary research.

[27] https://www.otherwisewageningen.nl/en/otherwise/About.htm

Moreover, several interviewees remarked that WU employees are primarily evaluated by their scientific publications – but often-cited publications do not necessarily have a strong, positive impact on society.

There are several reasons to assume that scientific publications do not automatically lead to societal value creation. First, while Open Access makes research results available to the public, proper public engagement also requires translating scientific findings into value propositions for societal stakeholders. Second, research funders financially reward plans, but look much less at outcomes. Outcomes taken into account are mostly realised publications rather than the value that the funded research projects (hopefully) create in society. Third, if an innovation fails in society, encounters resistance or has unexpected negative consequences, WUR is usually so far 'upstream' that it is not held accountable, and thus, has no reason to be responsive. Interviewees gave examples such as pesticide use in intensive agriculture, electric pulse fishing and genetic modification. They argued that WUR might not be accountable for resulting problems of or societal resistance to these innovations, even though it has participated in realising them. However, they also thought that, if the relevant WUR research processes had exhibited more anticipation and societal engagement, some of these problems might have been prevented or dealt with at an early stage. Finally, while research projects requested by societal stakeholders are expected to create value for that stakeholder, questions may arise as to how their benefits should be distributed (usually they accrue primarily to those stakeholders who can financially afford such projects), and whether economic value always entails societal value (e.g. a project that benefits the tobacco industry may create economic value for the industry at the cost of societal values such as public health).

For these reasons, several interviewees argued that a deeper change in WUR's formal evaluation structure, that mostly reward publications, was needed. If this were not done, they argued, value creation exercises such as the Wageningen Dialogues would at best have a superficial and short-lasting impact, and responsiveness to societal concerns would remain limited. The creation of the department of Corporate Value Creation, and the search for indicators for social value creation, could be the start of such a deeper change, if managed wisely.

2.3 RRI Keys

The European Commission uses five keys - ethics, gender diversity, Open Access, public engagement and science education - as a core instrument for conceptualising RRI. They indicate particular priorities within the AIRR dimensions. As in most universities, these five keys are not treated in Wageningen as a unified whole. However, each of the components is addressed at WUR in various ways. The most salient are listed in Table 2 below. In this section, we will treat each of the keys in turn and mention the indicators by which WUR tracks them in publicly available documentation (primarily in the annual reports). These indicators show which aspects of the organisation's functioning WUR considers important to measure, improve and present to the outside world.

Table 2   Salient WUR activities and institutions concerned with the RRI keys

RRI Key	Ethics	Gender Diversity	Open Access	Public engagement	Science Education
WUR Activities	Integrity Code	Action plan for gender balance	WUR Open Access policy	Science Shop	Studium Generale
	Committee Scientific Integrity	Social Annual report & Strategic plan 2015-2018	Open Access Section at WUR Library	Education Project Services WUR	Wageningen Academy
	Committee for Animal Experimentation		WUR repository	Wageningen Dialogues	Activities and lessons for primary (Science Hub) and secondary (Food Valley Network VO-HO) education.
	Medical Research and Ethics Committee	Gender & Diversity Studies	National OA framework	Webcare team	
				Academic Consultancy Training	
	Social Sciences Ethics Committee	*Defunct* minor and chair group	Open Science blog	Corporate Communications & Marketing	MOOC's (platform edX)
			'Open up to Open Access' campaign		WURth-while
	CSR agenda				

2.3.1 Ethics

Ethics covers various aspects of an organisation and the conduct of its individual researchers, including:

- Aiming for morally desirable *outcomes...* (e.g. dealing with the grand challenges of our time)
- ...by morally acceptable *methods or behaviour...* (e.g. as described in the Code of Conduct for Scientific Practice[28] as drawn up by the Association of Universities in the Netherlands (VSNU))
- *...embedded in a morally acceptable *research and innovation process...* (e.g. as described by the AIRR framework)
- ...in an organisation that takes *corporate social responsibility* for the impacts of its day-to-day functioning (e.g. the WUR's Corporate Social Responsibility (CSR) agenda).

Classically, research ethics has focused on acceptable *methods and behaviour.* For example, the VSNU writes in their Code of Conduct for Scientific Practice (preamble 4): 'The integrity of each scientific practitioner is an essential condition for maintaining stakeholders' faith in science. Integrity is the cornerstone of good scientific practice.' The unwritten assumption here is that, as long as researchers keep to good scientific practices / maintain scientific integrity, then their valid results will automatically benefit society. In this picture researchers have responsibility only for this element: hence there are well-established, legally required ethics committees for this aspect at WUR, but not for the others. Research outcomes will by definition be beneficial under the classical view, or possibly, priorities are set by policy-makers; processes and CSR are of little interest.

However, if researchers are to take responsibility for addressing wicked problems, they have to take on a wider set of responsibilities. Section 2.2 has already shown why researchers should pay attention to appropriate *processes* when organising their research on wicked problems. With regard to *outcomes*, not all research is automatically valuable. More interesting, as one WR interviewee put it, is that a research question e.g. from the Ministry is always the start of a negotiation rather than a final word. He proceeded to give an example where a research question put to him contained various assumptions and framings. According to him, addressing this question would not have led to

a practically implementable answer. He therefore had to negotiate a different framing of the question, which was difficult, but necessary to properly address the underlying problem. This is a good example of a researcher taking responsibility for the *outcome* of research.

Finally, though CSR still doesn't figure much in debates about science and innovation governance, it has received increasing attention from especially NGOs. After all, organisational management is one way in which an organisation can have an impact on society and the environment, for better or worse.

Starting with the classical focus on morally acceptable *methods and behaviour*, WUR can lean on more overarching guidelines, such as the VSNU's Codes of Conduct. Its integrity code complements this, not only with regard to scientific integrity, but also with regard to proper employee behaviour in general, and with regard to a complaints procedure. Similarly, the Committee for Animal Experimentation and the Medical Research and Ethics Committee are not only good practices: they are also required by law.

The Social Sciences Ethics Committee plays a more contested role. The Social Sciences Ethics Committee was formed to evaluate research projects in the social sciences. As opposed to the other ethics committees, ethical approval for such research projects is not compulsory by either Dutch law or WUR regulations. Many social sciences projects thus receive no internal ethical screening, which is problematic.[29] However, an interviewee indicated that such screening could become compulsory in the near future, not in the least because funders increasingly require project proposals to have received internal ethical screening.

WUR used to have an Ethics Committee to address more general ethical issues at WUR and advise on ethical aspects of management and strategy. However, it has recently requested to be disbanded, ostentatiously because general ethical issues were regulated well enough already by existing codes. Any remaining recommendations have been passed on to the Dean of Research.

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28 http://www.vsnu.nl/en_GB/netherlands-code-of-conduct-scientific-practice.html

29 Ethisch oké? Interview with Michiel Korthals, then the chair of the Social Sciences Ethics Committee. Resource 17 Jan 2013. http://edepot.wur.nl/245738 (Dutch).

Indicators: number of complaints received by the Committee Scientific Integrity.[30]

Apart from the committees, the Wageningen Graduate Schools (WGS) organise *courses for PhD researchers on ethics and scientific integrity.*[31] Most of these are one-day courses, though some are longer. They are optional for all WUR PhDs, but some are compulsory for PhDs in the Animal Sciences and Agrotechnology and Food Sciences Groups. In addition, WGS strongly recommends all PhDs to follow at least the scientific integrity course. Moreover, all PhDs are expected to know and endorse the VSNU Code of Conduct for Scientific Practice when they graduate.

An interviewee remarked that the increasing gender and cultural diversity of (PhD) researchers necessitates having more discussions on ethics: while severe transgressions like plagiarism are broadly understood to be unethical, there are many 'grey areas' of ethical behaviour about which people from different backgrounds have different intuitions on what is acceptable. At the same time, however, several interviewees indicated that PhD researchers often were discouraged by their supervisors from following courses on ethics or other non-specialist topics, as this would distract them from their core research and publication tasks.

When it comes to wider responsibilities, WUR is strongly concerned with morally desirable *outcomes*, as reflected in its mission, vision and 'grand challenges' approach. This is due to its particular historical roots; its combination of WU with WR; and, according to several interviewees, the fact that the life sciences have an immediate and obvious presence in society, so that WUR could not avoid interactions with concerned societal stakeholders even if it wanted to. As has been observed earlier, however, many of these grand challenges are wicked problems. This means that the *process* by which these grand challenges are defined is ethically laden.

With morally acceptable *research and innovation processes* we mean processes that adhere to norms of procedural ethics, including, but not limited to, involving those in the process who are anticipated to be affected by it; being honest and transparent about research; being willing to engage with different

arguments about and framings of the problem under consideration. Some elements of this are covered by other keys, e.g. Open Access and public engagement, which have practical as well as ethical benefits. Some elements of this are also present in WUR's annual report (such as an overview of different kinds of relevant stakeholders for WUR activities and the ways in which WUR currently engages with them); and some groups and themes more or less explicitly engage with its relevant issues. Nevertheless, it is the only of the four abovementioned categories that is not explicitly governed or championed as a whole by one or more institutions within WUR. As the RRI AIRR dimensions are considered separately in this Review and Outlook, however, and we have already noted that these also have both a practical and an ethical dimension, we will not go further into them here.

Finally, as an organisation with its own social and environmental impacts, WUR has drawn up its own *Corporate Social Responsibility* agenda ('maatschappelijk verantwoord ondernemen'), maintained and coordinated by the MVO group since 2015. This agenda grew from an earlier focus on sustainability in corporate management and also includes employee wellbeing and development, responsibility for partnerships, transparency, sustainable procurement, etc.[32] The Science Shop has also explicitly been evaluated as as a WUR institution that contributes to the CSR agenda. Students have created their own organisation that is (still) specifically oriented at sustainability at WUR, Green Office Wageningen. As these aspects are more easily quantifiable than, say, discussions held about ethics, or adjustments of research following ethical reflection, most indicators related to ethics can be found in this category.

Indicators: Climate neutrality in %; annual energy reduction in %;[33] CO2 footprint; compensation CO2 footprint; % of energy from renewable sources purchased; amount of wind energy generated in kWh; % of waste reduction since 2014; amount of produced waste in tonnes for different categories.[34]

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[30] Annual report 2016, p. 52.
[31] See for an overview https://wgs.crs.wur.nl/, section 7.

[32] See e.g. the WUR Annual Report 2016, pp. 17-19.
[33] Annual report 2016, p. 13.
[34] Annual report 2016, p. 56-58.

2.3.2 Gender Diversity

As the 2013 Action plan for gender balance[35] points out, the "issue [of gender diversity] has become more urgent since it has become clear that WU scores worse on this issue than does nearly every other European university." Wageningen's negative track-record in gender diversity is the result of interacting factors of institutional culture at WUR and disciplinary cultures in the life sciences. Recent numbers of the "Monitor Women Professors 2016"[36] of the Dutch Network of Women Professors show that, while there has been some progress, this has been slow indeed. This also holds for other technical universities in the Netherlands: "For the first time, the percentages of women professors at the universities of technology – TU Eindhoven, TU Delft, and the University of Twente – topped 10%: 10.1%, 11.5%, and 12.9%, respectively. At Wageningen University, which for years lagged far behind in terms of gender diversity, 11.9% of the professors are now women, as compared with 7.6% in 2014."

While the representation of women at WUR remains unacceptably low in both national and international comparison, the situation is improving. One factor that might have influenced this is the 2013 Action plan for gender balance that identified five measures to be implemented: (1) equal opportunities for the tenure track[37], (2) gender balance in appointment advisory committees (BAC) and selection committees, (3) management reports and discussions that pay attention to the position of women, (4) an explicit focus on the position of women in the annual reports, (5) emphasis of the importance of female candidates for vacancies. Moving forward, the action plan focuses on four components: (a) Increasing gender awareness, (b) a systematic approach to mentoring, (c) a realistic approach to appointments, including supportive measures, (d) the creation, support and increase of the visibility of female role models at WUR, e.g. through publication of the book *Inspiring Women at WUR*.

The document analysis and interviews indicated an institutional culture in which gender diversity is recognized as a pressing responsibility issue at WUR.

Not only is gender diversity addressed in main documents such as the strategic plan and annual reports but there was also a consensus in interviews about the urgency of addressing the lack of gender diversity at WUR. At the same time, the interviews also indicated a number of institutional barriers. First, there remain tensions between widely shared goals such as an increased representation of women as full professors (25% in 2020 in the Gender Action Plan 2.0) and reluctance to commit to enforceable mechanisms such as quotas for reaching these goals. Second, some interviewees experienced a 'hierarchical, competitive' culture at WUR that they deemed particularly unwelcoming to women. This would be an extra reason to commit to enforceable mechanisms for increasing gender diversity, as it is unlikely that such cultural aspects change by themselves. Third, research on gender and other diversity issues is in a precarious position. WUR had a gender chair group, built up over almost twenty years from 1979 onwards, but this was discontinued during a reorganisation, its expertise fragmented over several other chair groups. The gender studies minor (WUGAS) is now defunct. This situation seems to constitute a clear institutional barrier for adequate embedding of gender and diversity focused research and education at WUR. It also means that, unless re-integration and capacity development of the gender studies group is institutionally supported, WUR might well miss out on opportunities to further the Sustainable Development Goals (one of which is on gender equality) and participate in funding programmes that require explicit attention to gender aspects.

Though the Gender Action Plan 2.0 focuses on female professors and tenure-trackers, WUR does maintain indicators for female PhDs and women with a permanent contract. This is useful as it helps to show that there is a 'leaking pipe' syndrome, where the percentage of women decreases the higher one goes up in the organisation. WUR's diversity indicators also take non-gender diversity issues into account, such as international researchers and people with poor job prospects. However, as far as we are aware, no non-gender diversity policy has been implemented at the time of writing.

Indicators: % of female PhDs; % of PhDs with a non-Dutch nationality;[38] % of female professors; appointment of people with poor job prospects in fte; % of employees with a non-Dutch nationality;[39] % of women with a permanent

[35]   https://www.wur.nl/web/file?uuid=1ef05948-5a32-42ea-a054-edf438d270c7&owner=2c3db26c-0f76-44f2-b7a1-0c69e32f96d8
[36]   https://www.lnvh.nl/files/downloads/387.pdf
[37]   Though this is partly offset by plans for new tenure track regulations, that would make it more difficult to make the step from associate professor to full professor. See https://resource.wur.nl/en/organisation/show/Five-questions-about-tenure-track-2.0.htm.

[38]   Annual report 2016, p. 35.
[39]   Annual report 2016, p. 48-49.

contract; overview of % women per pay grade; % of female managers; number and position of female tenure-trackers.[40]

2.3.3 Open Access

Open Access (OA) is relevant for both transparency and accessibility. The idea behind OA is that the results of research that is publicly funded should also be freely accessible to the public in ways that maximise dissemination. This can be done through what is called Gold OA, where researchers, research institutions or a third party pay an article processing charge to a scientific journal to make their publication(s) freely accessible. (The journal can be fully OA, or selectively make publications OA when this charge is paid: the latter is also called Hybrid OA).

Another option is Green OA, where authors make the final draft version of their publication accessible via a trusted repository. Ideas propagated next to Open Access are *Open Data*, where the data sets generated by publicly funded research are also made publicly accessible, and *Open Science*, which aims to open up a broader range of research outputs and scientific processes and findings to the public for free (e.g. by promoting new ways to disseminate research results.)[41]

Open Access is a topic deemed important at various layers of governance, including the EU (ibid.) and the Netherlands (e.g. the National Plan Open Science[42]) – indeed, for projects funded by the EU's Horizon 2020 programme as well as by the Dutch NWO programmes, OA publishing is mandatory.[43] WUR is currently developing its own Open Access policy, keeping in mind the Dutch government's aim of having 100% of Dutch publicly funded academic publications OA by 2020.[44] Moreover, WUR library offers support in OA publishing, has funding arrangements with various publishers[45] and offers a

repository for self-archiving / green OA.[46] There is also the 'Open up to Open Access' campaign, which figures posters with prominent WUR scientists endorsing OA. According to the WUR Open Science blog, the percentage of OA publications in 2016 was 41,6%.[47] This is about on par with the average of all Dutch scientific publications in that year.[48] However, the current trend is that this percentage grows with about 7% per year, which means that the trend has to be accelerated if the Dutch government's aim is to be achieved.[49]

For Open Science, WUR has a weblog (https://weblog.wur.eu/openscience/). The WUR has also recently signed the European Open Science Cloud Declaration[50] that facilitates Open Data, among others. Also, though the 2018 WUR Research Data Policy does not mention Open Data explicitly, it reinforces the need to apply FAIR principles (findability, accessibility, interoperability and reusability) to research data.

While Wageningen is thus active in promoting Open Access, interviewees note that this development is not uncontroversial. One interviewee mentioned that it is unclear how they should deal with publications from projects funded by both public and private partners. While the government wants all projects funded (partly) by public money to be Open Access, the private sector sometimes wants to restrict publications on findings that give them a competitive advantage. The researcher is then caught in the middle. These dilemmas might well occur more often in the future, given that the Dutch government currently wants researchers to acquire more (co)-funding from private parties, a strategy that WUR endorses.

Another worry that several interviewees had, is that of the added societal value of Open Access. Scientific articles are primarily written for scientific peers. As such, non-scientists may not understand them properly, even if they can

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40 Social annual report Wageningen University & Research 2016.

41 See e.g. the EU's Horizon 2020 page on Open Science at http://ec.europa.eu/programmes/horizon2020/en/h2020-section/open-science-open-access.

42 https://www.openscience.nl/

43 See the WUR library page on 'Requirements from EU and NWO' at https://www.wur.nl/en/Expertise-Services/Facilities/Library/Researchers/Open-Access/Requirements-from-EU-and-NWO-1.htm

44 https://www.openscience.nl/themas/open-access-publiceren/index

45 WUR Library Funding Arrangements page. https://www.wur.nl/en/Expertise-Services/Facilities/Library/Researchers/Open-Access/Funding-arrangements.htm

46 WUR Library Self-Archiving (Green Open Access). https://www.wur.nl/en/Expertise-Services/Facilities/Library/Researchers/Open-Access/Self-archiving.htm

47 https://weblog.wur.eu/openscience/share-open-access-articles-wageningen-university-research

48 http://www.openaccess.nl/nl/actueel/open-access-in-nederland-in-cijfers.

49 'Open Access: only halfway there'. *Resource*, 08-02-2018. https://resource.wur.nl/en/show/Open-access-only-halfway-there.htm

50 'Dean of Research ondertekent European Open Science Cloud Declaration.' https://intranet.wur.nl/umbraco/nl/actueel/dean-of-research-ondertekent-european-open-science-cloud-declaration/

access them. It was stressed that 'making science accessible to society' requires a much more active role of the researcher, inviting stakeholders to meetings or publishing brochures, infographics or other material explicitly aimed at non-scientists. One interviewee stressed that doing this well would require a structural, university-wide change in incentives, where valorisation – i.e. the process of making scientific knowledge suitable and available for economic and societal use - becomes more important relative to publications in scientific journals.

The WUR library contact persons for Open Access in an interview considered the greatest barrier for OA at WUR that there is currently too little (formal) incentive to change habitual publication practices, e.g. consider OA as a factor in selecting an appropriate journal for submission of research results. While researchers are generally enthusiastic about the idea of OA when discussing it, few show up at education meetings. When the library contacts researchers about archiving their publications in their repository (green OA), they get few replies, or authors don't know which version they are allowed to upload. This is a challenge from an RRI perspective, but also from a policy perspective (the Dutch government's aim to have 100% Open Access by 2020) and even from a researcher perspective, as OA publications on average are cited more and thus increase researchers' citation scores.[51]

Indicators: number of journals in which WUR (first) authors can publish OA without paying an Article Processing Fee (APC);[52] % of peer reviewed WUR articles published per year; share of WUR OA articles per journal; potential amount of OA articles, if all articles that could be published OA would be.[53]

2.3.4 Public engagement

Public engagement of societal stakeholders in the research and innovation process is an important component of inclusion. Moreover, it can also further other AIRR dimensions: stakeholders can help anticipate future developments, indicate what they would consider appropriate responsiveness of scientists to their concerns, and help scientists reflect on their role in the research process.

As mentioned in the introduction, WUR has a long tradition in focusing on applied, impact-driven research, particularly WR, and thus has a strong position in public engagement. One interviewee estimated that Wageningen cooperated with over 2000 different actors from the public, private and citizen sectors. This section looks particularly at the following themes:

- Collaboration of researchers with *private sector actors* (the business sector).
- Collaboration of researchers with *public sector or citizen actors* (e.g. government, citizen groups, NGOs)*.*
- Collaboration of *students* with public, private and citizen actors.

Regarding *collaboration with private sector actors*, a significant part of WUR's funding comes from contract research, co-financing, etc. As noted earlier, there is a trend of direct funding from the government for WU not keeping up with the growth of the student population, and a decrease in contract research from the government for WR. Therefore, it is unsurprising that WUR aims to strengthen its collaboration with business.

Many examples can be found in WUR of successful researcher-business collaborations. WUR keeps extensive track of these: the number of indicators for such collaborations is far greater than those used for other public engagement activities (see below). Overall, our interviewees were consistently optimistic about their relations with industry. They stated that their long-term value for companies was exactly in their objectivity, and that companies knew that; or that the fact that they had unique and high-quality research to offer put them in a strong bargaining position. They did mention that dealing with business stakeholders requires particular skills that you currently have to learn 'on the job': negotiating contracts, properly setting up experiments, etc. One interviewee mentioned that professional training in these skills would be useful here.

However, collaborations with business may also create tensions, particularly regarding conflicts of interest and the autonomy of the researcher – examples of malpractice in pharmaceutical research attest that this is no hypothetical

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[51] See the relevant WUR Open Science blog entry at
https://weblog.wur.eu/openscience/citation-advantage-open-access/.
[52] Annual report 2016, p. 53-54.
[53] How big is the share of WUR articles being published Open Access?
https://weblog.wur.eu/openscience/share-open-access-articles-wageningen-university-research/#comment-529.

worry.[54] One example of such tensions at WUR is that one interviewee mentioned that WUR has guidelines on collaborations with companies (e.g. no collaborations with companies from countries under a UN embargo; no collaborations with companies involved in illegal activities), but he didn't know whether they were formalised, and we have not managed to find any online. Potentially ethically questionable collaborations (e.g. with tobacco companies) were discussed in the group or directly with the Executive Board. This interviewee also saw *not* turning down companies as their responsibility: given the unique position of Wageningen in the Netherlands, he saw it as their responsibility to be there for everyone who needed them. Therefore, collaboration guidelines should place some restrictions, but not be too restrictive either.

Indicators: number of public-private partnerships; number of EU-co-financing projects;[55] number of joint publications with corporate partners;[56] number of patent applications filed; number of new spin-offs generated; number of student start-ups started;[57] customer satisfaction and considered usefulness of Wageningen Research;[58] number of licenses on patents, breeds, models and materials; utilisation of WUR special equipment; number of temporary exchanges / secondments of WUR employees with the business community; turnover from the business community in M€;[59] external matching of WUR strategic themes; formation of cross-departmental market teams.[60]

Regarding collaboration of researchers with *public sector and citizen actors*, the Science Shop has already been named as a place where (Dutch) citizen actors can request Wageningen expertise. It has a budget to fund small projects for those actors who cannot afford to fund their own. Requirements are that Wageningen can provide the needed expertise, and that the question is of broader societal relevance. The Interdisciplinary Research and Education Fund (INREF) programme also has its own seed money for projects for the benefit of public, citizen and private actors in the global South. Here, though, the

projects tend to be initiated by WUR researchers, with the aim of partnership building with partners in developing countries or emerging economies being one of the funding criteria.[61]

Interestingly, more interviewees indicated that their groups engaged in research of societal value that was not financially self-supporting or of interest to private actors (e.g. research for the benefit of actors in the global South or for nature and public green), but that it tends to be very challenging to find funds for this kind of research. This will likely remain challenging, given the trend (at least in the Netherlands) to increasingly link public funding to collaboration with the private sector. This observation was often accompanied by the critical remark that the Executive Board was too much concerned with profit-oriented research (e.g. promoting the Dutch Top Sector approach, prioritising nine economic sectors in which The Netherlands is a global leader) and too little with societally valuable but non-profit oriented research.

Indicators: number of joint publications with non-corporate partners;[62] customer satisfaction and considered usefulness of Wageningen Research;[63] number of publications for the general public; number of TV and radio appearances by WUR staff members;[64] external matching of WUR strategic themes.[65]

A relatively new initiative on the public engagement front is the *Wageningen Dialogues*. The idea behind this initiative, promoted by the WUR executive board, is to understand, be inspired by, and work together with societal stakeholders on grand challenges in our domain. The Wageningen Dialogues have a solid base in research done on how to conduct successful dialogues by WUR's communication scientists, a group that has been around for a long time. Nevertheless, though a number of Wageningen Dialogues have been organised in the past one and a half years, it seems too early to say how successful the dialogues were, or whether they had changed WUR's research and teaching

[54] See e.g. Goldacre, B. (2012). *Bad Pharma: How Drug Companies Mislead Doctors and Harm Patients*. Fourth Estate / HarperCollins.
[55] Annual report 2016, p. 36.
[56] Annual report 2016, p. 43.
[57] Annual report 2016, p. 44.
[58] Annual report 2016, p. 45.
[59] Annual report 2016, p. 112-116.
[60] Key Performance Indicators for the Strategic Plan 2015-2018 - Report 2016.

[61] See the INREF's 'Seed money projects' website at https://www.wur.nl/en/Research-Results/Projects-and-programmes/INREF/Seed-Money-projects.htm.
[62] Annual report 2016, p. 43.
[63] Annual report 2016, p. 45.
[64] Annual report 2016, p. 117.
[65] Key Performance Indicators for the Strategic Plan 2015-2018 - Report 2016.

practices (and thus would be a proper dialogue with learning experiences for both parties).

Indicators: Themes and activities that fall within the 'Wageningen Dialogues' concept.[66]

For public engagement on social media, the WUR has a *webcare team* that consists of 14 student members.[67] This team monitors social media for discussions on WUR themes. The official purpose of this is increase visibility of the organisation; take a leading role in relevant online debates and prevent or minimise reputation damage.[68]

Students also collaborate with societal actors of all kinds. Indeed, one interviewee mentioned that students were a prime way to make a little budget (e.g. from the Science Shop) go a long way. For example, the budget might pay for the costs of one supervisor, travel and accommodation, while a team of students addresses a research question from a public party. Students might informally become part of such an arrangement, but there are also more formal structures through which students can do this as part of their studies, such as through the *Education Project Services WUR* and the multi-disciplinary *Academic Consultancy Training course*. Apart from these educational arrangements, there are also student-led organisations that seek to work for or with society. One example is the Peasant Foundation (Boerengroep), that seeks to close the gap between scientific theory and (poor) farmers' problems and practices.

Indicators: number of courses specifically aimed at value creation or entrepreneurship; number of students participating in those courses;[69] number of student projects facilitated by Education Project Services WUR at the request of societal actors; number of research projects funded by the Science Shop at the request of societal actors.[70]

PhD researchers deserve a special mention here. They can follow courses from the Wageningen Graduate Schools (WGS) on practical topics such as writing and project management, but also on ethics and wellbeing. Following interest by the WIMEK graduate school, a course was introduced to help PhD researchers create societal impact, titled 'Making an Impact! How to increase the societal relevance of your PhD research'. However, though PhDs were enthusiastic and the course was evaluated well, an interviewee noted that many supervisors actively discouraged their students from following this course. This was because of the time and resources those impact activities would likely take away from research and generating scientific publications. This, again, suggests a tension between what WUR would like its PhDs to do (create societal impact, learn about scientific integrity) and what it formally rewards (publications resulting from research).

A recurring issue in the field of public engagement is how WUR and its experts should position themselves in relation to societal actors. Multiple interviewees were quick to stress that they sought to provide 'objective information, based on scientific reasoning', 'being as clear and complete as possible about the facts' and 'getting as close as possible to the actual problem'. Scientists should refrain from normative judgements: they should 'not try to sit on the chair of politicians.' Nominally these interviewees thus adhered to the classic view of a value-free science whose aim is to discover the truth about the world. What is interesting, though, is that at the same time these interviewees were very much aware of the need to engage with stakeholders to get a good grasp on problems, to negotiate the framing of research questions or the set-up of experiments with stakeholders who have their own interests, etc., and did not see any problems with this. The understanding of science thus still seems rooted in the classical view, while scientific practice is much more in line with pragmatic or constructivist notions of science and recommendations for dealing with wicked problems.

A similar trend can be discerned at the Communications department. An interviewee here remarked that, a decade ago, WUR would 'send' information and 'grade' public responses for being right or wrong. This strategy didn't really work for convincing stakeholders or for engaging society. Today, WUR's role responsibility (as a scientific authority) hasn't changed, but the means of communicating science and research has. The department now seeks to add

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66   Annual report 216, p. 19; Key Performance Indicators for the Strategic Plan 2015-2018 - Report 2016.
67   Annual report 2016, pp. 22.
68   WUR social media strategy, May 2014. (Dutch.)
69   Annual report 2016, p. 39.
70   Annual report 2016, p. 41.

broader and deeper understandings of issues: 'Your claim is interesting, but have you also thought about...?' This was found to work much better.

Our interviewees seem able to reconcile classical views on the role of science very well with pragmatic practices. Nevertheless, a discussion on how to reconcile the idea of scientific expertise with the value of stakeholder engagement within the organisation would be useful for finding and maintaining a proper balance between the theoretical and practical sides of 'good science'. This is especially relevant when dealing with wicked problems, as their aspects span multiple areas of scientific expertise, and non-scientific expertise, norms and values as well. For example, feeding the world requires scientific expertise from plant sciences to logistics; but also expert knowledge generated by non-scientists about the role of food in local cultures, how the taste of meat substitutes is experienced, etc.

2.3.5 Science Education

What distinguishes science education from public engagement is that the former is explicitly aimed at one of three specific groups: *students, teachers*, or *lifelong learners*. Educational activities aimed at others (e.g. businesses, broader society) are treated under the public engagement header. For students, this section will focus on extracurricular (outside regular Bachelor and Master courses) educational activities. We do wish to note that WUR offers one modular skills training course for students on RRI: 'Stewardship for Responsible Innovation.'

Students: WUR has a *Honours Programme* for talented and motivated Bachelor students that offers education on leadership, group work and extra courses or assignments to increase disciplinary excellence.[71]

The multidisciplinary and often international *Academic Consultancy Training*,[72] also mentioned in the previous section, is compulsory for some Master tracks and allows students to work on real-life cases. Sometimes these cases are brought in by the Science Shop.

All Dutch universities have a *Studium Generale* department,[73] introduced shortly after the Second World War to provide students and academic staff with a broader education about society beyond the confines of their own discipline. Though the department has shrunk since budget cuts in the '90s, the WUR Studium Generale department is still quite active. It focuses on extracurricular education through lectures, workshops and various arts. Some examples of recent activities are: discussions on collaboration of science with industry; reflections on student life during WWII; a lecture series on modern slavery. During an interview, a Studium Generale employee stressed that they pay particular attention to intercultural diversity and bringing people from different backgrounds together. Studium Generale furthermore runs the *Open Mind Lab* where interested students can come together and organise a Studium Generale activity on a topic of their own choosing, and has a *Certificate programme* where students can get a certificate for attending and reflecting on those activities.

Finally, worth noting here is the *WURth-while* initiative, started in 2017, where several WUR courses are offered for free to refugee students who are waiting for a legal status or who have received a temporary residence permit.[74] It is inspired by the Utrecht University InclUUsion initiative. However, unlike InclUUsion it does not receive financial support from the university because of its limited scale, and is dependent on volunteer work.[75]

Teachers: WUR offers *Educational Staff Development courses* for teachers, if desired leading up to a University Teaching Qualification (UTQ or 'BKO' in Dutch).[76] The Qualification was developed in 2008 by the VSNU to create a quality standard for teachers in higher education in the Netherlands. Achieving it, usually within three years, is compulsory for new WUR teachers whose contract includes more than 10% teaching. WUR also offers *education for research professionals*, e.g. career development for PhD's; courses on patents; laboratory skills, etc. Teachers can also attend *Studium Generale* activities.

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71 https://www.wur.nl/nl/Onderwijs-Opleidingen/Bachelor/Honours-Programme.htm. (Dutch).
72 https://www.wur.nl/-/Over-Academic-Consultancy-Training.htm. (Dutch).

73 https://www.wur.nl/en/Education-Programmes/Studium-Generale/About-Studium-Generale.htm.
74 https://www.wur.nl/en/Education-Programmes/WURth-while.htm
75 27 refugee students registered for the program for courses taught in the academic year 2017-2018. See https://resource.wur.nl/nl/student/show/Negen-vluchtelingen-gaan-vak-volgen.htm and https://resource.wur.nl/nl/show/WURth-while-verkeert-in-zwaar-weer.htm. (Dutch).
76 https://esd.crs.wur.nl/

Lifelong learning. WUR has some initiatives to bring life sciences to the attention of children in primary and secondary education. There is the *Science Hub* ('wetenschapsknooppunt') for primary education, that invites children and teachers to the university and also develops activities and lesson plans.[77] The *Food Valley VO-HO Network* is a network of secondary education schools and universities of applied sciences ('hogescholen') in the vicinity of Wageningen that offers to bring knowledge to and inspire children and students.[78] A recent initiative of the Board is the *Wageningen Borlaug Youth Institute*, launched in 2018 to celebrate WUR's 100-year anniversary, which challenges secondary education students to come up with innovations for food security.[79]

Indicators: number of students and teachers reached through Science Hub and Food Valley VO-HO Network activities.[80]

For mid-career professionals and executives, WUR offers courses, summer schools, seminars, etc. through *Wageningen Academy.*[81] Both professional skills and specialised, state-of-the-art knowledge are taught. WUR's *Centre for Development Innovation also* offers lifelong learning opportunities, though these are especially aimed at mid-career professionals from developing countries, and focus on creating capacities for change.[82] As a member of edX, WUR offers a number of Massive Open Online Courses (MOOCs), many of which can be followed for free by anyone.[83]

Indicators: number of courses offered by Wageningen Academy; number of students following courses with Wageningen Academy; number of courses offered by the Centre for Development Innovation; number of students following courses with the Centre for Development Innovation;[84] number of WU MOOCs; number of students who register for / complete a WU MOOC.[85]

In short, WUR offers various science education options to various stakeholders, from school children to adult professionals, aimed at Western as well as developing countries. Many of the courses are specialist: education activities that incorporate RRI-relevant aspects such as ethics or reflexivity are particularly the Academic Consultancy Training (multidisciplinary work on real-life cases) and Studium Generale (reflecting on social/ethical topics related to the life sciences; intercultural diversity).

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[77] https://www.wur.nl/nl/Onderwijs-Opleidingen/Wetenschapsknooppunt.htm. (Dutch).
[78] https://www.wur.nl/nl/Onderwijs-Opleidingen/Docenten-vwo/Food-Valley-Scholennetwerk.htm. (Dutch).
[79] https://www.wur.nl/en/Education-Programmes/Wageningen-Borlaug-Youth-Institute.htm.
[80] Annual report 2016, p. 42.
[81] https://www.wur.nl/en/Education-Programmes/wageningen-academy-1.htm. Before 2013, Wageningen Academy was known as Wageningen Business School.
[82] https://www.wur.nl/en/Expertise-Services/Research-Institutes/centre-for-development-innovation/short-courses.htm.
[83] https://www.wur.nl/en/Education-Programmes/online-education/MOOC.htm.
[84] Annual report 2016, p. 40-41.
[85] Key Performance Indicators for the Strategic Plan 2015-2018 - Report 2016.

Part B

Outlook

3. Recommendations for discussion

The Review has investigated how WUR conceptualises its responsibilities with regard to research. The Outlook provides recommendations for WUR on how to embed responsible research and innovation in its research practices in ways designed to better operationalise its mission, and in particular, its commitments to societal value creation.

At its most fundamental level, the question of what responsible research looks like depends on the kinds of problems it aims to address, and what kind of research process is best suited to that task. From the Review, we conclude that WUR has clear and explicit ideas on what problems it aims to address, namely, global societal challenges in the fields of society and well-being; food, feed and biobased production; and natural resources and living environment. However, we also conclude that WUR does not have a clear vision on what *kind* of problems these are in societal terms, and how they can be legitimately framed in different ways. Consequently, neither does it have a clear vision on what kind of research processes should be brought to bear on those problems, so that the results can become accepted by and embedded in society.

More broadly, our Review points to a *mismatch between WUR's mission of doing science for societal impact, and the kind of research processes that are rewarded by its institutional structure.* For the kind of problems WUR aims to address are for a large part *wicked problems*. Yet its institutional structure particularly rewards and encourages autonomous disciplinary research, typically using criteria of excellence, which is particularly suited to address *tame problems*. Dialogues and co-creation with societal stakeholders, reflections on ethics, multidisciplinary research and other activities to address wicked problems are organised in the organisation, but remain in the periphery rather than in the core of research methodology and practice.

It follows that our most fundamental recommendation must be that WUR *explicitly and strategically reflects on the kinds of problems that it aims to address; determines what kind of research and societal engagement processes*

are best suited to that task; and proceeds to *adjust the formal reward structure and culture of the organisation so that following such processes is encouraged and rewarded*. This is a recommendation for WUR as a whole, and consequently, should be taken up at all levels in the organisation. Below, we provide more specific recommendations that can contribute to realising this overall recommendation.

3.1 General recommendations and cross-cutting themes

Our specific recommendations are proposals for WUR to strengthen its pillar of (societal) value creation in the face of wicked problems: to identify mechanisms and indicators for societal value creation, and to diversify formal reward mechanisms for researchers.

There is a *fundamental tension between WUR's institutional culture and its institutional structure in relation to societal value*. On the one hand, both WUR and its scientists are driven, often quite explicitly and vocally, by the desire to create societal value. This is aptly captured in WUR's mission of 'understanding the potential of nature to improve the quality of life'. On the other hand, formal reward mechanisms at WUR, while not disconnected from societal value, are not sufficiently aligned with it. As one interviewee put it, WU basically rewards its researchers for high-impact publications, and WR rewards them for project acquisition. However, as argued in the Review (section 2.2.4. on responsiveness), scientific publications do not automatically translate into societal value, nor project acquisition into (fair) societal impacts.

'Value creation' is now an official pillar of WUR next to 'research' and 'education', and recently the main WUR website has been adjusted to reflect this. However, there are still gains to be made in institutionalising societal value creation more thoroughly: to ensure and assure WUR staff and students that

societal value is an equal partner and not a subsidiary of economic value, and to clarify and refine links and trade-offs between different values.[86] The following measures have been identified by our interviewees and endorsed by us as instances of good practice to achieve this objective in line with WUR's vision and ambition. We propose *a working group to be commissioned by the Executive Board to oversee broad deliberation on these recommendations and how these should be taken forward by WUR.*

- Develop *mission-relevant, context-specific indicators for societal value creation.*
  - The task of developing societal value indicators to remain the responsibility of the CVC.
  - WUR to use indicators to track the ways in which research creates societal value, for how research becomes responsive to society (and vice versa), and for formulating ambitions and identifying areas for improvement.[87]
  - A 'fan' of indicators to be developed from which Science Groups can pick and choose those most relevant or applicable to their own research.
  - The Science Groups to be consulted throughout this process to get input and feedback on the set of indicators.
  - A balance to be maintained between 'outcome' indicators (valuable results), 'process' indicators (RRI/engagement activities during research) and 'perception' indicators (how these activities and results are perceived by the public).[88]

- *Facilitate the formation of teams to address wicked problems.*
  - Teams to contain not only researchers from multiple disciplines, WU and WR, but also researchers with expertise in societal value creation and/or organising RRI activities.
  - Diversity in other factors than disciplines and skills also to be encouraged (e.g. gender, age, ethnicity).
  - Existing initiatives to connect WU and WR researchers to be continued and strengthened.
  - Existing initiatives to connect researchers from the natural sciences groups and the social science group to be continued and strengthened.[89]
  - Awareness of knowledge and skills present in the different groups to be increased.[90]
  - Experimentation of researchers with implementing the AIRR dimensions in research to be encouraged.[91]
  - Impact of those experiments on group research and societal value creation to be tracked, so that successful practices can be identified, and scaled up or inspire WUR policy changes.
  - Societal value creation 'champions' in the organisation to be identified and supported.[92]

- *Develop a tenure track option with a focus on value creation.*
  - This tenure track option to run alongside the 'standard' research track, and to complement the proposed 'tenure track 2.0' teaching track option.[93]
  - This option to focus at least as much on societal value creation as on economic value creation.

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[86] Several interviewees mentioned the donut economy as a promising example of how social, environmental and economic values can be linked together to form a sustainable system. See e.g. Kate Raworth's (2017) *Doughnut Economics.* Random House Business.

[87] One of our interviewees told us the KNAW (Royal Dutch Academy of Sciences) is developing indicators for the societal impact of science as well. WUR vice-president Arthur Mol is a member of the relevant commission. Input from this commission should facilitate the process of developing societal impact indicators.

[88] See the EC report 'Indicators for promoting and monitoring Responsible Research and Innovation' at https://publications.europa.eu/en/publication-detail/-/publication/306a7ab4-f3cb-46cb-b675-9697caf5df19/language-en. To give a concrete example of the difference with regard to societal value creation: A *process* indicator could be 'Number or percentage of research projects with a formal procedure for citizen's involvement in research, e.g. focus groups or valorisation panels.' An *outcome* indicator could be 'number of educational activities undertaken'. A *perception* indicator could be 'Number or percentage of stakeholders who expect this research project to help address their problem.'

[89] One way to address this issue would be to appoint new personnel with a focus on societal value creation in groups that have little or no expertise in this field. However, this would make this recommendation contingent on the structural availability of significant funds. Moreover, the relevant expertise is already present to a large degree in the Social Sciences Group.

[90] This could be done through joint seminars, complete We@WUR profiles, internal Wageningen Dialogues, etc.)

[91] For example, through a budget or hours specifically allocated for this purpose per chair or science group.

[92] Apart from the usefulness of having 'figureheads' for societal value creation in the organisation, such 'champions' could help connect the currently scattered and fragmented initiatives in the organisation and facilitate organisational learning.

[93] See the WUR Resource at https://resource.wur.nl/nl/show/Medezeggenschap-stemt-in-met-aanpassing-tenure-track.htm. (Dutch). Given that WUR regards research, education and value creation at its three pillars, devising a tenure track option with a focus on value creation would be a logical step to further embed this third pillar in the organisation.

- This option to focus not so much on quantity of value creation activities, as well as on their quality and diversity.

- *Extend the responsibilities of WUR's Dean of Research to include developing a vision on and strategy for incorporating societal value creation activities in research processes.*
  - In this role, the Dean would be a senior figurehead for societal engagement activities as well as an extra link between Corporate Value Creation and WUR science groups.
  - Additionally, the Dean to lead activities such as investigating the feasibility of a tenure track option as mentioned above.
  - This vision and strategy to receive explicit commitment in WUR's policies governing research

- *Develop a mandatory first-year PhD course on responsible research practices for all WUR PhDs.*
  - Course to treat societal value creation, implementing the AIRR dimensions and the RRI keys in PhD research.
  - Course to build on existing expertise with relevant courses.[94]
  - WGS, the Dean of Research and chair group holders to educate supervisors about the importance and benefits of such a course or activity.
  - Funding to be made available to free up time of / attract RRI specialists to deal with the increased workload.

- *Extend researcher evaluation with societal value creation criteria.*
  - Societal value creation and societal engagement activities to be explicitly made part of staff activities, and to become a topic of discussion between staff and chair holders/Business Unit managers.[95]
  - Chair groups and Business Units to appraise options: societal value creation as an optional element in annual evaluation processes; societal value

creation as a group activity and commitment, with tasks to be distributed within the group or even across the cluster/ section or department.[96]
  - Societal value creation and implementing the AIRR dimensions to be explicitly made an optional part of the PhD process. [97]
  - Societal value creation and implementing the AIRR dimensions to be explicitly made an optional part of the evaluation of PhD researchers by their supervisors.[98]

- *Make RRI an integral part of WUR's investment themes.*
  - Investment themes, at the intersection of WU and WR, and cutting across the science disciplines, to embed RRI through the AIRR dimensions, to help researchers deal with the different kinds of knowledge, visions and problem framings that such themes inevitably evoke, and to ensure that themes are attuned to societal values.

Note, finally, that we recommend *not* to prescribe *more* work to already overburdened and overstressed researchers and PhDs. Any extra activities on e.g. societal engagement will have to take the place of existing research and teaching tasks. As long as societal engagement activities are not formally rewarded, and work pressure is high, only researchers with a very strong internal motivation and few private commitments can be expected to engage in such activities, and then only in an incidental way. The question WUR should pose itself is thus not only: 'How can our researchers best create societal value?', but also, and more importantly: 'What do we consider a proper balance between research, teaching and value creation activities?', and: 'On which level should we achieve this balance: individual, team, chair group/Business Unit or other?'

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[94] Good examples would be the courses 'Scientific Integrity' and 'Making an Impact! How to increase the societal relevance of your PhD research'). An example of a good practice abroad is offered by the UK Engineering and Physical Sciences Research Council (EPSRC), that names Responsible Innovation training a 'mandatory requirement' as part of its PhD researcher training.

[95] Note that especially for WR employees this would require allocating a set number of hours to such activities

[96] In effect, the latter would again lead to the creation of teams to address wicked problems by cooperation between departments.

[97] We see that PhDs are often interested in following courses on topics of vital relevance to doing good research, such as ethics and creating societal impact, but either are discouraged by their supervisors, or follow scientific courses for the benefit of their disciplinary research instead. Educating supervisors about the importance of such courses and activities is necessary to create space for PhDs to follow them.

[98] Again, this requires educating supervisors about the importance of such courses and activities and ways in which those activities can be practically implemented in PhD research. Allowing societal impact activities to count towards the completion of a PhD would be another option, though depending on the scale of the activity, this could be subject to approval from the Dean of Research, the Wageningen Graduate Schools and/or the Academic Board ('College voor promoties'), in consultation with the Wageningen PhD Council.

3.2 Procedural dimensions

In this section of the Outlook we give specific recommendations for strengthening the procedural dimensions of anticipation, inclusion, reflexivity and responsiveness at WUR.

3.2.1 Enhancing anticipation at WUR

As discussed in the Review, explicit anticipatory activities at WUR are mostly limited to individual cases and promises made in research proposals. As a first step to strengthen anticipation, we recommend:

- *Capacity building of and experimentation with anticipatory activities.*
  - A department (e.g. CVC), person (e.g. the Dean of Research), or chair group or Business Unit that has experience with organising anticipatory activities to take responsibility for this, or;
  - The Executive Board to appoint a responsibility entity for this task.[99]

- *To experiment with anticipatory activities in existing programmes for societal value creation, inclusion or reflexivity, e.g. the Science Shop or Wageningen Dialogues.[100]*

In the Review we noted that research funders reward promises and raising expectations more than they reward actually making good on promises and expectations. Developing anticipatory activities at WUR does not have to clash with this funding structure. On the contrary, *if WUR researchers could not only make good promises, but also explain the anticipatory activities by which they have developed those promises, this would likely give their proposals a competitive advantage.*

3.2.2 Enhancing inclusion at WUR

Unlike anticipation, inclusion of societal stakeholders in WUR activities is more prevalent, and supported by activities such as Wageningen Dialogues and the WUR's Open Access policy. We recommend:

- *To connect local initiatives, create an institutional home for them, and spread inclusion activities throughout the science groups.[101]*
  - A corporate department to take responsibility for this[102], or;
  - The Executive Board to appoint a responsible entity for this task.
  - To facilitate uptake of inclusion activities among science groups by forming teams to address wicked problems, and/or extending researcher evaluation with societal value creation criteria (3.1).

Inclusion activities with regard to specific keys (e.g. gender and diversity) will be treated under those keys.

3.2.3 Enhancing reflexivity at WUR

Reflexivity at WUR benefits from *ongoing collaboration between WU and WR, between the different science groups and between researchers and societal stakeholders*. All of these interactions confront researchers with different viewpoints and values, which gives them opportunities to reflect on their own. This *trend of ongoing collaboration is likely to continue*, given the impulse and legitimacy it has received by the recommendations of the focus groups for the new Strategic Plan 2019-2022. These recommendations include focusing on 'trade-offs' in investment themes and removing institutional barriers for collaboration. The 2018 re-election of Louise Fresco as president of the Executive Board is also expected to help, as she is a strong proponent of the One Wageningen concept[103] and societal engagement activities such as the Wageningen Dialogues and the Wageningen Borlaug Youth Institute.

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[99] This responsible entity could then do an inventarisation of existing anticipation practices at WUR and link this to scientific literature on how to organise anticipatory activities well.

[100] This would allow WUR researchers to experiment with various forms of anticipatory activities without necessitating them to integrate them in their research straightaway.

[101] This advice mirrors recent advice of the NVAO's audit of WU education with regard to innovations in education: 'Over the years, several innovations in education have had the time to mature, were disseminated often in an informal way and now need to be implemented across the university. The panel sees a specific task for the Executive Board to organise this transfer from innovation to standardisation.' (NVAO, 'Besluit tot het verlenen van een instellingstoets kwaliteitszorg', 11 april 2018).

[102] Two good candidates would be Corporate Strategy and Accounts, as close collaboration with various stakeholders is an explicit part of WUR's vision and strategy; and Corporate Communications and Marketing, as they can build on expertise in science communication and organising the Wageningen Dialogues.

[103] The 'One Wageningen' concept stands for the ambition to have WUR perceived *and* operating as a single organisation, rather than as a university and a research institute, or as several disparate science groups. Though WU and WR are two separate legal organisations, efforts have been made to increase synergy between WU and WR and across groups, e.g. through the investment themes.

However, collaboration between researchers and non-researchers with different viewpoints can *enable* reflexivity, but does not *guarantee* it. Therefore, we recommend:

- *Researchers to be made aware of these opportunities for reflection as well as of the value they represent for their own research (especially on, but not limited to, wicked problems).*
  - Chair groups and Business Units to organise discussions on ethics, scientific integrity and good science in general within and between their group/Unit (see section 3.3.1 on ethics) to sensitise researchers to these opportunities.[104]
  - Wageningen Dialogues to continue to help researchers practice reflexivity when participating in dialogues.
  - Discussions within WUR also to concern its wider vision on the kind of problems it aims to address, and the research processes that would be best suited to address them.

3.2.4 Enhancing responsiveness at WUR

Ideally, researchers – as well as chair and science groups, and WUR as a whole - should be responsive to the result of anticipatory, inclusion and reflexivity exercises. We recommend:

- *To create awareness of how exercises in anticipation, inclusion and reflexivity can create societal value, and to ensure that institutional structures reward acting on this awareness.*
  - Along with discussing societal engagement indicators at e.g. annual evaluation meetings, to add a narrative / qualitative indicator for responsiveness.[105]

3.3 Strengthening RRI keys

3.3.1 Creating opportunities for ethical reflection at WUR

As argued in section 2.3.1 of the Review, ethics is crucial for good science. In this sub-section of the Outlook we provide recommendations to strengthen the capacity of researchers at WUR to structurally engage in ethical reflection. We recommend:

- *To organise discussion sessions on ethical practice*
  - Science groups; chair groups; Business Units, or the relevant Graduate School to organise those discussion sessions.[106]
  - Support to be arranged for those discussion sessions where necessary (e.g. time allocated for WR employees; attendance of a member of the Philosophy Group to help reflect on the discussion.)
  - Special attention to be paid to young researchers and to the grey area between 'acceptable' and 'unacceptable'.[107]
  - Special attention to be paid to PhD researchers.[108]

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[104] This recommendation is especially valuable when implemented together with those regarding the formation of teams to address wicked problems, and regarding connecting researchers from the natural sciences groups with the social science group.

[105] This indicator would require keeping track of changes to research projects made as a result of anticipation, inclusion, or reflection activities, such as participating in a Wageningen Dialogue. (E.g.: 'Describe the original research plan, the activity undertaken, its result, and the resulting adjustment to the plan.') This would not only enhance the societal value of research: it would also provide *accountability and transparency to society* of how WUR responds to societal concerns and takes responsibility for addressing them.

[106] This will allow researchers to discuss cases relevant to their area of work. It will also help them to cultivate a culture where ethics is seen as a positive and inherent part of their work, which will benefit their core research tasks: see Manville, C. ea. (2015). *Characteristics of high-performing research units*. Prepared for the Higher Education Funding Council for England (HEFCE). The Policy Institute at King's College London and RAND Europe.

[107] The increasing diversity of the student and researcher population increases the need for continuing discussions on shared ethical norms and values in research.

[108] PhD researchers are formally required to sign the VSNU Code of Conduct for Scientific Practice when they graduate, and should thus be properly informed of its contents in an early stage. This recommendation can be addressed by following the earlier recommendation to develop a mandatory first-year PhD course on responsible research practices for all WUR PhDs. An additional reason to do this is the fact that the VSNU's Standard Evaluation Protocol now explicitly evaluates university policies with regard to scientific integrity, see https://www.vsnu.nl/sep.

- *To form a policy on responsible partnerships.* [109]
  - Policy to mention basic legal requirements.[110]
  - Policy to detail the responsibility WUR considers itself to have towards the business sector; and the norms and values that should guide interactions of WUR personnel with business.[111]
  - Policy to detail if WUR considers cooperation with particular industries or organisations not to be in line with her mission and vision.
  - Policy to be in line with the OECD Guidelines for Multinational Enterprises[112] and build on WUR's anticorruption code.[113]
  - Policy to be also discussed at VSNU level.[114]

3.3.2 Strengthening diversity and inclusion at WUR

In the context of gender, lack of diversity has been widely recognized as a problem and initiatives such as the action plan for gender balance have been implemented. These initiatives are of crucial importance and require continued institutional support and strengthening. We recommend:

- *To keep endorsing and strengthening the Gender Action Plan to increase gender diversity.*

- *To ensure an adequate representation and support of gender-related research at WUR.*[115]
  - To reintegrate the Gender & Diversity Studies chair group and appoint a new full professor.
  - The management of the Social Sciences Group and the gender studies researchers at WUR to draw up a research and education plan for the long-term viability of the group, and to create a secure institutional embedding.

- *To institutionally reflect on further diversity dimensions, including ethnicity.*
  - The section on "Gender balance and diversity" in the annual report to be extended to explicitly address not only gender, but also other diversity issues.[116]
  - Other diversity issues not (only) to be conceptualised in terms of "nationality", but (also) in terms of "ethnicity."[117]
  - These diversity issues to be integrated in future diversity action plans.

3.3.3 Towards 100% Open Access at WUR

There are drivers at WUR as well as at the national and EU levels for promoting Open Access. Nevertheless, the fact that not (nearly) every researcher publishes OA shows that not even they change their habits and daily practices easily when it would be rational to do so. We recommend:

- *To include the percentage of Open Access publications as a criteron in annual researcher evaluations.*
  - Supervisors and group chairs to remain aware of and committed to the added value of OA publishing.

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[109] A policy on responsible partnerships could a) help researchers identify potential partners, b) advise them in case of doubt, c) strengthen the profile of the university and align the partner choice of its researchers with its mission and vision, and d) mitigate reputation risk that could come of association with partners with a contested reputation. See e.g. the recent case where Utrecht University was criticised for accepting research funding from PMI Impact, a research fund created by tobacco company Philip Morris. https://beta.volkskrant.nl/wetenschap/universiteit-utrecht-zet-financier-philip-morris-aan-de-kant-tabaksindustrie-als-geldschieter-blijft-gevoelig~b666d66a/. (Dutch). Or the involvement of University of Cambridge employees in facilitating the activities of Cambridge Analytica https://www.theguardian.com/education/2018/mar/24/cambridge-analytica-academics-work-upset-university-colleagues).

[110] Examples would be: no collaboration with countries or organisations that are under embargo; no collaboration with organisations associated with illegal activities. Such a policy would not necessarily have to name particular parties or place high sustainability demands, though that could also be done.

[111] This could be inspired by the WUR integrity code, but with special attention to the tensions that might arise in these interactions. It would also fit naturally with the policy that WUR already has with regard to procurement and supply chain responsibility.

[112] WUR already endorses the OECD Guidelines, given that the University Fund Wageningen uses it as inspiration when selecting a winner for its tri-annual Mansholt Business Award for Sustainable Entrepreneurship. See https://www.wur.nl/en/Benefactors/Areas-to-support/Awards/Mansholt-Business-Award-for-Sustainable-Entrepreneurship-M-BASE.htm.

[113] See https://resource.wur.nl/en/show/WUR-draws-up-anticorruption-code.htm

[114] As the VSNU has already critically engaged with the Dutch 'top sector policy' (see https://www.vsnu.nl/nl_NL/onderzoek_topsectoren.html), drawing up a policy on responsible partnerships would be an appropriate next step.

[115] This is because the Gender Studies group is currently in an institutionally precarious position through a defunct chair group and minor.

[116] https://www.wur.nl/upload_mm/c/8/1/1f4927d8-5283-4c3d-bea3-d85da413f985_20160324%20annual%20report%20BCT%202015.pdf

[117] A focus on nationality comes with the risk of overlooking the participation of ethnic minorities in the Netherlands. Moreover, it could fail to promote the genuinely global orientation that WUR aims to have: if the focus is only on hiring researchers from Western Europe and North America. On the upside, if WUR succeeds in incorporating a true plurality of perspectives, this will enhance its ability to appreciate the different perspectives on, and thereby properly address, global wicked problems.

- Recommendation separate from, but can be combined with, that of discussing societal value creation activities in annual evaluations.

- *Have Open Access education activities during staff meetings.*[118]

These measures could accelerate progress towards national and WUR targets on OA publications, lead to more citations and knowledge dissemination and help avoid penalties from research funders that require all their project publications to be available OA.

3.3.4 Strengthening public engagement at WUR

WUR has a much stronger responsibility profile with regard to *impacts* (e.g. a focus on societal impacts and grand challenges) than *processes* (e.g. incorporation of deliberative and public engagement components). However, these processes are of crucial relevance for negotiating which impacts and associated innovations are desirable and how they should be pursued, how global challenges should be framed and addressed, etc. In this sub-section we focus on three aspects: the Science Shop as a well-established institution for arranging public engagement; Wageningen Dialogues as an opportunity for societal dialogues; and the possibility for a wider reflection on the balance between scientific authority and the need and desirability to negotiate with societal parties on research design. We recommend:

- *The vision on and commitment to the Science Shop to be upheld and be connected to the wider goal of fostering dialogues and strengthening the AIRR dimensions at WUR.*[119]

- *Wageningen Dialogues to embrace the need to have a lasting impact on the organizational culture and institutional structure by actively supporting dialogues among WUR researchers, as well as between WUR researchers and various stakeholders.*
  - The Executive Board to provide institutional support and a long-term vision or plan for the place of Wageningen Dialogues in the organisation.

- *To provide researchers with a contact point for pursuing public engagement activities such as focus groups, deliberative mapping, or citizen panels.*[120]
  - To be realised through a broadened role of the Science Shop or the Wageningen Dialogues project team, or otherwise embedded in the department of Corporate Communications and Marketing or Corporate Strategy and Accounts.[121]

- *To create awareness of the role of scientists in addressing wicked problems, by having debates on this topic or a course in philosophy of science for researchers.*[122]
  - To be combined with the recommendation to have group discussions on ethics, scientific integrity and good science as a part of increasing reflexivity.
  - To be combined with the general recommendation to develop a mandatory first-year PhD course on responsible research practices.

3.3.5 Strengthening science education at WUR

Science education at WUR seems to be in a good place. Education is offered for age groups both before and after the typical student population, from primary (Science Hub) and secondary education (Food Valley Network; Wageningen

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[118] According to several interviewees, this increases attendance in general and that of senior staff members in particular, who can then stimulate their PhDs and postdocs to publish Open Access. This requires commitment from both the library OA contact persons and the group chair holders.

[119] The need for this is driven by the fact that the WUR Science Shop has been in a precarious position at WUR (and other Dutch universities). This is even though it constitutes an important institution with decades of public engagement expertise, and is part of the Living Knowledge network that 'aims to foster public engagement with, and participation in, all levels of the research and innovation process' at partners in the EU and beyond (http://www.livingknowledge.org/). The recent endorsement of the science shop, its continued funding for four years and work to increase its embedding within WUR all are good developments in this direction.

[120] WUR would benefit from a more concentrated effort in monitoring, supporting and connecting the wide variety of public engagement activities that are going within its organisation. This would also allow mutual learning to take place among public engagement initiatives.

[121] Preferably to be combined with the recommendation to create an institutional home for inclusion and anticipatory activities, into creating an institutional home for RRI activities and expertise in general.

[122] As mentioned in the Review on public engagement (section 2.3.4), there is a discrepancy between how WUR researchers understand their role, as the 'objective' scientific authority, and how they operate in practice, negotiating framings and experimental set-ups with stakeholders, etc. Helping scientists to understand what their scientific authority consists of and what they can and cannot claim on its basis might help them to position themselves better in public engagement activities. More importantly, it is crucial for advancing our main recommendation in this Outlook: that current research processes should be reflected upon and adapted to fit the kinds of problems that WUR aims to address.

Borlaug Youth Institute) to mid-career professionals and executives (Wageningen Academy). WUR offers education for professionals from developing countries as well (Centre for Development Innovation). Apart from these more specialised courses, students can also seek broader education by attending Studium Generale activities and engage in RRI-like activities by participating in Academic Consultancy Training and Science Shop projects.

- *Our team has no recommendations for this key at this point.*

The full list of recommendations from this Outlook is summarised in Table 1 in the Executive Summary.

Appendices

Appendix A   List of interviewees

We would like to thank the following persons for taking the time to be interviewed by us:

Jan Brouwers

Gionata Leone

Gerard Straver

Valentina Tassone

Seerp Wigboldus

...And 14 others who preferred to remain anonymous.

We would also like to thank Tess Doezema and Mario Pansera from the RRI Practice team for their comments on a draft version of our Review and Outlook.

Appendix B   List of documents studied

(Note that this list does not mention www.wur.nl or any of its subpages that were visited over the course of the research.)

Berendse, S. (2018). *Value creation Wageningen Graduate Schools.* Corporate Value Creation (presentation).

Brouwers, J. and Wigboldus, S. (2014). *Responsible Research and Innovation – between funding opportunity and corporate commitment*. WUR Centre for Development Innovation.

Delpeut, J. and Schoenmaker, J. (2013). *Wageningen UR in balans. Plan van aanpak gender balance.* WUR Corporate HR.

Feskens, E. (2016). *Vademecum for Professors of Wageningen University & Research.* WUgenoten and Wageningen University & Research.

Krekels, H. and Jetten, T. (2017). *Beleid Open Access*.

Leemans, A.M. (2017). *Gender Action Plan 2.0, 2017-2019. Future activities and report on past activities*.

NVAO (2018). *Besluit tot het verlenen van een instellingstoets kwaliteitszorg.* NVAO: The Hague.

Ringersma, J. (2017). *WUR and the National Plan Open Science*.

Wetenschapswinkel (2017). *Maatschappelijke waardecreatie in de praktijk.* Jaarrapport 2016.

WUR (2007-2016). *Jaarverslagen 2007 - 2016.*

WUR (2011). *Positioning study at Wageningen UR.*

WUR (2014). *Social Media Strategie Wageningen University & Research.*

WUR (2015). *2015-2017 Multi-Year Environmental Plan. Environmental principles for Wageningen UR operational management.* Safety and Environment.

WUR (2015, 2016). *Sociaal Jaarverslag Wageningen University & Research*.

WUR (2016). *De MVO-agenda van Wageningen University & Research.*

WUR (2016). *Strategisch Plan 2015-2018.*

WUR (2017). *Kritische Prestatie Indicatoren Strategisch Plan 2015-2018 – Rapportage 2016.*

WUR (2018). *Appendix 1: Our common ground.* (Foundational document for the process to come to the Strategic Plan 2019-2022.)

WUR (nd). *Integriteit Wageningen University & Research.* Richtingwijzer.

WUR (nd). *Intentieverklaring MVO Wageningen UR.*

WUR Corporate Communications (2017). *To explore the potential of nature to improve the quality of life.*

WUR Veiligheid & Milieu (2016). *Wageningen UR 2015 Annual environmental report. Report of the environmental results of Wageningen UR operational management.*

WUR Veiligheid & Milieu (2017). *MVO-verslag 2016. Maatschappelijke verantwoordelijkheid op basis van de GRI-richtlijnen*.

Appendix C   Abbreviations used

AIRR	Anticipation, Inclusion, Reflexivity and Responsiveness
APC	Article Processing Fee
CDI	Centre for Development Innovation
CSR	Corporate Social Responsibility
CVC	(Department of) Corporate Value Creation
EC	European Commission
EU	European Union
FTE	Full-time equivalent
GMO	Genetically Modified Organism
HRM	Human Resources Management (Personeelszaken)
KNAW	Koninklijke Nederlandse Akademie van Wetenschappen (Royal Netherlands Academy of Arts and Sciences).
MOOC	Massive Open Online Course
NGO	Non-Governmental Organisation
NVAO	Nederlands-Vlaamse Accreditatie Organisatie (The Accreditation Organisation of the Netherlands and Flanders)
OA	Open Access
OECD	The Organization for Economic Co-operation and Development
RRI	Responsible Research and Innovation
UN	United Nations
VSNU	Vereniging van Samenwerkende Nederlandse Universiteiten (Association of Universities in the Netherlands)
WGS	Wageningen Graduate Schools
WR	Wageningen Research
WU	Wageningen University
WUR	Wageningen University & Research

Many grand challenges of our times, like food security, climate change, poverty, and health inequity are characterised by deep value conflicts. The same applies to possible technological and societal responses to those problems. At the section Communication, Philosophy and Technology (CPT) of Wageningen University & Research, we study problems and solutions. We analyse and clarify key values and arguments, develop new forms of dialogue and persuasive communication, and we contribute to strategies for inclusive development and responsible innovation.